



**Galaxy<sup>®</sup> Series AF-3112  
Primary - Mirror**

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**Display Manual**

*ED-14212*

*Rev 0*

*19 January 2004*

**ED-14212**  
**Product 1301**  
**Rev 0 – 19 January 2004**

## **DAKTRONICS, INC.**

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# Section 1: Introduction

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## 1.1 How to Use This Manual

This manual explains the installation, maintenance, and troubleshooting of a Daktronics Galaxy® AF-3112 34mm louvered LED Primary-Mirror display. For questions regarding the safety, installation, operation, or service of this system, please refer to the telephone numbers listed on the cover page of this manual.

The manual is divided into seven sections: Introduction, Mechanical Installation, Electrical Installation, Maintenance and Troubleshooting, Appendix A, Appendix B, and Appendix C.

- **Introduction** covers the basic information needed to make the most of the remainder 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** gives general guidance on terminating power and signal cable at the display.
- **Maintenance and Troubleshooting** addresses such things as removing basic display components, troubleshooting the display, performing general maintenance, and exchanging display components.
- **Appendix A** lists the drawings referenced within this manual.
- **Appendix B** provided information on the signal converter.
- **Appendix C** provided information on the optional temperature sensor.

Daktronics identifies manuals by an ED number located on the cover page of each manual. For example, this manual would be referred to as **ED-14212**.

Listed below are a number of drawing types commonly used by Daktronics, along with the information that each is likely to provide. This manual might not contain all these drawings.

- **System Riser Diagrams:** Overall system layout from control computer to display, power, and phase requirements.
- **Shop Drawings:** Fan locations, mounting information, power and signal entrance points, and access method (front and rear).
- **Schematics:** Power and signal wiring for various components.
- **Component Placement Diagrams:** Locations of critical internal display components, such as power supply assemblies, controller boards, thermostats, and light detectors.

**Figure 1** below illustrates the Daktronics drawing label. The drawing number is located in the lower-right corner of the drawing. Listing the last set of digits and the letter preceding them identifies drawings in the manual. In the example below, the drawing would be referred to as **Drawing B-181287**. Reference drawings are inserted in **Appendix A**.

THE CONCEPTS EXPRESSED AND DETAILS SHOWN ON THIS DRAWING ARE CONFIDENTIAL AND PROPRIETARY. DO NOT REPRODUCE BY ANY MEANS, INCLUDING ELECTRONICALLY WITHOUT THE EXPRESSED WRITTEN CONSENT OF DAKTRONICS, INC. COPYRIGHT 2002 DAKTRONICS, INC.		
DAKTRONICS, INC. BROOKINGS, SD 57006		
PROJ: VANGUARD VARIABLE MESSAGE SIGNS		
TITLE: SHOP DRAWING; VF-****-27x75-18-W		
DES. BY: CKELLY		DATE: 13 JAN 03
REVISION	APPR. BY:	1246-E10B-181287
00	SCALE: 1=60	

**Figure 1: Drawing Label**

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

“Refer to **Drawing B-181287** in **Appendix A** for the power supply location.”

Additionally, drawings referenced in a particular section are listed at the beginning of that section as seen in the following example:

**Reference Drawing:**  
 Shop Drawing; VF-\*\*\*\*-27x75-18-W..... **Drawing B-181287**

Daktronics displays are built for long life and require little maintenance. However, from time to time, certain display components will need replacing. The **Replacement Parts List** in **Section 4.11** provides the names and numbers of components that may need to be ordered during the life of the display. Most display components have a white label that lists the part number. The component part number is in the following format: OP-\_\_\_\_-\_\_\_\_ (component) or OA-\_\_\_\_-\_\_\_\_ multi-component assembly).

Following the **Replacement Parts List** is the **Daktronics Exchange and Repair and Return Programs** in **Section 4.12**. Refer to these instructions if any display component needs replacement or repair.

## 1.2 Safety Precautions



**Important Safeguards:**

1. Read and understand these instructions before installing.
2. Be sure the display and other exterior enclosures are properly grounded with an earth ground electrode at the display.
3. Disconnect power when servicing the display.
4. **Do not** modify the display structure or attach any panels or coverings to the display without the written consent of Daktronics, Inc.



## 1.3 Network Concepts

The concept of using LED displays as a cost effective, high impact method of communication is rapidly growing throughout many industries and businesses. The need for additional features and the complexity of multiple display installations has emerged. Daktronics display systems have been designed to meet those needs.

The common thread to most client requests is a means of programming and controlling a group of displays from a central control point. Daktronics responded by developing a powerful system of interconnecting and controlling displays. Daktronics designs products with great care that satisfy a wide variety of installations. Some of the design goals of these systems include the following:

- Easy transfer of messages
- The ability to tell a display or group of displays in the network which message should run
- The ability to determine the status of any display on the network
- The ability to control multiple display technologies on the same network

There are five (5) network systems available: RS232, RS422, Modem, Fiber Optic, and Radio. Up to 240 displays can exist on one network.

### RS232 Network

RS232 (EIA/TIA-232-E) is a standard communication interface that employs a single-ended serial transmission scheme that uses a maximum cable length of 7.6 meters (approximately 25 feet). This interface was designed for computer communication at short distances. All computers have an RS232 communications port. Refer to **Section 3** for additional information.

### RS422 Network

RS422 (EIA/TIA-422-B) is a standard communication interface that utilizes a differential balanced transmission scheme that uses a typical maximum cable length of 1.2km (approximately 4,000 feet). The main advantage of RS422 over RS232 is the longer cable length that is possible. A signal converter is needed to convert the computer's RS232 to RS422. Refer to **Section 3** for more information.

### Modem Network

The modem is a standard communication interface that utilizes standard phone transmission lines. The phone company assigns each phone line a number that the modem uses to communicate between controller and display. Each modem network needs to have a dedicated phone line assigned to it. Refer to **Section 3** for additional information.

### Fiber Optic Network

A fiber optic network is a standard communication method transmitting light (signal) through a glass fiber. Fiber optic cable has a maximum length of 600 meters (approximately 2,000 feet). A signal converter is needed to convert the computer's RS232 signal to fiber optic signal; a minimum of two fibers is required. Refer to **Section 3** for additional information.

## Radio Network

The Radio network is a standard communication method that uses radio waves at high frequencies to transmit signal. The Venus 1500 Radio network has a maximum distance of 450 meters (approximately 1,500 feet) outdoor and 150 meters (approximately 500) indoor. A nearly straight line-of-sight path must be maintained between the Server Radio connected to the computer and the Client Radio connected to the display. Refer to **Section 3** and the Venus 1500 Radio manual, **ED-13932**, for additional information.

## 1.4 Display Overview

### Reference Drawing:

Shop Drawing, AF-3112-2480-34-SF-\*-P/M..... **Drawing A-193720**  
Shop Drawing, AF-3112-1680-34-SF-\*-P/M..... **Drawing A-201993**

Daktronics AF-3112 Galaxy® displays are designed and manufactured for performance, reliability, easy maintenance, and long life. The pixels have a 34mm center-to-center spacing and are illuminated using LEDs (light-emitting diodes). A light sensor on the front of the display is used for automatic dimming of the LEDs based on the ambient light levels. The configuration of pixels depends on the model of display ordered.

Refer to **Drawing A-193720** or **A-201993** for the approximate size, weight, and power requirements for your display.

The Galaxy® model numbers are described as follows:

**AF-3112-RRxCCC-34-X-X(X)**

<b>AF-3112</b>	<b>=</b>	Outdoor 34mm Louvered Galaxy® Display
<b>RR</b>	<b>=</b>	Number of Pixel Rows High (8-32)
<b>CCC</b>	<b>=</b>	Number of Pixel Columns Long (32-112)
<b>34</b>	<b>=</b>	34mm pixel to pixel spacing
<b>R</b>	<b>=</b>	Monochrome Red or Amber LED Color
<b>XX</b>	<b>=</b>	PM - Primary-Mirror and M – Mirror

A typical display system consists of a Windows® based personal computer (PC) running Venus® 1500 software and one or more displays. The displays are offered as single-face units, which are single-sided stand-alone displays. They can become double-faced by mounting them back-to-back with a second unit.

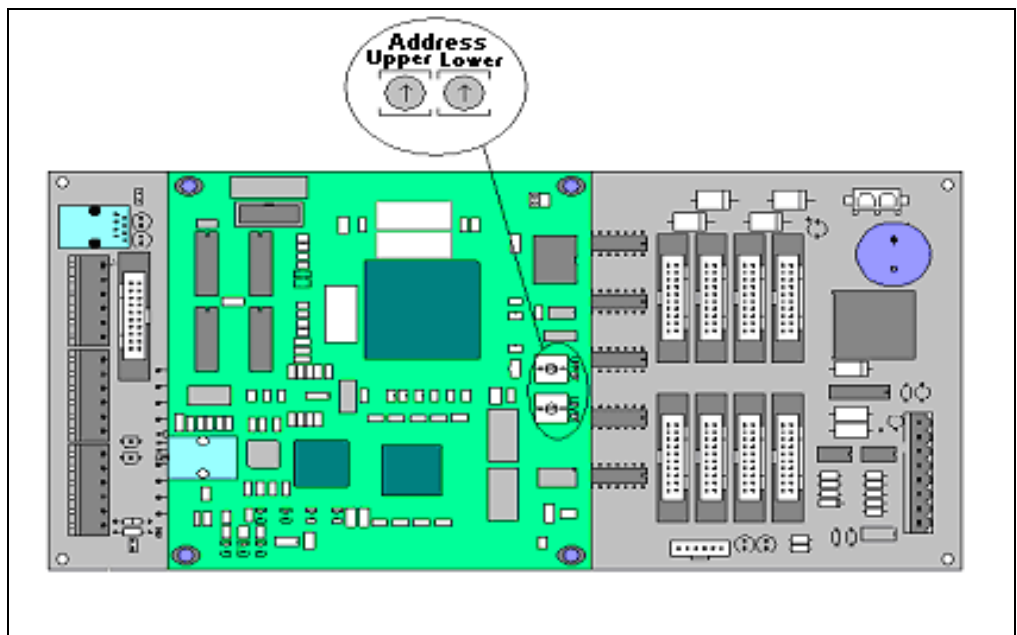
Venus® 1500 is a software package that runs under Windows® 98, ME™, NT® 4.0, 2000, or XP Home/Professional operating systems on an IBM®-compatible computer. Refer to the Venus® 1500 operator's manual (**ED-13530**) for installation and operation of the Venus® 1500 editing station.

## 1.5 Component Identification

The following illustrations depict some of the more commonly accessed Galaxy<sup>®</sup> display components. Because Daktronics occasionally alters standard design to meet customer needs, the actual display design may vary slightly from the illustrations below.

This is only a brief overview. Refer to **Section 4** for additional information on maintaining the various display components.

**Controller:** The display's controller is the "brains" of the display (refer to **Figure 2** below). The controller receives, translates, and activates the signal information from the control computer to the appropriate pixels on the display accordingly.



**Figure 2:** Version 3 Controller

**Display Address:** The display address is an identification number assigned to each display of a network. Rotating the address switches on the controller sets the display address. The control software uses the address to locate and communicate with each display. Displays that are on the same network cannot have the same address.

**Driver/Pixel Board:** The LED pixels are mounted directly onto the driver/pixel board. This board is also responsible for the switching and intensity levels of the LEDs.

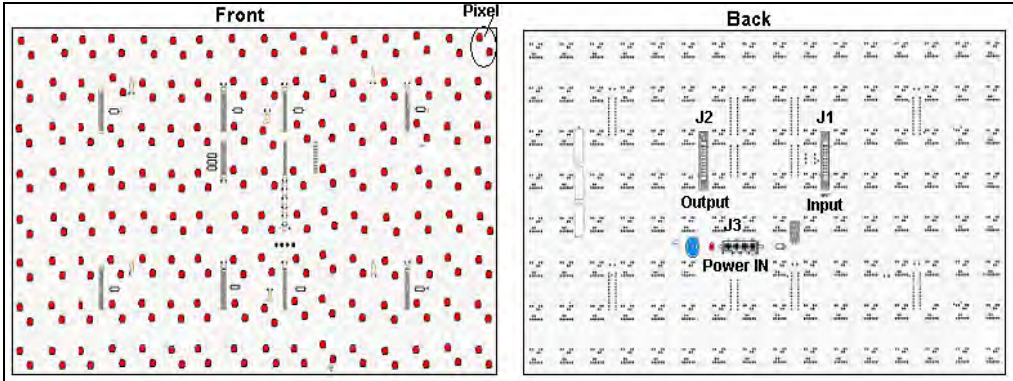
**Galaxy<sup>®</sup>:** Daktronics trademarked name for LED monochrome, tri-colored, or RGB matrix displays.

**LED (light emitting diode):** Low energy, high intensity lighting units.

**Louwer:** Black plastic shade positioned horizontally above each pixel row. The louvers increase the level of contrast on the display face and direct LED light. The louvers are attached to the Plexiglas face on the door of the display.

**Mirror:** The second display in a Primary-Mirror configuration that **does not** have a controller. All signal information to the display is received through a signal inter-connect cable.

**Module:** 34mm Galaxy® modules are 8 pixels high by 16 pixels wide. Each is individually removable from the inside of the door of the display. The module for the AF-3112 is one unit with both the LEDs and the driver making up one module. Refer to **Figure 3** below.



**Figure 3:** 34mm Module

**Network:** A network consists of multiple displays connected to each other. Up to 240 displays can exist on one network.

**Pixel:** There are two LEDs per pixel. The number and color of the LEDs depend on display application.

**Power Supply:** Converts AC line voltage from the load center to low DC voltage for one or more module driver boards.

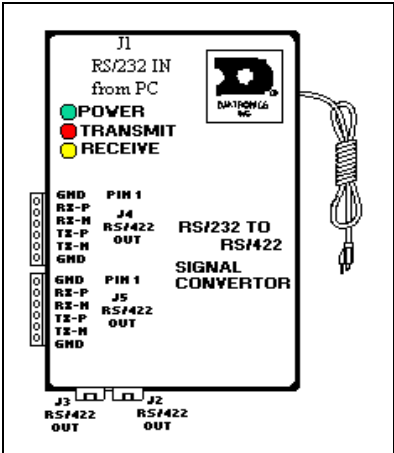
**Primary:** The first display in a Primary-Mirror or Primary-Secondary configuration. The communication inputs and the light sensor will be connected to this display.

**Router:** This device forwards data packets along networks and provides additional security.

**RS232:** RS232 is a standard PC communication type with a maximum cable length of 25 feet (7.6 meters)

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

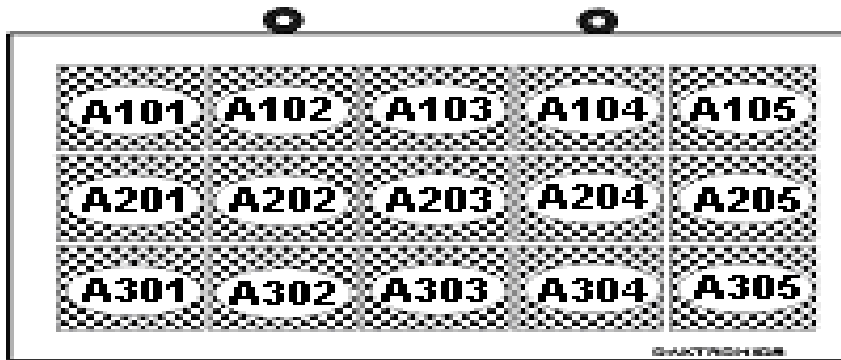
**Signal Converter:** The signal converter, shown in **Figure 4** on the right, is a Daktronics supplied unit that converts the data from RS232 to RS422 or RS232 to fiber optic signal. The signal converter is connected to the control PC via straight through serial cable.



**Figure 4:** RS232 to RS422 Signal Converter

**Venus 1500:** Daktronics designed, Windows® based software used to create and edit messages on the display. Refer to **ED-13530** for the operation manual.

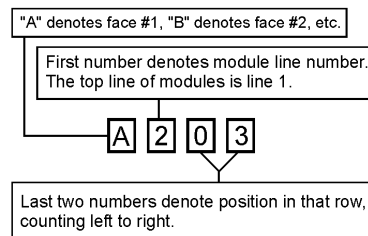
## 1.6 Daktronics Nomenclature



**Figure 5:** Numbering Example - 24x80 Front

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

A module is the building block of the Galaxy® display. Each module measures 8 pixels high by 16 pixels wide. By placing modules side-by-side and on top of one another, a display of any size can be designed and built. Individual modules can be easily removed from the display if required. **Figure 5** above illustrates how Daktronics numbers modules on a Galaxy® display. **Figure 6** on the right demonstrates the module numbering method.



**Figure 6:** Module Numbering

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

- “TB\_” represents a termination block for power or signal cable.
- “F\_” denotes a fuse.
- “E\_” signifies a grounding point.
- “J\_” indicates a power or signal jack.
- “P\_” identifies a power or signal plug for the opposite jack.

Finally, Daktronics part numbers are commonly found on drawings. Those part numbers can be used when requesting replacement parts from Daktronics Customer Service. Take note of the following part number formats:

- “OP-\_\_\_\_-\_\_\_\_” shows an individual circuit board, such as the internal fiberboard.
- “OA-\_\_\_\_-\_\_\_\_” indicates an assembly, such as a circuit board and the plate or bracket to which it is mounted. A collection of circuit boards working as a single unit may also carry an assembly label.

**OP-1195-0001**  
**SN: 6343**  
**05/19/99 REV.1**

**Figure 7:** Typical Label

- “W-\_\_\_\_” represents a wire or cable. Cables may also carry the assembly numbering format in certain circumstances. This is especially true of ribbon cables.

Most circuit boards and components within this display carry a label that lists the part number of the unit. If a circuit board or assembly is not listed in the **Replacement Parts List** in **Section 4**, use the label to order a replacement. A typical label is shown in **Figure 7**. The part number is in bold.

## Section 2: Mechanical Installation

---

**Note:** Daktronics **does not** guarantee the warranty in situations where the display is not constantly in a stable environment.

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

**Daktronics is not responsible for installations or the structural integrity of support structures done by others.** It is the customer's responsibility to ensure that a qualified structural engineer has approved the structure and any additional hardware.

### 2.1 Mechanical Installation Overview

Because every installation site is unique, there is no single Daktronics-approved procedure for mounting the Galaxy<sup>®</sup> displays. The information contained in this section is general information only and may or may not be appropriate for your particular installation.

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

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

### 2.2 Support Structure Design

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

**It is the installer's responsibility to ensure the mounting structure and hardware are capable of supporting the display, and will agree with local codes.**

Before beginning the installation process, verify the following:

- The mounting structure will provide a straight and square-mounting frame for the display.
- The mounting structure is capable of supporting the display and will not yield at any unsupported points after mounting.
- Clearance:
  - 3" of unobstructed space below the display for adequate ventilation.
  - 2 3/8" of unobstructed space is available above the display to allow door to hinge open.
  - 3" of unobstructed space behind display for adequate ventilation.

Correct any deficiencies before installation.

There are nutserts provided on the back of the display for mounting of the display to a structure. Use all the provided mounting nutserts when mounting the display.

If a mounting kit was ordered with the display, mount the channel to the display using the nutserts on the back of the display.

## 2.3 Ventilation Requirements

### Reference Drawing:

Shop Drawing, AF-3112-2480-34-SF-\* -P/M..... **Drawing A-193720**  
Shop Drawing, AF-3112-1680-34-SF-\* -P/M..... **Drawing A-201993**

For ventilation, fans are mounted in the back of the display. Maintain a minimum distance of 3" (7.62cm) below the display to maintain proper airflow to the ventilation inlets. Refer to **Drawing A-193720** or **A-201993** for your display size for additional information.

If the display cabinet is completely enclosed:

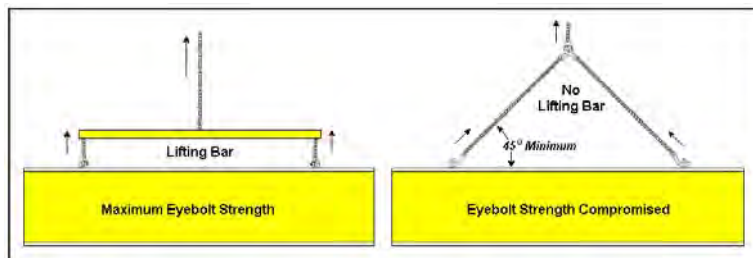
- 13 square inches of unobstructed opening per module must be provided to ensure adequate cooling.
- Allowances must be made to compensate for the percentage of material covering the openings in the structure.
- For adequate cooling, forced ventilation may be required. If air is forced into the enclosed structure, a minimum of 200 cfm is required for both inlet and exhaust.

If these requirements are not met, the Galaxy® display warranty may be void.

## 2.4 Lifting the Display

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

**Figure 8** below 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. Use every lifting point provided.



**Figure 8:** Lifting the Display (Correct, Left; Incorrect, Right)

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



If removing the eyebolts, adequately seal the holes using bolts and sealing washers, ½ inch in size. Silicone along the threads to ensure that water does not enter the display.

## 2.5 Display Mounting

### Reference Drawing:

Shop Drawing, AF-3112-2480-34-SF-\*-P/M ..... **Drawing A-193720**  
Shop Drawing, AF-3112-1680-34-SF-\*-P/M ..... **Drawing A-201993**

The method used to mount displays can vary greatly from location to location. For this reason, only general mounting topics can be addressed in this manual.

**It is the responsibility of the installer to ensure the installation will adequately meet local codes and standards, as well as the mounting hardware and methods.**

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.

The back of the display has nutserts to which the mounting structure will be attached as shown in **Drawing A-193720 or Drawing A-201993**. Remember to have **all** mounted displays inspected by a qualified structural engineer. It is the customer's responsibility to determine the proper wall mounting method and location.

Refer to **Drawing A-193720 or A-201993** for a suggested wall mount method. The number of attachment points needed and the wall structure **must** be reviewed by a qualified structural engineer and meet all national and local codes. Daktronics recommends attaching to all nutserts provided.

1. Carefully uncrate the display. Look each side of the display over for damage during shipping.
2. Following the guidelines described in **Section 2.4**, lift the display into position on the support structure.
3. Use the provided nutserts in the display for mounting to the structure.
4. Refer to **Section 3** for information on routing power and signal.
5. After installation is complete, carefully inspect the display for any holes that may allow water to seep into the display. Seal any openings with silicone. **If the eyebolts on the top of the display have been removed, plug the holes with bolts and the rubber-sealing washers that were removed with the eyebolts.**

## 2.6 Optional Temperature Sensor Mounting

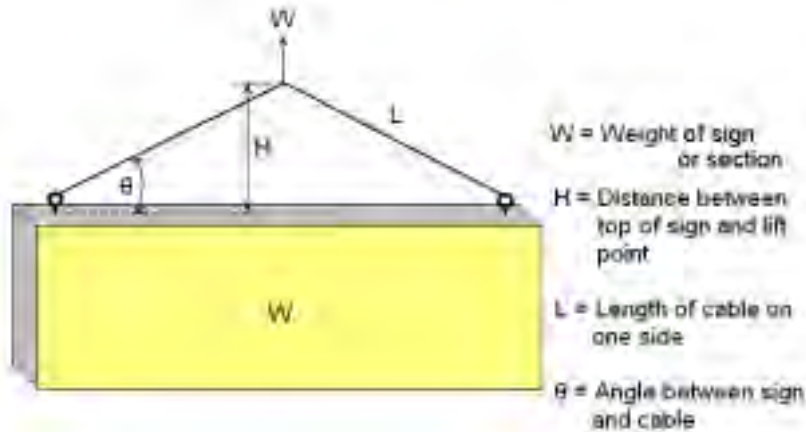
If a temperature sensor will be used with your display, see **Appendix C** for mounting and signal connections.



# Eyebolts

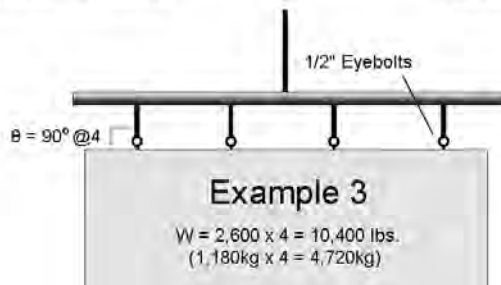
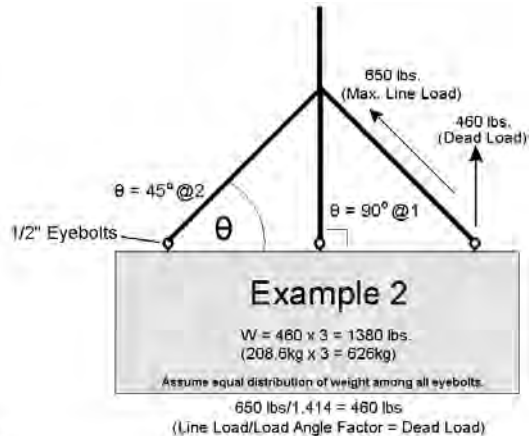
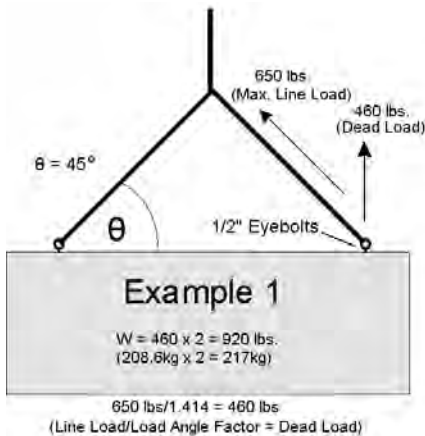
Almost every display that leaves Daktronics is equipped with eyebolts for lifting the display. There are two standard sizes of eyebolts: 1/2" and 5/8".

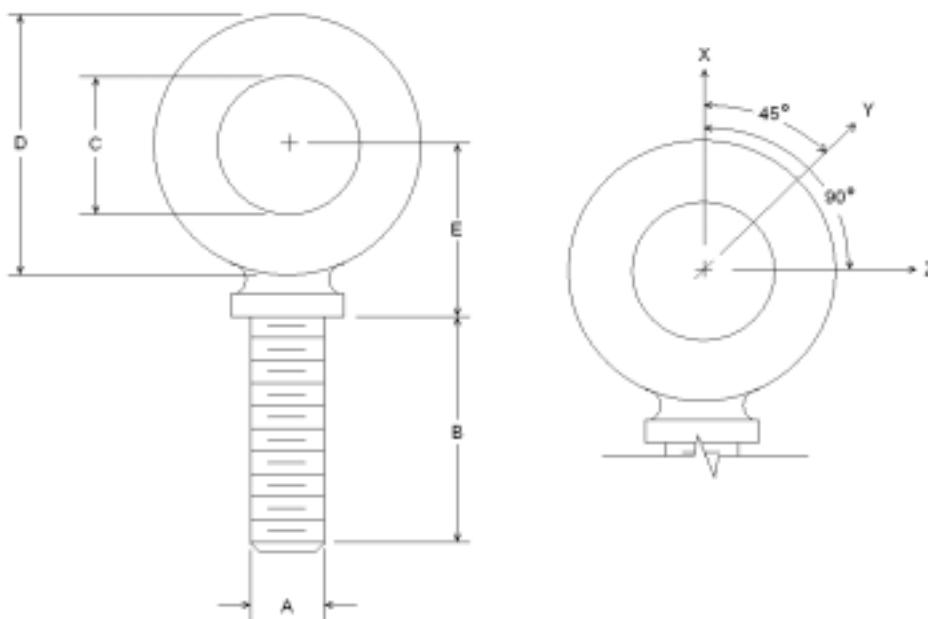
**Load Increase Factor:** The load increases as the lift angle ( $\theta$ ) decreases. The allowable load on the eyebolts also decreases with the lift angle due the bending stress on the eyebolts. In sum, the smaller the angle between the cable and the top of the display, the lighter the sign must be 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

$\theta$	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
<b>1/2</b>	<b>1-1/2</b>	<b>1-3/16</b>	<b>2-1/16</b>	<b>1-13/32</b>	<b>25</b>	<b>3,900</b>	<b>9,200</b>	<b>Blank 1/2-13</b>	<b>1-11/32</b>	<b>2,600</b>	<b>650</b>	<b>520</b>
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
<b>5/8</b>	<b>1-3/4</b>	<b>1-3/8</b>	<b>2-1/2</b>	<b>1-11/16</b>	<b>27</b>	<b>6,000</b>	<b>14,700</b>	<b>Blank 5/8-11</b>	<b>1-9/16</b>	<b>4,000</b>	<b>1,000</b>	<b>800</b>
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.

## Section 3: Electrical Installation

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Only a qualified individual should terminate power within this Daktronics display or signal to the signal enclosure.

The Daktronics engineering staff **must** approve **any** changes made to the display. Before altering the display, submit detailed drawings for the proposed modifications to the Daktronics engineering staff for evaluation and approval, or the warranty will be rendered null and void.

### 3.1 Common Connectors in the Display

The power and signal connections in the displays use many different types of connectors. 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 installation and maintenance.

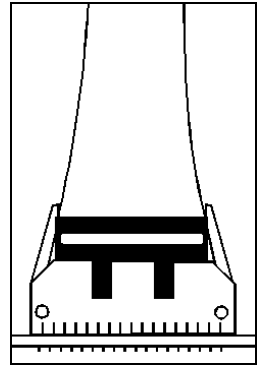
#### 1. Ribbon Cable Connectors:

**Figure 9** on the right illustrates a typical ribbon connector. To disconnect the ribbon cable, push the plastic clips on the sides out to unlock and remove the jack.

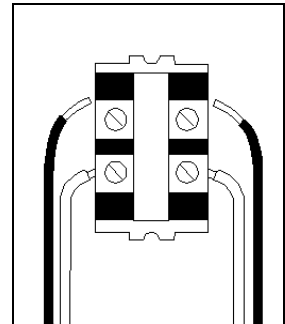
Before replacing a ribbon cable connector, spray it with DeoxIT™ contact cleaner to remove any foreign matter that may cause signal problems. In addition, apply a generous amount of CaiLube™ protector paste to the plug before inserting it into the jack. This paste will protect both the plug and the jack from corrosion.

#### 2. Termination Blocks:

Termination blocks are usually used to connect internal power and signal wires to wires of the same type coming into the display from an external source. 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 10** on the right.



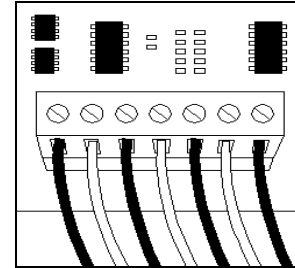
**Figure 9:** Ribbon Cable Connector



**Figure 10:** Termination Block

**3. Phoenix™-Style Connectors:**

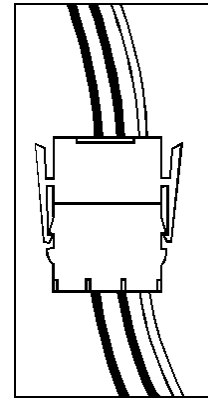
Phoenix-style connectors, which are usually green, are often used for signal termination on circuit boards. Refer to **Figure 11** on the right. Strip one-quarter inch of insulation from the wire prior to termination. To remove a wire, turn the above screw counter-clockwise to loosen the connector's 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 11:** Phoenix Connector

**4. Mate-n-Lok™ Connectors:**

The Mate-n-Lok connectors found in the displays are white and come in a variety of sizes. **Figure 12** on the right illustrates a four-pin Mate-n-Lok connector. To remove the plug from the jack, squeeze the plastic locking clasps on the side of the plug and pull it from the jack.

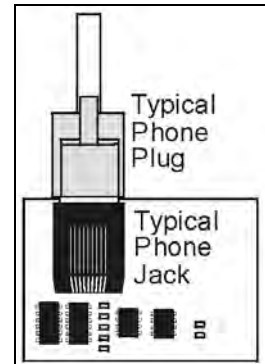


**Figure 12:** Mate-n-Lok Connector

**5. RJ11/RS45 Connectors:**

RJ connectors, as seen in **Figure 13** on the lower right, are similar to the telephone connectors found in homes. In order to remove this plug from the jack, depress the small clip on the underside of the plug. RJ11 connectors use six-conductor cable and RJ45 connectors use eight-conductor cable.

Before replacing an RJ 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.



**Figure 13:** RJ11 Connector

**6. Six-Pin Insulation Displacement Connector:**

The six-pin connectors found in the display are keyed connectors, meaning that they will only go together one way and should not be forced. To remove the connector, squeeze the plastic tab and gently pull the plug from the jack.

## 3.2 Control Cable Requirements

### RS232

A quick connect cable for an RS232 display will connect from the communication enclosure to the display. The quick connect cable is provided by Daktronics.

### RS422

This cable is a 4-conductor shielded cable used to transmit an RS422 signal (Daktronics part number W-1234). This shielded cable consists of paired wires. They should not be subjected to mechanical flexing after installation. This cable is not for direct burial and should have one of the following routings:

- In dedicated, metallic conduit
- Inside buildings – if cable is not in conduit, keep away from interference signals.

With interference signals, such as power conductors, intercom, etc., typically a two-foot separation is required. The maximum length of an RS422 signal cable is 4,000 feet (1.22km) from the signal converter to the enclosure at the display.

### Modem

The modem option will use a standard telephone cable routed through conduit. The local telephone company will need to assist in this installation. Ask the telephone company which colors are used for the TIP wire and the RING wire for signal connections to the modem enclosure at the display.

**Note:** The telephone lines must be dedicated lines, and **not** run through a switch board/communications system.

### Fiber Optic

This cable is a 4-fiber cable (Daktronics part number W-1376). Two fibers are used for display communications and the other two are saved for spares. The cable may be either direct burial or in conduit, but it should **not** be subjected to mechanical flexing. The maximum length of a fiber optic cable is 2,000 feet (611.6 meters) from the signal converter to the fiber enclosure at the display.

### Radio

The Server radio connected to the computer requires an 18-gauge six-conductor cable (Daktronics part number W-1370). Four-conductors will be used for the signal and two for the power. These wires need to be in conduit when exposed to outdoor conditions to the Server radio. The maximum distance from the J-box by the computer and the Server radio is 1,000 feet (305.8 meters).

The Client radio at the display comes with cable that is rated for outdoor use and does not need to be in conduit. The cable should be secured to the structure to prevent it from being pulled loose from the display.

## Display Enclosures

In each communication method, the final termination will be from a provided weather resistant enclosure to the display.

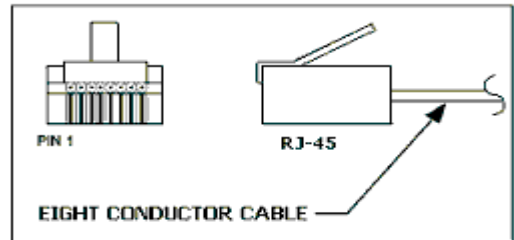
Note the following information when mounting the enclosure:

1. Be sure to mount the enclosure with the cable exiting from the bottom, to prevent water from entering into the enclosure.
2. Mount the enclosure securely and if possible at a height inaccessible to vandalism.
3. A quick connect cable will be connected to the enclosure and will terminate to the back of the Primary display. The length of the cable is either 25 or 30 feet depending on the communication method used.
4. The quick connect cable can be run from the enclosure through conduit or through the display pole to the sign, but is not required. The cable is weather and sunlight resistant.
5. Daktronics strongly recommends that the cable be secured to the display to prevent it from being pulled loose by weather or vandalism.
6. Ground those enclosures that use wire signal cable, which includes the RS422 and modem. The resistance to ground should be 10 ohms or less. A wire is attached to the enclosure to make the necessary ground connection.

### 3.3 RJ Connector Cables

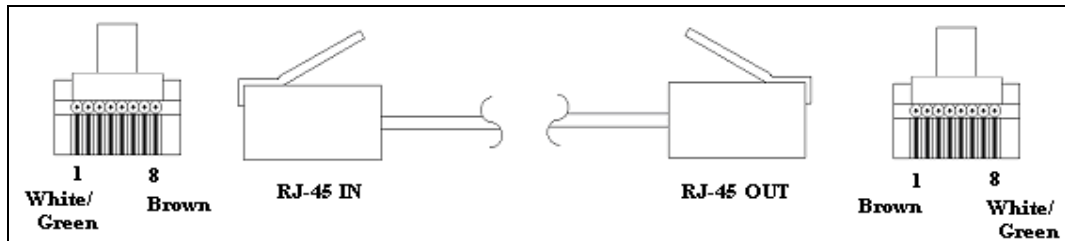
The conductor connectors used in the network are an industry standard 6-pin RJ11 or 8-pin RJ45. These connectors can be found on many networks and LANs.

The cables used in a network are a standard eight-conductor Cat-5 cable. Refer to **Figure 14** on the right. This cable has one end that is the mirror image of the other end (i.e. the cable is flipped). Refer to **Figure 15** below for a standard flipped cable.



**Figure 14:** Eight-Conductor Cable

Notice below in **Figure 15** that the color code on one connector must be made the opposite on the other connector. When installing a network, it is not easy to remember in which direction the previous end was oriented. One simple way to avoid confusion is to standardize the color code, having one color for the connector going into the output of a sign, and the opposite color for a connector going into the input of a sign. This will help ensure correct cabling since cables are always installed from the output jack of one sign to the input jack of the next sign.



**Figure 15:** Flipped Cable with RJ45 Connectors



The Cat-5 cable used is an eight-conductor cable that has a special configuration for use. See **Section 3.7** for the signal cable configuration.

### 3.4 Conduit

**Reference Drawings:**

- Shop Drawing, AF-3112-2480-34-SF-\*-P/M ..... **Drawing A-193720**
- Shop Drawing, AF-3112-1680-34-SF-\*-P/M ..... **Drawing A-201993**

Daktronics **does not** provide the conduit. Refer to **Drawing A-193720** or **A-201993** for your display size for approximate locations for power and signal conduit. Separate conduit must be used to route:

- Power
- Signal IN wires
- Signal OUT wires (if signal is required for another display)

Knockout holes for ½" conduit are located at the bottom right (rear view) of the back of the display (refer to **Drawing A-193720** or **A-201993**).

For displays with more than one face, signal and temperature sensor wiring between displays is done using a quick connect interconnect cable.

### 3.5 Preparing for Power/Signal Connection

**Reference Drawings:**

- F. Assy, AF-3112-2480-34 ..... **Drawing B-200259**

1. The display door has three face panel latches, see **Figure 17**. Release the latches using a 5/32" Allen wrench as shown in **Figure 16**. Lift the face panel. Gas springs will hold the door open for servicing. **Caution:** The door will swing up. Take extra precautions during windy conditions.



**Figure 17:** Face Panel Latches



**Figure 16:** Use 5/32" Hex Wrench to Release Latches

2. Punch or use 7/8" (0.875) conduit holes for the desired conduit openings. **Be careful that none of the internal components are damaged.** Attach the conduit.
3. Locate the controller and power termination panel for these displays in **Drawing B-200259**

4. An enclosure receives the signal from the control computer and transfers it to the display controller. The controller receives the incoming signal and relays it to the individual modules.
5. Route power to the display through a fused disconnect switch capable of opening all ungrounded power conductors. Install this disconnect within the line-of-sight of any personnel performing maintenance on the display. If the disconnect is located out of sight of the display, it must be capable of being locked in the open position.
6. Power conductors from the disconnect to the display should be routed through conduit in agreement with local code.
7. You may also route the signal cable from the display enclosure to the display at this time.
8. **Note:** Always use water resistant boxes for signal/power termination enclosures to prevent corrosion or other physical damage to interior parts.

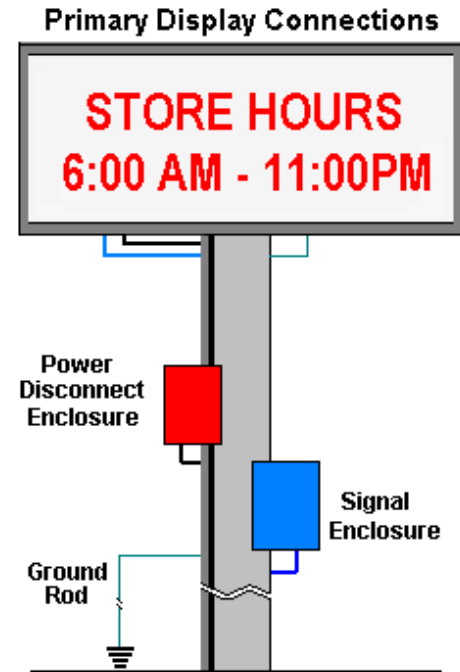


Figure 18: Primary Display with Enclosures

## 3.6 Power

### Reference Drawings:

Shop Drawing, AF-3112-2480-34-SF-*-P/M.....	Drawing A-193720
Power Specs, 8x144 – 32x144, AF-3112, Amber .....	Drawing A-200044
Power Specs, 8x144 – 32x144, AF-3112, Red .....	Drawing A-200045
Shop Drawing, AF-3112-1680-34-SF-*-P/M.....	Drawing A-201993
Schem, AF-3112-8-32***-34mm-Mon-PM.....	Drawing C-200002

### Power Requirements

Refer to **Drawing A-200044** or **A-200045** for voltage and current requirements for your display size. Each uses a 120VAC single-phase power source. Depending on the module color and display size the power supply may vary.

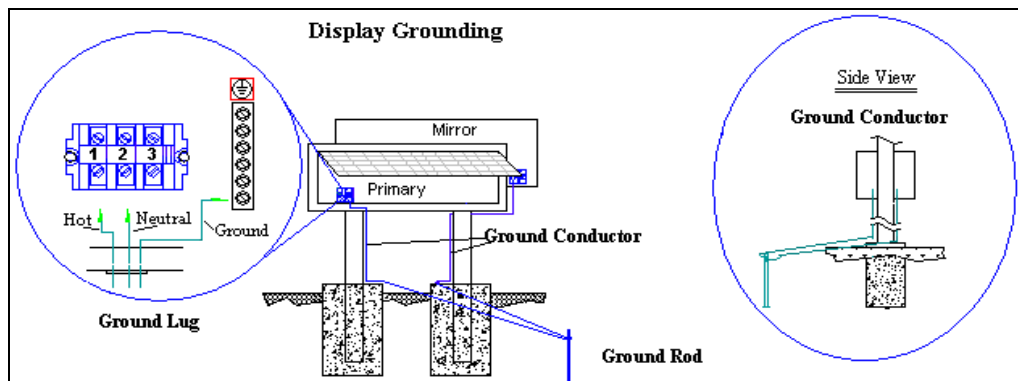
**Do not connect the displays to any voltage other than that listed on the Daktronics product label.**

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

### Grounding

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

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



**Figure 19:** Ground Conductor

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

A minimum of one grounding electrode must be installed for each display face. The grounding electrode is typically one grounding rod for each display face. Other grounding electrodes as described in Article 250 of the National Electric Code may be used. Daktronics requires that the resistance to ground be 10 ohms or less. If the resistance to ground is higher than 10 ohms, it will be necessary to install additional grounding electrodes to reduce the resistance. The grounding electrode should be installed within 25 feet of the base of the display. The grounding electrode must be connected to the ground terminal in the display panel board.

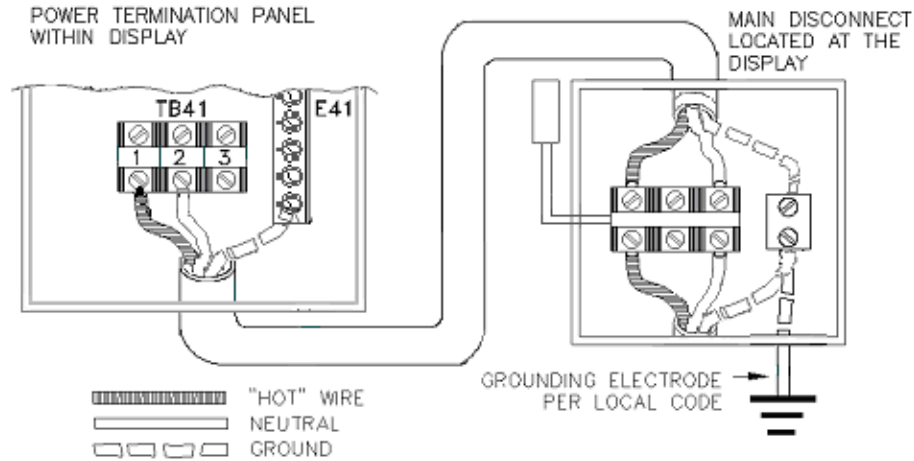
**Note: This display is intended to be installed in accordance with the requirements of Article 600 of the National Electrical Code and/or other applicable local codes. This includes proper grounding and bonding of the sign.**

## Power Installation

There are two considerations for power installation: installation with ground and neutral conductors provided, and installation with only a neutral conductor provided. For these displays, installation with ground and neutral conductors provided is used.

### ***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 20** for installation details. The National Electrical Code requires the use of a lockable power disconnect within sight of or at the display.



Second Hot wire not shown, if it is used then remove the jumper.

**Figure 20:** Installation with Ground and Neutral Conductors Provided

## Power Connection

### Reference Drawings:

Schem, AF-3112-8-32X\*\*\*-34-Mono-PM..... **Drawing C-200002**

Incoming power is connected to the power termination panel. Complete the following steps to terminate the hot and neutral wires at the termination block within the display. Refer to **Drawing C-200002** for your display.

1. Access the panel by opening the display as described in **Section 3.5**.
2. Route the power cables through the power conduit in the rear of the display and to the power term panel.
3. Connect the white neutral wire to termination block, TB41-2.
4. Connect the hot wire to termination block at TB41-1.
5. Connect the green grounding wire to the grounding bus, E41. Refer to **Figure 20** on the previous page.

## Main Disconnect

The National Electrical Code requires the use of a lockable power disconnect near the display. Provide a lockable disconnect switch (knife switch) at the display location so that all power lines can be completely disconnected. Use a 3-conductor disconnect so that both hot lines and the neutral can all be disconnected. The main disconnect should be mounted at or near the point of power supply connection to the display. A main disconnect is to be provided for each supply circuit to the display.

The disconnecting means must be located in a direct line of sight from the display or outline lighting that it controls. This requirement provides protection by enabling a worker to keep the disconnecting means within view while working on the display.

**Exception:** Disconnecting means that are capable of being locked in the open position may be located elsewhere.

### 3.7 Signal Termination from Network to Display

**Reference Drawing:**

Schem, AF-3112-8-32X\*\*\*-34mm-Mono-PM.....**Drawing C-200002**

The AF-3112 is designed for quicker connection to the computer and to the Mirror display. Refer to **Drawing C-200002** for electrical terminations.

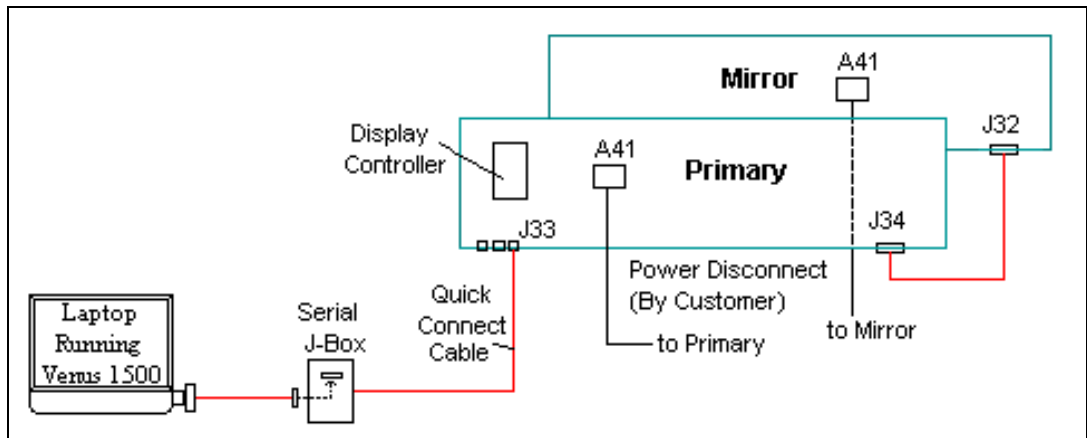
- Signal will terminate to a watertight enclosure, which connects to the primary display using a quick connect cable.
- The temp sensor will mount to the display and terminate to the primary display with a quick connect cable.
- The primary display will connect to the mirror display with a quick connect, inter-connect cable.

### RS232

**Reference Drawings:**

System Riser Diagram, RS232 Comm. Box .....**Drawing A-199104**

A RS232 controlled display connections are in a weather resistant enclosure to be mounted within 25 feet of the display, as shown below in **Figure 21**. From the enclosure to the display, the signal will be connected to the primary using a quick connect cable. **Do not** run signal and display power through the same conduit.



**Figure 21:** RS232 Display Layout

**Note:** The cable from the enclosure to the display can be routed through conduit, or should be secured to prevent being pulled loose from the display by weather or vandalism.

1. Mount the enclosure within 25 feet of the display.
2. Connect the quick connect cable from the enclosure to the primary display at J33.
3. The controlling laptop computer connects to the enclosure through the serial cable (W-1249). Refer to **Drawing A-199104** and **Figure 22** for additional information.

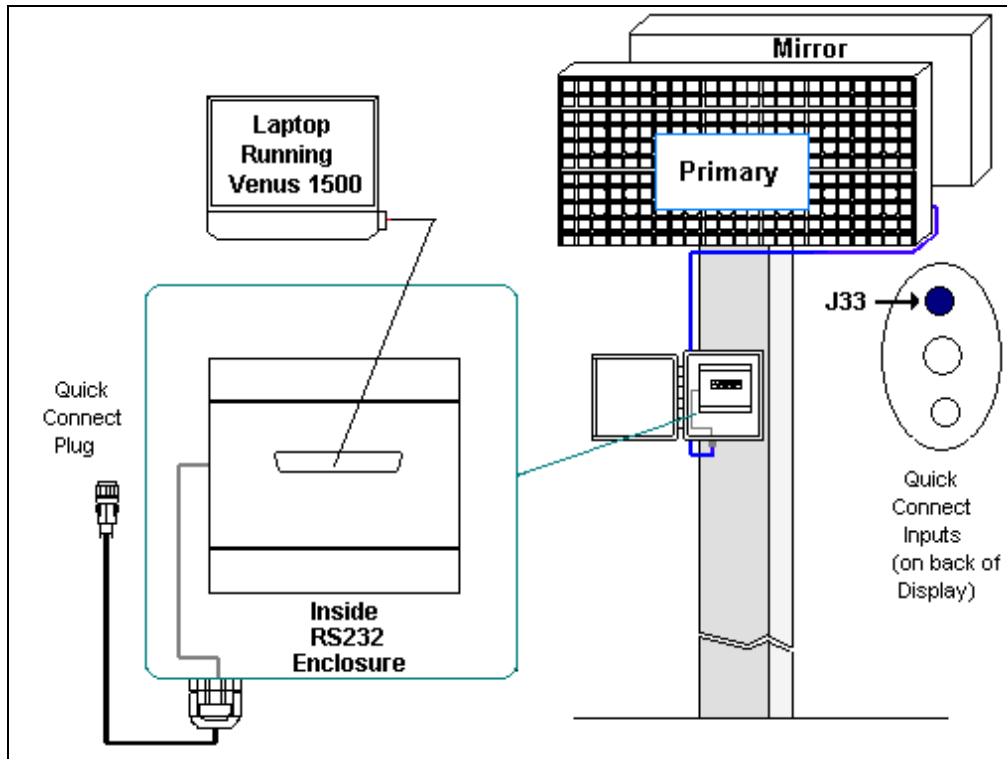


Figure 22: RS232 Enclosure Connection

## RS422

### Reference Drawings:

System Riser Diagram, RS422 Comm. Box ..... **Drawing A-199144**

A RS422 controlled display requires the use of signal converter (0A-1127-0237) near the computer. From the signal converter, cable is run to the surge board assembly in a weather resistant enclosure at the display, as shown in **Figure 23**. A quick connect cable connects the enclosure to the display. The cable from the signal converter to the display, must be routed through conduit. **Do not** run signal and display power through the same conduit. Refer to **Drawing A-199144** for system layout.

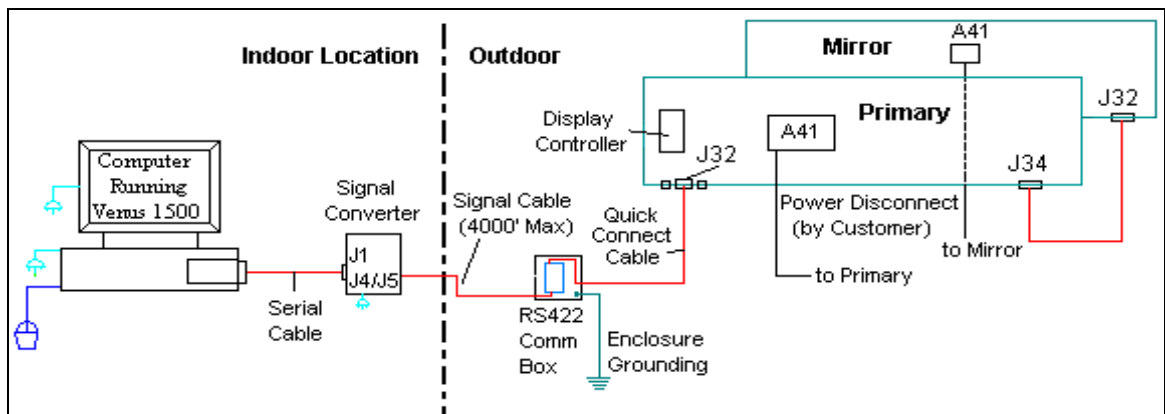
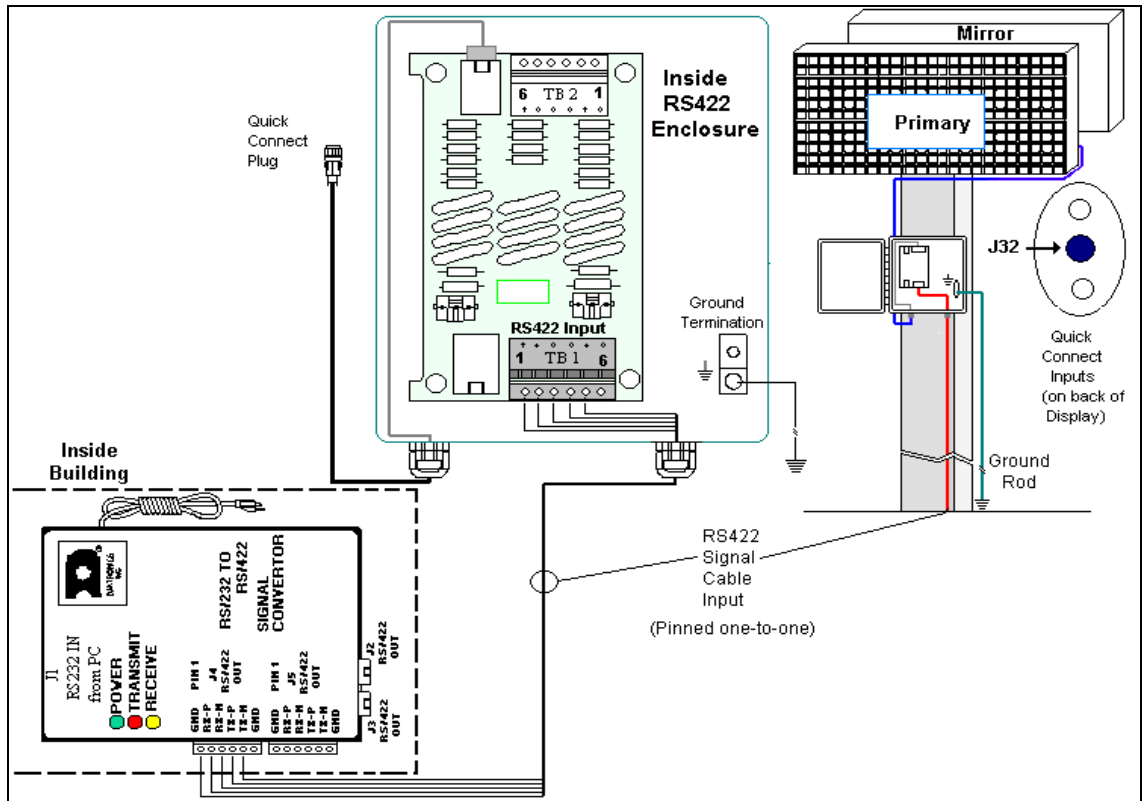


Figure 23: RS422 Display Layout

**Note:** The cable from the enclosure to the display can be routed through conduit, or should be secured to prevent being pulled loose from the display by weather or vandalism.

1. Mount the enclosure within 30 feet of the display.
2. Route signal from the signal converter to the watertight enclosure at the base of the display. Connect the cable to the signal converter and at the enclosure as shown in
3. **Figure 24.**
4. Connect the quick connect cable from the enclosure to the primary display at J32.
5. Ground the RS422 signal enclosure.



**Figure 24:** Signal Converter to Surge Board Assembly Enclosure

### Signal Converter to Surge Board Assembly

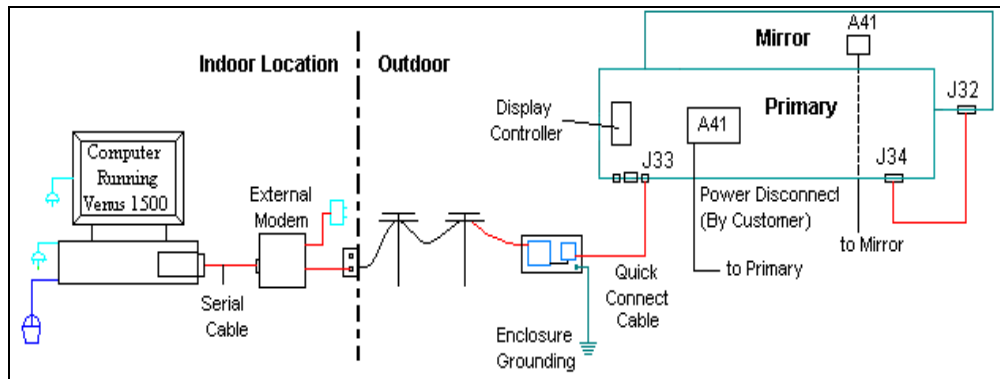
Signal Converter (J4/J5)	Field Cabling	Surge Board Assembly TB1 (RS422 In)
Pin 1 (GND)	Shield	Pin 1 (NC)
Pin 2 (RX-P)	Red	Pin 2 (TX-P)
Pin 3 (RX-N)	Black	Pin 3 (TX-N)
Pin 4 (TX-P)	Green	Pin 4 (RX-P)
Pin 5 (TX-N)	White	Pin 5 (RX-N)
Pin 6 (GND)		Pin 6 (NC)

## Modem

### Reference Drawings:

System Riser Diagram, Modem Comm. Box..... **Drawing A-199218**

A modem-controlled display requires the use of an internal or external modem at the computer. The local phone company must provide a dedicated phone line to the display and identify the colors used for “Tip” and “Ring”. The telephone cable is terminated to TB2 on the modem in the weather resistant enclosure at the display. The phone cable must be routed through conduit. **Do not** run signal and display power through the same conduit. Refer to **Drawing A-199218** and **Figure 25** for system layout.



**Figure 25:** Modem Display Layout

**Note:** The cable from the enclosure to the display can be routed through conduit, or should be secured to prevent being pulled loose from the display by weather or vandalism.

1. Mount the enclosure within 25 feet of the display.
2. Have the phone company route a dedicated phone line to the display and identify which wires are used for Tip and Ring.
3. The Tip and Ring phone wires will terminate to the modem, as shown in the modem termination enclosure in **Figure 26**.
4. Connect the quick connect cable from the enclosure to J33 on the back of the primary display.
5. Ground the modem enclosure.

**Note:** The jumper X1 on the controller board **must be** closed while the display powers up to recognize that a modem is being used with the display. See **Figure 40** in Section 4 for jumper location.



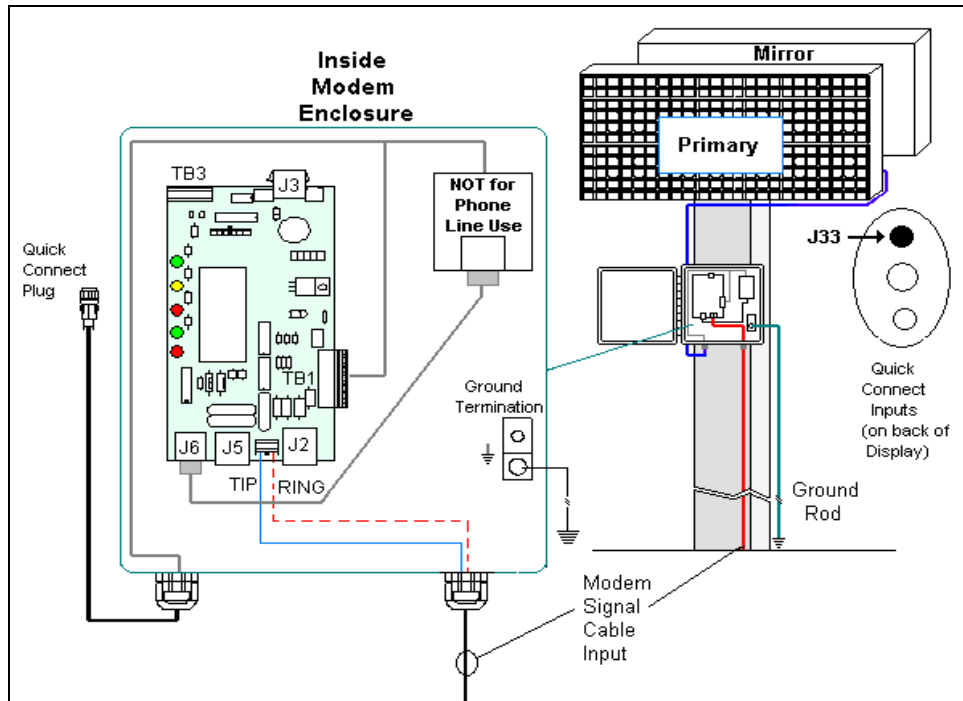


Figure 26: Modem Phone Line Termination Enclosure

## Fiber Optic

### Reference Drawings:

System Riser Diagram Fiber Comm. Box Term ..... **Drawing A-187293**

When fiber optic cable is used, a signal converter (0A-1127-0239), connected to the computer, relays signal via fiber signal cable to the fiberboard (J4/J5) in the weather resistant enclosure at the display. When connecting fiber cables, always connect transmit to receive and receive to transmit. Refer to **Drawing A-187293** and **Figure 27** for the system layout.

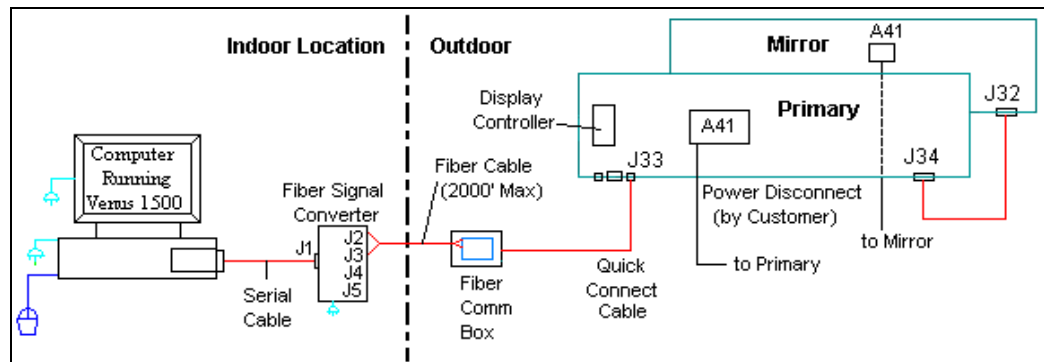
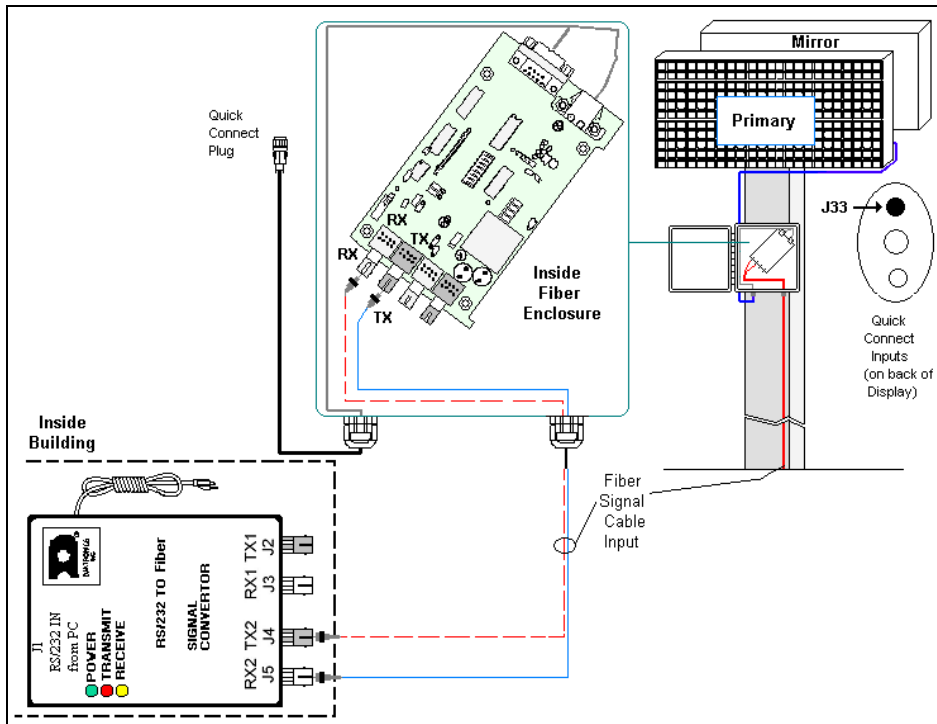


Figure 27: Fiber Display Layout

**Note:** The cable from the enclosure to the display can be routed through conduit, or should be secured to prevent being pulled loose from the display by weather or vandalism.

1. Mount the enclosure within 30 feet of the display.
2. Route fiber optic cable to the enclosure. Two fibers are required.
3. Connect the fiber at the signal converter and to the fiberboard in the enclosure. Connect transmit to receive and receive to transmit. Refer to **Figure 28** for fiber termination locations.
4. Connect the quick connect cable from the enclosure to J33 on the back of the primary display.



**Figure 28:** Signal Converter to Fiber Card Enclosure

### Signal Converter to Fiber Board

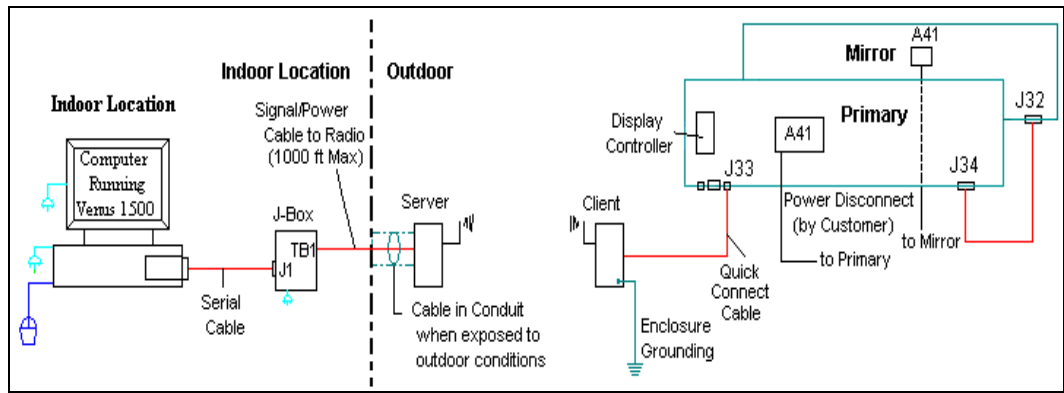
Signal Converter	Field Cabling	Fiber Control Card
J2 Transmit (TX1)	(Color Varies)	J5 Receive (RX2)
J3 Receive (RX1)	(Color Varies)	J4 Transmit (TX2)

## Venus 1500 Radio

### Reference Drawings:

System Riser Diagram, QC Outdoor Radio, Gen 2..... **Drawing A-185359**

A radio-controlled display requires a Server radio connected to the control computer and a Client radio at the display. The radios must be in line-of-site of each other. The Client radio is provided with 25 feet of weather resistant pre-terminated cable. Refer to **Drawing A-185359** and **Figure 29** for the system layout.

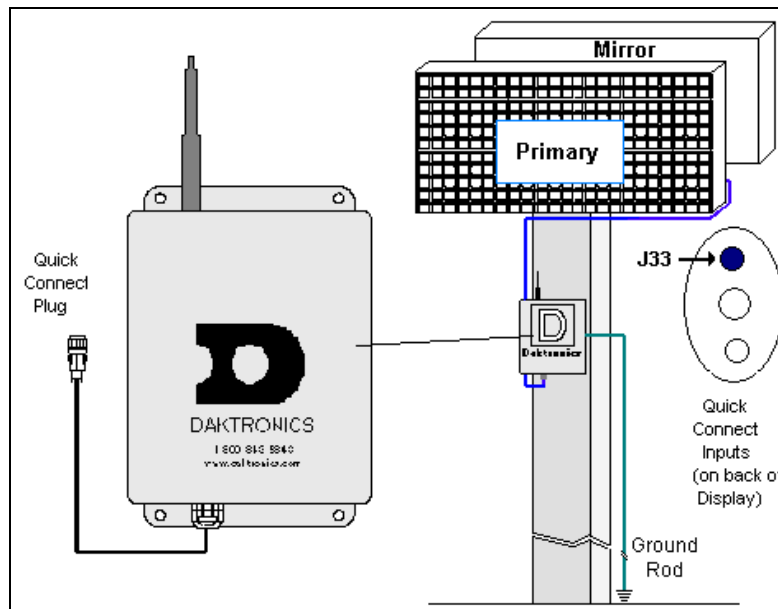


**Figure 29:** Radio Display Layout

**Note:** The cable from the Client radio to the display can be routed through conduit, or should be secured to prevent being pulled loose from the display by weather or vandalism.

1. Mount the Client radio at the display.
2. Connect the quick connect plug to J33 on the back of the primary display as shown in **Figure 30**.
3. Ground the Server and Client Radio enclosures.

**Note:** Additional drawings for the Server Connections are in the Venus 1500 Radio Manual (**ED13932**).



**Figure 30:** Client Radio Display Connection

## 3.8 Signal Termination Between Two (or More) Signs

### RS422 Interconnection

The Primary – Mirror quick connect cable is used to terminate signal between two displays. The six-foot cable goes from the Primary OUT (J34) on the Primary display to the Mirror IN (J32) on the Mirror display.

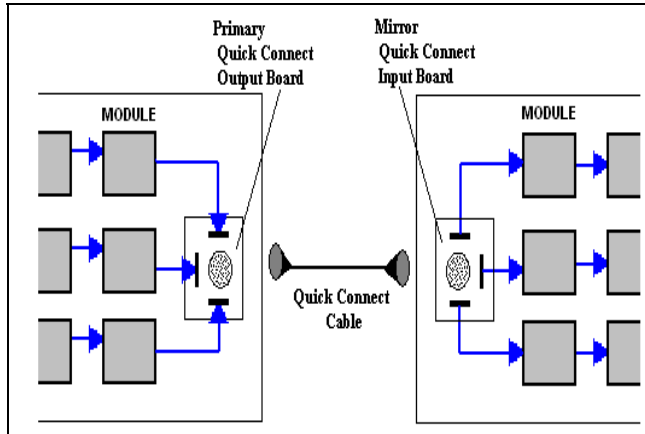


Figure 31: Quick Connect Boards (Input and Output)



Figure 32: Display Interconnect

## 3.9 First Time Operation

When first operated, the display will run through an initialization or boot up sequence in which it will display the following:

1. Product Name (Galaxy®)
2. Display Size (Row x Column)
3. Shading (32K RGB)
4. Bootloader Version (OS X.XX)
5. Firmware Number (ED13305)
6. Firmware Revision (Rev X.XX)
7. Hardware Address (HW:XX)
8. Software Address (SW:XX)
9. IP Address: (172.16.192.25)
10. Subnet Msk: (255.255.0.0)
11. COM1 Configuration (C1:V15) ((Modem C1:V15) If a Modem is present)
12. Line Frequency (CLK:60 Hz)
13. Display Name Description

## Section 4: Maintenance and Troubleshooting

---



### Important Notes:

1. Power must be turned off before any repair or maintenance work is done on the display.
2. Qualified service personnel must make any access to internal display electronics.
3. The Daktronics engineering staff must approve ANY changes made to the display. Before altering the display, detailed drawings for the proposed modifications must be submitted to the Daktronics engineering staff for evaluation and approval or the warranty will be rendered null and void.

### 4.1 Maintenance and Troubleshooting Overview

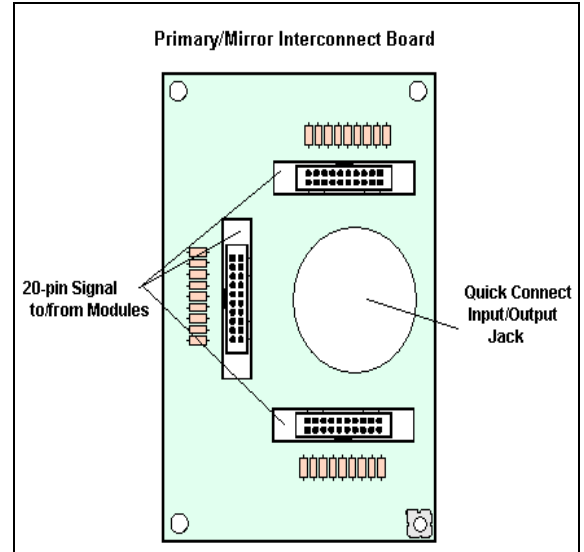
Daktronics Galaxy® series AF-3112 displays are front accessible; meaning access to the internal components can be gained only from the front of the display.

This section provides the following Galaxy® display information:

- **Signal Routing Summaries** provide a basic explanation of the way signal travels through the display.
- **Power Routing Summaries** offer a basic explanation of the way power travels through the display.
- **Service and Diagnostics** give instructions for removing various display components, and explain the functions of circuit board connectors and the meanings of any diagnostic LEDs.
- **Maintenance** includes a number of steps to take to keep this Galaxy® display in a safe, working order.
- **Troubleshooting** lists some possible display malfunctions, and provides a number of possible causes for that malfunction.
- **Replacement Parts List** suggests the description and part number of display components that could possibly need replacing during the life of this display.
- **Exchange and Repair and Return Programs** explain Daktronics component return policy.

## 4.2 Signal Summary

1. Data from the control computer, which runs Venus 1500 software, travels via RS232, RS422, modem, fiber optic cable, radio signal, or Ethernet signal into the enclosure by the display.
2. From the display enclosure, signal is sent to the display controller via a quick connect cable.
3. From the controller, the signal then travels over 20-conductor ribbon cables from the controller (J11 through J16 provide signal out) to J2 on the driver of the first column of modules in the display.
4. Data exits at J1 and is relayed to J2 of the next driver board and so on, traveling down the entire row of modules. This display data is used to control the LEDs.
5. At the last column of modules a 20-conductor ribbon cable from the J1 output connects to a 31-pin quick connect output board. Refer to **Figure 33** on the right.
6. For multiple face displays a quick connect interconnect cable transfers data from the primary display to the mirror display.
7. A 31-pin quick connect input board on the mirror display receives the signal and transmits it to J2 on the first column of modules, via a 20-conductor ribbon cable.
8. Data exits at J1 and is relayed to J2 of the next driver board and so on, traveling down the entire row of modules in the Mirror face. This display data is used to control the LEDs.



**Figure 33:** Primary/Mirror Interconnect Board

## 4.3 Power Summary

### Reference Drawings:

Schem, AF-3112-8-32X\*\*\*-34mm-Mono-PM ..... **Drawing C-200002**

The power routing for the display can be summarized as follows:

1. Incoming power terminates at the power termination panel. Before leaving the panel, power is sent through a circuit breaker and an RFI electrical filter.
2. Power for the controller board passes through a transformer located on the controller/power panel.
3. Depending on pixel count and color, power supplies (6.5VDC or 9VDC) are used to power the modules. Power supplies are preset. Contact Daktronics Customer Service for the proper settings.
4. The AF-3112 Galaxy displays use either red or amber LEDs for a monochrome display. See **Drawing C-200002** for power supply wiring information.
  - Each 9VDC power supply (A-1633) provides power to up to five modules in a display that uses three amber LEDs per pixel.
  - Each 6.5VDC (A-1591) power supply provides power to up to five modules in a display that uses two red LEDs per pixel.

## 4.4 Service and Diagnostics

### Reference Drawings:

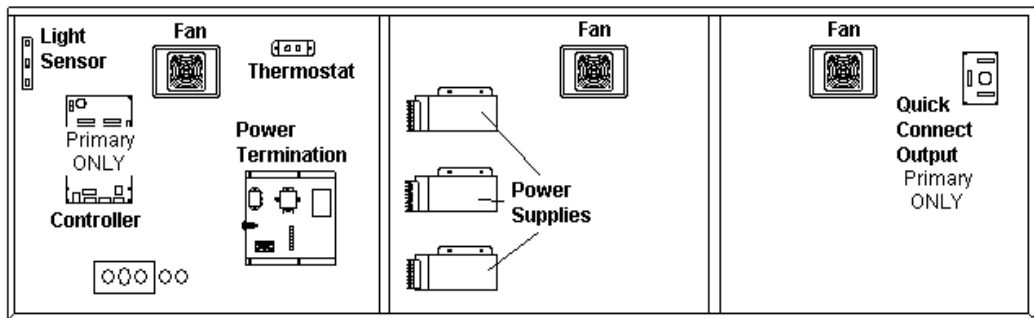
F. Assy, AF-3112-2480-34.....**Drawing B-200259**  
 Schem, AF-3112-8-32X\*\*\*-34mm-Mono-PM.....**Drawing C-200002**

**Remember:** Disconnect power before servicing any internal components.

The following sub-sections address servicing of the following display components:

- transformer, RFI filter
- controller
- modules, drivers and power supplies

The sub-sections also address any diagnostic LEDs, fuses, and signal/power connectors found on the unit. A general display component layout is shown in **Figure 34**. See the schematic, **Drawing C-2000002**, for exact number of fans and power supplies used for your display size and see **Drawing B-200259** for component locations. **Note:** The controller, light sensor, and quick connect output board are only loaded in the primary display.



**Figure 34:** General Display Component Layout

The table below give the part number for some of the various components used in your display. In addition, the label on the part can also be used for further identification.

Component	Denoted As	Location
Filter and Transformer	0A-1301-0501(Primary) 0A-1301-0502 (Mirror)	Inside the power termination box
Controller	0A-1229-0005	Inside the controller/power panel (behind the bottom left module)
Modules	0P-1301-1000	Over entire face of the display (includes driver)
Power Supplies	A-1591 (red) A-1633 (amber)	Behind modules (refer to the display's <b>Schematic</b> )
Light Detector	0A-1301-0500	In top left corner of door

## Transformer and RFI Filter

### Reference Drawings:

Assy, Electrical Plate, AF-3112-\*\*\*\*-34mm..... **Drawing A-200282**  
Schem, AF-3112-8-32X\*\*\*-34mm-Mono-PM ..... **Drawing C-200002**

### *Transformer*

The transformer is located in the upper portion of the power termination panel (Primary display only). To replace the transformer, first disconnect and label all the wires attached to it. **Turn off power to the display before removing the wires.**

Then release the hardware, securing it to the panel. Position the new transformer in its place, and tighten it down. Re-connect all the wires using the display's schematic as a reference.

### *RFI Filter*

The RFI electrical filters are mounted in the upper portion of the power termination panel (**Drawing A-200282**). Like the transformer, first remove all connecting wires, and then release the attachment hardware can replace the filters. Install the new filter using **Drawing C-200002** as a wiring reference.

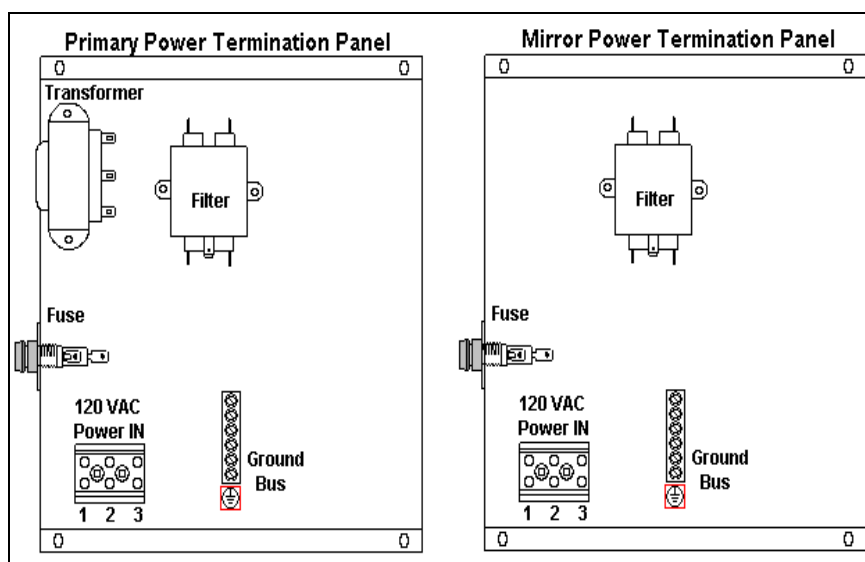


Figure 35: Power Termination Panel

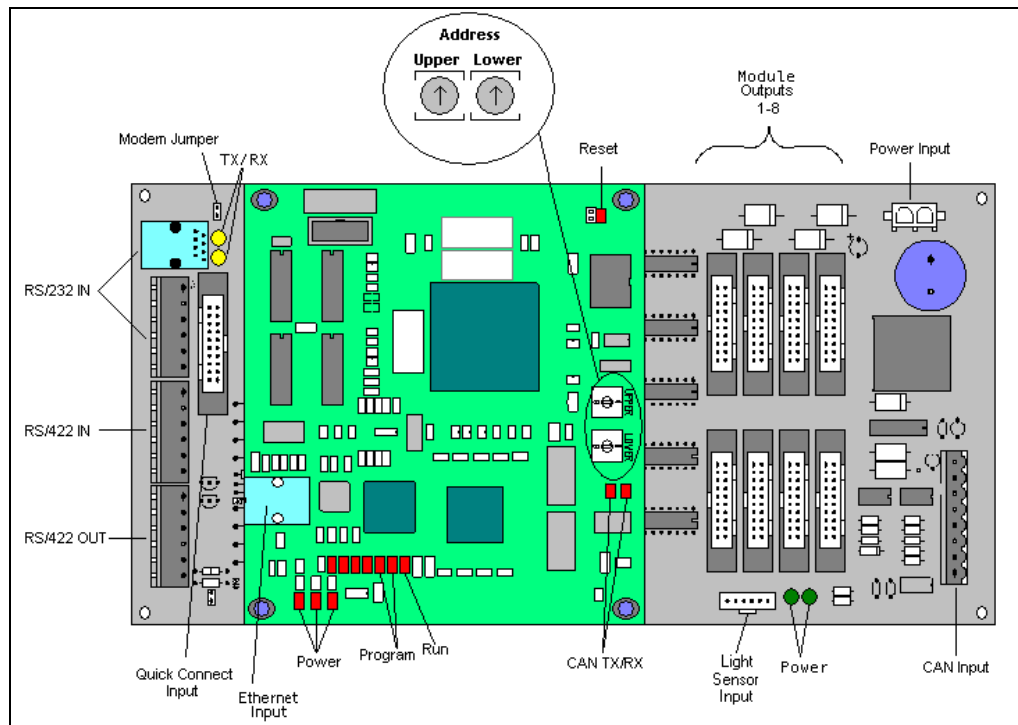


## Controller

### Reference Drawings:

Controller, Galaxy, 8-conn, J1087 ..... **Drawing B-177838**

The controller sends data to the modules. Refer to the signal summary in **Section 4.2** and **Drawing B-177838** for more information. **Figure 36** illustrates a typical controller.



**Figure 36:** Controller Component Layout

The rotary switches set the hardware address, which the software uses to identify that particular display. When replacing a controller board, be sure to set the rotary switches in the same address configuration as the defective controller. Each controller in a network needs a unique address.

**Note:** Setting both rotary switches to address 0 (set the switches to 0 by rotating them counter clockwise until the arrow points to 0) can activate a test mode. The display's power must be turned off, and then turned back on to run the test mode.

Complete the following steps to remove the controller from the display:

1. Disconnect power from J5.
2. Remove all power and signal connections from the board. "Locked" connectors are released by pushing apart the latches then carefully pulling them from the jack. When replacing the board, it is helpful to have the cables labeled for easier replacement.
3. Remove the six screws holding the board in place with a 3/16" nut driver.
4. Follow the previous steps in reverse order to install a new controller board.

The following chart illustrates several common hexadecimal address.

<b>Controller Address Settings</b>		
<b>Upper</b>	<b>Lower</b>	<b>Address</b>
0	0	Test Mode
0	1	1
0	2	2
0	3	3
0	4	4
0	5	5
0	6	6
0	7	7
0	8	8
0	9	9
0	A	10
0	B	11
0	C	12
0	D	13
0	E	14
0	F	15
1	0	16
1	1	17
...	...	...
F	0	240

Four diagnostic LEDs are located on the controller; the table below tells what each LED denotes:

<b>CPU</b>			
<b>LED</b>	<b>Color</b>	<b>Function</b>	<b>Operation</b>
DS1	Red	CAN TxD	Flashes when controller is transmitting CAN information.
DS2	Red	CAN RxD	Flashes when controller is receiving CAN information.
DS3	Red	System Reset	Off when controller is functioning properly. Flashes at 1.5-second rate if controller is not resetting the watchdog timer.
DS4	Red	Run	A steady flash indicates the controller is running properly. Normal flash rate is about once per second.
DS5	Red	U15 Programmed	On when U15 contains a valid logic program.
DS6	Red	U7 Programmed	On when U7 contains a valid logic program.
DS7	Red	Link	On when Ethernet interface is in the link-up condition. Flashes when the Ethernet chip detects transmits or receives activity.
DS8	Red	Speed	On when the Ethernet interface is at 100Mbps. Off when the Ethernet interface is at 10Mbps.
DS9	Red	Duplex	On when the Ethernet interface is at full duplex. Off when the Ethernet interface is at half-duplex.
DS10	Red	Collision	Flashes when the Ethernet interface detects a collision in half-duplex.
DS11	Red	+5V	On when +5V power supply is functioning.
DS12	Red	+3.3V	On when +3.3V power supply is functioning.
DS13	Red	+2.5V	On when +2.5V power supply is functioning.

<b>Product Board</b>			
<b>LED</b>	<b>Color</b>	<b>Function</b>	<b>Operation</b>
DS1	Green	+5V	On when +5V power supply is functioning.
DS2	Green	+3.3V	On when +3.3V power supply is functioning.
DS3	Yellow	COM1 TxD	Flashes when transmitting serial information.
DS4	Yellow	COM1 RxD	Flashes when receiving serial information.
<b>Temp/Light Sensor</b>			
<b>LED</b>	<b>Color</b>	<b>Function</b>	<b>Operation</b>
DS1	Green	+5V	On when +5V power supply is functioning.
DS2	Red	Run	A steady flash indicates the controller is running correctly. Normal flash rate is about once a second. Flashes faster when the sensor is transmitting temp or light information.

## Modules and Drivers

### Reference Drawings:

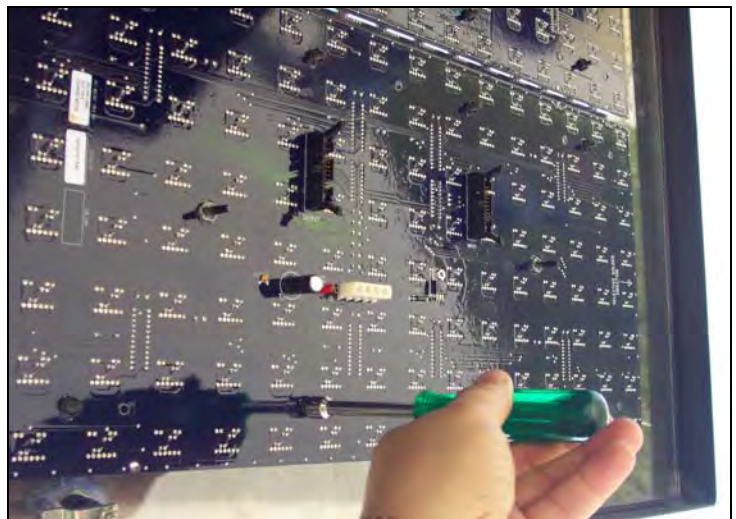
Schem, AF-3112-8-32X\*\*\*\*-34mm-Mono-PM ..... **Drawing C-200002**

The module and driver board are a single functional unit. The LED power supplies are identified as assemblies.

- In displays with 2 red LEDs per pixel, each power supply unit controls up to five modules.
- In displays with 3 amber LEDs per pixel, each power supply unit controls up to five modules.

To remove a module, complete the following steps:

1. Locate the latch access fasteners on the front of the display. With a 5/32" hex wrench turn the latch fasteners a quarter turn as shown in **Section 3.5** for opening the display front.
2. Disconnect and label the wires cables to the module.
3. Remove the ten, 5/16" nuts holding the module to the face panel and the louvers. Gently pull the module away from the face panel.
4. When installing a module, reverse the previous steps.



**Figure 37:** Removing a Module

## Power Supplies

The LED power supplies are identified as A-1591 or A-1633.

Complete the following steps to remove a power supply from the display:

1. Locate the latch access fasteners on the front of the display. With a 5/32" hex wrench turn the latch fasteners a quarter turn as shown in **Section 3.5** for opening the display front.
2. Disconnect and label all the wires connected to the power supply.
3. Remove the hardware holding the power supply in place to free the unit.
4. Follow these steps in reverse order to install a new power supply. Refer to the **Drawing C-200002** when reconnecting the wires.

## Light Detector

The light detector is internally mounted and wired at Daktronics. It is located in the top left corner of the display door on the primary display as shown in **Figure 38**. A 4-conductor cable connects the light detector to the controller. Only the Primary display has a light sensor.



**Figure 38:** Light Sensor In Display

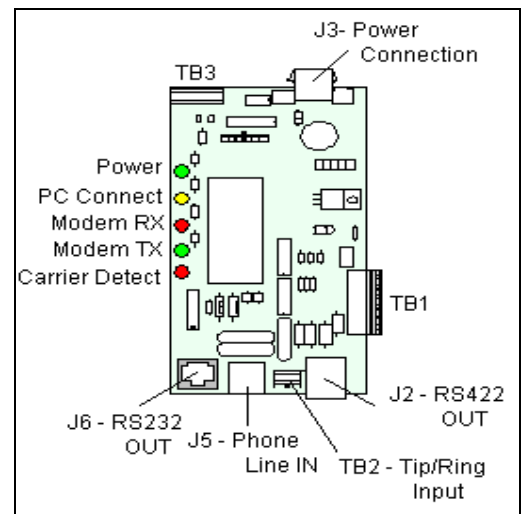
## Modem

If a modem was included with the display, it is located in the modem enclosure mounted at the display. Refer to the modem information in **Section 3.7** for modem enclosure location.

1. To replace a modem, first disconnect the power and signal connections (refer to **Figure 39** on the right for the location of the connectors).
2. The modem is held in place with four screws. Remove the screws using a 3/16" nut driver, and lift the modem out of the display.
3. Install the new modem, replace the screws, and reconnect power and signal cables.

The modem module has five LEDs.

- The power LED should remain lit while power is applied to the modem.
- The modem RX and TX LEDs will flash when communicating.
- The carrier detect LED will light when the modem has established communication to another modem.
- The PC connect LED is not used when this modem is mounted in a display.

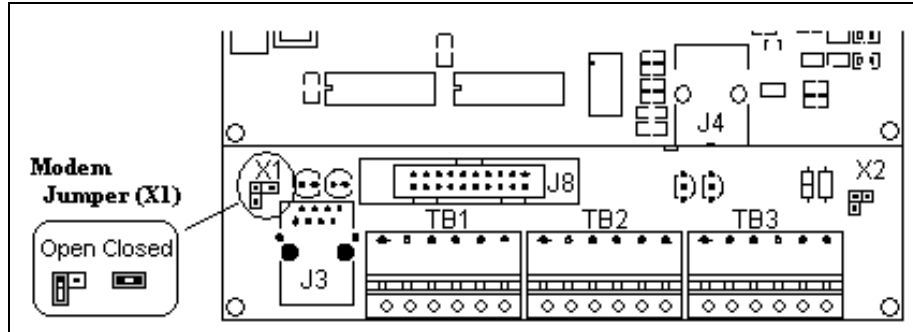


**Figure 39:** Modem

The modem board also has several input and output jacks:

1. J3 is the power input for 12VAC
2. TB2 is a phoenix connector to terminate the Tip and Ring wires
3. J5 is an RJ11 jack for termination of a pre-terminated phone line
4. J6 is the RS232 RJ45 output to the controller
5. J2, TB1, and TB3 are not used in this display application

A modem system requires a jumper (X1) to be set on the controller board. Refer to **Figure 40** below for the location of the jumper settings.



**Figure 40:** Modem Jumper Location

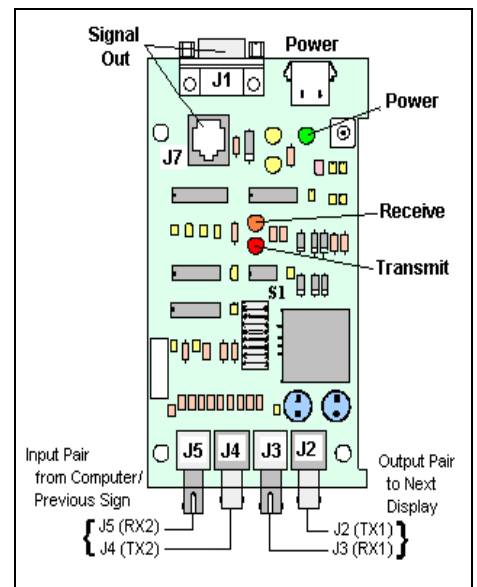
### Fiber Board

If a fiberboard is included with the display, it is located in the fiber enclosure mounted at the display. Refer to the fiber information in **Section 3.7** for fiberboard enclosure location.

1. To replace a fiber optic board, first disconnect the power and signal connections (refer to **Figure 41** for disconnection of power).
2. The fiber optic board is held in place with four screws. Carefully remove them using a 3/16" nut driver.
3. Install the new fiberboard, replace the screws and reconnect power and signal cables.

The fiber module has three LEDs.

- The power LED (DS1) should remain lit while power is applied to the module.
- The receive LED (DS2) will flash when the display fiberboard is accepting signal from the signal converter.
- The transmit LED (DS3) will flash when the display fiberboard is sending to the signal converter.



**Figure 41:** Fiber Optic Board

In addition, the fiber module has two input fiber connectors, which the computer or the previous display connects to, and two output fiber connectors that connect to the next display. A straight through RJ45 cable connects from J7 on the fiberboard to J3 on the controller board.

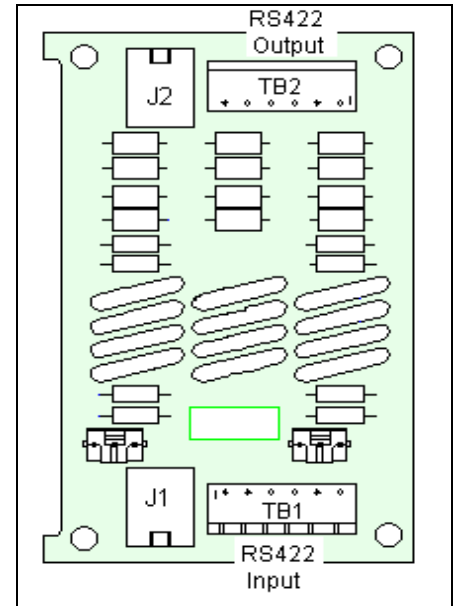
## RS422 Surge Suppressor

If a surge board was included with the display, it is located inside the RS422 enclosure mounted at the display. Refer to the RS422 information in **Section 3.7** for surge board enclosure location.

1. To replace the surge board, first disconnect the signal connections (refer to **Figure 42** on the right).
2. The surge suppressor is held in place with four screws. Carefully remove them using a 3/16" nut driver.
3. Install the new surge suppressor, replace the screws, and reconnect power and signal cables.

The surge suppressor is an inline device that is used to filter the RS422 data line. It suppresses surges down to a low voltage in order to protect the display controller's RS422 input.

**Note:** The surge suppressor must be firmly connected to the enclosure, and the enclosure must be properly grounded in order to be effective. The mounting hardware used to secure the surge suppressor is sufficient if it is fastened properly.



**Figure 42:** RS422 Surge Suppressor

## 4.5 Ventilation Systems (With Fans and Filters)

Ventilation fans should be checked after 1,500 hours of operation and every 1,500 hours after that to ensure the display is being cooled properly. Fans should be checked more often if the display is located in a dusty or harsh weather environment (i.e. along a gravel road with dust laden air).

- 1,500 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.
- 1,500 hours is equivalent to 62 days if the display is running non-stop for 24 hours a day.
- Each time a module is removed, for whatever reason, 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 must be cleaned/changed more often. Fan blades must be kept 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.

To check the operation of the fans, push the bypass button (momentary contact) on the thermostat enclosure to temporarily turn the fans on (The bypass button is located behind A102, top row, and second module from the left).

- Hold your hand or a piece of light paper beneath the display to detect air movement.
- If the fan does not turn or does not operate smoothly, replace it.

## 4.6 Thermostats

A thermostat controls when the ventilation fans are turned on in the display. Refer to **Figure 34** for the location of the thermostat. The ventilation fans turn on when the inside of the display reaches 85° F (29° C), and turn off at 70° F (21° C).

## 4.7 Weather Stripping

To ensure that the display is waterproof, weather stripping has been provided around the entire display and around each module. It is important that the weather stripping is installed properly at all times or water may leak into the display and damage the components.

## 4.8 Display Maintenance

A yearly inspection should be completed to maintain safe and dependable display operation. This inspection should address the following issues:

- **Loose Hardware**  
Verify fasteners, such as bolts and rivets, have not come loose. Fasteners should be checked and tightened or replaced as required.
- **Excessive Dust Buildup**  
Occasionally it may be necessary to vacuum the inside of the display cabinet to remove dust/dirt buildup that may interfere with airflow.
- **Water Intrusion – Water Stain Marks**  
Water can enter the display where weather stripping has come loose or deteriorated, where fasteners have come loose allowing gaps in the panels, or where moisture may be entering around hardware. Be sure to check around the lift eyes or replacement bolts to ensure that water has not entered there. If so, replace hardware immediately to prevent more water from entering the display. Also, check electronic components for possible corrosion.
- **Corrosion**  
Check the paint, and look for possible corrosion especially at footings, structural tie points, and ground rods.

**If any of the above conditions are noticed, action must be taken immediately to correct the situation.**

## 4.9 Troubleshooting

This sub-section contains some symptoms that may be encountered in the displays. This list does not include every possible symptom, but does represent common situations that may occur.

Symptom/Condition	Possible Cause/Remedy
One or more LEDs on a single module fail to light.	<ul style="list-style-type: none"> <li>• Replace/check ribbon cables on the module.</li> <li>• Replace the module.</li> </ul>
One or more LEDs on a single module fail to turn off.	<ul style="list-style-type: none"> <li>• Replace/check ribbon cables on module.</li> <li>• Replace the module.</li> </ul>
A section of the display is not working. The section extends all the way to the right side of the display.	<ul style="list-style-type: none"> <li>• Replace/check the ribbon cable to the first module.</li> <li>• Check that the first module has power.</li> <li>• Replace the first module/driver on the left side of the first module that is not working.</li> <li>• Replace the second module that is not working.</li> <li>• Replace the power supply assembly on the first module that is not working.</li> </ul>
One row of modules does not work or is garbled.	<ul style="list-style-type: none"> <li>• Replace/check ribbon cable to first module.</li> <li>• Check for bent pins on module and controller.</li> <li>• Replace controller.</li> <li>• Replace first module.</li> <li>• Check the fuses in the power termination box.</li> </ul>
A group of modules, (a column or block) which share the same power supply assembly, fail to work.	<ul style="list-style-type: none"> <li>• Check the wire connections at the power supply.</li> <li>• Check power to modules.</li> <li>• Replace the power supply assembly.</li> </ul>
Entire display fails to work.	<ul style="list-style-type: none"> <li>• Check for proper line voltage into the power termination panel.</li> <li>• Check for correct power to controller and modules.</li> <li>• Check fuse in power termination panel.</li> <li>• Check/replace the ribbon cable from the controller to the modules.</li> <li>• Check the voltage settings on the power supplies.</li> <li>• Verify proper use of the software in the V1500 Controller manual (<b>ED13530</b>).</li> <li>• Replace the controller.</li> <li>• (For direct displays) Check the signal cable to the controller using the loopback test.</li> </ul>
Temperature always reads –196F/-127C degrees F/ C	<ul style="list-style-type: none"> <li>• Check temperature sensor connections.</li> <li>• Replace the temperature sensor.</li> <li>• Replace the controller.</li> </ul>
Display is stuck on bright or dim.	<ul style="list-style-type: none"> <li>• Check Manual/Auto dimming in Venus 1500 software.</li> <li>• Check light detector cable.</li> <li>• Check the address on the Light Sensor.</li> <li>• Check light detector for obstructions.</li> <li>• Replace the light detector.</li> <li>• Replace the controller.</li> </ul>



## 4.10 Initialization Operation Information

Every time the display is operated, the display will run through an initialization in which it will display the following:

14. Product Name (Galaxy®)
15. Display Size (Row x Column)
16. Shading (32K RGB)
17. Bootloader Version (OS X.XX)
18. Firmware Number (ED13305)
19. Firmware Revision (Rev X.XX)
20. Hardware Address (HW:XX)
21. Software Address (SW:XX)
22. IP Address: (172.16.192.25)
23. Subnet Msk: (255.255.0.0)
24. COM1 Configuration (C1:V15) ((Modem C1:V15) If a Modem is present)
25. Line Frequency (CLK:60 Hz)
26. Display Name Description

## 4.11 Replacement Parts List

The following tables contain some of the items that may need to be replaced in these displays over a period of time. Many of the parts within the display also list their part numbers on labels affixed to them.

To prevent theft Daktronics recommends purchasing a lockable cabinet to store manuals and replacement/spare parts.

Part Description	Part Number
Controller Galaxy 8 Conn	0A-1229-0005
Module, 2R (1:1) 8x16 (30x70)	0P-1301-1004
Module, 3A (1:1) 8x16 (30x70)	0P-1301-1003
Digital Light Sensor	0P-1247-0003
Digital Temperature Sensor	0P-1247-0007
Temperature Sensor w/Enclosure, Cable 25' w/QC	0A-1151-0005
Thermostat Enclosure 85-70-9L	0A-1213-4024
Fan; 110, <a href="#">CFM@120V</a> , 29-24 watt, 4.5"	B-1006
Fan finger guide (for B-1006 fan)	HS-1036
Transformer; Pri 115V, Sec 10VCT, 3Amp, Primary only	T-1119
Filter, RFI Line 10 AMP 115/250 VAC	Z-1007
<b>Types of Signal boards found in the Enclosure:</b>	
• Surge Suppression Board, RS422	0P-1146-0031
• Modem Board; 232 Coated	0P-1279-0003
• Fiber Board; RS232 to Fiber, 12V	0P-1127-0024
Radio Client	0A-1146-0078
Radio Server (outdoor)	0A-1146-0079
Signal Converter (RS232/RS422)	0A-1127-0237

Signal Converter (RS232/Fiber)	0A-1127-0239
<b>Quick Connect Cable from Enclosure:</b>	
• QC Enclosure Cable (RS232, Fiber, and Modem)	W-1484
• QC Enclosure Cable (RS422)	W-1504
<b>Ribbon Cables; 20 Position</b>	
• Cable Assy; 20 pos. Ribbon 18", Dual Row	W-1387
• Ribbon Assy; 20 pos, 30"	0A-1000-0017
• Ribbon Assy; 20 pos, 36"	0A-1000-0018
• Ribbon Assy; 20 pos, 60"	0A-1000-0021
Cable; 22 AWG, 2-pair, (Light or Temp Sensor to Controller)	W-1234
Cable; 31-pin male to 31-pin male, 6', QC	W-1503
31-pin, Quick Connect Input/Output Board	0P-1229-2005
Power Supply (2 Red, A-1591)	A-1591
Power Supply (3 Amber, A-1633)	A-1633
Electrical Contact Cleaner Lubricant / Cal-Lube	CH-1019
Hex Wrench, T-Handle 1/8" RT	TH-1062
Manual; Venus 1500 Operator's, Version 3.0	<b>ED13530</b>

## 4.12 Daktronics Exchange and Repair and Return Programs

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

Daktronics' unique Exchange Program is a quick, economical service for replacing key components in need of repair. If a component fails, Daktronics sends the customer a replacement, and the customer, in turn, sends the failed component to Daktronics. This not only saves money, but also decreases display downtime.

Daktronics provides these plans to ensure users get the most from their Daktronics products, and it offers the service to qualified customers who follow the program guidelines explained below. Please call the Help Desk – 877-605-1113 – if you have questions regarding the Exchange Program or any other Daktronics service.

When you call the 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 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 box and packaging in which the replacement part arrived attach the enclosed UPS shipping document, and **return the part to Daktronics**. In most circumstances, you will be invoiced for the replacement part at the time it is shipped. This bill, which represents the exchange price, is due when you receive it.

Daktronics expects immediate return of an exchange part if it does not solve the problem. The company also reserves the right to refuse equipment that has been

damaged due to acts of nature or causes other than normal wear and tear., fill out and

If you do not ship the defective equipment Daktronics within 30 working days from the invoice date, Daktronics assumes you are purchasing the replacement part outright (with no exchange), and you will be invoiced for it. This second invoice represents the difference between the exchange price and the full purchase price of the equipment. The balance is due when you receive the second invoice. If you return the exchange equipment after 30 working days from the invoice date, you will be credited for the amount on the second invoice, minus a restocking fee. **To avoid a restocking charge, you must 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.

**Return Materials Authorization:** To return parts for service, contact your local representative prior to shipment to acquire a Return Material Authorization (RMA) number. If you do not have a local representative, call the Daktronics Help Desk for the RMA. This expedites repair of your component when it arrives at Daktronics.

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

*This is how to reach us:*

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

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

**Fax:** 605-697-4444

**E-mail:** [helpdesk@daktronics.com](mailto:helpdesk@daktronics.com)



# Appendix A: Reference Drawings

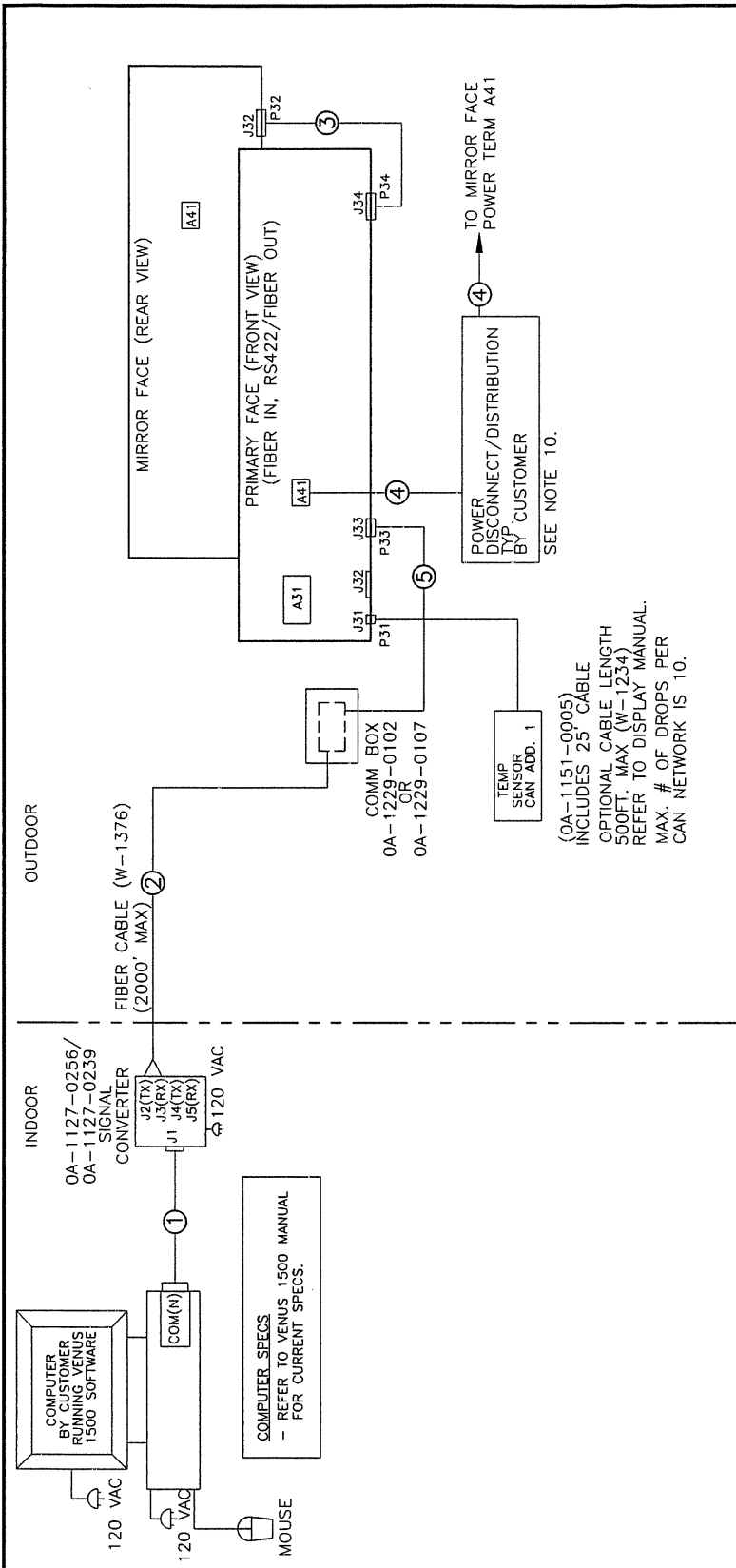
---

Refer to **Section 1.1** for information on reading drawing numbers. The following drawings are listed in numerical order by size (A, B, C, etc.)

System Riser Diagram, QC Outdoor Radio, Gen 2.....	<b>Drawing A-185359</b>
System Riser Diagram, Fiber Comm Box Term.....	<b>Drawing A-187293</b>
Shop Drawing, AF-3112-2480-34-SF-* -P/M.....	<b>Drawing A-193720</b>
System Riser Diagram, RS232 Comm Box.....	<b>Drawing A-199104</b>
System Riser Diagram, RS422 Comm Box.....	<b>Drawing A-199144</b>
System Riser Diagram, Modem Comm Box.....	<b>Drawing A-199218</b>
Power Specs, 8x144 – 32x144, AF-3112, Amber .....	<b>Drawing A-200044</b>
Power Specs, 8x144 – 32x144, AF-3112, Red .....	<b>Drawing A-200045</b>
Assy, Electrical Plate, AF-3112-****-34mm.....	<b>Drawing A-200282</b>
Shop Drawing, AF-3112-1680-34-SF-* -P/M.....	<b>Drawing A-201993</b>
Controller, Galaxy, 8 Conn, J1087 .....	<b>Drawing B-177838</b>
F Assy, AF-3112-2480-34mm .....	<b>Drawing B-200259</b>
Schem, AF-3112-8-32***-34mm-Mon-PM.....	<b>Drawing C-200002</b>







**NOTES:**

- 1 SERIAL CABLE, DB9-F TO DB25-M, 6 FT. DAK. P.N. (W-1249)
- 2 FIBER CABLE, 62.5/125 GRADE GRAYBAR P.N. (W-1376)
- 3 31 PIN, 22 AWG, STRANDED, SHIELDED CABLE, DAK. P.N. (W-1503), 6 FT IN LENGTH. FIELD SIGNAL TERMINATION TO BE 31 POS QUICK CONNECT. INCLUDED WITH MIRROR FACE.
- 4 POWER FEEDER SIZED AS NEEDED BY CUSTOMER
- 5 6 CONDUCTOR, 22 AWG, STRANDED CABLE. LENGTH TO BE 25 FT. MAX. SIGNAL TERMINATION TO BE 6 POS QUICK CONNECT.
- 6 INPUT TO SIGNAL CONVERTER IS RS232.
7. ALL SIGNAL CABLES BY CUSTOMER. LABOR TO PULL CABLES BY CUSTOMER.
8. ALL POWER WIRES BY CUSTOMER. LABOR TO PULL WIRES BY CUSTOMER.
9. ALL WIRING TO MEET NEC AND LOCAL ELECTRICAL CODES.
10. DISPLAYS MUST BE GROUNDED PER ARTICLE 250 AND 600 OF THE NATIONAL ELECTRICAL CODE.
11. A31= CONTROLLER ASSEMBLY

DETAIL: A

COMPUTER	SIGNAL CONVERTER	FIELD CABLE BOARD	COMM BOX
J2(TX)	J3(RX)	J4(TX)	J5(RX)
J3(RX)	J4(TX)	J5(RX)	J6(TX)

REV	DATE	DESCRIPTION	BY	APPR.
04	26 MAR 04	REPLACED 0A-1127-0239 WITH 0A-1127-0256 (INCLUDES SURGE PROTECTION)	SAI	DJM
03	26DEC03	REMOVED NOTE 3. THIS NOTE GAVE DETAIL ABOUT THE TEMP SENSOR CABLE.	DJM	
02	11NOV03	ADDED 0A-1229-0107 COMM BOX PART NUMBER REMOVED SERIAL ADAPTOR NOTE.	DJM	
01	15AUG03	CHANGED MIRROR SIGNAL LABEL FROM J31 TO J32	DJM	

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DAKTRONICS, INC. BROOKINGS, SD 57006

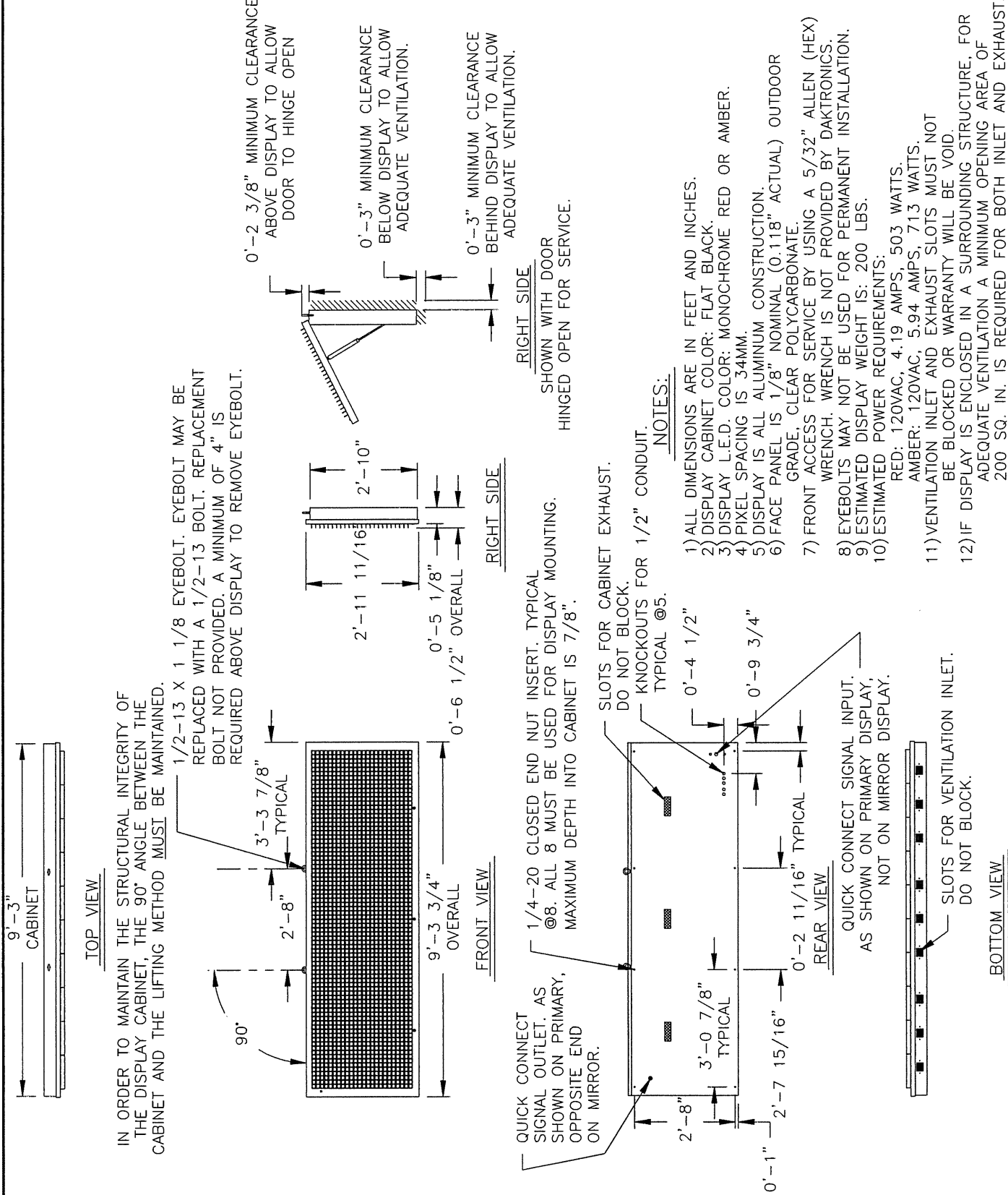
PROJ: M2 MATRIX CONTROLLER

TITLE: SYSTEM RISER DIAGRAM, FIBER COMM BOX TERM

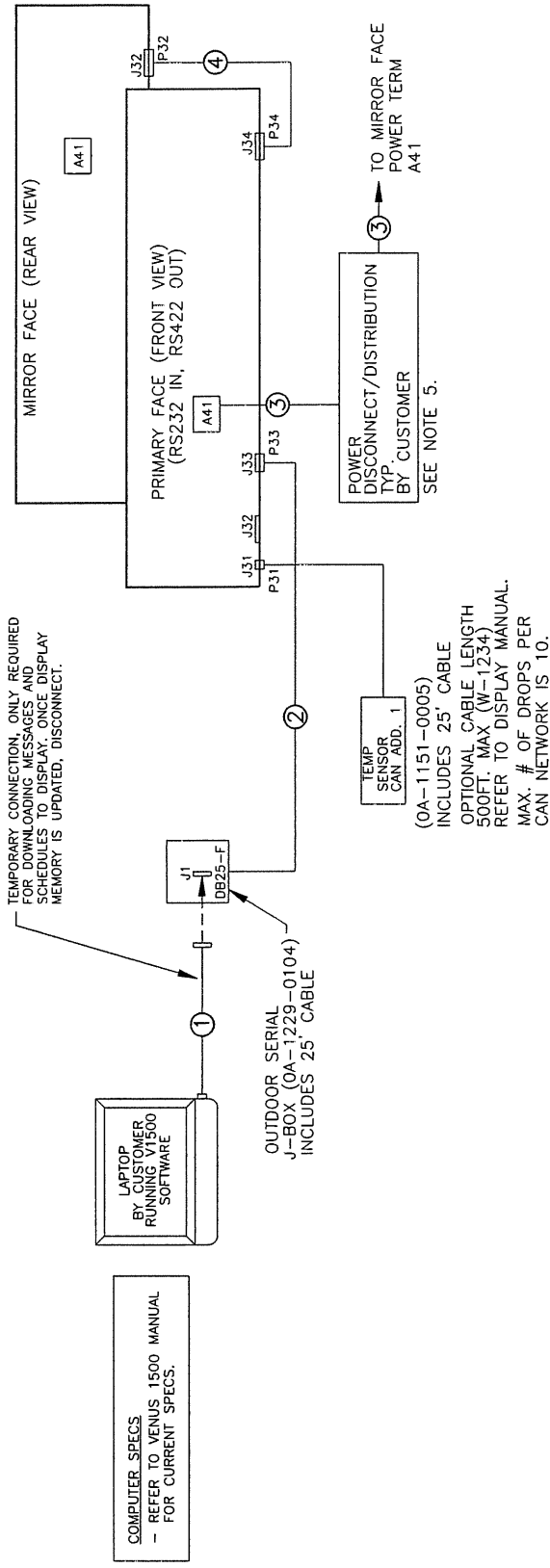
DES. BY: DRAWN BY: DMATHERN DATE: 18 APR 03

REVISION 04 APPR BY: SCALE: NONE 1229-R01A-187293





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03	2JAN04	MOVED KNOCKOUTS TO MATCH NEW STANDARD. UPDATED POWER REQUIREMENTS AND SEPARATED RED AND AMBER.	DJD	
02	31DEC03	UPDATED DIMENSIONS TO MATCH LATEST STANDARD. ADDED QUICK CONNECT SIGNAL INPUT.	DJD	
01	12AUG03	CHANGED EXHAUST LOUVERS TO SLOTS. ADDED VENTILATION INLETS. CHANGED DISPLAY HEIGHT AND VERTICAL SPACING OF MOUNTING NUTSERTS.	DJD	
REV	DATE	DESCRIPTION	BY	APPR.
03				
DAKTRONICS, INC. BROOKINGS, SD 57006				
PROJ: OUTDOOR GALAXY DISPLAYS				
TITLE: SHOP DWG, AF-3112-2480-34-SF-*-P/M				
DES. BY: DDAGGITT		DRAWN BY: DDAGGITT		DATE: 31JUL03
REVISION	APPR. BY:	1301-E10A-193720		
03	SCALE: 1"=3'-6"			

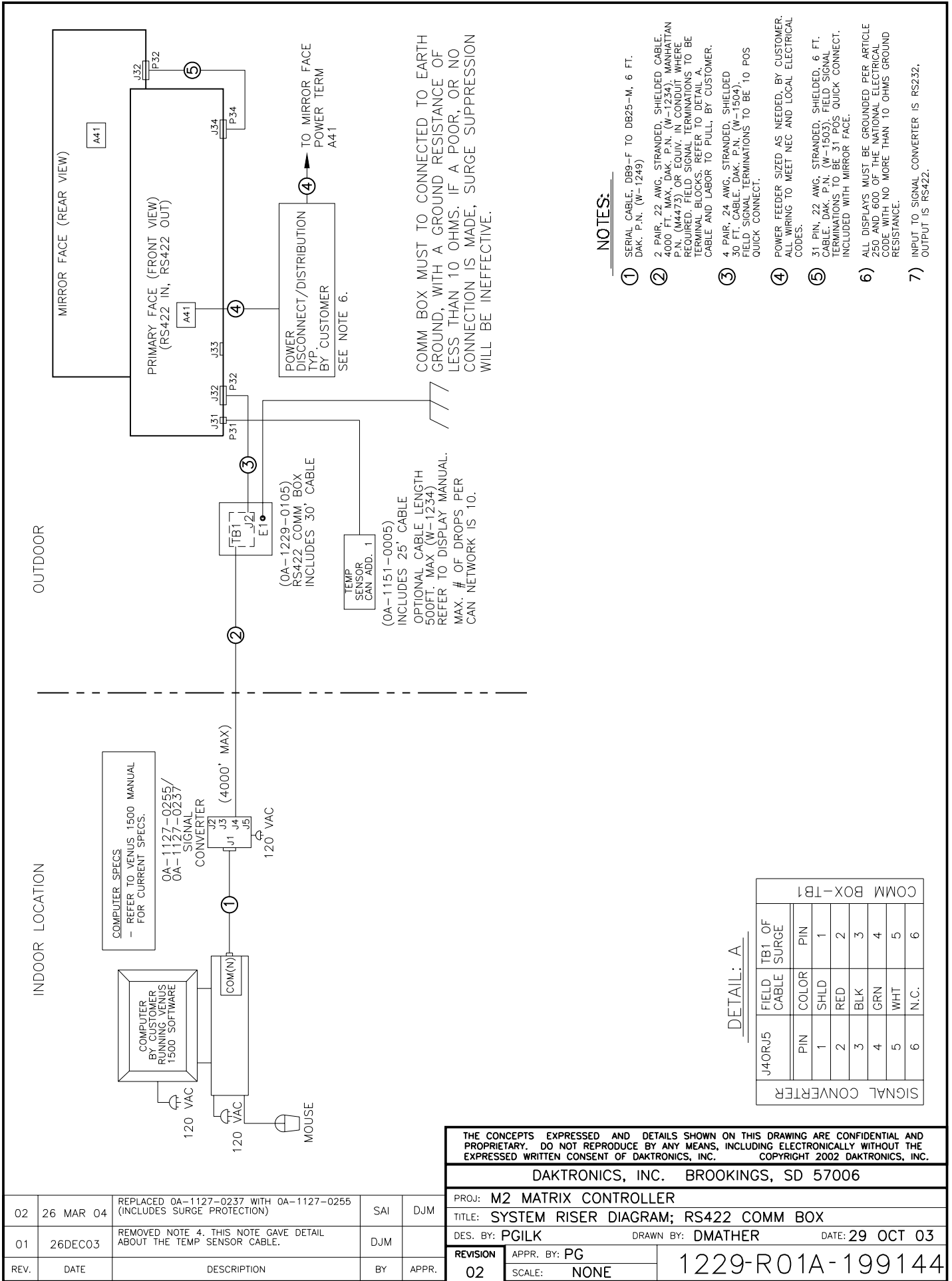


**NOTES:**

- 1 SERIAL CABLE, DB9-F TO DB25-M, 6 FT. DAK. P.N. (W-1249)
- 2 6 CONDUCTOR, 22 AWG, STRANDED, SHIELDED 25 FT. CABLE, DAK. P.N. (W-1484). FIELD SIGNAL TERMINATION TO BE 6 POS QUICK CONNECT.
- 3 POWER FEEDER SIZED AS NEEDED, BY CUSTOMER. ALL WIRING TO MEET NEC AND LOCAL ELECTRICAL CODES.
- 4 31 PIN, 22 AWG, STRANDED, SHIELDED, 6 FT. CABLE, DAK. P.N. (W-1503). FIELD SIGNAL TERMINATION TO BE 31 POS. QUICK CONNECT. INCLUDED WITH MIRROR FACE.
- 5 ALL DISPLAYS MUST BE GROUNDED PER ARTICLE 250 AND 600 OF THE NATIONAL ELECTRICAL CODE WITH NO MORE THAN 10 OHMS GROUND RESISTANCE.
- 6 INPUT TO J-BOX IS RS232, OUTPUT IS RS232.

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DAKTRONICS, INC. BROOKINGS, SD 57006			
PROJ: M2 MATRIX CONTROLLER			
TITLE: SYSTEM RISER DIAGRAM; RS232 COMM BOX			
DES BY: PGILK		DRAWN BY: DMATHER	
DATE: 28 OCT 03			
REVISION	APPR. BY: PG	1229-R01A-199104	
01	SCALE: NONE		

01	26DEC03	REMOVED NOTE 3. THIS NOTE GAVE DETAIL ABOUT THE TEMP SENSOR CABLE.	DJM	
REV.	DATE	DESCRIPTION	BY	APPR.



**NOTES:**

- ① SERIAL CABLE, DB9-F TO DB25-M, 6 FT. DAK. P.N. (W-1249)
- ② 2 PAIR, 22 AWG, STRANDED, SHIELDED CABLE, 400 FT. MAX. DAK. P.N. (W-1503) MANHATTAN P.N. (M4473) OR EQUIV. IN CONDUIT WHERE REQUIRED. FIELD SIGNAL TERMINATIONS TO BE TERMINAL BLOCKS. REFER TO DETAIL A. CABLE AND LABOR TO PULL, BY CUSTOMER.
- ③ 4 PAIR, 24 AWG, STRANDED, SHIELDED 30 FT. CABLE. DAK. P.N. (W-1504). FIELD SIGNAL TERMINATIONS TO BE TO POS QUICK CONNECT.
- ④ POWER FEEDER SIZED AS NEEDED, BY CUSTOMER. ALL WIRING TO MEET NEC AND LOCAL ELECTRICAL CODES.
- ⑤ 31 PIN, 22 AWG, STRANDED, SHIELDED, 6 FT. CABLE, DAK. P.N. (W-1503). FIELD SIGNAL TERMINATIONS TO BE 31 POS QUICK CONNECT. INCLUDED WITH MIRROR FACE.
- ⑥ ALL DISPLAYS MUST BE GROUNDED PER ARTICLE 250 AND 600 OF THE NATIONAL ELECTRICAL CODE WITH NO MORE THAN 10 OHMS GROUND RESISTANCE.
- ⑦ INPUT TO SIGNAL CONVERTER IS RS232. OUTPUT IS RS422.

**DETAIL: A**

SIGNAL CONVERTER		COMM BOX-TB1	
J40RJ5	FIELD CABLE	TB1 OF SURGE	
PIN	COLOR	PIN	
1	SHLD	1	
2	RED	2	
3	BLK	3	
4	GRN	4	
5	WHT	5	
6	N.C.	6	

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DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: M2 MATRIX CONTROLLER

TITLE: SYSTEM RISER DIAGRAM; RS422 COMM BOX

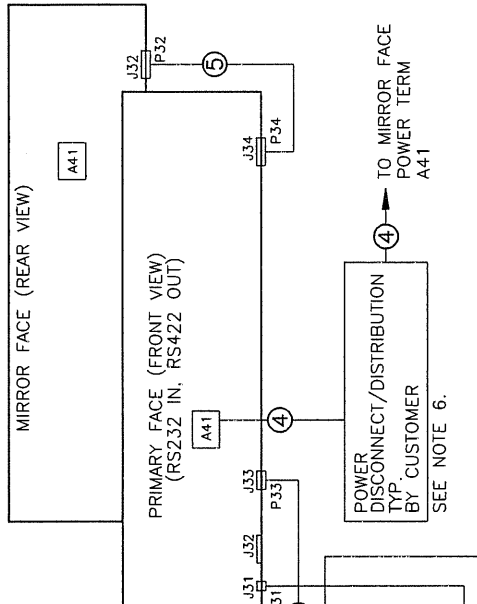
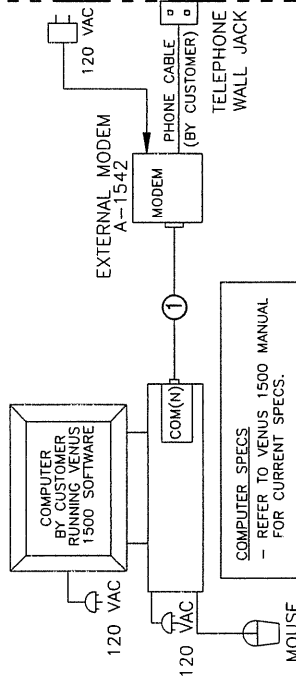
DES. BY: PGILK DRAWN BY: DMATHER DATE: 29 OCT 03

REVISION	APPR. BY: PG	1229-R01A-199144
02	SCALE: NONE	

REV.	DATE	DESCRIPTION	BY	APPR.
02	26 MAR 04	REPLACED 0A-1127-0237 WITH 0A-1127-0255 (INCLUDES SURGE PROTECTION)	SAI	DJM
01	26DEC03	REMOVED NOTE 4. THIS NOTE GAVE DETAIL ABOUT THE TEMP SENSOR CABLE.	DJM	

INDOOR LOCATION

OUTDOOR



(0A-1229-0106)  
MODEM COMM BOX  
INCLUDES 25' CABLE

TEMP  
SENSOR  
CAN ADD. 1

(0A-1151-0005)  
INCLUDES 25' CABLE  
OPTIONAL CABLE LENGTH  
500FT. MAX (W-1234)  
REFER TO DISPLAY MANUAL.  
MAX. # OF DROPS PER  
CAN NETWORK IS 10.

COMM BOX MUST BE CONNECTED TO EARTH GROUND, WITH A GROUND RESISTANCE OF LESS THAN 10 OHMS. IF A POOR, OR NO CONNECTION IS MADE, SURGE SUPPRESSION WILL BE INEFFECTIVE.

NOTES:

- ① SERIAL CABLE, DB9-F TO DB25-M, 6 FT. DAK. P.N. (W-1249)
- ② DEDICATED MODEM LINE. BY CUSTOMER CONSULT LOCAL PHONE COMPANY FOR IDENTIFICATION OF "TIP & RING". FIELD TERMINATIONS TO BE TERMINAL BLOCKS. REFER TO DETAIL A.
- ③ 6 CONDUCTOR, 22 AWG, STRANDED, SHIELDED 25 FT. CABLE. DAK. P.N. (W-1977). FIELD SIGNAL TERMINATIONS TO BE 6 POS QUICK CONNECT.
- ④ POWER FEEDER SIZED AS NEEDED. BY CUSTOMER. ALL WIRING TO MEET NEC AND LOCAL ELECTRICAL CODES.
- ⑤ 31 PIN, 22 AWG, STRANDED, SHIELDED, 6 FT. CABLE. DAK. P.N. (W-1503). FIELD SIGNAL TERMINATIONS TO BE 31 POS QUICK CONNECT. INCLUDED WITH MIRROR FACE.
- ⑥ ALL DISPLAYS MUST BE GROUNDED PER ARTICLE 250 AND 600 OF THE NATIONAL ELECTRICAL CODE WITH NO MORE THAN 10 OHMS GROUND RESISTANCE.
- ⑦ INPUT TO MODEM IS DEDICATED MODEM LINE. INPUT IS RS232.

DETAIL: A

FIELD TB1 OF CABLE MODEM		MODEM TB2	
COLOR	PIN	TIP	RING
	1		2

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DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: M2 MATRIX CONTROLLER

TITLE: SYSTEM RISER DIAGRAM; MODEM COMM BOX

DES BY: PGILK

DRAWN BY: DMATHER

DATE: 30 OCT 03

REV.	DATE	DESCRIPTION	BY	APPR.
01	26DEC03	REMOVED NOTE 4. THIS NOTE GAVE DETAIL ABOUT THE TEMP SENSOR CABLE.	DJM	

REVISION 01

APPR. BY: PG  
SCALE: NONE

1229-R01A-199218

AF-3200-34mm LOUVERED AMBER GALAXY DISPLAYS  
POWER SPECIFICATION CHART

MATRIX SIZE	TOTAL WATTS	120V AMPS	240V AMPS
8X32	93	0.78	0.39
8X48	157	1.30	0.65
8X64	196	1.63	0.82
8X80	235	1.96	0.98
8X96	298	2.48	1.24
8X112	361	3.01	1.51
16X32	172	1.43	0.71
16X48	274	2.28	1.14
16X64	376	3.14	1.57
16X80	455	3.79	1.89
16X96	557	4.64	2.32
16X112	635	5.29	2.65
24X32	274	2.28	1.14
24X48	415	3.46	1.73
24X64	557	4.64	2.32
24X80	674	5.62	2.81
24X96	816	6.80	3.40
24X112	933	7.78	3.89
32X32	352	2.93	1.47
32X48	533	4.44	2.22
32X64	713	5.95	2.97
32X80	870	7.25	3.62
32X96	1051	8.76	4.38
32X112	1207	10.06	5.03

BY USING THE PROPER POWER TERM PANEL, THE ABOVE  
DISPLAY SIZES CAN BE POWERED BY 120VAC (2 WIRE + GND)  
OR 240VAC (2 WIRE + GND) SERVICES (EXCEPT WHERE NOTED).

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<b>DAKTRONICS, INC. BROOKINGS, SD 57006</b>			
PROJ: GALAXY, LOUVERED, VENUS 1500, 34MM, AF-3200			
TITLE: POWER SPECS, 8X112-32X112 DISPLAYS			
DES. BY: LKERR		DRAWN BY: DMATHER	
		DATE: 18 NOV 03	
REVISION	APPR. BY:	<span style="font-size: 2em;">1301-R10A-200044</span>	
01	SCALE: 1=1		

01	01 MAR 04	REVISED POWER SPECS FOR DRIVER WATTAGE	LLK	
REV	DATE	DESCRIPTION	BY	APPR

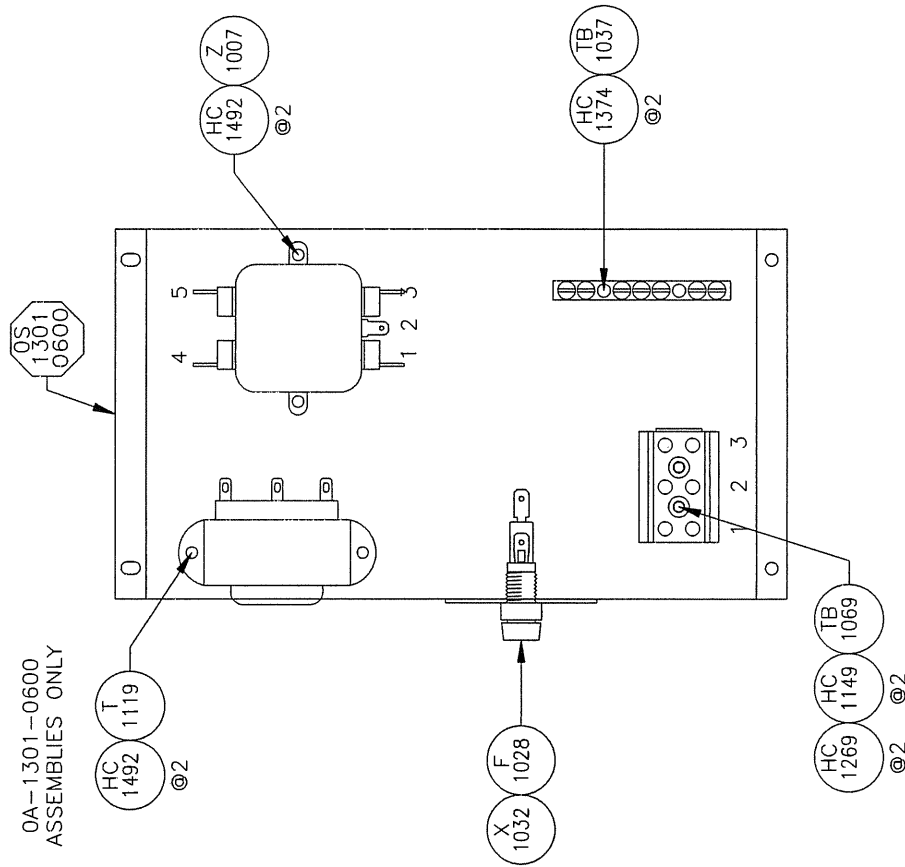
AF-3200-34mm LOUVERED RED GALAXY DISPLAYS  
POWER SPECIFICATION CHART

MATRIX SIZE	TOTAL WATTS	120V AMPS	240V AMPS
8X32	67	0.56	0.28
8X48	117	0.98	0.49
8X64	143	1.20	0.60
8X80	169	1.41	0.71
8X96	220	1.83	0.92
8X112	270	2.25	1.12
16X32	119	0.99	0.50
16X48	196	1.63	0.81
16X64	272	2.27	1.13
16X80	324	2.70	1.35
16X96	400	3.34	1.67
16X112	452	3.77	1.89
24X32	196	1.63	0.81
24X48	298	2.48	1.24
24X64	400	3.34	1.67
24X80	478	3.99	1.99
24X96	581	4.84	2.42
24X112	659	5.49	2.75
32X32	248	2.06	1.03
32X48	376	3.13	1.57
32X64	505	4.20	2.10
32X80	609	5.07	2.54
32X96	737	6.14	3.07
32X112	842	7.01	3.51

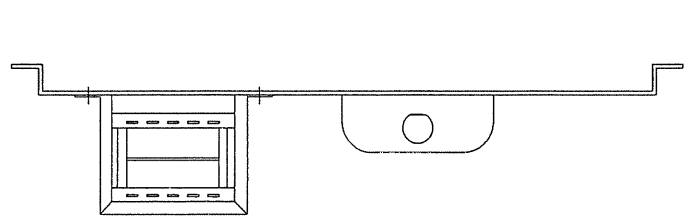
BY USING THE PROPER POWER TERM PANEL, THE ABOVE  
DISPLAY SIZES CAN BE POWERED BY 120VAC (2 WIRE + GND)  
OR 240VAC (2 WIRE + GND) SERVICES (EXCEPT WHERE NOTED).

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<b>DAKTRONICS, INC. BROOKINGS, SD 57006</b>			
PROJ: GALAXY, LOUVERED, VENUS 1500, 34MM, AF-3200			
TITLE: POWER SPECS, 8X112-32X112 DISPLAYS			
DES. BY: LKERR		DRAWN BY: DMATHER	
		DATE: 18 NOV 03	
REVISION	APPR BY:	<span style="font-size: 1.5em;">1301-R10A-200045</span>	
01	SCALE: 1=1		

01	01 MAR 04	REVISED POWER SPECS FOR DRIVER WATTAGE	LLK	
REV.	DATE	DESCRIPTION	BY	APPR.



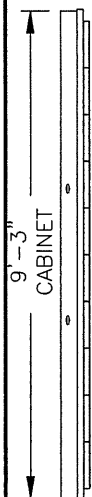
FRONT VIEW



RIGHT SIDE

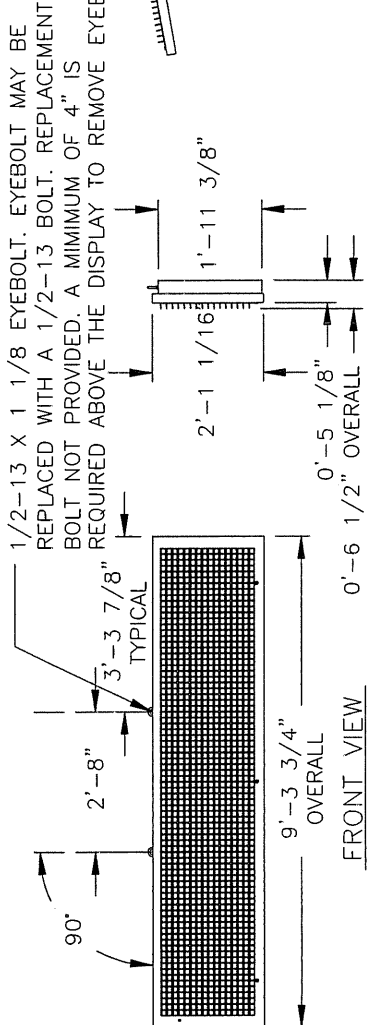
THE CONCEPTS EXPRESSED AND DETAILS SHOWN ON THIS DRAWING ARE CONFIDENTIAL AND PROPRIETARY. DO NOT REPRODUCE BY ANY MEANS, INCLUDING ELECTRONICALLY WITHOUT THE EXPRESSED WRITTEN CONSENT OF DAKTRONICS, INC. COPYRIGHT 2003 DAKTRONICS, INC.			
DAKTRONICS, INC. BROOKINGS, SD 57006			
PROJ: OUTDOOR GALAXY DISPLAYS			
TITLE: ASSY, ELECTRICAL PLATE, AF-3112-****-34			
DES. BY: DDAGGITT		DRAWN BY: DDAGGITT	
		DATE: 24NOV03	
REVISION	APPR. BY:	1301-E10A-200282	
00	SCALE: 1=3		

REV	DATE	DESCRIPTION	BY	APPR.



TOP VIEW

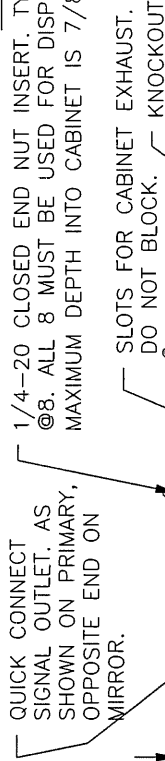
IN ORDER TO MAINTAIN THE STRUCTURAL INTEGRITY OF THE DISPLAY CABINET, THE 90° ANGLE BETWEEN THE CABINET AND THE LIFTING METHOD MUST BE MAINTAINED.



FRONT VIEW

RIGHT SIDE

1/4-20 CLOSED END NUT INSERT, TYPICAL @8. ALL 8 MUST BE USED FOR DISPLAY MOUNTING. MAXIMUM DEPTH INTO CABINET IS 7/8".

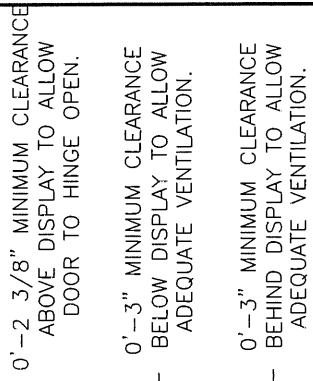


REAR VIEW

QUICK CONNECT SIGNAL INPUT, AS SHOWN ON PRIMARY DISPLAY, NOT ON MIRROR DISPLAY.



BOTTOM VIEW



RIGHT SIDE

SHOWN WITH DOOR HINGED OPEN FOR SERVICE.

NOTES:

- 1) ALL DIMENSIONS ARE IN FEET AND INCHES.
- 2) DISPLAY CABINET COLOR: FLAT BLACK.
- 3) DISPLAY L.E.D. COLOR: RED OR AMBER.
- 4) PIXEL SPACING IS 34MM.
- 5) DISPLAY IS ALL ALUMINUM CONSTRUCTION.
- 6) FACE PANEL IS 1/8" NOMINAL (0.118" ACTUAL) OUTDOOR GRADE, CLEAR POLYCARBONATE.
- 7) FRONT ACCESS FOR SERVICE BY USING A 5/32" ALLEN (HEX) WRENCH. WRENCH IS NOT PROVIDED BY DAKTRONICS.
- 8) EYEBOLTS MAY NOT BE USED FOR PERMANENT INSTALLATION.
- 9) ESTIMATED DISPLAY WEIGHT IS: 130 LBS.
- 10) ESTIMATED POWER REQUIREMENTS:  
 RED: 120VAC, 2.84 AMPS, 340 WATTS.  
 AMBER: 120VAC, 4.00 AMPS, 480 WATTS.
- 11) VENTILATION INLET AND EXHAUST SLOTS MUST NOT BE BLOCKED OR WARRANTY WILL BE VOID.
- 12) IF DISPLAY IS ENCLOSED IN A SURROUNDING STRUCTURE, FOR ADEQUATE VENTILATION A MINIMUM OPENING AREA OF 200 SQ. IN. IS REQUIRED FOR BOTH INLET AND EXHAUST.

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DAKTRONICS, INC. BROOKINGS, SD 57006			
PROJ: OUTDOOR GALAXY DISPLAYS			
TITLE: SHOP DRAWING, AF-3112-1680-34-SF-*--P/M			
DES. BY: DDAGGITT		DRAWN BY: DDAGGITT	
		DATE: 2JAN04	
REVISION	APPR. BY:	1301-E10A-201993	
00	SCALE: 1"=3'-6"		

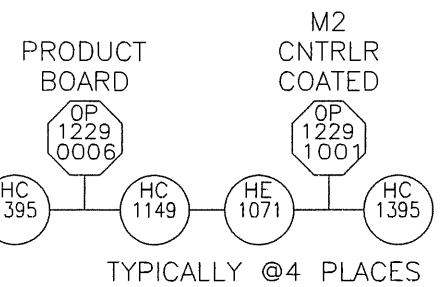
REV.	DATE	DESCRIPTION	BY	APPR.



FUNCTION	PIN	PIN	FUNCTION
DTIN-P	1	A	I/O_00
DTIN-N	2	B	D1OUT-P
+V_LINREG	3	C	D1OUT-N
TX_COM1	4	D	AGND_IN
GND	5	E	D2_OUT-N
D2OUT-P	6	F	D2IN-P
RX_COM1	7	H	D2IN-N
DCD_COM1	8	J	AGND
CANH	9	K	+5V_CAN
CANL	10	L	GND_CAN

FUNCTION	PIN	PIN	FUNCTION
TCK	1	2	GND
TDO	3	4	+3.3V
TMS	5	6	N.C.
N.C.	7	8	N.C.
TDI	9	10	GND

FUNCTION	PIN	PIN	FUNCTION
TDO1	1	2	N.C.
TDI1	3	4	TRST1
N.C.	5	6	+3.3V
TCK1	7	8	N.C.
TMS1	9	10	N.C.
HALT	11	12	N.C.
N.C.	13	14	KEYING PIN
N.C.	15	16	GND



PIN	FUNCTION
2	10VAC
1	10VAC

INSTALL JUMPER FOR MODEM USE.

PIN	FUNCTION
1	GND
2	RTS
3	I/O
4	TX
5	GND
6	RX
7	DCD
8	GND

RS232 IN

PIN	FUNCTION
1	RTS
2	GND
3	TX
4	GND
5	RX
6	DCD

RS232 IN

PIN	FUNCTION
1	N.C.
2	OUT+
3	OUT-
4	IN+
5	IN-
6	N.C.

RS422 IN

PIN	FUNCTION
1	AGND
2	OUT-
3	OUT+
4	IN-
5	IN+
6	AGND

RS422 OUT

INSTALL JUMPER FOR RESET USE.

PIN	FUNCTION
1	TX+
2	TX-
3	RX+
4	CHGND
5	CHGND
6	RX-
7	CHGND
8	CHGND

ETHERNET J4

FIRMWARE REVISION DATE

EPLD PROGRAM REVISION DATE

UPPER / LOWER ADDRESS SWITCHES

PIN	FUNCTION
1	LIGHT-P
2	LIGHT-N
3	+5V-P
4	GND-N
5	SHIELD-N
6	N.C.

PIN	FUNCTION
8	CANL
7	CANH
6	CAN_GND
5	RELAY
4	CANL
3	CANH
2	CAN_GND
1	CAN_+5V

TB4

REV.	DATE	DESCRIPTION	BY	APPR
03	14 APR 04	OP-1229-0004 TO OP-1229-1001 M2 CONTROLLER, GEN II.	MER	
02	23 FEB 04	ADDED HC-1149 WASHER TO STANDOFF FOR M2 TYP. @4	WT	
01	09 JUL 03	CORRECT REF. TABLE FOR TB4	WT	

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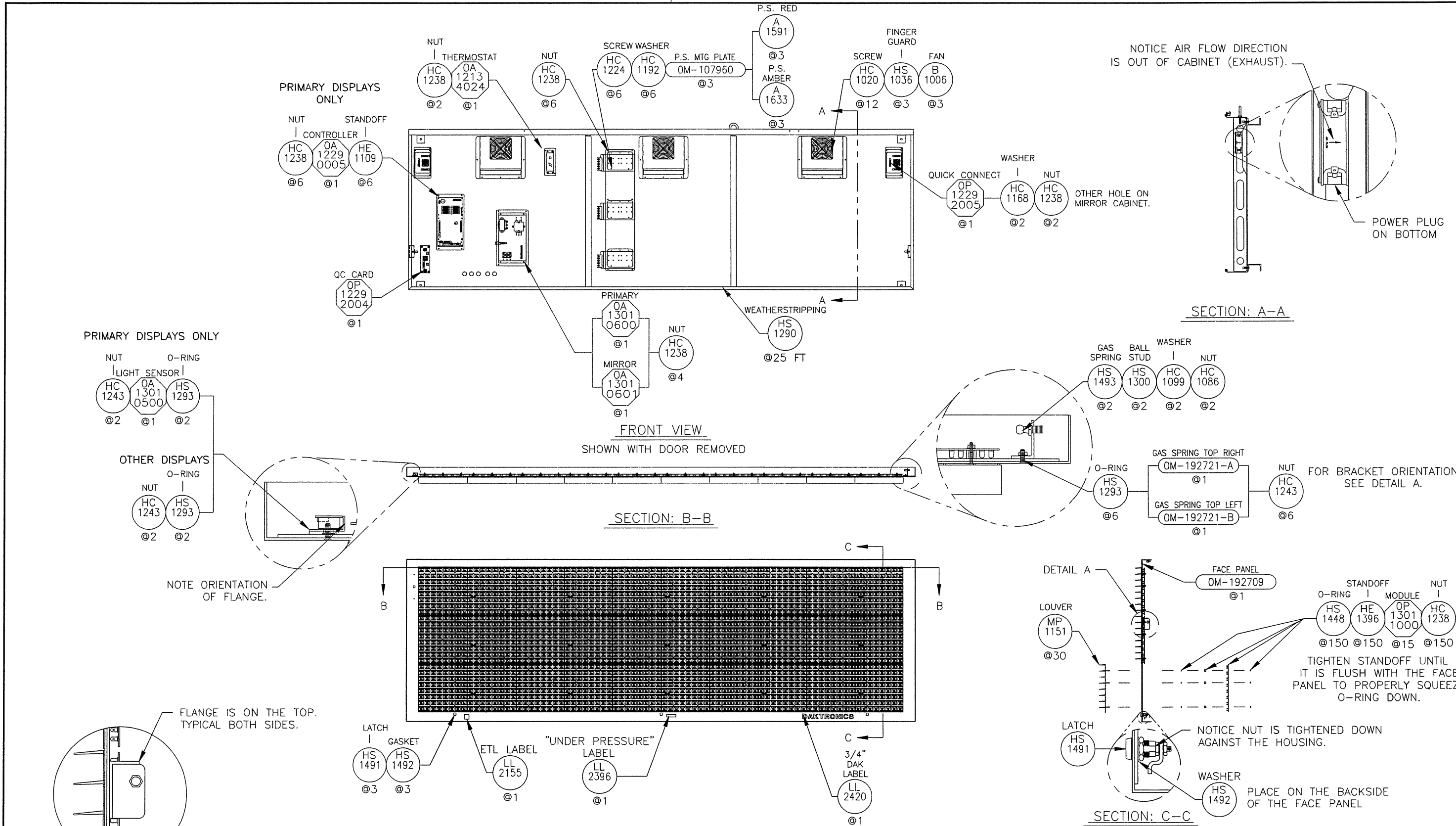
DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: CNTRLR, GALAXY, 8 CONN, J1087

DES BY: WTAYLOR DATE: 04 NOV 02

REVISION 03 APPR BY: SCALE: 1=1

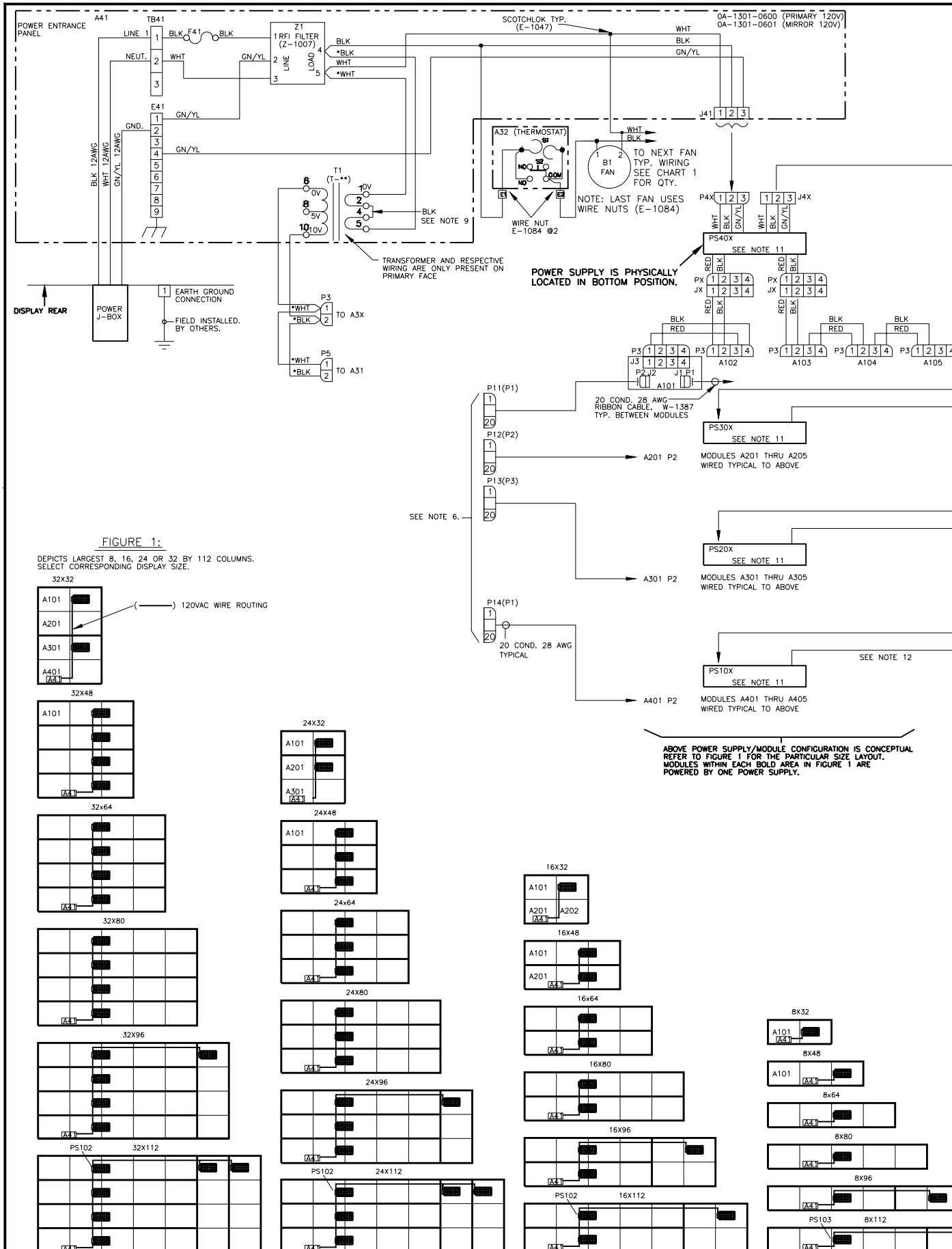
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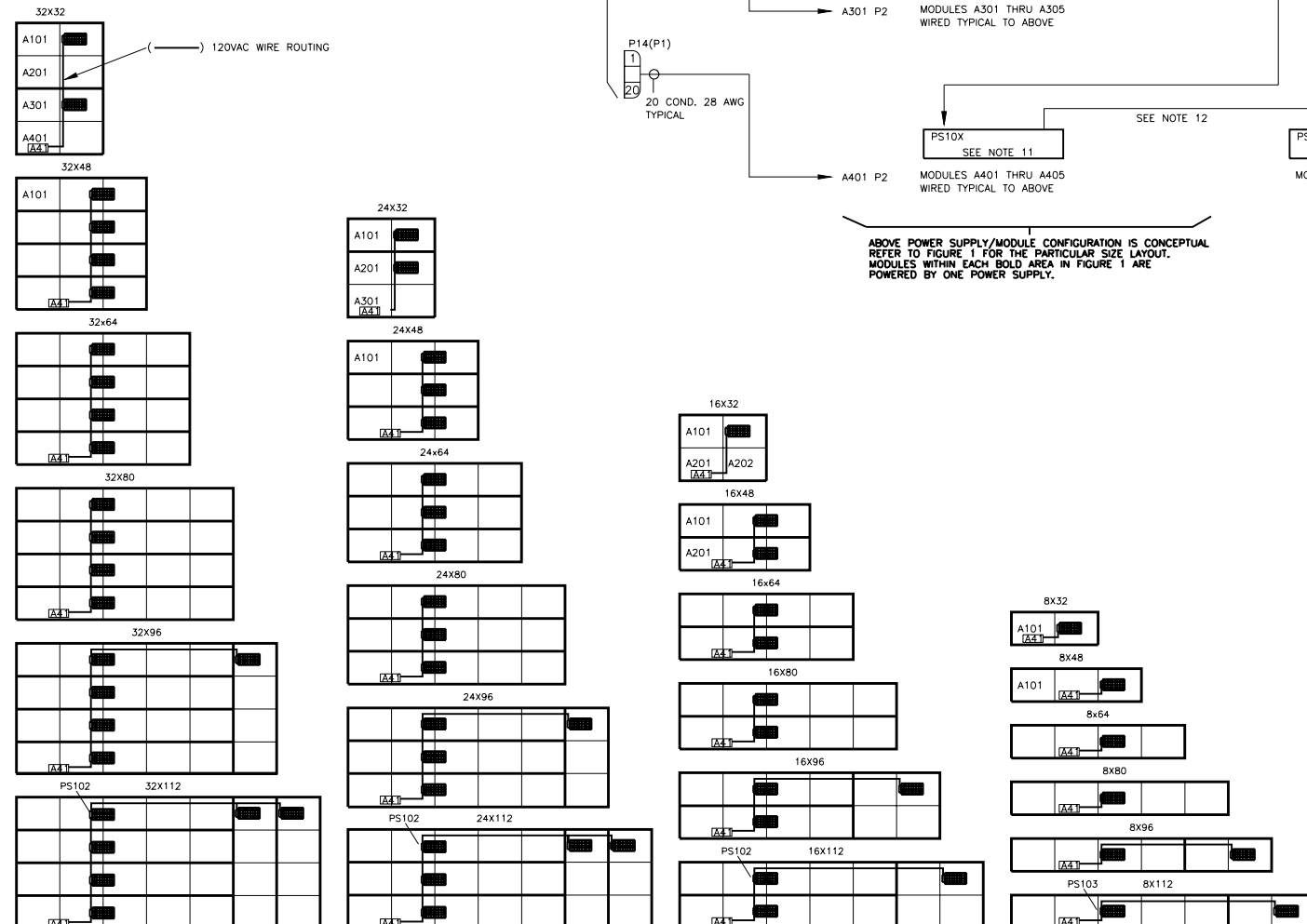
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DAKTRONICS, INC. BROOKINGS, SD 57006			
PROJ: OUTDOOR GALAXY DISPLAYS			
TITLE: F ASSY, AF-3112-2480-34			
DES. BY: DDAGGITT	DRAWN BY: DDAGGITT	DATE: 22NOV03	
REVISION	APPR. BY:	SCALE: 1=20	
00		1301-E10B-200259	

REV.	DATE	DESCRIPTION	BY	APPR
01	12JAN04	ADDED HC-1168 @2 AND HC-1238 @2 IN CONNECTION WITH OP-1229-2005 @1.	RTV	



**FIGURE 1:**  
DEPICTS LARGEST 8, 16, 24 OR 32 BY 112 COLUMNS. SELECT CORRESPONDING DISPLAY SIZE.



CONTROLLER AND QUICK CONNECT I/O BOARD RIBBON CABLE CHART.

LINE/PLUG#	8	16	24	32
1 (P11)	W-1387	0016	0016	0018
2 (P12)	N/A	0018	0018	0020
3 (P13)	N/A	N/A	0020	0021
4 (P14)	N/A	N/A	N/A	0022
5 (P15)	N/A	N/A	N/A	N/A
6 (P16)	N/A	N/A	N/A	N/A

(0A-1000-\*\*\*\*)

**CHART 1:**

DISPLAY LENGTH (PIXELS)	POWER SUPPLY ASSEMBLY QTY.	MODULE QTY.	FAN QTY.
8X32	1	2	0
8X48	1	3	1
8X64	1	4	1
8X80	1	5	1
8X96	2	6	2
8X112	2	7	3

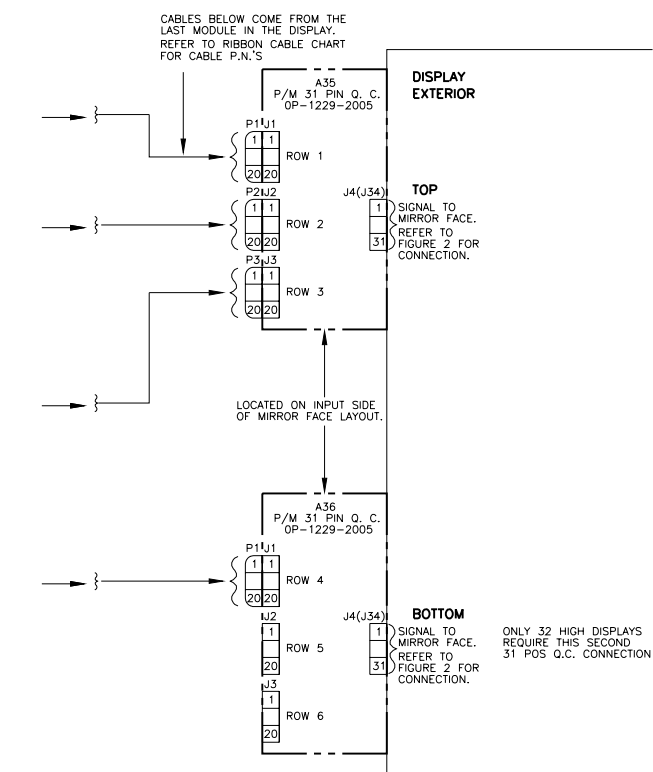
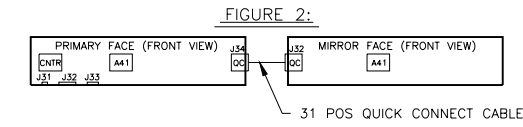
DISPLAY LENGTH (PIXELS)	POWER SUPPLY ASSEMBLY QTY.	MODULE QTY.	FAN QTY.
16X32	1	4	0
16X48	2	6	1
16X64	2	8	2
16X80	2	10	2
16X96	3	12	3
16X112	3	14	3

DISPLAY LENGTH (PIXELS)	POWER SUPPLY ASSEMBLY QTY.	MODULE QTY.	FAN QTY.
24X32	3	6	1
24X48	3	9	2
24X64	3	12	3
24X80	3	15	3
24X96	4	18	4
24X112	5	21	4

DISPLAY LENGTH (PIXELS)	POWER SUPPLY ASSEMBLY QTY.	MODULE QTY.	FAN QTY.
32X32	2	8	1
32X48	4	12	2
32X64	4	16	3
32X80	4	20	3
32X96	5	24	4
32X112	6	28	4



- NOTES:**
- ALL WIRE IS 14 AWG EXCEPT \* IS 18 AWG UNLESS OTHERWISE NOTED.
  - FOR 120VAC INPUT F41 AND F42 ARE MWO-15 FUSES (DAK# F-1028). FOR 240VAC INPUT F41 AND F42 ARE MDL-7 FUSES (DAK# F-1031).
  - FOR 120VAC INPUT \*\* IS T-1119. FOR 240VAC INPUT \*\* IS T-1082.
  - EACH LED MODULE IS A 8X16 MATRIX.
  - THE FRAME IS TO BE CONNECTED TO EARTH GROUND AT INSTALLATION TIME.
  - REFER TO DWG. B-206146 FOR CONTROLLER SIGNAL WIRING OF PRIMARY FACE ONLY. NOTE: ON MIRROR FACES: P/M 31 PIN Q.C. BOARD IS USED IN PLACE OF THE CONTROLLER. REFER TO FIGURE 2 FOR LAYOUT. REFER TO RIBBON CABLE CHART FOR CABLE P.N.'S
  - SCHEMATIC SHOWN DEPICTS THE LARGEST LENGTH 32 HIGH DISPLAY (32X112). REFER TO CHART 1 AND FIGURE 1 FOR DETAILS ON ALL DISPLAYS.
  - REFER TO DWG. A-200044 (AMBER) & A-200045 (RED) FOR POWER SPECS.
  - WHEN T-1119 IS USED PINS 2 & 4 AND JUMPER DO NOT EXIST.
  - FAN AND THERMOSTAT DO NOT EXIST ON 8X32 AND 16X32 MODELS.
  - REFER TO DWG. A-206665 FOR POWER SUPPLY CONFIGURATIONS.
  - USE INTERCONNECT CABLE 0A-1289-4015.

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**DAKTRONICS, INC. BROOKINGS, SD 57006**

PROJ: GALAXY, LOUVERED VENUS 1500, 34MM

TITLE: SCHEMATIC, AF-3200-8-32X\*\*-34-MONO-P/M.\*

DES. BY: LKERR DRAWN BY: DMATHER DATE: 18 NOV 03

REVISION APPR. BY: SCALE: NONE 1301-R03C-200002

REV.	DATE	DESCRIPTION	BY	APPR.
01	27 FEB 04	REARRANGED POWER SUPPLIES, ADDED RIBBON CABLE CHART, CHANGED TITLE NOMENCLATURE.	LLK	