



**Galaxy<sup>®</sup> Series  
AF-3010**

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**Display Manual**

*ED-10972*

*Rev 9 12 August 2003*

**Informing  
& Entertaining  
the World**

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**ED-10972**  
**Product 1185**  
**Rev 9 – 12 August 2003**

## **DAKTRONICS, INC.**

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**Display Manual; Galaxy® Series AF-3010**

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- 4) Insert **ED-7244** after **Section 2**.
- 5) Use a blue window cover and a blue back.
- 6) Punch all pages, window cover and back cover along the left edge, and bind with a binder.
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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-3010 monochrome LED 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 rest of this manual. Take time to read the entire introduction as it defines terms and explains concepts used throughout the manual.
- **Mechanical Installation** provides general guidance on sign mounting.
- **Electrical Installation** gives general guidance on terminating power and signal cable at the sign.
- **Maintenance and Troubleshooting** addresses such things as removing basic sign components, troubleshooting the sign, performing general maintenance, and exchanging sign components.
- **Appendix A** offers general information about the optional temperature sensor.
- **Appendix B** contains general information about the signal converters.
- **Appendix C** includes the drawings referenced in this manual.

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-10972**.

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 sign, 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 sign 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 after the section that references them.

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DAKTRONICS, INC. BROOKINGS, SD 57006			
PROJ: VANGUARD VARIABLE MESSAGE SIGNS			
TITLE: SHOP DRAWING; VF-****-27X75-18-W			
DES. BY: GKELLY		DRAWN BY: GKELLY	
		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 C** 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 signs are built for long life and require little maintenance. However, from time to time, certain sign components will need replacing. The **Replacement Parts List** in **Section 4.13** provides the names and part numbers of components that may need to be ordered during the life of the sign. Most sign 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 Return and Repair Programs** in **Section 4.14**. Refer to these instructions if any sign component needs replacement or repair.

## 1.2 Safety Precautions

**Important Safeguards:**

1. Read and understand these instructions before installing.
2. Be sure the sign is properly grounded with an earth ground electrode at the display.
3. Disconnect power when servicing the sign.
4. **Do not** modify the sign structure or attach any panels or coverings to the sign 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 reasons for this growth are many, but the need for additional features and the complexity of multiple sign 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 signs from a central control point. Daktronics responded by developing a power system of interconnecting and controlling signs. Great care has been taken to design products that will 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 sign or group of signs in the network which message should run
- The ability to determine the status of any sign on the network
- The ability to control multiple sign technologies on the same network

All the programming features would seem insignificant if the systems could not be accomplished with basic tools and without technical difficulty. Daktronics decided to use the very popular and readily available RJ11 connector. This connector is also used on modern home and office telephone equipment.

All that is required for signal installation is standard six (6)-conductor modular telephone wire and a tool to install the connector. Tools required for mounting the display depend on the location and size of the display. For some installations, it may be possible to purchase pre-terminated telephone cables for use with the displays.

There are four (4) network systems available: RS232, RS422, modem, and fiber optic.

### 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 8 meters (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, which uses a typical maximum cable length of 1.2 km (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 additional 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 the control computer and display. 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 2,000 feet. A signal conductor is needed to convert the computer's RS232 to fiber optic signal. 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 1,500 feet outdoor and 500 feet 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 radio manual (**ED-13932**) for additional information.

# 1.4 Display Overview

### Reference Drawing:

Shop Drawing ..... **Refer to Appendix C**

The Daktronics outdoor LED displays have been designed and manufactured for performance, reliability, easy maintenance, and long life. The displays consist of an array of LED pixels. The configuration of LED pixels is dependent on the family of LED displays.

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 controller operator's manual (**ED-13530**) for installation and operation of the Venus® 1500 controller editing station.

Refer to **Section 4** for the summaries of how signal and power are routed through the displays.

The Galaxy Series AF-3010 displays are matrix-based outdoor LED displays, which are available in monochrome red characters. They are offered as 8 pixel high displays with a standard 7 high 9", 16 high 21" character, or 24 high displays with a standard 7 high 9", 15 high 20", or 24 high 32" character in six (6) different lengths. The Galaxy model numbers are described as follows: AF-3010-RRxCCC-9-R.

<b>AF-3010</b>	=	Outdoor Galaxy® Display
<b>RR</b>	=	8, 16, or 24 Rows High
<b>CCC</b>	=	Number of Columns Long (48, 64, 80, 96, 112, and 128 are available)
<b>9</b>	=	9" Character Height
<b>R</b>	=	Monochrome Red

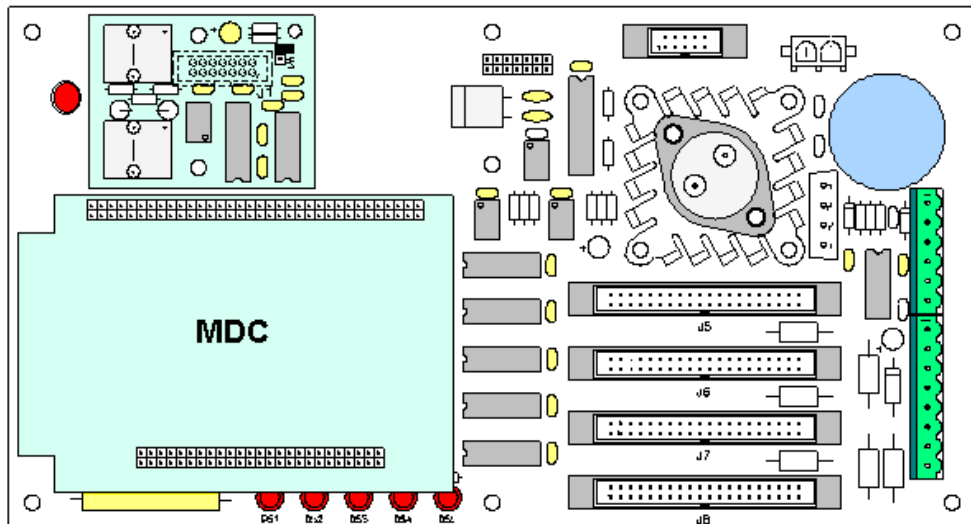
## 1.5 Component Identification

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

This is only a brief overview. Refer to **Section 4** for more detailed information on maintaining and troubleshooting various sign components.

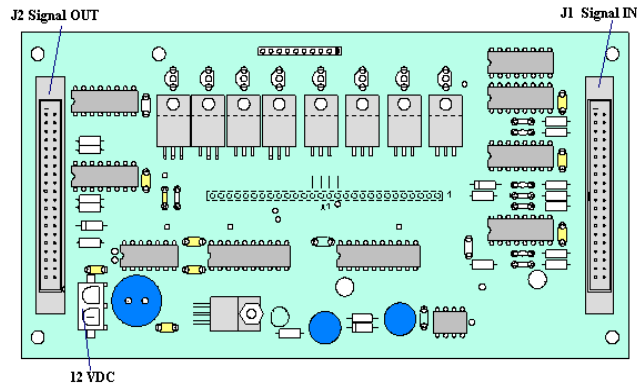
**Com Port:** Connector on the back of the control computer. The COM port is used to control the sign network through either a 9- or a 25-pin serial connector. The computer requires a serial port to work with this display.

**Controller:** “Brains” of the sign. The controller receives, translates, and activates the signal information from the control computer to the appropriate pixels on the sign accordingly.



**Figure 2:** MDC Controller

**Driver/Pixel Board:** Responsible for the switching and intensity levels of the LEDs. The LED pixels are mounted directly onto the pixel board. The driver is located on the back of the display board.

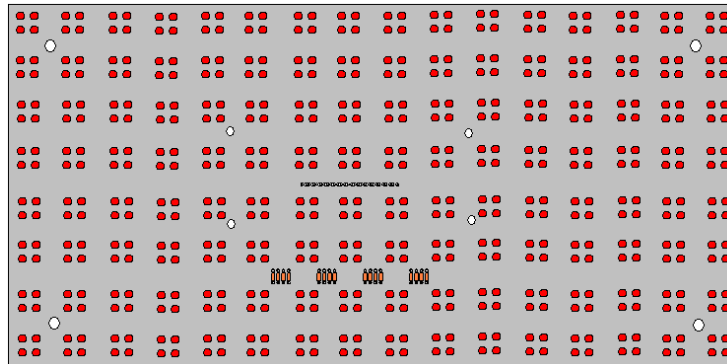


**Figure 3:** AF-3010 Driver/Pixel Board

**Galaxy:** Daktronics trademarked name for LED monochrome or tri-colored matrix signs.

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

**Module:** 8 pixels high by 16 pixels wide. Each is individually removable from the front of the sign.



**Figure 4:** 8x16 Pixel Module

**Network:** Consists of multiple signs connected to each other. Up to 240 Venus 1500 controlled displays can exist on one network.

**Pixel:** Cluster of four LEDs. The number and color of the LEDs depends on sign application.

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

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

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

**Sign Address:** Identification number assigned to each sign of a network. Flipping DIP switches on the controller sets the sign address. The control software uses the

address to locate and communicate with each sign, but signs on the same network cannot have the same address.

**Signal Converter:** 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.

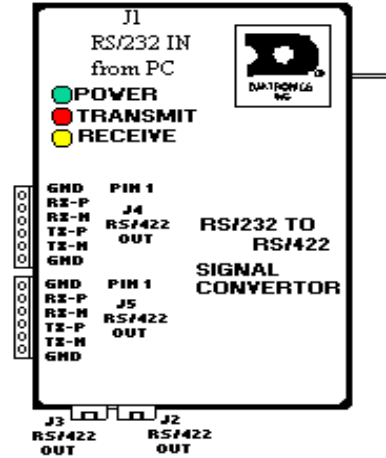


Figure 5: Signal Converter

## 1.6 Daktronics Nomenclature

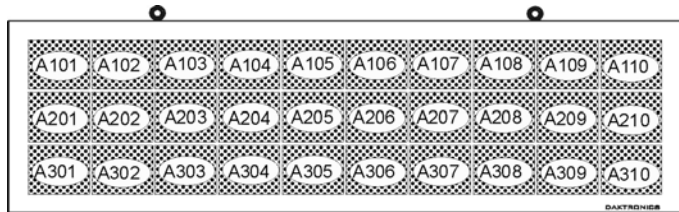


Figure 6: Module Numbering Example – 24x160 Front

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 sign. Each module measures 8 pixels high by 16 pixels wide. By placing modules side-by-side and on top of one another, a sign of any size can be designed and built. Individual modules can be easily removed from the sign if required. **Figure 6** above illustrates how Daktronics numbers modules on a Galaxy sign. **Figure 7** on the right breaks down the module numbering method.

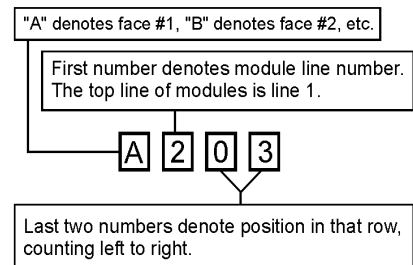


Figure 7: Module Numbering

The label “A” on a drawing typically denotes an assembly. An assembly can be a single circuit board or a collection of components that function together, usually mounted on a single plate or in a single enclosure. Assemblies are divided into two types: those that route signal and those that route power.

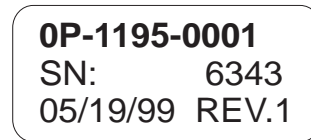
In addition, the following labeling formats might be found on various Daktronics drawings:

- “TB\_ \_” represents a termination block for power or signal cable.
- “F\_ \_” stands for a fuse.
- “E\_ \_” indicates a grounding point.
- “J\_ \_” symbolizes 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- \_ \_ \_ \_ - \_ \_ \_ \_” denotes an individual circuit board, such as a driver board.
- “OA- \_ \_ \_ \_ - \_ \_ \_ \_” represents an assembly, such as a circuit board and the plate or bracket to which it is mounted. A collection of circuit boards working as a single unit may also carry an assembly label.
- “W- \_ \_ \_ \_” shows a wire or cable. Cables may also carry the assembly numbering format in certain circumstances. This is especially true of ribbon cables.
- “F- \_ \_ \_ \_” indicates a fuse.

Most circuit boards and components within this sign 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 4.13**, use the label to order a replacement. A typical label is shown in **Figure 8** on the right. The part number is in bold.



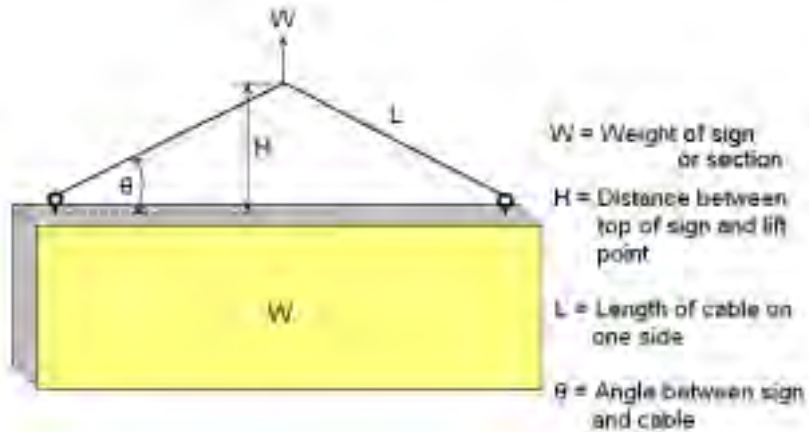
*Figure 8: Typical Label*



# Eyebolts

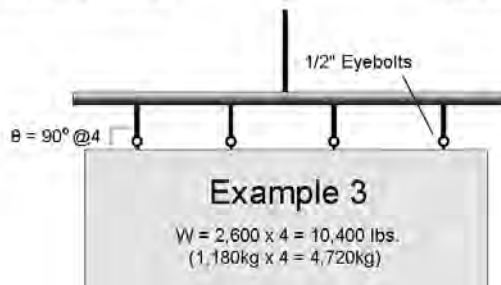
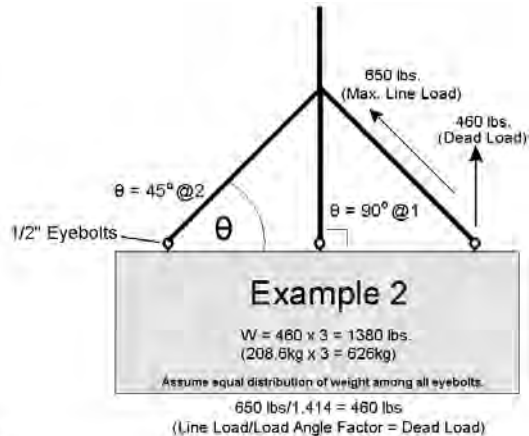
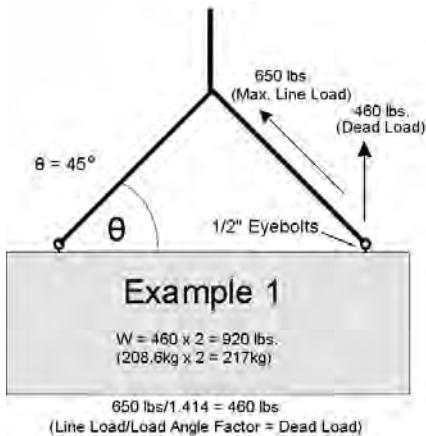
Almost every display that leaves Daktronics is equipped with eyebolts for lifting the display. There are two standard sizes of eyebolts: 1/2" and 5/8".

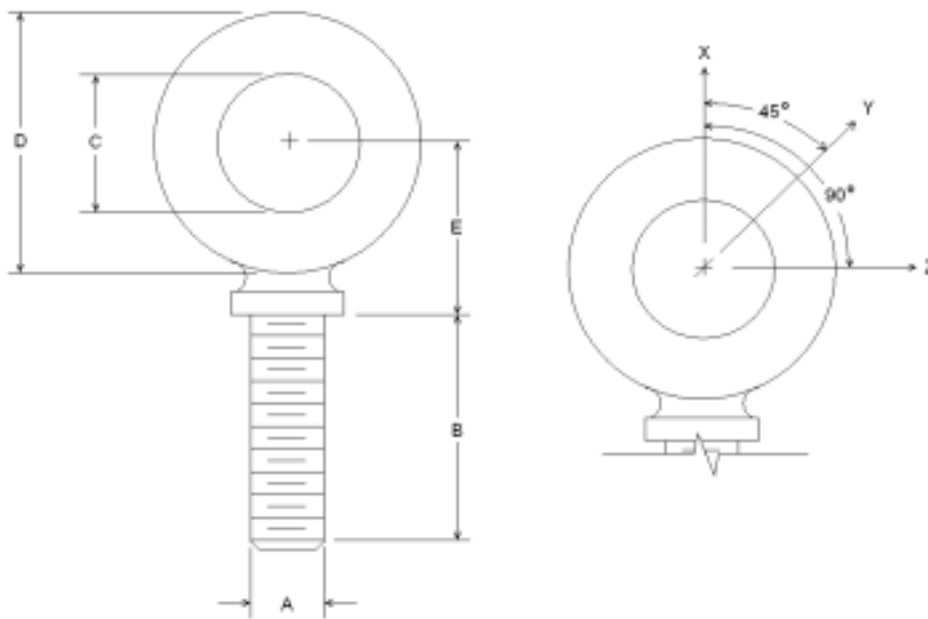
**Load Increase Factor:** The load increases as the lift angle ( $\theta$ ) decreases. The allowable load on the eyebolts also decreases with the lift angle due the bending stress on the eyebolts. In sum, the smaller the angle between the cable and the top of the display, the lighter the sign must be 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 2: Mechanical Installation

---

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

Daktronics engineering staff must approve **any** changes that may affect the weather-tightness of the sign. 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 make sure that a qualified structural engineer has ensured 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 signs. 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 sign.**

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

### 2.2 Support Structure Design

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

**It is the installer's responsibility to ensure the mounting structure and hardware are capable of supporting the sign, 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 sign.
- The mounting structure is capable of supporting the sign and will not yield at any unsupported points after mounting.

Correct any deficiencies before installation.

## 2.3 Display Ventilation Requirements

### Reference Drawing:

Shop Drawing ..... Refer to Appendix C

Fans are mounted inside the back of the display for cooling. Fresh air inlets and exhaust vents should not be obstructed in any way (refer to **shop drawings** located in **Appendix C**). Using the Daktronics suggested mounting methods will ensure proper ventilation. Fans turn ON when the interior display temperature reaches 140° F.

Consult a Daktronics sales representative for clearance requirements regarding your particular display if you are using a different mounting method. If ventilation requirements are not met, the display warranty will be void.

## 2.4 Mounting Kit

A mounting kit is available when ordering a display. The mounting kit includes the hardware to either mount the display on a pole or on a wall. When using a Daktronics mounting kit, refer to the instructions in **Section 2.5**.

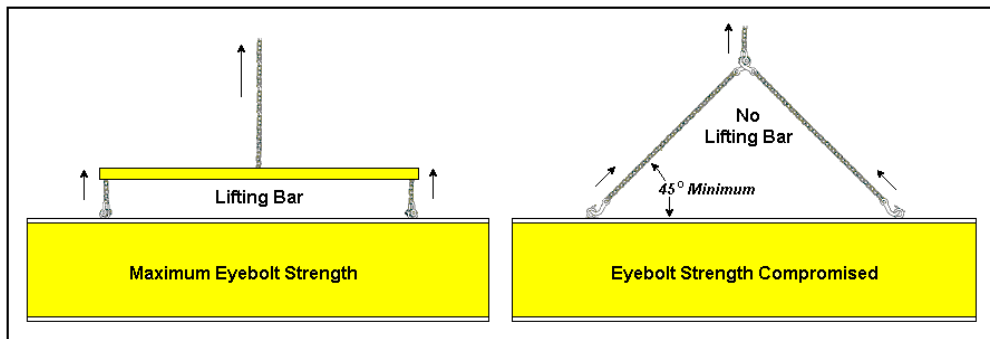
## 2.5 Display Lifting

### Reference Drawing:

Shop Drawing ..... Refer to Appendix C

Eyebolts are provided on the top of each display for lifting purposes. Refer to **ED-7244** at the end of this section for the proper lifting procedure. A spreader bar should be used to maintain a vertical force on each eyebolt. Using cables or chains to attach the eyebolts directly to the central lifting point can apply dangerous lateral force to the eyebolts. **Do not use the eyebolts for permanent installation.** Refer to **shop drawings** for the dimensions of the eyebolts from each end of the display.

Once the display is permanently mounted, replace the eyebolts with the hex-head bolts (supplied by Daktronics) and sealing washers used with the eyebolts. Use water proofing compound, such as silicon, along with bolts and sealing washers, to ensure a waterproof seal.



**Figure 9:** Lifting the Display (Correct, Left; Incorrect, Right)

## 2.6 Display Cabinet Mounting

### Reference Drawings:

Mounting Drawing, AF-3010-\*\*\*\*-9-\* ..... **Drawing A-102469**  
Shop Drawing..... **Refer Appendix C**

It is the customer's responsibility to ensure that the installation will meet local standards. The mounting hardware must be capable of supporting all components to be mounted. The mounting hardware and method are the responsibility of the customer. Refer to **shop drawings** located within **Appendix C** for the approximate weight and size of each model of display. **Daktronics is not responsible for the installations or the structural integrity of support structures done by others.**

Daktronics has recommendations for both a wall mount method and a pole mount method. Remember to have **all** mounted displays inspected by a qualified structural engineer.

**Note:** The display has hinged face panel. Care must be taken to allow the door to properly open (refer to **Drawing A-102469**).

### Wall Mount

**Note:** Because each site differs, the Daktronics wall mount kit is **not** a complete installation kit. It is the customer's responsibility to determine the proper wall mounting method and location.

Refer to **Drawing A-102469** for a suggested wall mount method. The wall mounting channels are attached to the rear of the display by Daktronics. Notice that the vertical distance between the mounting channels is 21". 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.

### Pole Mount

Refer to **Drawing A-102469** for a suggested pole mount method. The location of the poles needs to be determined by the customer. The number of poles needed and the pole structure and footings **must** be reviewed by a qualified structural engineer and meet all national and local codes.

One (1) Daktronics provided mounting kit includes:

- Clamping Channel (qty. 2, attached to rear of display by Daktronics)
- Clamping Angles (qty. 4)
- 1/2" Threaded Rod (qty. 8)
- 1/2" Nut (qty. 16)
- 1/2" Lock Washer (qty. 16)

Study the illustration of the pole mounting method in **Drawing A-102469**, and then use the following procedure for each display:

1. Measure the beam spacing and drill a 9/16" diameter hole for each 1/2" threaded rod through one flange of the clamping channels.
2. Insert the threaded rods through the drilled opening and secure using 1/2" nuts and lock washers.
3. Position the display at the front of the beams with the threaded rods extending from the rear of the channels, straddling the poles.
4. Raise the display to the desired height.
5. Slide clamping angles over the ends of the threaded rods and loosely install 1/2" washers and nuts.
6. Make final adjustments in positioning the display. Make sure the threaded rods are perpendicular to the display.
7. Tighten all the 1/2" hardware.

## Section 3: Electrical Installation

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**Only a qualified individual should terminate power and signal cable within this Daktronics sign.**

The Daktronics engineering staff must approve **any** changes made to the sign. Before altering the sign, 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 Sign

The power and signal connections in the signs 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.

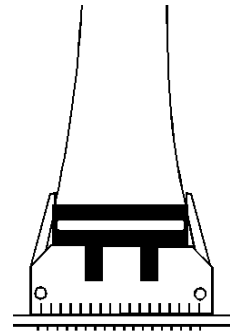
When pulling a connector plug from a jack, **do not** pull on the wire or cable; pull on the jack itself. Pulling on the wires may damage the cable and connector.

The following information presents some common connectors encountered during sign installation and maintenance:

#### 1. Ribbon Cable Connectors:

**Figure 10** on the right illustrates a typical ribbon cable connector. To disconnect the ribbon cable, push the plastic clips on the sides of the jack to unlock and remove the cable.

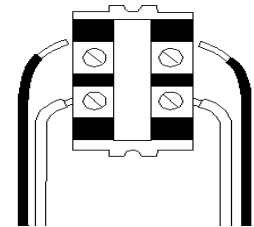
Before replacing a ribbon cable connector, spray it with DeoxIT™ contact cleaner to remove any foreign matter that may cause signal problems. In addition, apply a generous amount of CaiLube™ protector paste to the plug before inserting it into the jack. This paste will protect both the plug and the jack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



**Figure 10:** Ribbon Cable Connector

#### 2. Termination Blocks:

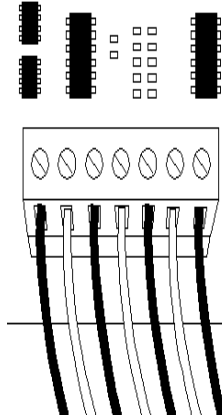
Termination blocks are usually used to connect internal power and signal wires to wires of the same type coming into the sign from an external source. Power wires need to have one-half inch of insulation stripped from the end of the wire prior to termination. Tighten all screws firmly to ensure a good electrical connection. Refer to **Figure 11** on the right.



**Figure 11:** Termination Block

3. **Phoenix™-Style Connectors:**

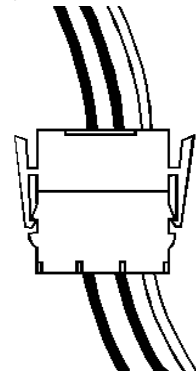
Phoenix-style connectors, which are usually green, are often used for signal termination on circuit boards. Refer to **Figure 12** on the right. Strip one-quarter inch of insulation from the wire prior to termination. To remove a wire, turn the above screw counter-clockwise to loosen the connector's 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 12:** Phoenix-Style Connector

4. **Mate-n-Lok™ Connectors:**

The Mate-n-Lok connectors found in the signs are white and come in a variety of sizes. **Figure 13** 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 13:** Mate-n-Lok Connector

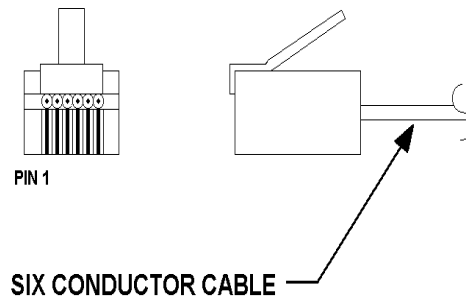
5. **Phone Jacks (RJ11/RJ45 Connectors):**

RJ connectors are similar to the telephone connectors found in homes and are used on the ends of RJ11 or RJ45 cable. In order to remove this plug from the jack, depress the small clip on the underside of the plug. 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.

### 3.2 Control Cable Categories

The conductor connector used in the network is an industry standard, 6-pin RJ11. This connector can be found on many telephones and LANs.

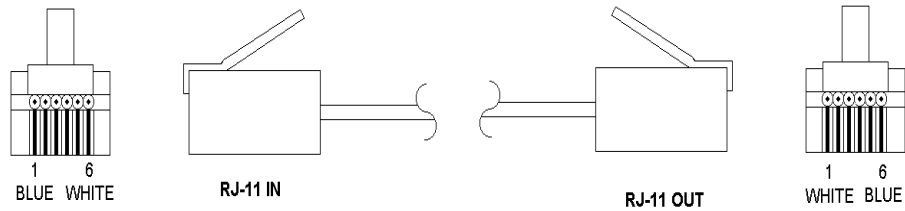
The cable used in the network is a standard flat six-conductor telephone cable (standard flipped cable). Refer to **Figure 14** on the right. This cable has one end that is the mirror image of the other end (i.e. the cable is flipped). Refer to **Figure 15** on the following page for a standard flipped cable.



**Figure 14:** 6-Conductor RJ11 Connector and 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 RJ Connectors

### 3.3 Conduit

#### Reference Drawings:

System Riser Diagram, Modem .....	<b>Drawing A-88426</b>
Power/Signal Termination Panel.....	<b>Drawing A-88427</b>
System Riser Diagram, RS422 .....	<b>Drawing A-92681</b>
System Riser Diagram, RS232 .....	<b>Drawing A-96058</b>
System Riser Diagram, Fiber .....	<b>Drawing A-110559</b>
System Riser Diagram, Outdoor Radio, Gen 2.....	<b>Drawing A-185325</b>
Shop Drawing.....	<b>Refer to Appendix C</b>

Daktronics **does not** include the conduit. Knockouts will be provided for power and signal. Separate conduit must be used to route:

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

The conduit holes are located at the bottom right (rear view) of the back of the display (refer to **shop drawings** located within **Appendix C**).

To access the knockouts, release the face panel latches using an 8mm Allen wrench (provided by Daktronics). Open the face panel. **Caution:** The door will swing up. Remove the bottom left module (front view) to reach the knockouts (refer to **Section 4.3** to remove a module).

Punch or drill out the desired knockouts. Be careful that none of the internal components are damaged. Attach the conduit and route the power and signal cables. Refer to **Drawing A-88427** for a picture of the power and signal termination panels.

For displays with more than one face, signal and temperature sensor wiring between displays can be routed through the same conduit.

## 3.4 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 electrical contractor who is performing the electrical installation can perform verification of ground resistance. Daktronics Sales and Service personnel can also perform this service.

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

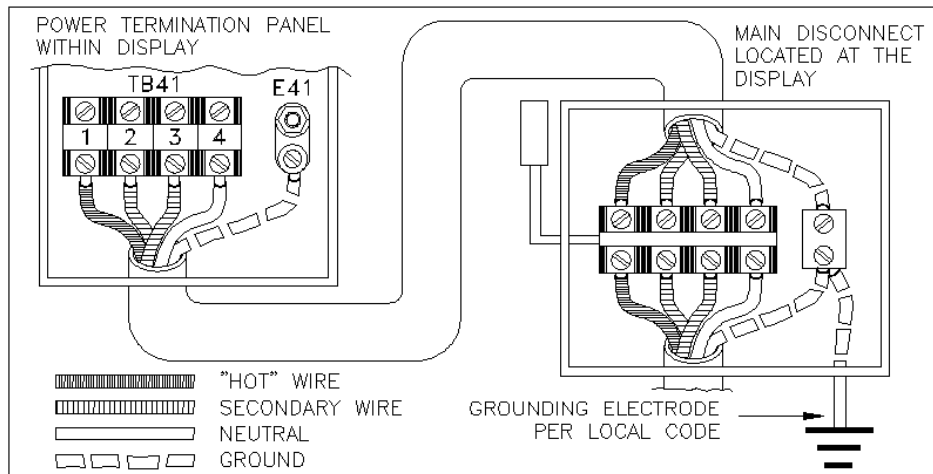
The material of an earth-ground electrode differs from region to region and from conditions present at the site. Consult the National Electrical Code and any local electrical codes that may apply. The support structure of the display cannot be used as an earth-ground electrode. The support is generally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

### Power Installation

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

#### ***Installation with Ground and Neutral Conductors Provided***

For this type of installation, the power cable **must** contain an isolated earth-ground conductor. Under this circumstance, **do not** connect neutral to ground at the disconnect or at the display. This would violate electrical codes and void the warranty. Use a disconnect so that all hot lines and neutral can be disconnected. Refer to **Figure 16** below for installation details. The National Electrical Code requires the use of a lockable power disconnect within sight of or at the display.



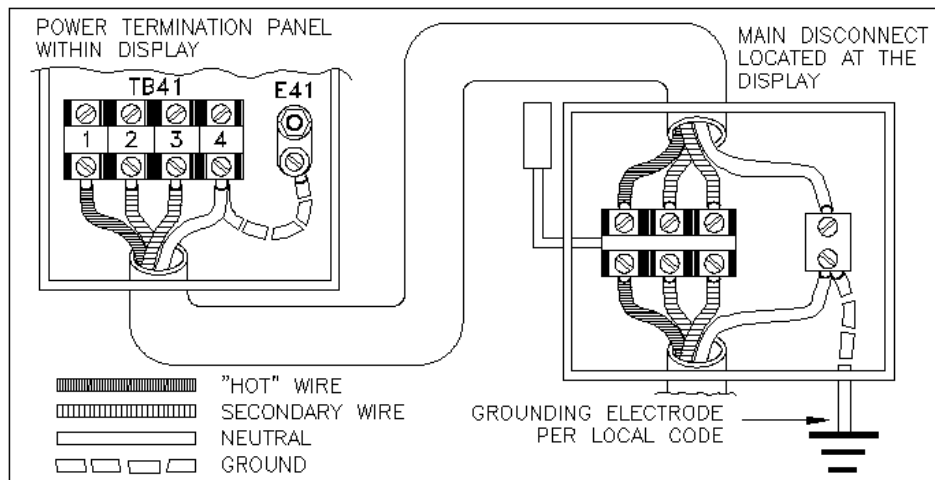
**Figure 16:** *Installation with Ground and Neutral Conductors Provided*

### ***Installation with Only a Neutral Conductor Provided***

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

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

Refer to **Figure 17** below for installation details.



**Figure 17:** *Installation with Only Neutral Conductor Provided*

## **3.5 Control Cable Requirements**

### **RS232**

This cable is a 2-conductor shielded cable used to transmit an RS232 signal (Daktronics part number W-1117). This unshielded cable should not be subjected to mechanical flexing after installation. This cable is **not** for direct burial and should be routed in a dedicated, grounded, metallic conduit at the base of the display structure. This cable has a maximum length of 25 feet.

## RS422

This cable is a 6-conductor shielded cable used to transmit an RS422 signal (Daktronics part number W-1210). This unshielded cable consists of un-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.

## Modem

The modem option will use a standard telephone cable routed through a conduit. The local telephone company will need to assist in this installation.

Ask the telephone company which colors the TIP uses, and the RING for signal hook up.

**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 routed in conduit but it should not be subjected to mechanical flexing.

## 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 power. These wires need to be in conduit when exposed to outdoor conditions to the Server radio. The maximum distance from the J-box to 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 so it does not come loose from the display.

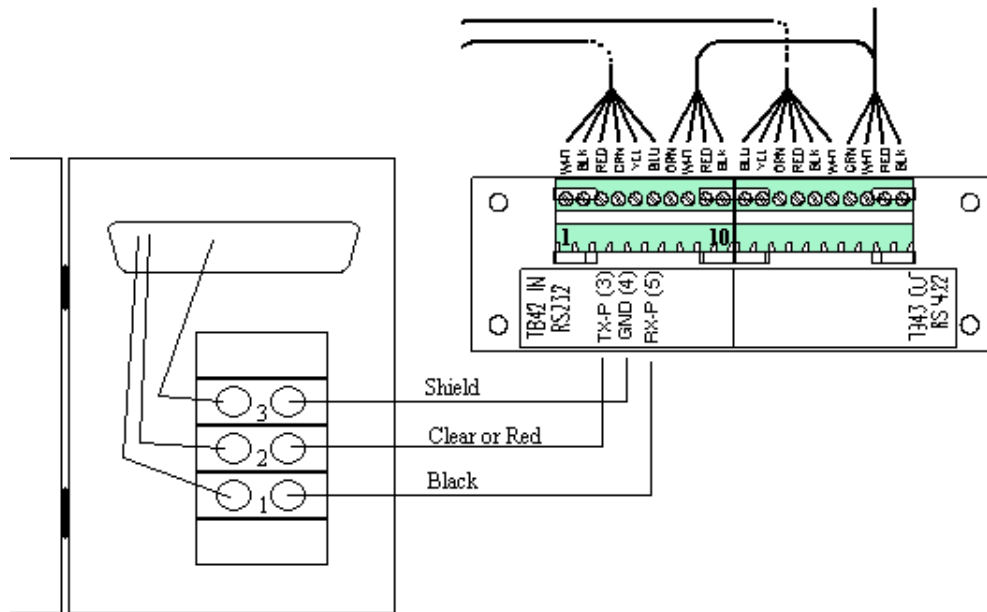
### 3.6 Signal Termination from Computer to Display

**Reference Drawings:**

- System Riser Diagram, Modem ..... **Drawing A-88426**
- System Riser Diagram, Power/Signal V1500 Displays .. **Drawing A-88427**
- System Riser Diagram, RS422 ..... **Drawing A-92681**
- System Riser Diagram, RS232 ..... **Drawing A-96058**
- System Riser Diagram, Fiber ..... **Drawing A-110559**
- System Riser Diagram, Outdoor Radio, Gen 2..... **Drawing A-185325**

**RS232**

One end of the signal cable should be terminated to the 10 position terminal block in the display labeled “IN RS232” (TB42). **Drawing A-88427** is an example of the termination panels. The opposite end is terminated at the J-box at the display structure. The laptop PC connects to the J-box through the serial cable (refer to **Drawing A-96058**).



**Figure 18:** RS232 Connections

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

## RS422

One end of the signal cable should be terminated to the surge suppressor terminal block in the display labeled “IN RS422” (TB1). **Drawing A-88427** is an example of the termination panel. The opposite end is terminated at the signal converter (Daktronics part number 0A-1127-0237). Refer to **Drawing A-92681** shows an example system riser using the RS422 signal termination.

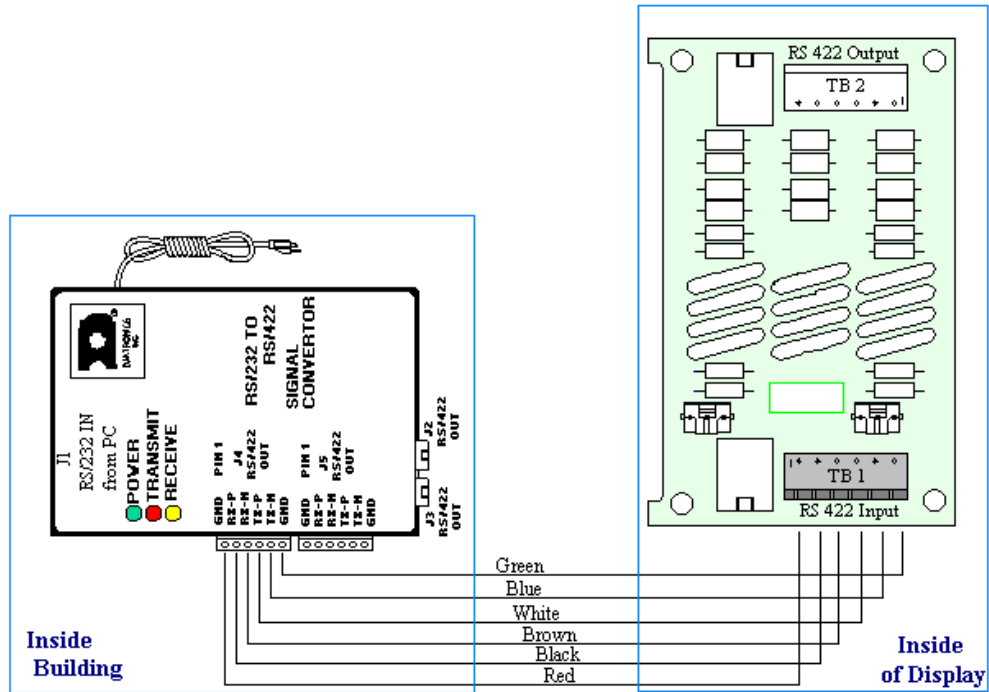
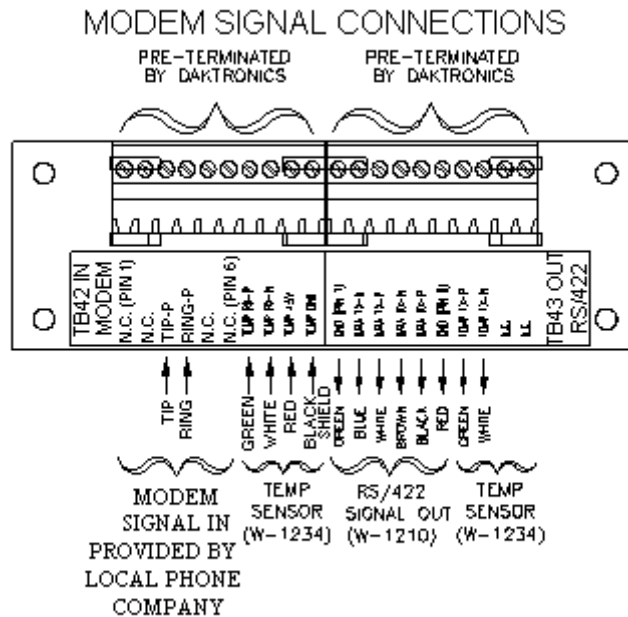


Figure 19: RS422 Signal Converter Connections

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

## Modem

Terminate the signal telephone wires to the 10 position terminal block labeled “IN MODEM” (TB42) as follows:



**Figure 20:** Modem Signal Connections

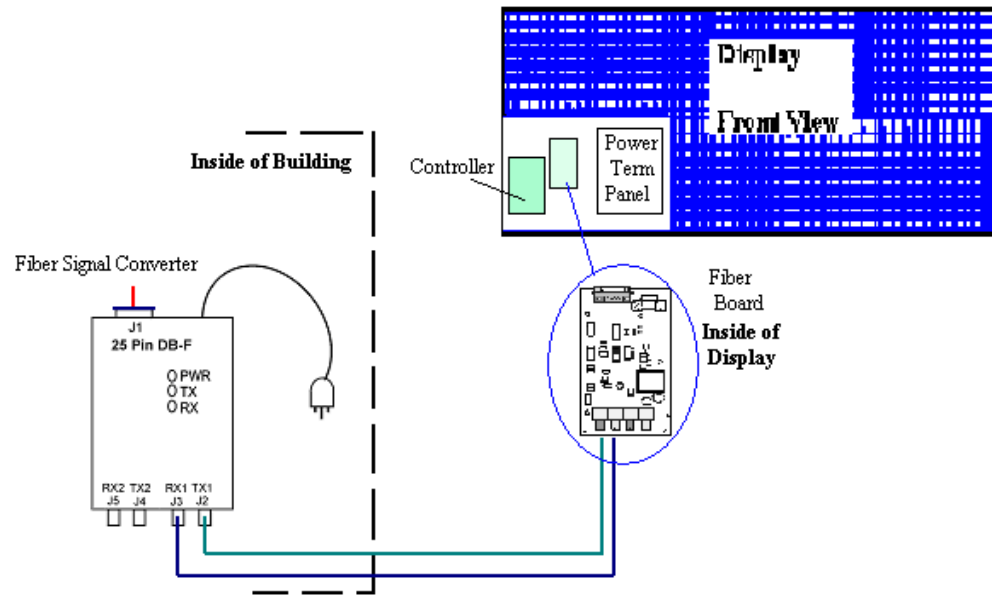
Telephone Wires	Terminal Block
N.C.	Pin 1
N.C.	Pin 2
TIP-P	Pin 3
Ring-P	Pin 4
N.C.	Pin 5
N.C.	Pin 6

**Drawing A-88426** shows an example modem system setup.

## Fiber Optic

Route conduit and fiber cable from the PC to the left end of the master display. Continue routing fiber to the controller box. Refer to **Drawing A-110559** for an example fiber system layout.

- Connect fiber to J2 and J3 at the signal converter end (0A-1127-0239)
- Connect fiber to J4 and J5 at the display end



**Figure 21:** Fiber Optic Layout

Signal Converter	Field Cabling	Display Fiber Board
J2 Transmit (TX)	(color varies)	J5 Receive (RX)
J3 Receive (RX)	(color varies)	J4 Transmit (TX)

## Radio

A display that is controlled using a radio requires a server radio connected to the control computer and a client radio at the display. The radios must be in line-of-sight with each other.

1. Connect a DB9M to DB9 serial cable from the computer to the J-box. Use 6-conductor, 18-gauge cable, to connect from the J-box to the Server radio. The cable must be in conduit when exposed to outdoor conditions. The distance from the J-box to the Server radio should not exceed 1000 feet. **Figure 22** on the following page shows the connections from the J-box to the server radio.
2. Route the cable provided with the Client radio into the display through one of the knockouts on the back of the display. Terminate the three signal wires, and connect the power plug from the Client radio to the additional jack in the display. **Figure 23** on the following page shows the connection from the client radio to the display.
3. Refer to **Drawing A-185325** and the radio manual (**ED-13932**) for the correct cable terminations.



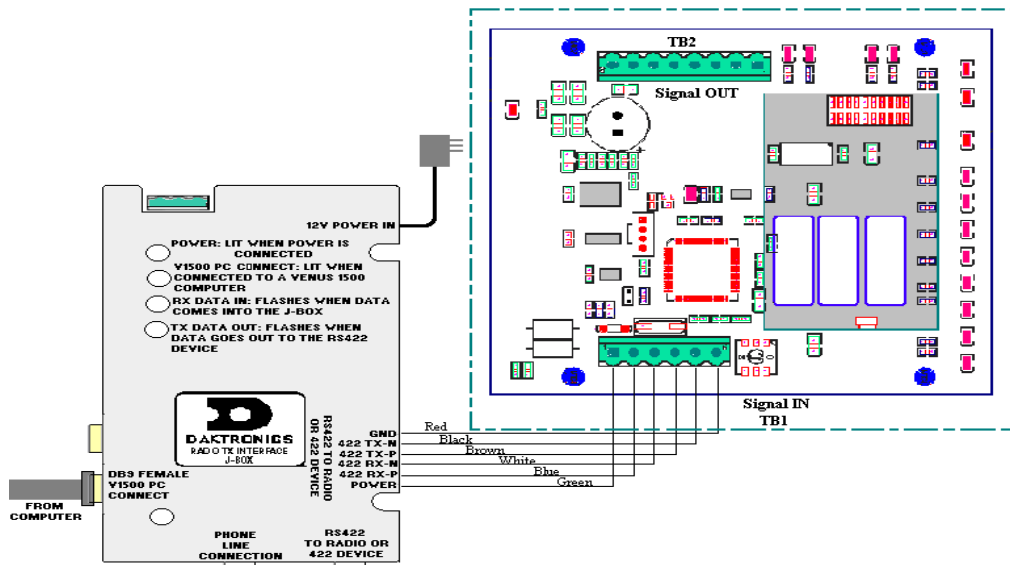


Figure 22: J-box to Server Radio Connections

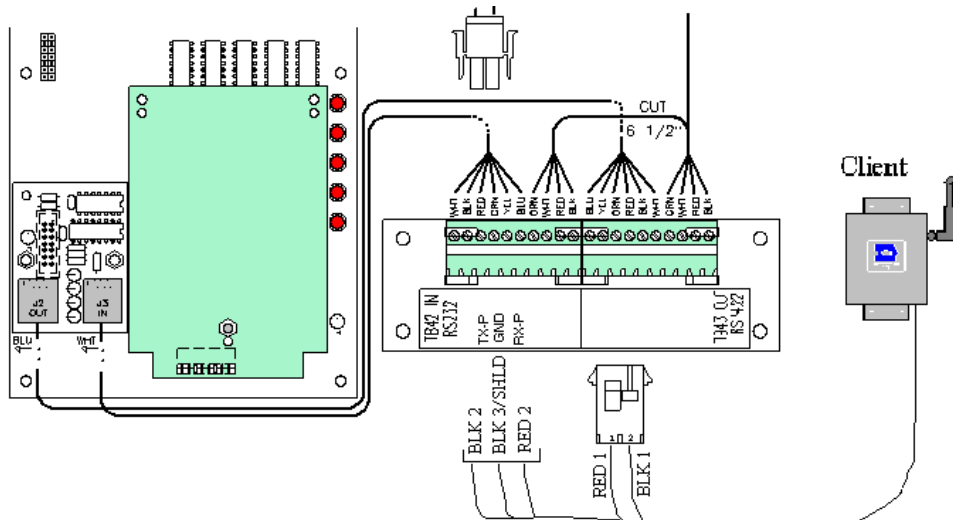


Figure 23: Client Radio to Display Connections

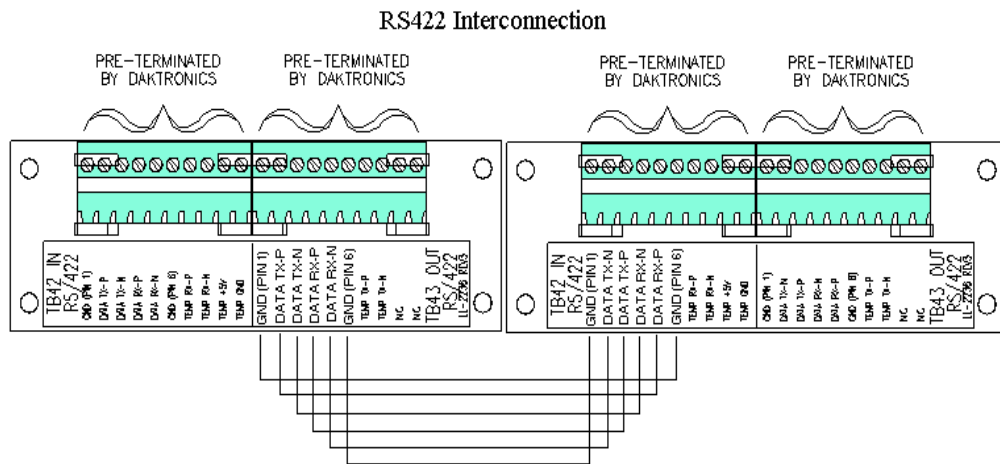
### 3.7 Signal Termination Between Two (or More) Displays

**Reference Drawings:**

- System Riser Diagram, Modem.....**Drawing A-88426**
- System Riser Diagram; Power/Signal, V1500 Displays..**Drawing A-88427**
- System Riser Diagram, RS422.....**Drawing A-92681**
- System Riser Diagram, RS232.....**Drawing A-96058**
- System Riser Diagram, Fiber .....**Drawing A-110559**
- System Riser Diagram, Outdoor Radio, Gen 2 .....**Drawing A-185325**

**RS422 Interconnection**

This is the most common method of terminating signal between two or more signs. A 6-conductor cable is used and one end terminates at the “OUT RS422” 10-position terminal block (TB43) on the first display. The other end terminates at the “IN RS422” 10-position terminal block (TB42) in the second display.



**Figure 24:** RS422 Interconnection

Sign A Data Out (TB43)	Field Cabling	Sign B Data In (TB42)
Pin 1 (GND)	Green	Pin 6 (GND)
Pin 2 (Data TX-N)	Blue	Pin 5 (Data RX-N)
Pin 3 (Data TX-P)	White	Pin 4 (Data RX-P)
Pin 4 (Data RX-N)	Brown	Pin 3 (Data TX-N)
Pin 5 (Data RX-P)	Black	Pin 2 (Data TX-P)
Pin 6 (GND)	Red	Pin 1 (GND)
	Shield (Bare)	N.C.

## Fiber Interconnection

A four-conductor fiber cable is used in connecting two or more displays in the Fiber Interconnection method. Connect the fiber cable to the fiber cards of the display as described on the following:

Sign A Data Out (J2 and J3)	Field Cabling	Sign B Data In (J4 and J5)
J2 (TX1)	-	J5 (RX2)
J3 (RX1)	-	J4 (TX2)

## 3.8 Initial Operation

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

1. Output Test (DDDs)
2. Product Name (Galaxy)
3. Display Size (Row x Column)
4. Firmware Number (**ED10134**)
5. Firmware Revision (Rev X.XX)
6. COM1 Configuration (C1: V15/RTD)
7. COM2 Configuration (C2: None)
8. Line Frequency (60 Hz)
9. Hardware Address (HW: XX)
10. Software Address (SW: XX)
11. Display Name
12. Modem (if Present)



# Section 4: Maintenance and Troubleshooting

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## Important Notes:

1. Disconnect power 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 product manager's engineering staff must approve any changes that may affect the weather tightness of the display. This includes, but is not limited to, the border shrouding and back sheets. If ANY modifications are made to the weather tightness of the display, detailed drawings of the changes MUST BE submitted to our engineering staff for evaluation and approval or the warranty will be null and void.
4. Care must be taken when handling the display's face panel to prevent injuries or damage, especially in windy conditions.

## 4.1 Weather Stripping

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

## 4.2 Module Numbering Convention

The following table shows the typical module numbering convention for a 16x64 display. A module is eight (8) pixels high by 16 pixels wide.

A101	A102	A103	A104
A201	A202	A203	A204

- Labeling reference begins with the upper left module and increments to the right and down from that point, independent of display size.
- Modules are designated by the prefix "A." A101 represents the upper left module.
- The hundreds digit indicates the module line number. A101 through A104 make up the first module line, A201 through A204 make up the second line and so forth.

### 4.3 Display Access/Module Removal

To access the display's interior electronic components, open the face panel and remove the appropriate modules. The Galaxy displays are front access. **Tools needed: 8mm Allen wrench and 5/16" nutdriver**

1. Release the face panel latches using an 8mm Allen wrench (provided by Daktronics).
2. Open the face panel. Gas springs will hold the door open for servicing. **Caution:** The door will swing up. Take extra precautions during windy conditions.
3. Remove the four 5/16" mounting nuts holding the module to the display. Each mounting nut is located in one corner of the module (refer to **Figure 25** below on the left).
4. Carefully pull the module forward to unplug the power/signal connections (refer to **Figure 26** below on the right).

To install or replace the modules, follow the previous steps in reverse order.



**Figure 25:** Removing the Mounting Nuts

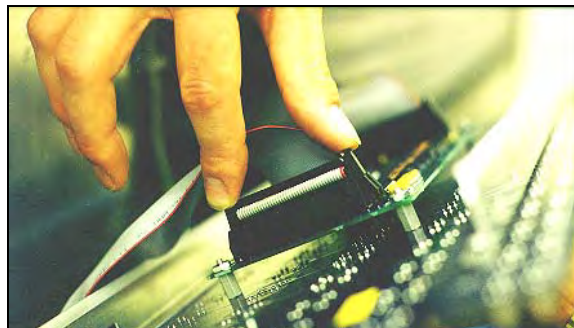


**Figure 26:** Removing the Module

### 4.4 LED Driver Replacement

The LED driver is located on the rear side of the module: **Tools needed: 8mm Allen wrench and 5/16" nutdriver**

1. Open the display, and release the module.
2. Remove all power and signal connection from the driver. By pressing outward on the locking tabs and gently pulling the connector free, the connectors are released (refer to **Figure 27** on the right).
3. Remove the four 5/16" nuts from the corners. (Some drivers are held in place by plastic mounts.)



**Figure 27:** Removing the Signal Connections

4. Take note of the driver's orientation.
5. Carefully remove the driver from the display board. Use an even amount of force to prevent any damage due to bending of the connector pins on the display board. Reverse the previous steps to replace the driver.

## 4.5 Power Supply

### Reference Drawing:

Schematic .....Refer to Appendix C

#### **Note: Disconnect power from the display before removing a power supply.**

The power supply is mounted behind every other module. The first power supply is located behind module A102. This unit supplies power to the modules A101, A102, A201, and A202. The remaining power supplies are located behind A103, A105, A107, and A109, when applicable. One power supply connects to four (4) modules (refer to **schematics**).

Refer to **Section 4.3** for information on removing a module. Once the module has been removed from the display: **Tools needed: 8mm Allen wrench, 5/16" nutdriver, and #2 Phillips screwdriver**

1. Open the display and remove the module directing in front of the failed power supply.
2. Disconnect the wires from the terminal block at the bottom of the power supply. It helps to have the wires labeled for reconnecting them to the power supply.
3. Use a Philips screwdriver to remove the power supply and bracket from the vertical support.
4. Remove the screws securing the power supply to the bracket.
5. Attach the new power supply to the bracket using M4x8mm screws.
6. Attach the power supply/bracket assembly to the vertical support with #6 screws and washers.
7. Reconnect all wires to the power supply as shown in **schematics**.

## 4.6 Controller Board

### Reference Drawings:

System Riser Diagram, RS422.....Drawing A-92681  
 Shop Drawing ..... Refer to Appendix C

### Accessing and Replacing the Controller Board

The controller board is located behind the bottom, left module (refer to **shop drawings**). To access the controller board: **Tools needed: 8mm Allen wrench, 5/16" nut driver, and 3/16" nutdriver**

1. Open the display and remove the module in front of the controller board (refer to **Section 4.3** to remove a module).
2. Remove all power and signal connections from the board. Pressing outward on the tabs, and carefully pulling them from the jack releases the "Locked" connectors.
3. Remove the mounting six screws using a 3/16" nutdriver.
4. Carefully remove the controller board from the display.

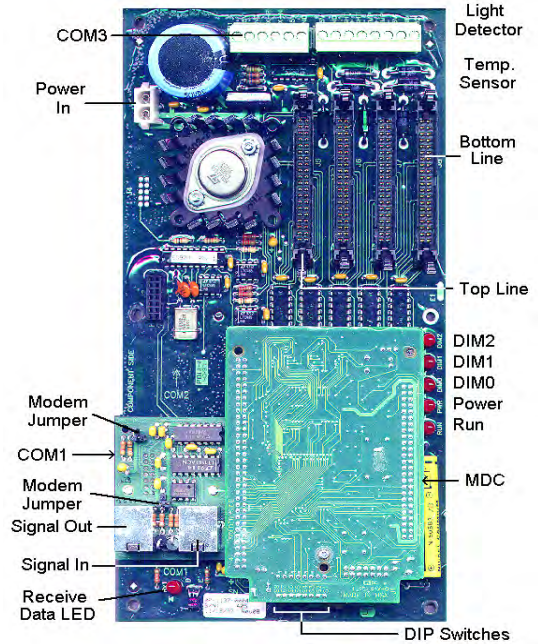


Figure 28: Controller Board

Follow the previous steps in reverse order to install a new controller board.

### LEDs and Jumpers

The controller board contains three DIM, one Power, one RUN, and one Receive Data LEDs.

**The controller's communication module contains two (2) jumpers for a modem system. The jumpers must connect both pins for a modem system. For all other applications, the jumpers must be removed.**

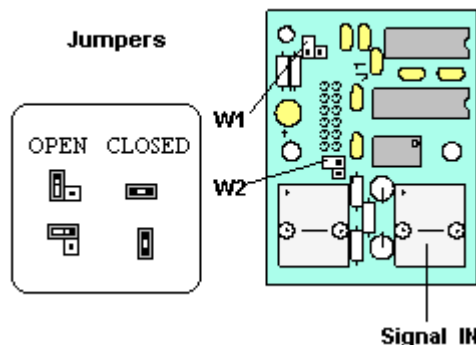


Figure 29: LEDs and Jumpers



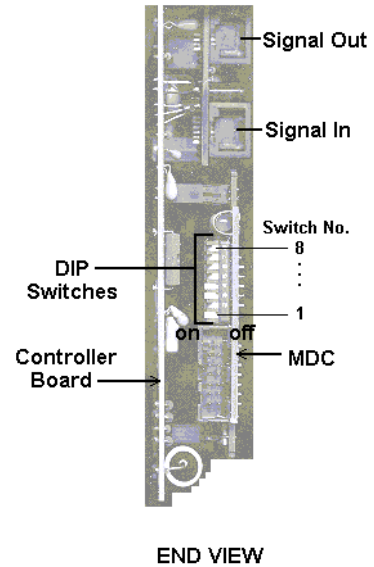
## Controller Address and Test Mode

Before a display can be run in a sign network, it must have an address. The display address can be set using “DIP” switches located on a PC board known as the MDC. The MDC is the circuit card mounted in the lower right corner of the controller board.

Locate the DIP switches on the MDC. They should be on the bottom end of the card. Refer to **Figure 30** on the right for a picture of the DIP switches.

When replacing a controller board, be sure to set the DIP switches to the same address configuration as the defective controller. The DIP switches follow standard binary code.

**Note:** By setting the DIP switches to address 0 (flip all the switches toward the numbers on the circuit board), a test mode can be activated. The display’s power must be downed, and then reconnected to run the test mode.



**Figure 30:** Location of DIP Switches

Switch 8	Switch 7	Switch 6	Switch 5	Switch 4	Switch 3	Switch 2	Switch 1	Address
Off	Off	Off	Off	Off	Off	Off	On	1
Off	Off	Off	Off	Off	Off	On	Off	2
Off	Off	Off	Off	Off	Off	On	On	3
Off	Off	Off	Off	Off	On	Off	Off	4
Off	Off	Off	Off	Off	On	Off	On	5
Off	Off	Off	Off	Off	On	On	Off	6
Off	Off	Off	Off	Off	On	On	On	7
Off	Off	Off	Off	On	Off	Off	Off	8
Off	Off	Off	Off	On	Off	Off	On	9
Off	Off	Off	Off	On	Off	On	Off	10
...	...	...	...	...	...		...	...
Off	On	On	On	On	On	On	On	127

## Light Detector

### Reference Drawings:

Shop Drawing..... Refer to Appendix C  
Schematic ..... Refer to Appendix C

The light detector is internally mounted and wired at Daktronics. It is located on the lower left of the display (refer to Detail A in **shop drawings**). A 4-conductor cable is used to connect the light detector to the controller board. The cable is terminated at the terminal block on the light sensor and at the terminal block on the controller board (refer to **schematics**).

Light Detector Pin No.	Cable Wires Color	Controller Board Pin No.
1	Green	3
2	White	4
3	Red	1
4	Black	2
N.C.	Bare	2

## 4.7 Transformer

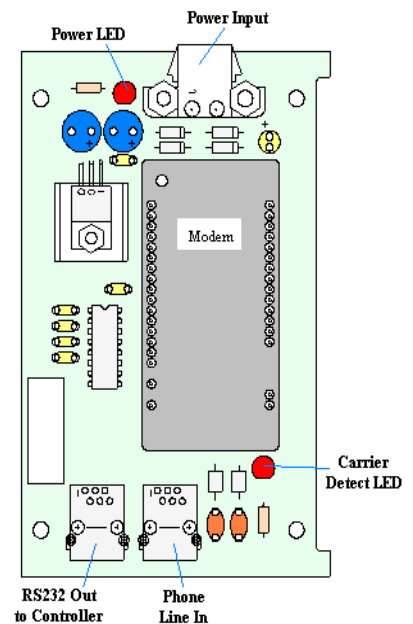
The transformer is used to provide power to the controller board 10-12 VAC, modem, fiber converter, or radio depending on the communication method used. It is located in the bottom left corner (front view) of the display in the power termination box.

## 4.8 Modem

### Accessing and Replacing the Modem

If a modem was included with the display, it is located inside the sign next to the controller board. **Tools required: 8mm Allen wrench, 5/16" nutdriver, and 3/16" nutdriver**

1. Open display and remove the module in front of the modem in the lower left corner.
2. To replace a modem, first disconnect the power and signal connections (refer to **Figure 31** on the right for the location of the power jack).
3. The modem is held in place with four 3/16" screws. Remove these four screws and carefully remove the modem.
4. Place the new modem over the four screws and replace the screws. Reconnect the power and signal connections.



**Figure 31: Modem**

## LEDs and Jumpers

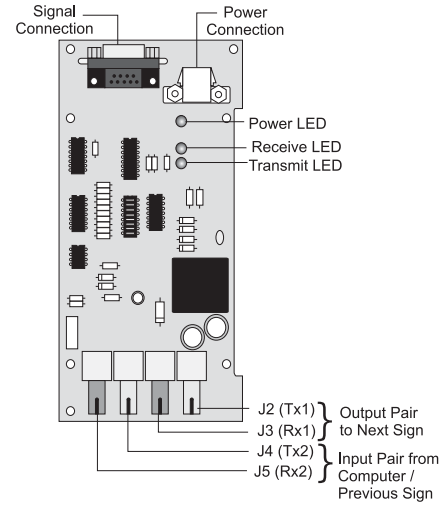
The modem module has two (2) LEDs. The Power LED should remain lit while power is applied to the modem. The Active LED will light when the modem is in the process of communicating.

A modem system requires jumpers to be set on the controller board. Refer to **Section 4.6** for these jumper settings.

## Fiber Board

The fiberboard has three LEDs. The power LED (DS1) should remain lit while power is applied to the module. The receive LED (DS2) will light when the display fiberboard is accepting signal from the fiber signal converter. The transmit LED (DS3) will light when the display fiberboard is sending to the fiber signal converter. In addition, the fiberboard has two input fiber connectors that the signal converter or the previous display connects to, and two output fiber connectors that connect to the next display. The fiberboard connects to the controller board with a small DB9 to RJ11 adaptor and a straight RJ11 cable.

To replace a fiber optic board: **Tools required: 8mm Allen wrench, 5/16" nutdriver, and 3/16" nutdriver**



**Figure 32: Fiber Board**

1. Open the display and remove the module in front of the fiber board in the lower left corner.
2. Disconnect the power and signal connections (refer to **Figure 32** above for disconnection of power).
3. The fiber optic board is held in place with four 3/16" screws. Carefully remove them.
4. Install the new fiber board, replace the screws, and reconnect power and signal cables.

## 4.9 Signal Routing

Figure 33 below shows the signal routing from the control computer to the display controller and the routing within the display.

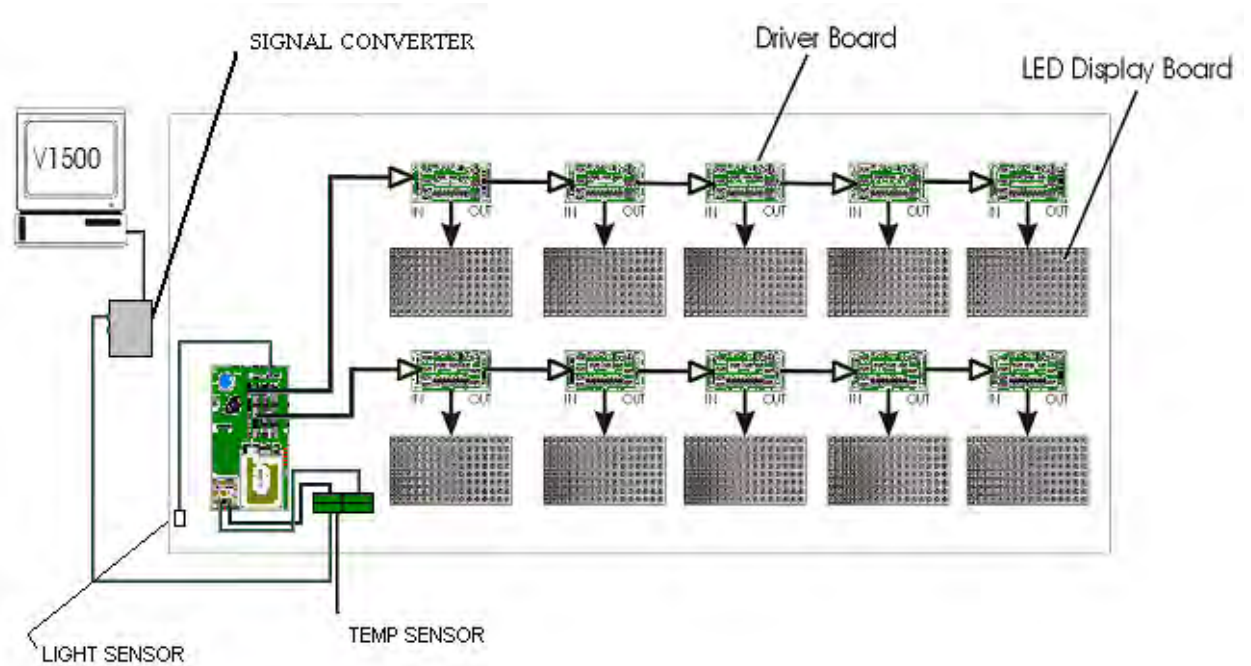


Figure 33: Signal Routing

## 4.10 Structural Inspection

Visual inspection should be done annually to check paint and look for possible corrosion, especially at footings, structural tie points, and ground rods. Fasteners should be checked, tightened, or replaced as required.

At least once a year, check the inside of the display for signs of water intrusion, i.e. – water stain marks. Water can enter a 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. Check the electronic components for signs of corrosion.

Check/clean the filters for proper air flow.

## 4.11 Troubleshooting

This section lists some symptoms that may be encountered with the display. Possible cause and corrective actions are given. This list does not include every possible problem, but does represent some of the more common situations that may occur. Contact Daktronics Customer Service if problems continue with the display (refer to **Section 4.14**).

Symptom/Condition	Possible Corrective Action
One or more individual LED pixels will not light.	<ul style="list-style-type: none"> <li>• Check/Replace ribbon cable.</li> <li>• Replace display board.</li> <li>• Replace module driver board.</li> </ul>
A column of LED pixels will not light.	<ul style="list-style-type: none"> <li>• Check/Replace ribbon cable.</li> <li>• Replace module driver board.</li> <li>• Replace Display board.</li> </ul>
A row of pixels will not light.	<ul style="list-style-type: none"> <li>• Check/Replace ribbon cable.</li> <li>• Replace driver board.</li> <li>• Replace Display board.</li> </ul>
A section of the display is not working. Section extends all the way to the right side of the display.	<ul style="list-style-type: none"> <li>• Check/ Replace the ribbon cable.</li> <li>• Check for power on modules.</li> <li>• Replace the first driver on the left side of the module that is not working.</li> <li>• Replace the second driver that isn't working.</li> <li>• Replace the power supply on the first module on the left side of the module that is not working.</li> <li>• Replace controller.</li> </ul>
Entire display is garbled.	<ul style="list-style-type: none"> <li>• Check power to controller board.</li> <li>• Replace the controller board.</li> </ul>
A single line is distorted.	<ul style="list-style-type: none"> <li>• Check/Replace ribbon cable.</li> <li>• Replace the first driver on the left side of the display of the bad line.</li> <li>• Replace the controller board.</li> </ul>
Four modules, which share power supplies will not light.	<ul style="list-style-type: none"> <li>• Check power to modules.</li> <li>• Check wires and plugs to modules.</li> <li>• Replace the power supply.</li> </ul>
Entire display does not work.	<ul style="list-style-type: none"> <li>• Check 120 VAC to the display.</li> <li>• Check fuse in Power term panel.</li> <li>• Check 10 VAC to the controller board.</li> <li>• Check for correct use of software.</li> </ul>
Controller not operating properly.	<ul style="list-style-type: none"> <li>• Check 10 VAC to the controller board.</li> <li>• Refer to the Venus 1500 operator's manual (<b>ED-13530</b>).</li> </ul>
Temperature always reads 32°F/ 0°C.	<ul style="list-style-type: none"> <li>• Check temperature sensor connections.</li> <li>• Check 5VDC to sensor.</li> <li>• Replace temperature sensor.</li> <li>• Replace controller board.</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>• Replace light detector.</li> <li>• Replace controller board.</li> </ul>

## 4.12 Initial Operation Information

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

1. Output Test (DDD's)
2. Product Name (Galaxy)
3. Display Size (Row x Column)
4. Firmware Number (**ED10134**)
5. Firmware Revision (Rev X.XX)
6. COM1 Configuration (C1: V15/RTD)
7. COM2 Configuration (C2: None)
8. Line Frequency (60 Hz)
9. Hardware Address (HW: XX)
10. Software Address (SW: XX)
11. Display Name
12. Modem if Present (Modem)

## 4.13 Replacement Parts

Part Description	Daktronics Part No.
Controller Board, RS232, Modem, Fiber or Radio	0A-1185-0001
Controller Board, RS422	0A-1185-0002
LED Driver Board	0P-1137-0001
LED Display Board, 8x18, Red, DS-1295	0P-1137-0038
Light Detector	0P-1151-0002
Modem; RS232 coated	0P-1146-0003
Fiber board; Fiber to RS232, 12V	0P-1127-0024
Surge board in display	0P-1146-0031
Power Supply; +12V	A-1555
Ribbon Cable; Controller to Bottom Module	0A-1000-0008
Ribbon Cable; Controller to Top Module	0A-1000-0006
Ribbon Cable; Between Modules	W-1362
Cable; RS232, DB9F to DB25M, 6'	W-1249
Adapter; DB9M to DB25F	A-1603
Flipped PC Connector; DB9F/RJ11F, Fiber	0A-1146-0029
Cable; 18" RJ11; 6-cond., Straight	0A-1137-0160
Temperature Sensor	0P-1151-0003
Signal Converter (RS/232/RS/422)	0A-1127-0237
Signal Converter (RS/232;Fiber)	0A-1127-0239
Fan (120 VAC Input)	B-1006
Fan (240 VAC Input)	B-1011
Fuse; MDL-7 (F41, 120 VAC)	F-1031
Fuse; MDL-3 (F41, 240 VAC)	F-1042
Fuse; MDX-5 (F42)	F-1021
RFI Filter	Z-1003
Transformer (120 VAC Input)	T-1072
Transformer (240 VAC Input)	T-1106
Manual; Venus 1500 Operator's, Version 3	<b>ED-13530</b>

## 4.14 Daktronics Exchange and Repair and Return Programs

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

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

If the replacement part fixes the problem, package the defective part in the same packaging the replacement part arrived in, fill out and attach the enclosed UPS shipping document, and **return the part to Daktronics**. You may use the same box and packing the exchange part was sent in. This will speed up the transaction and alleviate confusion when the failed component arrives at Daktronics. Daktronics expects immediate return of the exchange part if it does not solve the problem. For most equipment, you will be invoiced for the replacement part at the time it is shipped. This invoice is due when you receive it.

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

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

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

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

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



**Packaging for Return:** Package and pad the item well to prevent damage during shipment. Electronic components, such as printed circuit boards, should either be installed in an enclosure or should be put in an anti-static bag before boxing. Please enclose your name, address, phone number, and a clear description of symptoms.

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

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

**Customer Service Fax:** 1-605 / 697-4444

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



## Appendix A: Optional Temperature Sensor

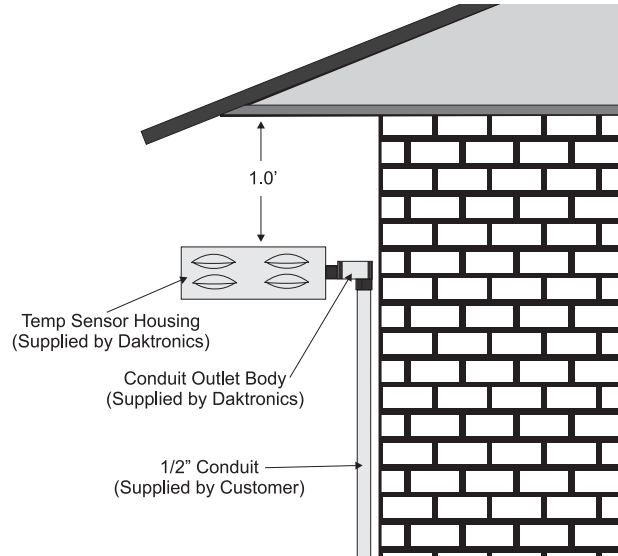
The optional temperature sensor is mounted separately and requires a location away from the influence of chimneys, air conditioners, vents, tar roofs, concrete, and parking lots that can cause abnormal temperature fluctuations. Usually, a separation of at least 20 to 30 feet horizontally and eight feet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

The recommended location for the temperature sensor is a north eave or northern exposure away from direct sunlight and above grass. This location gives extra stability and accuracy to the sensor because of the added shading, usually obtained on a northern exposure. There should be at least one foot between the bottom of the eave and the top of the temperature sensor housing for accurate readings, as seen in **Figure 34** on the right.

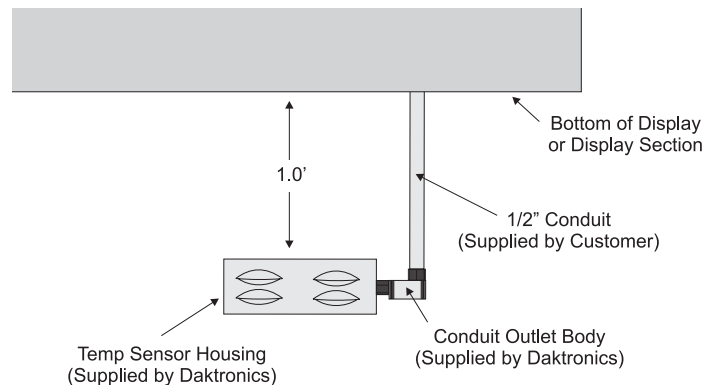
Due to the nature of the signal cable used to send the temperature information, the maximum distance between the temperature sensor and the display is 1,000 feet (304.8 meters).

Another recommended location for a temperature sensor is on the display itself, or somewhere on the display structure. A light-colored display is preferred in this application. Location of the sensor should be above, below, or on a northern edge to try to keep the sensor shaded. If mounting above the display, a minimum height of six feet is required. If mounting below the display, a minimum of eight feet above ground and a minimum of one foot between the sensor and display are required, as seen **Figure 35** on the right. Greater accuracy is obtained if there is grass below the display, rather than concrete or some other material.

Refer to **Figure 35** above for wiring instructions.



**Figure 34:** Temperature Sensor Eave/Wall Mount



**Figure 35:** Temperature Sensor Mounting to Bottom of Display

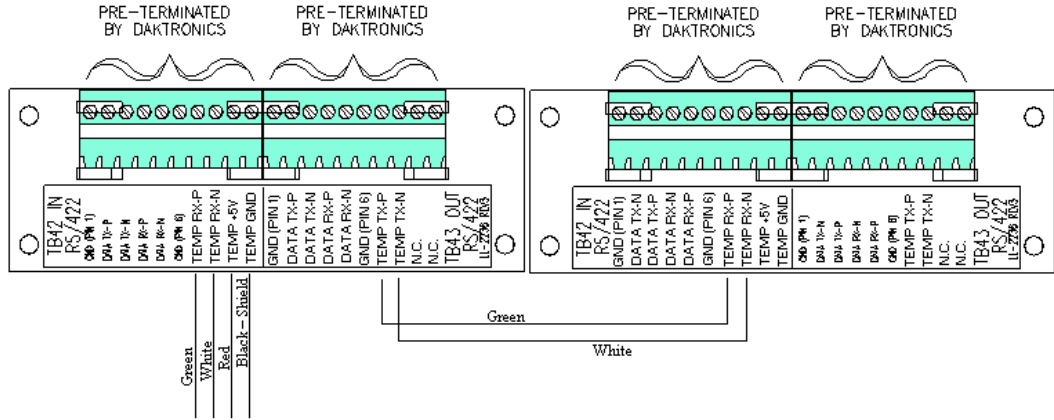


**Reference Drawings:**

- System Riser Diagram; Power/Signal, V1500 Displays ..... **Drawing A-88427**
- System Riser Diagram, RS422 ..... **Drawing A-92681**

A 4-conductor cable with shield is used to connect the temperature sensor to the display. The cable is terminated in the entrance enclosure on the terminal block labeled “TEMP SENSOR.”

**Temperature Sensor - Connection and Interconnection**



**Figure 36: Temperature Sensor--Connection and Interconnection**

TB42	Cable Wires	Temperature Sensor
Pin 7	Green	Temp RX-P
Pin 8	White	Temp RX-N
Pin 9	Red	Temp +5V
Pin 10	Black	Temp GND
Pin 10	Bare	N/A

**2V Displays**

If the display is 2V, one temperature sensor is used for both sides. An extra piece of the 4-conductor cable must be used to jumper the temperature sensor data to the second sign. Refer to **Drawing A-88426**, **Drawing A-88427**, and **Drawing A-92681** (located in **Appendix C**) for connections. **Note: Do not** connect the red, black, or shield wires in the jumper to the second sign. Refer to **Figure 36** above.

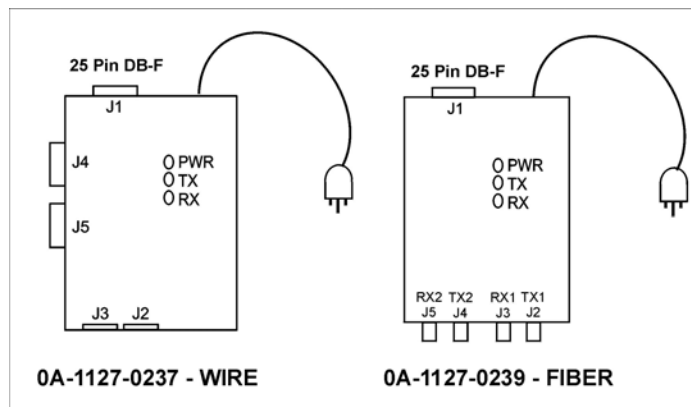
Sign A (TB43)	Field Cabling	Sign B (TB42)
Pin 7	Green	Pin 7
Pin 8	White	Pin 8
NC	Black	NC
NC	Red	NC
NC	Blue	NC



## Appendix B: Signal Converter

The following table gives the typical state of the signal converter when the LEDs are either on or off. Refer to **Figure 37** below for an illustration of the signal converters and the locations of the various components.

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



**Figure 37: Signal Converters**

### 0A-1127-0237 – Wire

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

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

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

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

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

<b>J2 and J3</b>	OR	<b>J4 and J5</b>
TX-N to RX-N		RX-P to TX-P
TX-P to RX-P		RX-N to TX-N

**0A-1127-0239 – Fiber**

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

JACK	OPERATION
J2	TX1 (out)
J3	RX1 (in)
J4	TX2 (out)
J5	RX2 (in)

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

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

<b>J2 and J3 or J4 and J5</b>
TX to RX

**Serial Cable (W-1249)**

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

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

**Serial Adaptor (A-1603)**

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



# Appendix C: Reference Drawings

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Drawings listed below are listed according to drawing type, and then listed according to sign size.

## Shop Drawings

Shop Drawing, AF-3010-8***-9-R .....	<b>Drawing A-139276</b>
Shop Drawing, AF-3010-16***-9-R .....	<b>Drawing A-82936</b>
Shop Drawing, AF-3010-24***-9-R .....	<b>Drawing A-105318</b>

## System Riser Diagrams

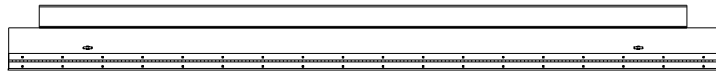
System Riser Diagram, Modem.....	<b>Drawing A-88426</b>
System Riser Diagram; Power/Signal, V1500 displays .....	<b>Drawing A-88427</b>
System Riser Diagram, RS422.....	<b>Drawing A-92681</b>
System Riser Diagram, RS232.....	<b>Drawing A-96058</b>
System Riser Diagram, Fiber.....	<b>Drawing A-110559</b>
System Riser Diagram, Outdoor Radio, Gen 2 .....	<b>Drawing A-185325</b>

## Mounting Drawing

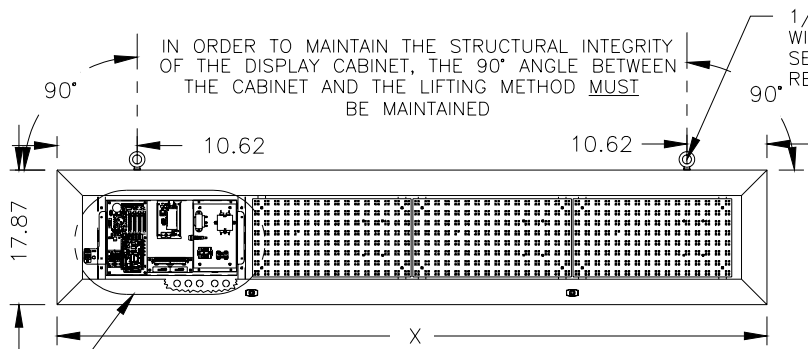
Mounting Drawing, AF-3010-****-9-* .....	<b>Drawing A-102469</b>
--	-------------------------

## Schematics

Schematic; AF-3010-8-**(*)-9 .....	<b>Drawing B-137612</b>
Schematic; AF-3010-16**(*)-9 .....	<b>Drawing B-99704</b>
Schematic; AF-3010-24**(*)-9 .....	<b>Drawing B-104021</b>

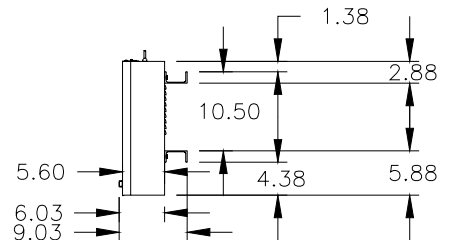


TOP VIEW

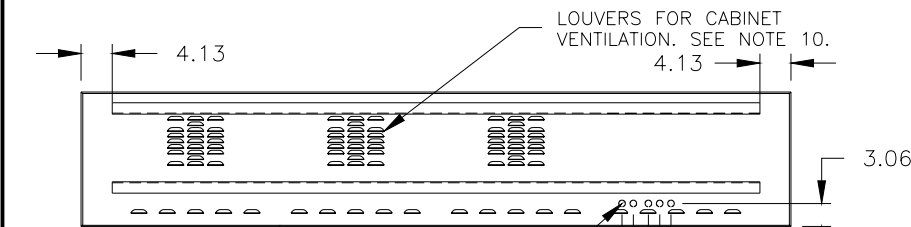


FRONT VIEW

1/2" X 1 1/8" EYEBOLT. EYEBOLT SHOULD BE REPLACED WITH A HEX-HEAD BOLT SUPPLIED BY DAKTRONICS. SEALING WASHER USED WITH THE EYEBOLT MUST BE REUSED. ALSO SEE NOTE AT LEFT AND NOTE 9.



RIGHT SIDE

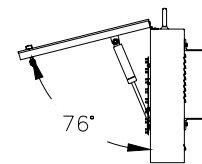


REAR VIEW

1/2" DIA HOLES IN DISPLAY BOTTOM FOR CABINET VENTILATION. SEE NOTE 10.

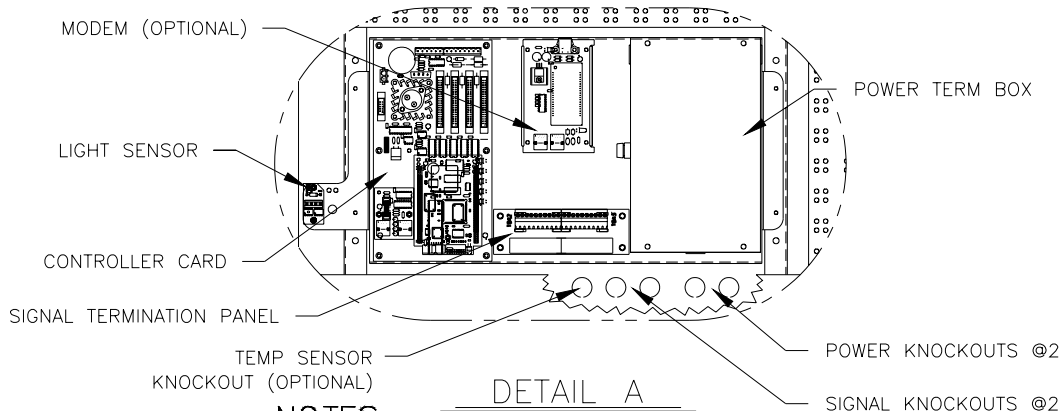
KNOCKOUTS FOR 1/2" CONDUIT. TYPICAL @5. MAY REQUIRE DRILLING.

- 22.43
- 20.95
- 18.95
- 17.45
- 15.95
- 0.00



RIGHT SIDE

SHOWN WITH THE DOOR IN OPEN POSITION. NOTE GAS SPRINGS HOLD DOOR OPEN FOR SERVICING.



NOTES:

- 1) ALL DIMENSIONS ARE IN INCHES.
- 2) DISPLAY CABINET COLOR IS FLAT BLACK.
- 3) DISPLAY L.E.D. COLOR: MONOCHROME RED.
- 4) CHARACTER HEIGHT IS 9".
- 5) ALL ALUMINUM CONSTRUCTION.
- 6) FACE PANEL MATERIAL IS 1/8" POLYCARBONATE PANEL.
- 7) FACE PANEL COLOR: RED
- 8) FRONT ACCESS FOR SERVICING BY USING A 8mm ALLEN (HEX) WRENCH.
- 9) EYEBOLTS MAY NOT BE USED FOR PERMANENT INSTALLATION.
- 10) INLET HOLES AND LOUVERS MUST NOT BE BLOCKED OR WARRANTY WILL BE VOID.

DISPLAY	DIMENSION X	DISPLAY WEIGHT (LBS)	APPROXIMATE	
			MAXIMUM POWER (WATTS)	AMPS @ 120VAC
AF-3010-832-9-*	51.69	75	80	0.7
AF-3010-848-9-*	72.97	95	110	0.8
AF-3010-864-9-*	94.25	117	155	1.0
AF-3010-880-9-*	115.53	140	185	1.3
AF-3010-896-9-*	136.81	161	230	1.5
AF-3010-8112-9-*	158.09	182	260	1.8
AF-3010-8128-9-*	179.37	203	305	2.0

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DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: OUTDOOR GALAXY DISPLAY

TITLE: SHOP DRAWING, AF-3010-8\*\*\*-9-R

DES. BY: KKLUDT

DRAWN BY: KKLUDT

DATE: 29SEP00

REVISION

APPR. BY:

SCALE: 1=25

1185-E10A-139276

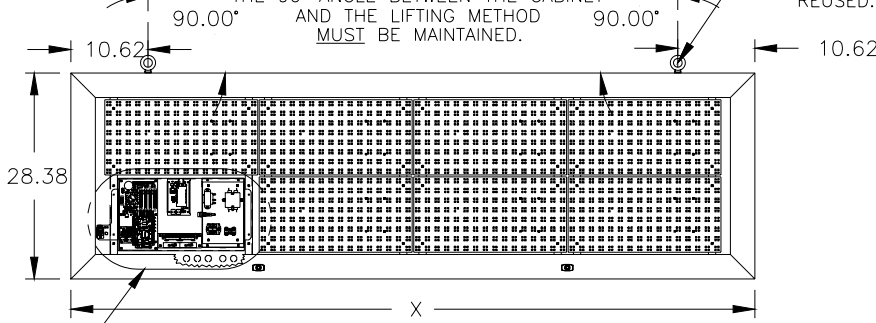
REV.	DATE	DESCRIPTION	BY	APPR.
2	8OCT01	ADDED DIMENSIONS FROM TOP & BOTTOM OF CABINET TO CHANNELS ON RIGHT SIDE VIEW.	DJD	
1	29NOV00	ADDED INFORMATION FOR AF-3010-8X32-9-*. CORRECTED MAX POWER.	DJD	



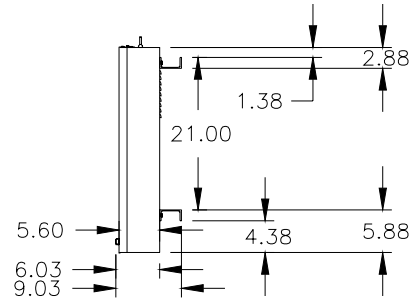
**TOP VIEW**

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

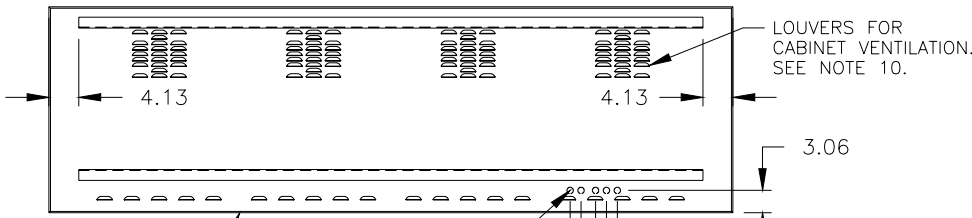
1/2" X 1 1/8" EYEBOLT. EYEBOLT SHOULD BE REPLACED WITH A HEX-HEAD BOLT SUPPLIED BY DAKTRONICS. SEALING WASHER USED WITH THE EYEBOLT MUST BE REUSED. ALSO SEE NOTE AT LEFT AND NOTE 9.



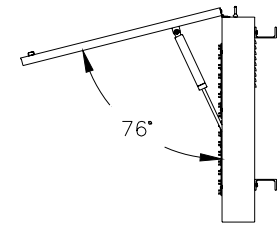
**FRONT VIEW**



**RIGHT SIDE**



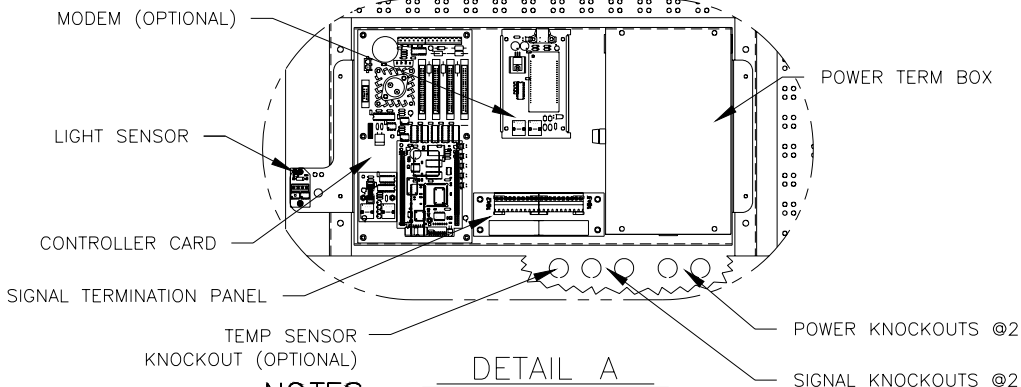
**REAR VIEW**



**RIGHT SIDE**

SHOWN WITH THE DOOR IN OPEN POSITION. NOTE GAS SPRINGS HOLD DOOR OPEN FOR SERVICING.

1/2" DIA HOLES IN DISPLAY BOTTOM FOR CABINET VENTILATION. SEE NOTE 10.



**NOTES:**

- 1) ALL DIMENSIONS ARE IN INCHES.
- 2) DISPLAY CABINET COLOR IS FLAT BLACK.
- 3) DISPLAY L.E.D. COLOR: MONOCHROME RED.
- 4) CHARACTER HEIGHT IS 9".
- 5) ALL ALUMINUM CONSTRUCTION.
- 6) FACE PANEL MATERIAL IS 1/8" POLYCARBONATE PANEL.
- 7) FACE PANEL COLOR: RED
- 8) FRONT ACCESS FOR SERVICING BY USING A 8mm ALLEN (HEX) WRENCH.
- 9) EYEBOLTS MAY NOT BE USED FOR PERMANENT INSTALLATION.
- 10) INLET HOLES AND LOUVERS MUST NOT BE BLOCKED OR WARRANTY WILL BE VOID.

DISPLAY	DIMENSION X	DISPLAY WEIGHT (LBS)	APPROXIMATE	
			MAXIMUM POWER (WATTS)	AMPS @ 120VAC
AF-3010-1648-9-R	72.97	109	186	1.5
AF-3010-1664-9-R	94.25	136	244	2.0
AF-3010-1680-9-R	115.53	164	301	2.5
AF-3010-1696-9-R	136.81	191	359	3.0
AF-3010-16112-9-R	158.09	220	417	3.5
AF-3010-16128-9-R	179.37	247	475	4.0

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DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: OUTDOOR GALAXY DISPLAY

TITLE: SHOP DRAWING, AF-3010-16\*\*\*-9-R

DES. BY: DDAGGITT

DRAWN BY: DDAGGITT

DATE: 6FEB98

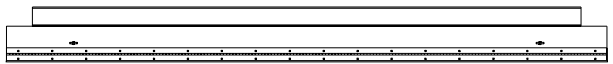
REVISION

APPR. BY:

SCALE: 1=25

1185-E10A-82936

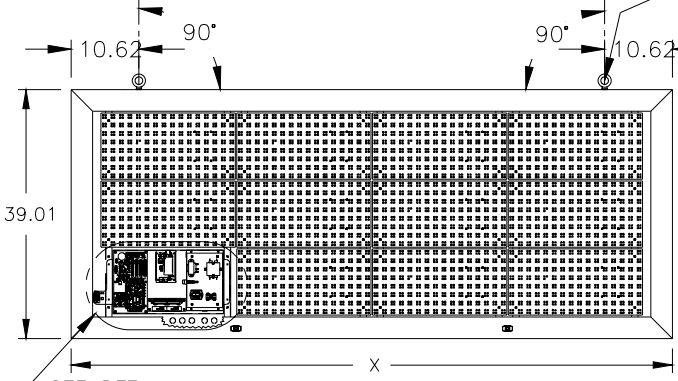
REV.	DATE	DESCRIPTION	BY	APPR.
2	8OCT01	ADDED DIMENSIONS FROM TOP & BOTTOM OF CABINET TO CHANNELS ON RIGHT SIDE VIEW.	DJD	
1	16FEB99	CHANGED FACE PANEL MATERIAL FROM ACRYLIC TO POLYCARBONATE.	DJD	



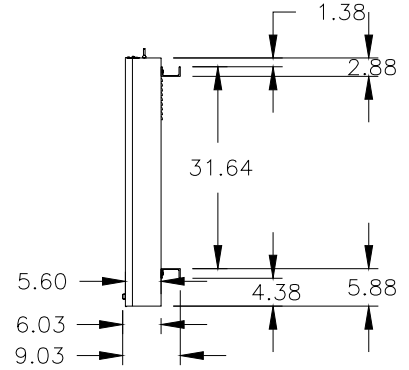
**TOP VIEW**

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

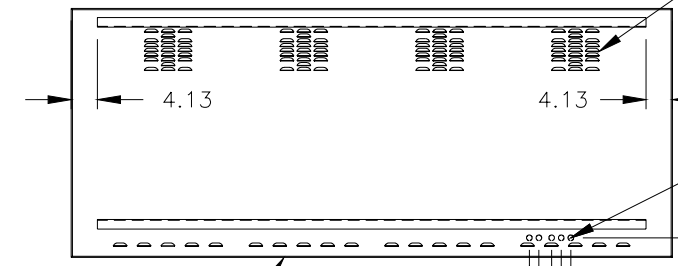
1/2" X 1 1/8" EYEBOLT. EYEBOLT SHOULD BE REPLACED WITH A HEX-HEAD BOLT SUPPLIED BY DAKTRONICS. SEALING WASHER USED WITH THE EYEBOLT MUST BE REUSED. ALSO SEE NOTE AT LEFT AND NOTE 9.



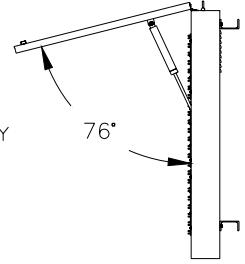
**FRONT VIEW**



**RIGHT SIDE**



**REAR VIEW**

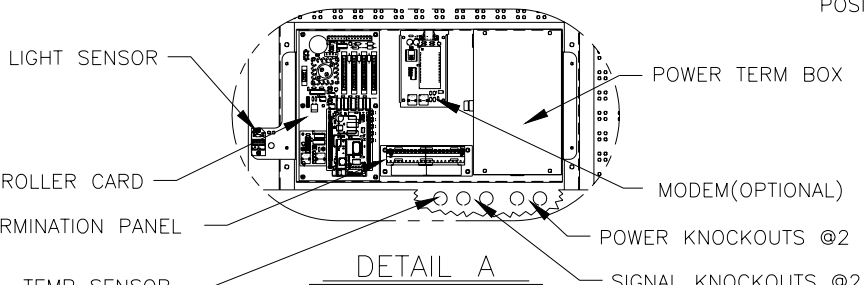


**RIGHT SIDE**

SHOWN WITH THE DOOR IN THE OPEN POSITION. NOTE THAT GAS SPRINGS HOLD DOOR OPEN FOR SERVICING.

1/2" DIA HOLES IN DISPLAY BOTTOM FOR CABINET VENTILATION. SEE NOTE 10.

KNOCKOUTS FOR 1/2" CONDUIT. TYP. @5. MAY REQUIRE DRILLING.



**NOTES:**

- 1) ALL DIMENSIONS ARE IN INCHES.
- 2) DISPLAY CABINET COLOR IS FLAT BLACK.
- 3) DISPLAY L.E.D. COLOR: MONOCHROME RED.
- 4) CHARACTER HEIGHT IS 9".
- 5) ALL ALUMINUM CONSTRUCTION.
- 6) FACE PANEL MATERIAL IS 1/8" POLYCARBONATE PANEL.
- 7) FACE PANEL COLOR: RED
- 8) FRONT ACCESS FOR SERVICING BY USING A 8MM ALLEN (HEX) WRENCH.
- 9) EYEBOLTS MAY NOT BE USED FOR PERMANENT INSTALLATION.
- 10) INLET HOLES AND LOUVERS MUST NOT BE BLOCKED OR WARRANTY WILL BE VOID.

DISPLAY	DIMENSION X	APPROXIMATE		
		DISPLAY WEIGHT (LBS)	MAXIMUM POWER (WATTS)	AMPS @ 120VAC
AF-3010-2448-9-R	72.97	130	317	2.6
AF-3010-2464-9-R	94.25	165	420	3.5
AF-3010-2480-9-R	115.53	200	524	4.4
AF-3010-2496-9-R	136.81	230	628	5.2
AF-3010-24112-9-R	158.09	265	732	6.1
AF-3010-24128-9-R	179.37	300	836	7.0

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

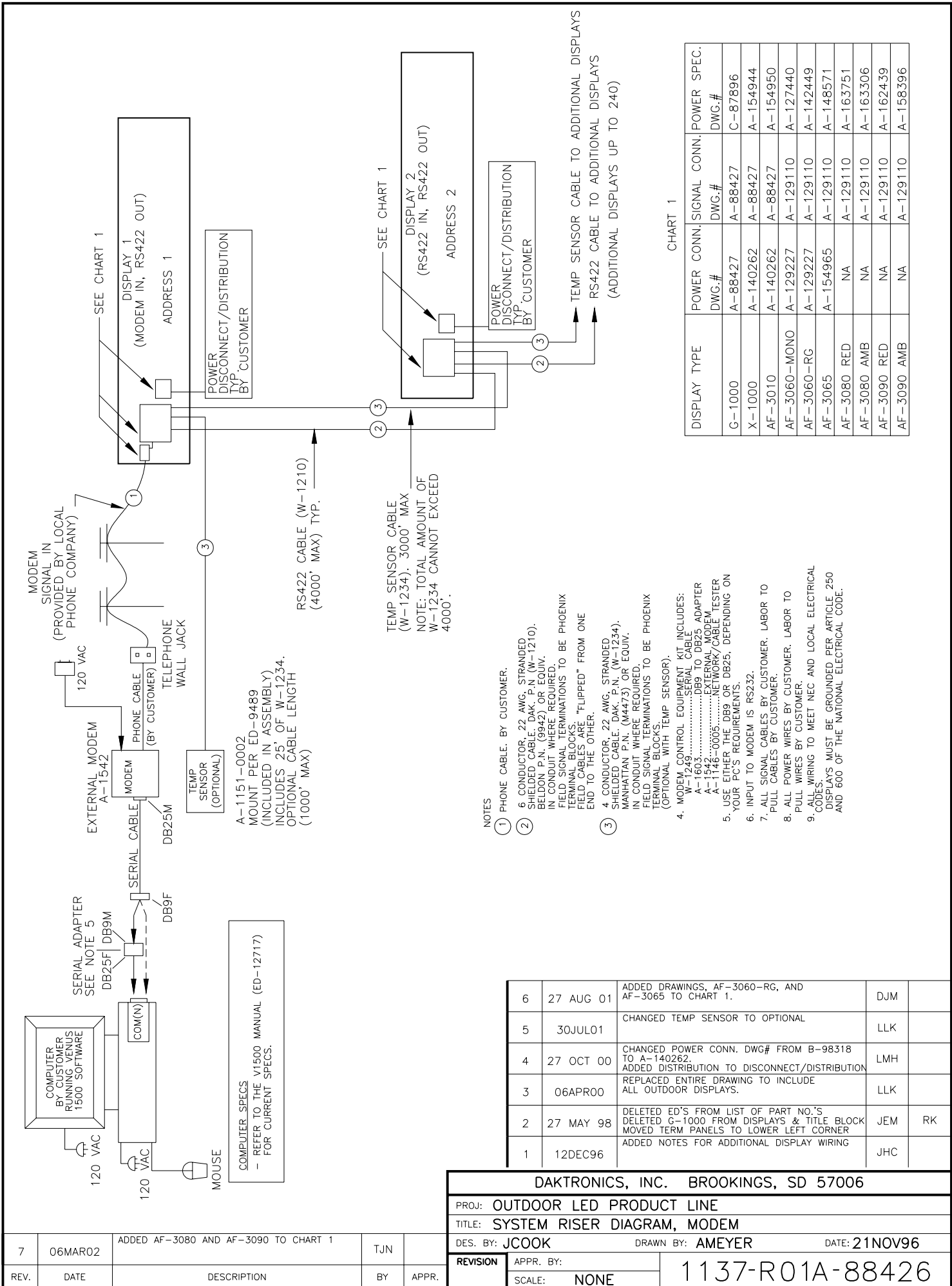
PROJ: **OUTDOOR GALAXY DISPLAYS**

TITLE: **SHOP DRAWING, AF-3010-24\*\*\*-9-R**

DES. BY: **DDAGGITT**      DRAWN BY: **DDAGGITT**      DATE: **21JUL98**

REVISION      APPR. BY:      SCALE: **1=30**      **1185-E10A-105318**

REV.	DATE	DESCRIPTION	BY	APPR.
3	8OCT01	ADDED DIMENSIONS FROM TOP & BOTTOM OF CABINET TO CHANNELS ON RIGHT SIDE VIEW.	DJD	
2	16FEB99	CHANGED FACE PANEL MATERIAL FROM ACRYLIC TO POLYCARBONATE.	DJD	
1	4NOV98	ADJUSTED WEIGHTS UPWARD.	DJD	



NOTES

- ① PHONE CABLE BY CUSTOMER.
  - ② 6 CONDUCTOR, 22 AWG, STRANDED SHIELDED CABLE, DAK, P.N. (W-1210), BELDON P.N. (9942) OR EQUIV. IN CONDUIT WHERE REQUIRED. FIELD SIGNAL TERMINATIONS TO BE PHOENIX TERMINAL BLOCKS. FIELD CABLES ARE "FLIPPED" FROM ONE END TO THE OTHER.
  - ③ 4 CONDUCTOR, 22 AWG, STRANDED SHIELDED CABLE, DAK, P.N. (W-1234), MANHATTAN P.N. (M4473) OR EQUIV. IN CONDUIT WHERE REQUIRED. FIELD SIGNAL TERMINATIONS TO BE PHOENIX TERMINAL BLOCKS. (OPTIONAL WITH TEMP SENSOR).
4. MODEM CONTROL EQUIPMENT KIT INCLUDES:  
 W-1249.....SERIAL CABLE  
 A-1603.....DB9 TO DB25 ADAPTER  
 A-1542.....EXTERNAL MODEM  
 A-1146-0005.....NETWORK/CABLE TESTER  
 5. USE EITHER THE DB9 OR DB25, DEPENDING ON YOUR PC'S REQUIREMENTS.
6. INPUT TO MODEM 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. DISPLAYS MUST BE GROUNDED PER ARTICLE 250 AND 600 OF THE NATIONAL ELECTRICAL CODE.

CHART 1

DISPLAY TYPE	POWER CONN. DWG.#	SIGNAL CONN. DWG.#	POWER SPEC. DWG.#
G-1000	A-88427	A-88427	C-87896
X-1000	A-140262	A-88427	A-154944
AF-3010	A-140262	A-88427	A-154950
AF-3060-MONO	A-129227	A-129110	A-127440
AF-3060-RG	A-129227	A-129110	A-142449
AF-3065	A-154965	A-129110	A-148571
AF-3080 RED	NA	A-129110	A-163751
AF-3080 AMB	NA	A-129110	A-163306
AF-3090 RED	NA	A-129110	A-162439
AF-3090 AMB	NA	A-129110	A-158396

6	27 AUG 01	ADDED DRAWINGS, AF-3060-RG, AND AF-3065 TO CHART 1.		DJM
5	30JUL01	CHANGED TEMP SENSOR TO OPTIONAL		LLK
4	27 OCT 00	CHANGED POWER CONN. DWG# FROM B-98318 TO A-140262. ADDED DISTRIBUTION TO DISCONNECT/DISTRIBUTION		LMH
3	06APR00	REPLACED ENTIRE DRAWING TO INCLUDE ALL OUTDOOR DISPLAYS.		LLK
2	27 MAY 98	DELETED ED'S FROM LIST OF PART NO.'S DELETED G-1000 FROM DISPLAYS & TITLE BLOCK MOVED TERM PANELS TO LOWER LEFT CORNER		JEM RK
1	12DEC96	ADDED NOTES FOR ADDITIONAL DISPLAY WIRING		JHC

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

PROJ: **OUTDOOR LED PRODUCT LINE**

TITLE: **SYSTEM RISER DIAGRAM, MODEM**

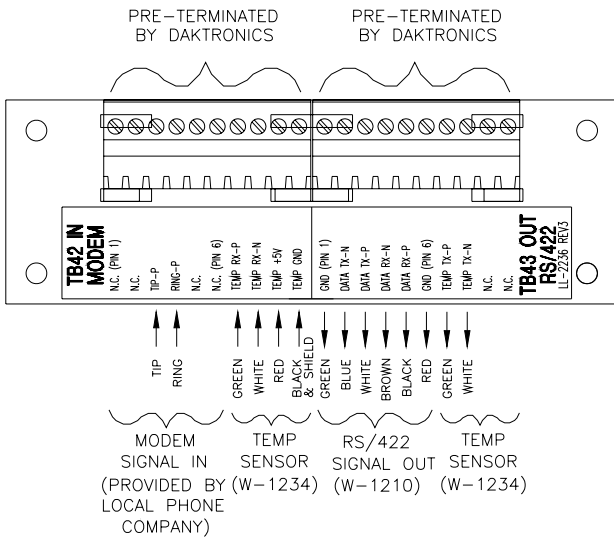
DES. BY: **JCOOK**      DRAWN BY: **AMEYER**      DATE: **21 NOV 96**

REVISION    APPR. BY:      SCALE: **NONE**

1137-R01A-88426

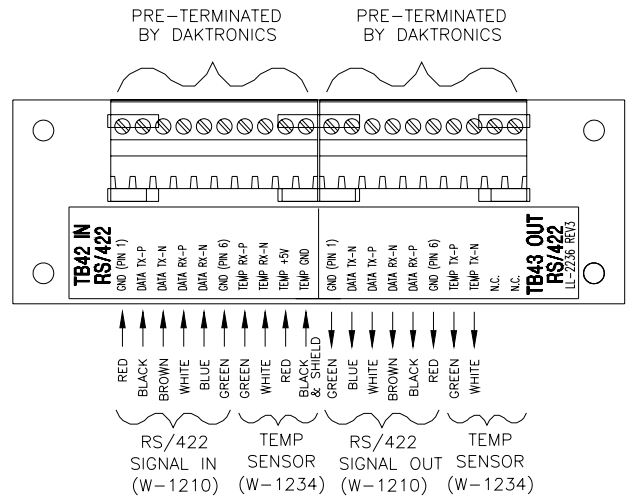
REV.	DATE	DESCRIPTION	BY	APPR.
7	06MAR02	ADDED AF-3080 AND AF-3090 TO CHART 1	TJN	

## MODEM SIGNAL CONNECTIONS



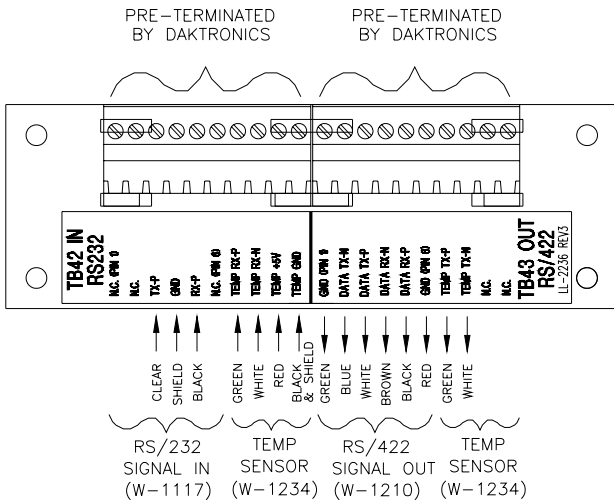
**DETAIL F**  
SIGNAL CONNECTIONS

## RS/422 SIGNAL CONNECTIONS



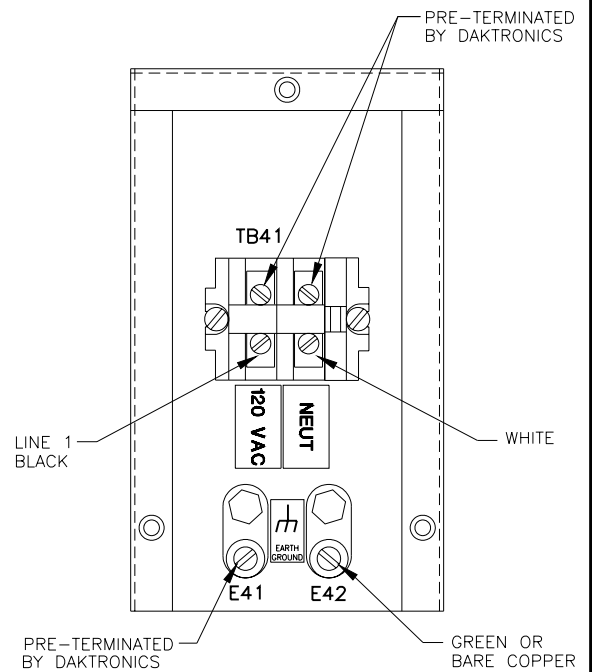
**DETAIL D**  
SIGNAL CONNECTIONS

## RS/232 SIGNAL CONNECTIONS



**DETAIL G**  
SIGNAL CONNECTIONS

## "ONLY USED IN G-1000 DISPLAYS"



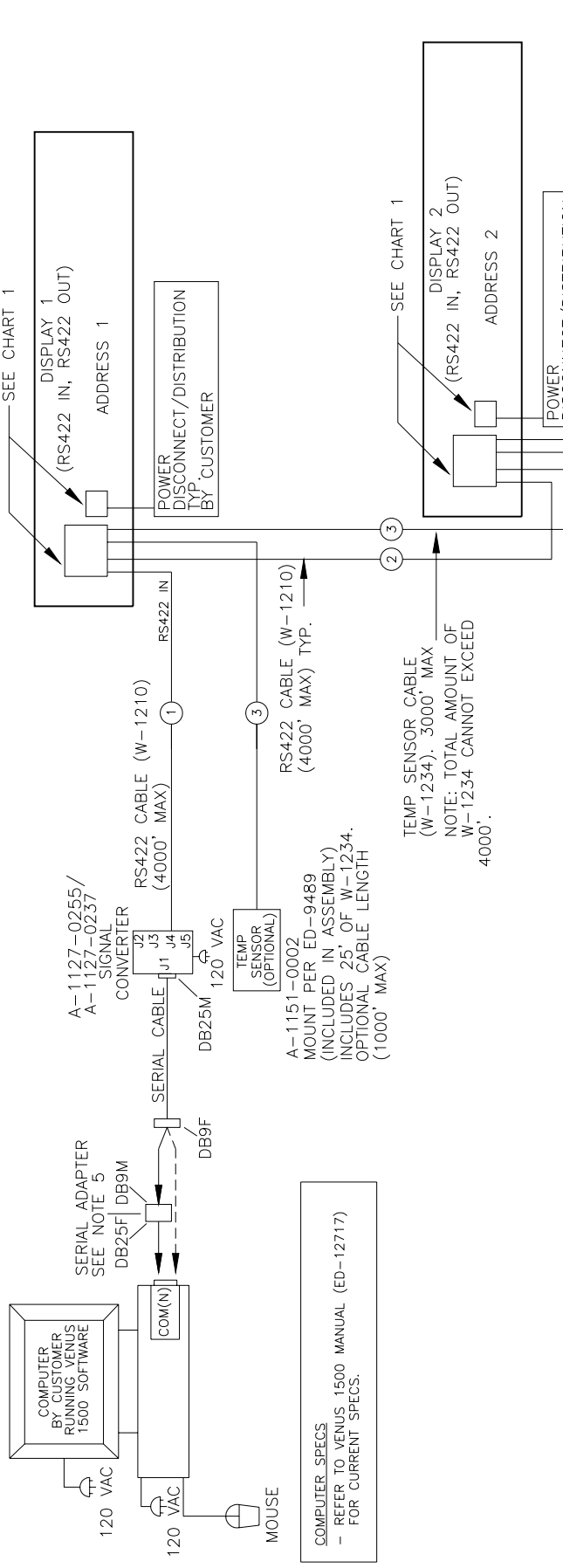
**DETAIL E**  
POWER CONNECTIONS

\*\* REFER TO DWG 1137-R01A-88425 FOR COMPLETE RS/422 SYSTEM RISER DIAGRAM

\*\* REFER TO DWG 1137-R01A-88426 FOR COMPLETE MODEM SYSTEM RISER DIAGRAM

REV.	DATE	DESCRIPTION	BY	APPR.
3	13NOV01	ADDED "G-1000 ONLY" NOTE TO DETAIL E	LLK	LLK
2	28 MAY 98	REPLACED G1000 WITH V1500 IN TITLE BLOCK	JEM	RK
1	2 SEPT 97	ADDED DETAIL G, UPDATED RS/232 LABEL AND REARRANGED DRAWING.	CI	

<b>DAKTRONICS, INC. BROOKINGS, SD 57006</b>	
PROJ:	OUTDOOR LED PRODUCT LINE
TITLE:	SYSTEM RISER DIAGRAM; PWR & SIG V1500 DISPLAYS
DES. BY:	JCOOK
DRAWN BY:	AMEYER
DATE:	21NOV96
REVISION	APPR. BY:
SCALE:	NONE
<b>1137-R01A-88427</b>	



- NOTES
- 6 CONDUCTOR, 22 AWG, STRANDED SHIELDED CABLE, DAK. P.N. (W-1210). BELDON P.N. (9942) OR EQUIV. IN CONDUIT WHERE REQUIRED. FIELD SIGNAL TERMINATIONS TO BE PHOENIX TERMINAL BLOCKS. FIELD CABLES ARE PINNED 1 TO 1 FROM ONE END TO THE OTHER.
  - 6 CONDUCTOR, 22 AWG, STRANDED SHIELDED CABLE, DAK. P.N. (W-1210). BELDON P.N. (9942) OR EQUIV. IN CONDUIT WHERE REQUIRED. FIELD SIGNAL TERMINATIONS TO BE PHOENIX TERMINAL BLOCKS. FIELD CABLES ARE "FLIPPED" FROM ONE END TO THE OTHER.
  - 4 CONDUCTOR, 22 AWG, STRANDED SHIELDED CABLE, DAK. P.N. (W-1234). MANHATTAN P.N. (M4473) OR EQUIV. IN CONDUIT WHERE REQUIRED. FIELD SIGNAL TERMINATIONS TO BE PHOENIX TERMINAL BLOCKS.
  - RS/422 CONTROL EQUIPMENT KIT INCLUDES:  
W-1249.....SERIAL CABLE  
A-1603.....DB9 TO DB25 ADAPTER  
A-1127-0255.....SIGNAL CONVERTER  
A-1146-0005.....NETWORK/CABLE TESTER  
YOUR PC'S REQUIREMENTS.
  - INPUT TO CONVERTER IS RS232. OUTPUTS RS422.
  - ALL SIGNAL CABLES BY CUSTOMER. LABOR TO PULL CABLES BY CUSTOMER.
  - ALL POWER WIRES BY CUSTOMER. LABOR TO PULL WIRES BY CUSTOMER.
  - ALL WIRING TO MEET NEC AND LOCAL ELECTRICAL CODES.
  - DISPLAYS MUST BE GROUNDED PER ARTICLE, 250 AND 600 OF THE NATIONAL ELECTRICAL CODE.

CHART 1

DISPLAY TYPE	POWER CONN. DWG.#	SIGNAL CONN. DWG.#	POWER SPEC. DWG.#
G-1000	A-88427	A-88427	C-87896
X-1000	A-140262	A-88427	A-154944
AF-3010	A-140262	A-88427	A-154950
AF-3060-MONO	A-129227	A-129110	A-127440
AF-3060-RG	A-129227	A-129110	A-142449
AF-3065	A-154965	A-129110	A-148571
AF-3080 RED	NA	A-129110	A-163751
AF-3080 AMB	NA	A-129110	A-163306
AF-3090 RED	NA	A-129110	A-162439
AF-3090 AMB	NA	A-129110	A-158396

4	27 AUG 01	REVISED COMPUTER SPEC BOX , ADDED DRAWINGS, AF-3060-RG, AND AF-3065 TO CHART 1.		DJM
3	27 OCT 00	CHANGED POWER CONN. DWG# FROM B-98318 TO A-140262. ADDED DISTRIBUTION TO DISCONNECT/DISTRIBUTION		LMH
2	06APR00	REPLACED ENTIRE DRAWING TO INCLUDE ALL OUTDOOR DISPLAYS		LLK
1	27 MAY 98	DELETED ED'S FROM LIST OF PART NO.'S DELETED G-1000 FROM DISPLAYS MOVED TERM PANELS TO LOWER LEFT CORNER		JEM RK

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DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ:	OUTDOOR LED PRODUCT LINE		
TITLE:	SYSTEM RISER DIAGRAM, RS422		
DES. BY:	JCOOK	DRAWN BY:	AMEYER
		DATE:	30APR97
REVISION	APPR. BY:	1137-R01A-92681	
06	SCALE: NONE		

REV.	DATE	DESCRIPTION	BY	APPR.
6	26 MAR 04	REPLACED OA-1127-0237 WITH OA-1127-0255 (INCLUDES SURGE PROTECTION)	SAI	DJM
5	06MAR02	ADDED AF-3080 AND AF-3090 TO CHART 1	TJN	

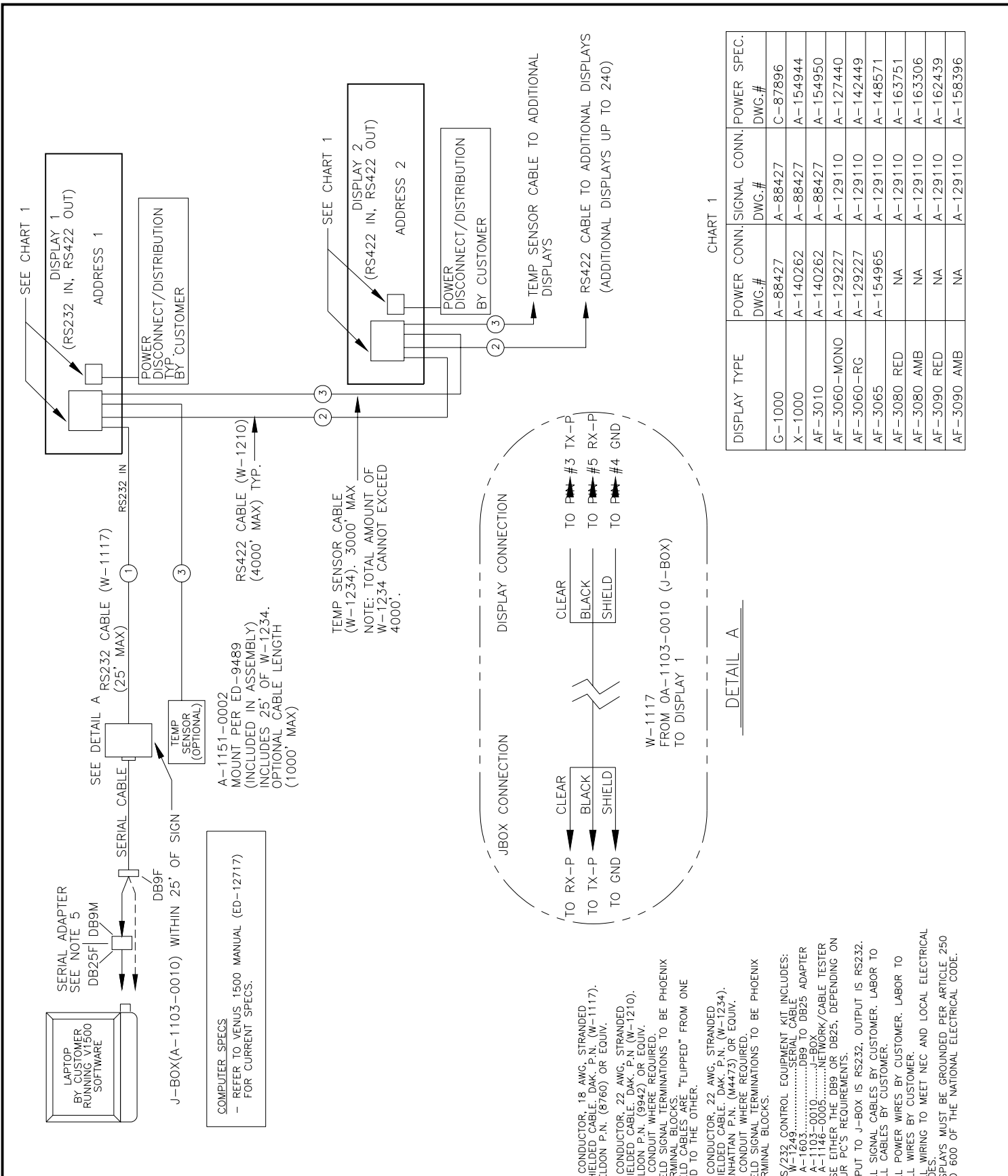
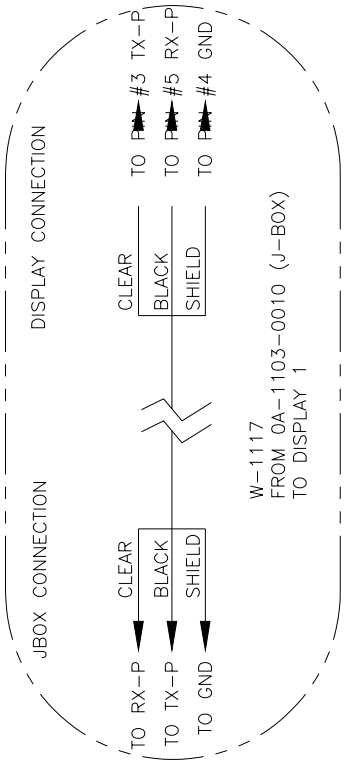


CHART 1

DISPLAY TYPE	POWER CONN. DWG.#	SIGNAL CONN. DWG.#	POWER SPEC. DWG.#
G-1000	A-88427	A-88427	C-87896
X-1000	A-140262	A-88427	A-154944
AF-3010	A-140262	A-88427	A-154950
AF-3060-MONO	A-129227	A-129110	A-127440
AF-3060-RG	A-129227	A-129110	A-142449
AF-3065	A-154965	A-129110	A-148571
AF-3080 RED	NA	A-129110	A-163751
AF-3080 AMB	NA	A-129110	A-163306
AF-3090 RED	NA	A-129110	A-162439
AF-3090 AMB	NA	A-129110	A-158396



REV.	DATE	DESCRIPTION	BY	APPR.
5	06 MAR 02	ADDED AF-3080 AND AF-3090 TO CHART 1	TJN	
4	27 AUG 01	REVISED COMPUTER SPEC BOX, ADDED DRAWINGS, AF-3060-RG, AND AF-3065 TO CHART 1.	DJM	
3	27 OCT 00	CHANGED POWER CONN. DWG# FROM B-98318 TO A-140262. ADDED DISTRIBUTION TO DISCONNECT/DISTRIBUTION	LMH	
2	06APR00	REPLACED ENTIRE DRAWING TO INCLUDE ALL OUTDOOR DISPLAYS.	LLK	
1	27 MAY 98	DELETED ED'S FROM LIST OF PART NO.'S DELETED G-1000 FROM DISPLAYS & TITLE MOVED TERM PANELS TO LOWER LEFT CORNER	JEM	RK

NOTES

- 2 CONDUCTOR, 18 AWG, STRANDED SHIELDED CABLE, DAK, P.N. (W-1117), BELDON P.N. (8766) OR EQUIV.
- 6 CONDUCTOR, 22 AWG, STRANDED SHIELDED CABLE, DAK, P.N. (W-1210), BELDON P.N. (9942) OR EQUIV. IN CONDUIT WHERE REQUIRED. FIELD SIGNAL TERMINATIONS TO BE PHOENIX TERMINAL BLOCKS. FIELD CABLES ARE "FLIPPED" FROM ONE END TO THE OTHER.
- 4 CONDUCTOR, 22 AWG, STRANDED SHIELDED CABLE, DAK, P.N. (W-1234), MANHATTAN P.N. (M4473) OR EQUIV. IN CONDUIT WHERE REQUIRED. FIELD SIGNAL TERMINATIONS TO BE PHOENIX TERMINAL BLOCKS.
- RS/232 CONTROL EQUIPMENT KIT INCLUDES: W-1249.....SERIAL CABLE A-1603.....DB9 TO DB25 ADAPTER A-1103-0010.....J-BOX A-1146-0005.....NETWORK/CABLE TESTER
- USE EITHER THE DB9 OR DB25, DEPENDING ON YOUR PC'S REQUIREMENTS.
- INPUT TO J-BOX IS RS232, OUTPUT IS RS232.
- ALL SIGNAL CABLES BY CUSTOMER. LABOR TO PULL CABLES BY CUSTOMER.
- ALL POWER WIRES BY CUSTOMER. LABOR TO PULL WIRES BY CUSTOMER.
- ALL WIRING TO MEET NEC AND LOCAL ELECTRICAL CODES. DISPLAYS MUST BE GROUNDED PER ARTICLE 250 AND 600 OF THE NATIONAL ELECTRICAL CODE.

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

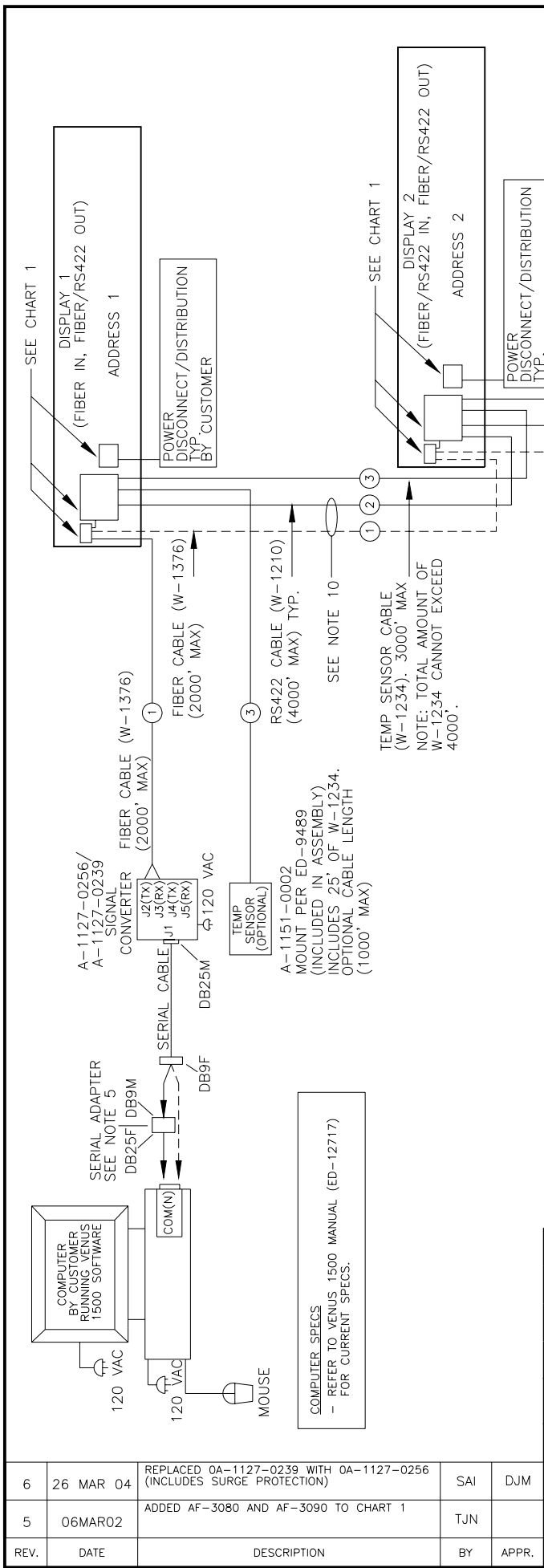
PROJ: **OUTDOOR LED PRODUCT LINE**

TITLE: **SYSTEM RISER DIAGRAM, RS232**

DES. BY: \_\_\_\_\_ DRAWN BY: **CIVERSEN** DATE: **28 AUG 97**

REVISION	APPR. BY:	1137-R01A-96058
SCALE: NONE		





- NOTES
- 4 FIBER CABLE, 62.5/125 GRADE DAK, P.N. (W-1376). GRAYBAR P.N. (BX040800-W35B1UC900R) IN CONDUIT WHERE REQUIRED.
  - 6 CONDUCTOR, 22 AWG, STRANDED SHIELDED CABLE, DAK, P.N. (W-1210). BELDON P.N. (9942), OR EQUIV. IN CONDUIT WHERE REQUIRED. FIELD SIGNAL TERMINATIONS TO BE PHOENIX FIBER CABLES. OTHER FIBER CABLES "FLIPPED" FROM ONE END TO THE OTHER.
  - 4 CONDUCTOR, 22 AWG, STRANDED SHIELDED CABLE, DAK, P.N. (W-1234). MANHATTAN P.N. (M4473), OR EQUIV. IN CONDUIT WHERE REQUIRED. FIELD SIGNAL TERMINATIONS TO BE PHOENIX TERMINAL BLOCKS.
  - FIBER CONTROL EQUIPMENT KIT INCLUDES: A-1503.....SERIAL CABLE A-1603.....DB9 TO DB25 ADAPTER A-1127-0256.....SIGNAL CONVERTER A-1146-0006.....NETWORK/CABLE TESTER
  - USE EITHER THE DB9 OR DB25, DEPENDING ON YOUR PC'S REQUIREMENTS.
  - INPUT TO CONVERTER IS RS232.
  - ALL SIGNAL CABLES BY CUSTOMER. LABOR TO PULL CABLES BY CUSTOMER.
  - ALL POWER WIRES BY CUSTOMER. LABOR TO PULL WIRES BY CUSTOMER.
  - ALL WIRING TO MEET NEC AND LOCAL ELECTRICAL CODES. DISPLAYS MUST BE GROUNDED PER ARTICLE 250 AND 600 OF THE NATIONAL ELECTRICAL CODE.
  - DISPLAY OUTPUTS CAN BE EITHER FIBER OR RS422.

CHART 1

DISPLAY TYPE	POWER CONN. DWG.#	SIGNAL CONN. DWG.#	POWER SPEC. DWG.#
G-1000	A-88427	A-88427	C-87896
X-1000	A-140262	A-88427	A-154944
AF-3010	A-140262	A-88427	A-154950
AF-3060-MONO	A-129227	A-129110	A-127440
AF-3060-RG	A-129227	A-129110	A-142449
AF-3065	A-154965	A-129110	A-148571
AF-3080 RED	NA	A-129110	A-163751
AF-3080 AMB	NA	A-129110	A-163306
AF-3090 RED	NA	A-129110	A-162439
AF-3090 AMB	NA	A-129110	A-158396

4	27 AUG 01	REVISED COMPUTER SPEC BOX AND ADDED DRAWINGS, AF-3060-RG, AF-3065 TO CHART 1.	DJM
3	27 OCT 00	CHANGED POWER CONN. DWG# FROM B-98318 TO A-140262. ADDED DISTRIBUTION TO DISCONNECT/DISTRIBUTION	LMH
2	06APR00	REPLACED ENTIRE DRAWING TO INCLUDE ALL OUTDOOR DISPLAYS.	LLK
1	20JAN99	REVISED FIBER CABLE LENGTH FROM 3000' MAX TO 2000' MAX.	LLK

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6	26 MAR 04	REPLACED 0A-1127-0239 WITH 0A-1127-0256 (INCLUDES SURGE PROTECTION)	SAI	DJM
5	06MAR02	ADDED AF-3080 AND AF-3090 TO CHART 1	TJN	
REV.	DATE	DESCRIPTION	BY	APPR.

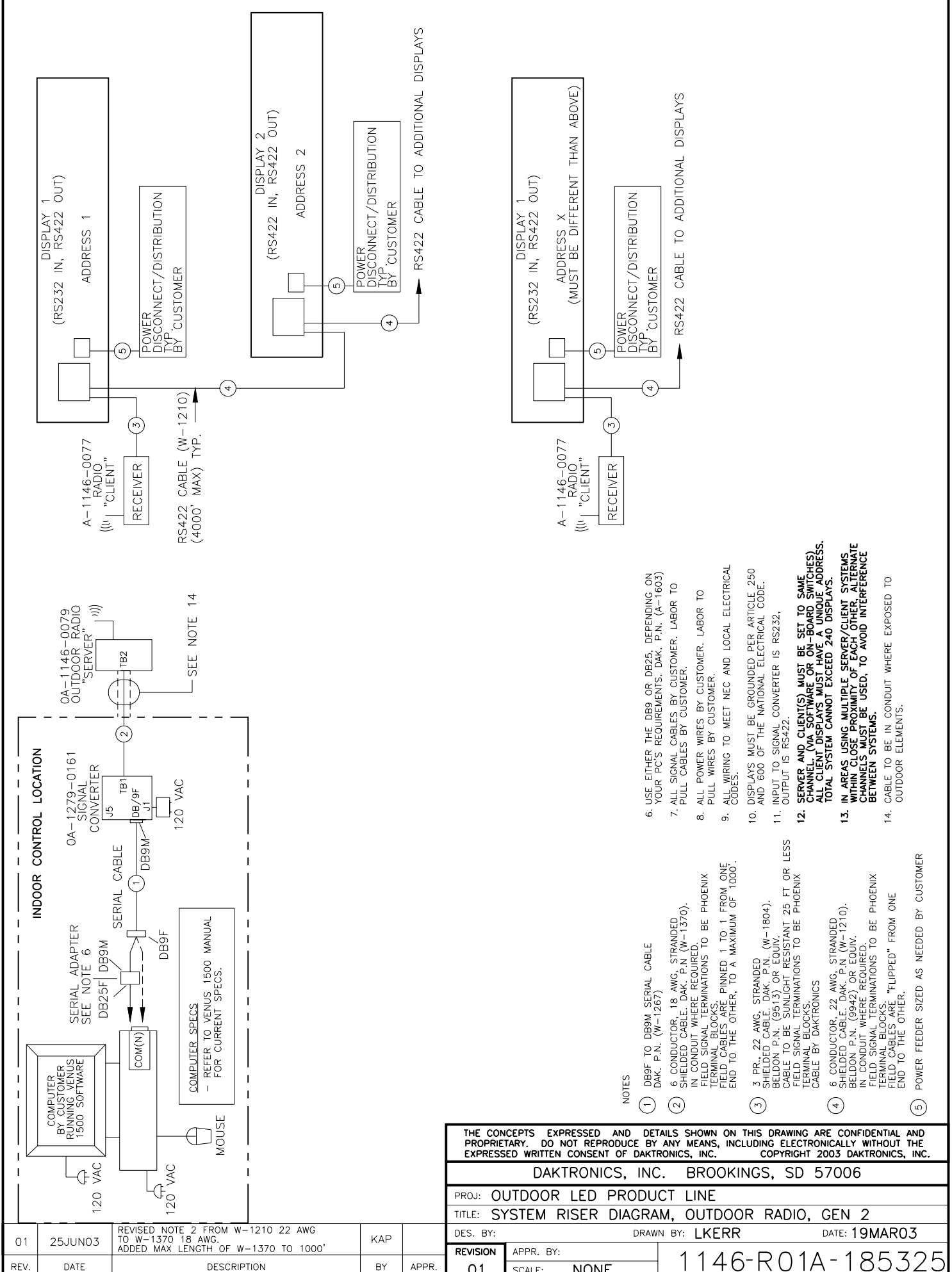
PROJ: OUTDOOR LED PRODUCT LINE

TITLE: SYSTEM RISER DIAGRAM, FIBER

DES. BY: DRAWN BY: LKERR DATE: 29DEC98

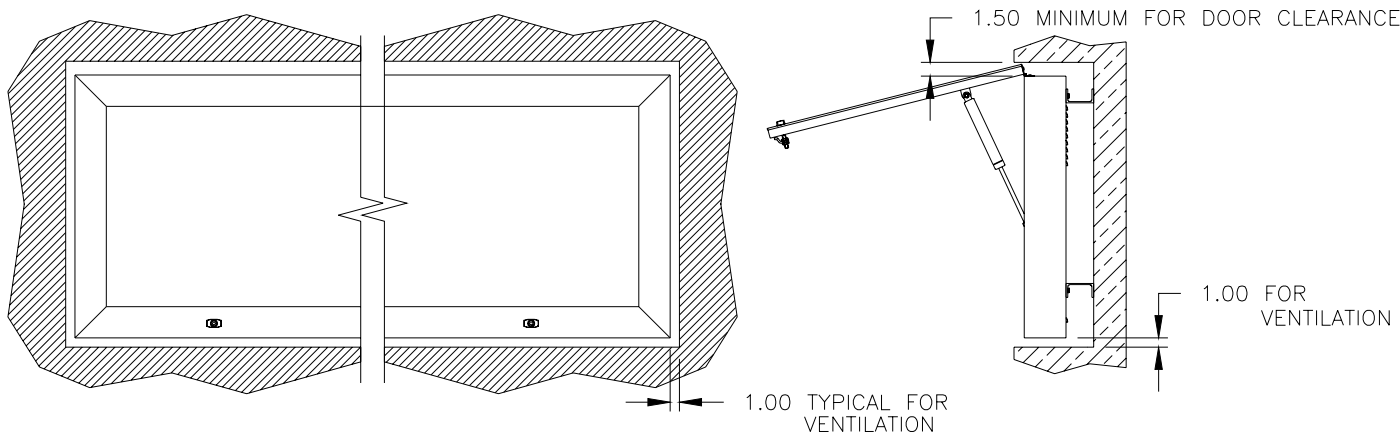
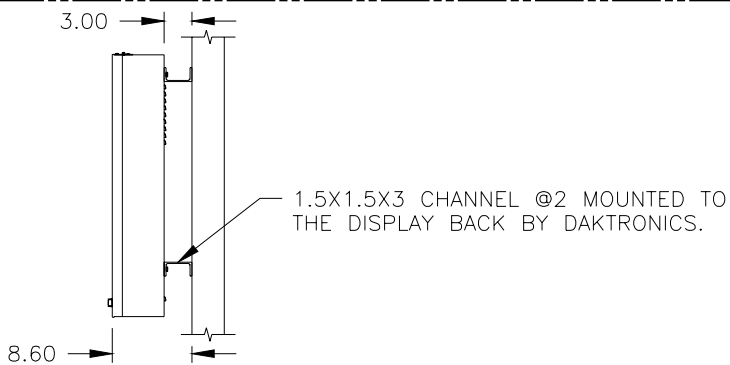
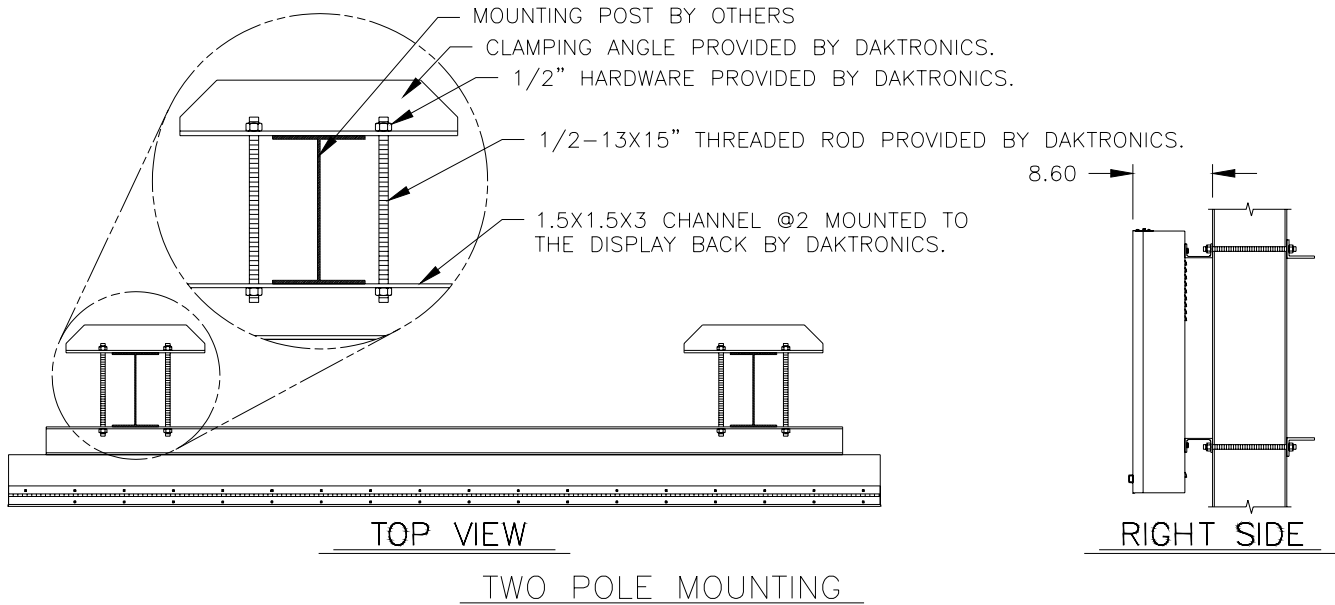
REVISION 06 APPR. BY: SCALE: NONE

1137-R01A-110559



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DAKTRONICS, INC. BROOKINGS, SD 57006			
PROJ: OUTDOOR LED PRODUCT LINE			
TITLE: SYSTEM RISER DIAGRAM, OUTDOOR RADIO, GEN 2			
DES. BY:	DRAWN BY: LKERR	DATE: 19MAR03	
REVISION	APPR. BY:	1146-R01A-185325	
01	SCALE: NONE		

01	25JUN03	REVISED NOTE 2 FROM W-1210 22 AWG TO W-1370 18 AWG. ADDED MAX LENGTH OF W-1370 TO 1000'	KAP	
REV.	DATE	DESCRIPTION	BY	APPR.

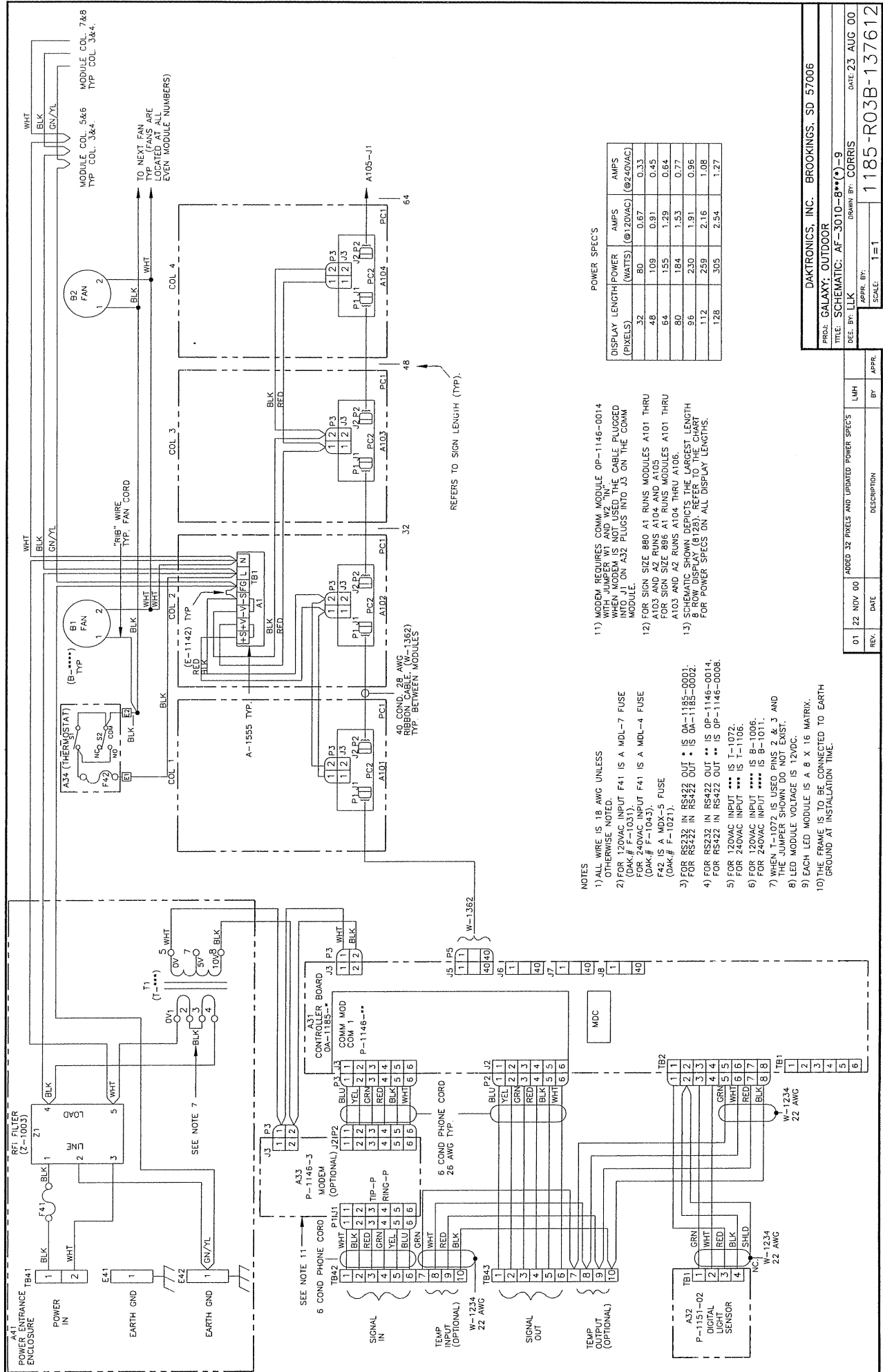


NOTES:

1. ALL DIMENSIONS ARE IN INCHES.
2. REFER TO DAKTRONICS SHOP DRAWING A-139276, A-82936, OR A-105318 FOR PHYSICAL DIMENSIONS OF THE DISPLAY.
3. THE TWO MOUNTING METHODS SHOWN ARE THE DAKTRONICS RECOMMENDED MOUNTING METHODS. ANY OTHER MOUNTING METHOD MUST BE DESIGNED AND INSTALLED BY QUALIFIED STRUCTURAL PERSONNEL.

DAKTRONICS, INC. BROOKINGS, SD 57006

2	60CT00	ADDED SHOP DRAWING NUMBER A-139276 TO NOTE 2.	DJD		PROJ: <b>OUTDOOR GALAXY DISPLAYS</b>
1	30OCT98	ADDED SHOP DRAWING NUMBER A-105318 TO NOTE 2.	DJD		TITLE: <b>MOUNTING DRAWING, AF-3010-*****-9-*</b>
REV.	DATE	DESCRIPTION	BY	APPR.	DES. BY: <b>DDAGGITT</b> DRAWN BY: <b>DDAGGITT</b> DATE: <b>7MAY98</b>
					REVISION APPR. BY: SCALE: <b>1=20</b>
					<b>1185-E10A-102469</b>



POWER SPECS

DISPLAY LENGTH (PIXELS)	POWER (WATTS) (@ 20VAC)	AMPS (@ 20VAC)
32	80	0.67
48	109	0.91
64	155	1.29
80	184	1.53
96	230	1.91
112	259	2.16
128	305	2.54

- NOTES
- 1) ALL WIRE IS 18 AWG UNLESS OTHERWISE NOTED.
  - 2) FOR 120VAC INPUT F41 IS A MDL-7 FUSE (DARK # F-1031).
  - 3) FOR 240VAC INPUT F41 IS A MDL-4 FUSE (DARK # F-1043).
  - 4) FOR RS232 IN RS422 OUT \*\* IS OP-1148-0014.
  - 5) FOR RS232 IN RS422 OUT \*\* IS OP-1185-0002.
  - 6) FOR RS422 IN RS422 OUT \*\* IS OP-1148-0014.
  - 7) FOR RS422 IN RS422 OUT \*\* IS OP-1148-0008.
  - 8) FOR 120VAC INPUT \*\* IS T-1072.
  - 9) FOR 240VAC INPUT \*\* IS B-1068.
  - 10) FOR 120VAC INPUT \*\* IS B-1011.
  - 11) WHEN T-1072 IS USED FINS 2 & 3 AND THE JUMPER SHOWN DO NOT EXIST.
  - 12) THE JUMPER VOLTAGE IS 12VDC.
  - 13) EACH LED MODULE IS A 8 X 16 MATRIX.
  - 14) THE FRAME IS TO BE CONNECTED TO EARTH GROUND AT INSTALLATION TIME.

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PROJECT: GALAXY: OUTDOOR

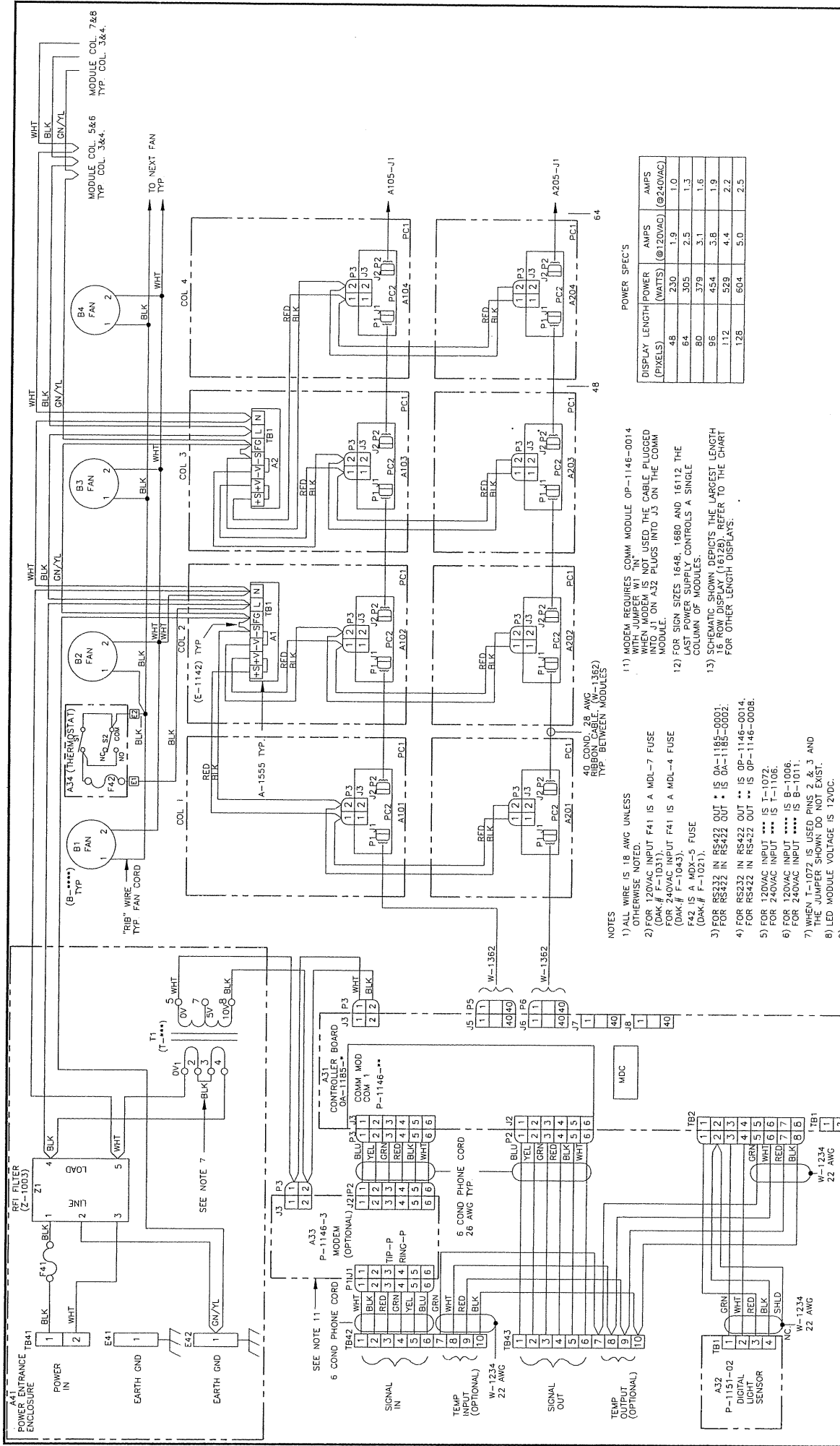
TITLE: SCHEMATIC: AF-3010-B\*\*(\*)-9

DES. BY: LJK DRAWN BY: CORNIS DATE: 23 AUG 00

APPR. BY: SCALE: 1=1

1185-R03B-137612

REV.	DATE	DESCRIPTION	LMH	BY	APPR.
01	22 NOV 00	ADDED 32 PIXELS AND UPDATED POWER SPECS			



POWER SPECS

DISPLAY LENGTH (PIXELS)	POWER (WATTS) (@20VAC)	AMPS (@20VAC)
48	230	1.9
64	305	2.5
80	379	3.1
96	454	3.8
112	529	4.4
128	604	5.0

- NOTES
- 1) ALL WIRE IS 18 AWG UNLESS OTHERWISE NOTED.
  - 2) FOR 120VAC INPUT F41 IS A MDL-7 FUSE (DAK # F-1031).
  - 3) FOR 240VAC INPUT F41 IS A MDL-4 FUSE (DAK # F-1043).
  - 4) FOR RS232 IN RS422 OUT \*\* IS 0A-1185-0014.
  - 5) FOR RS232 IN RS422 OUT \*\* IS 0A-1185-0002.
  - 6) FOR 240VAC INPUT \*\* IS 0A-1185-0006.
  - 7) WHEN F-1079 IS USED IN \*\* EXIST. 3 AND THE JUMPER SHOWN DO NOT EXIST.
  - 8) LED MODULE VOLTAGE IS 12VDC.
  - 9) EACH LED MODULE IS A 8 X 16 MATRIX.
  - 10) THE FRAME IS TO BE CONNECTED TO EARTH GROUND AT INSTALLATION TIME.
- 11) MODEM REQUIRES COMM MODULE OP-1146-0014 WHEN JUMPER W-1362 IS ON THE COMM MODULE.
- 12) FOR SIGN SIZES 1648, 1680 AND 16112 THE LAST POWER SUPPLY CONTROLS A SINGLE COLUMN OF MODULES.
- 13) SCHEMATIC SHOWN DEPICTS THE LARGEST LENGTH 16 ROW DISPLAY (16x128). REFER TO THE CHART FOR OTHER LENGTH DISPLAYS.

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: GALAXY; OUTDOOR

TITLE: SCHEMATIC: AF-3010-16\*\*(\*)-9

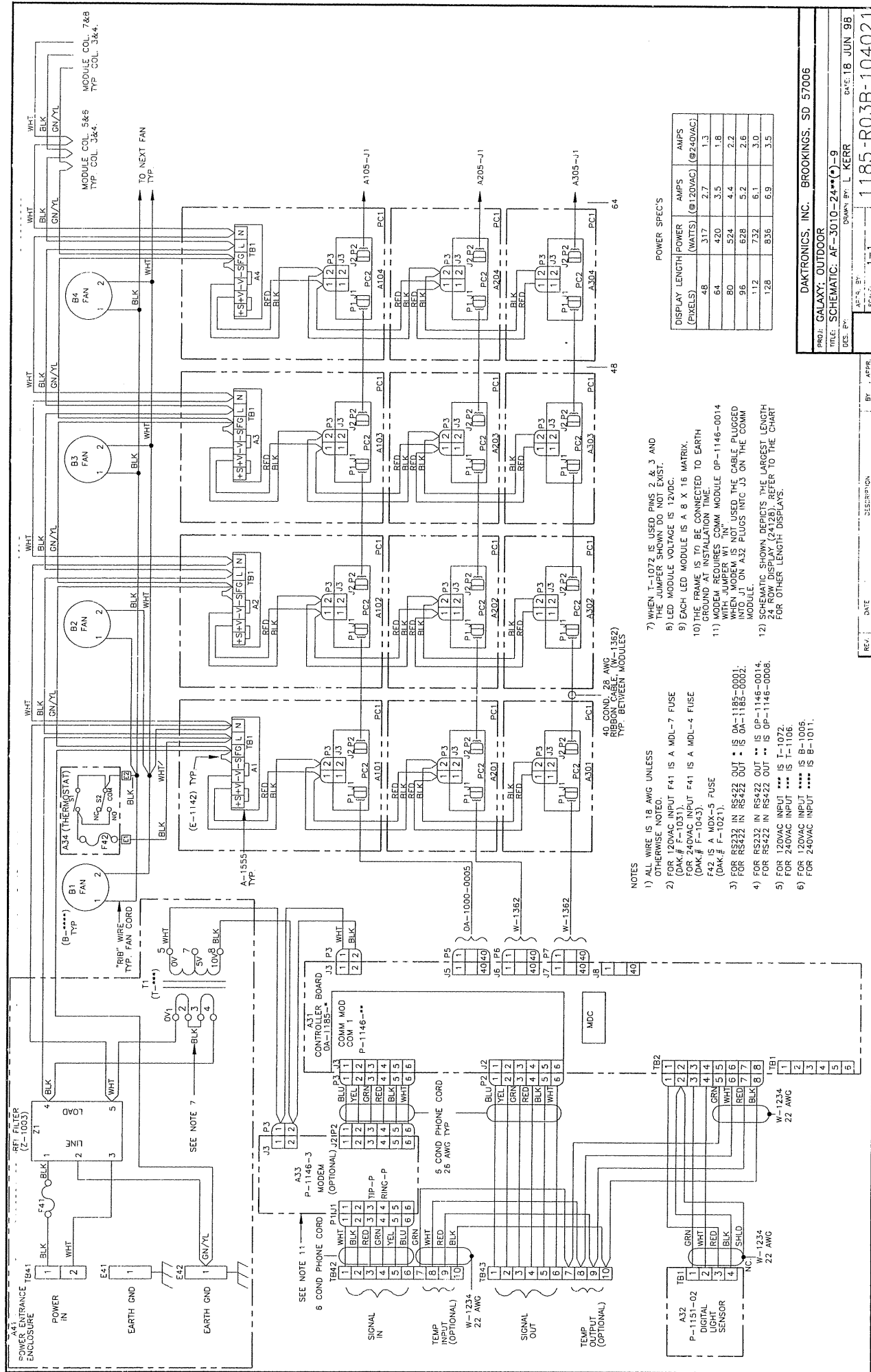
DES. BY: L. KERR

DATE: 16 SEPT 97

SCALE: 1=1

1185-R03B-99704

REV.	DATE	DESCRIPTION	BY	APPR.
02	18 JUN 98	CHANGED RIBBON CABLE PLS. FROM PRODUCT EB TO W-1362.	LLK	
01	20 APR 98	UPDATED POWER SPECS. RE-ORIENTED THERMISTAL. AND FAN. UPDATED POWER SPECS. CHANGED TITLE, MANUFACTURE.	LLK	



MODULE COL. 5&6  
TYP. COL. 3&4.

MODULE COL. 7&8  
TYP. COL. 3&4.

DISPLAY LENGTH (PIXELS)	POWER (WATTS) (@120VAC)	AMPS (@240VAC)
48	317	2.7
64	420	3.5
80	524	4.4
96	628	5.2
112	732	6.1
128	836	6.9
		3.5

POWER SPECS

- NOTES
- 1) ALL WIRE IS 18 AWG UNLESS OTHERWISE NOTED.
  - 2) FOR 120VAC INPUT F41 IS A MDL-7 FUSE (DAK.# F-1031). FOR 240VAC INPUT F41 IS A MDL-4 FUSE (DAK.# F-1043).
  - 3) FOR RS232 IN RS422 OUT \*\* IS DA-1185-0001. FOR RS422 IN RS422 OUT \*\* IS OP-1146-0002. FOR RS232 IN RS422 OUT \*\* IS OP-1146-0014. FOR 120VAC INPUT \*\*\* IS T-1072.
  - 4) FOR 120VAC INPUT \*\*\* IS T-1106.
  - 5) FOR 240VAC INPUT \*\*\* IS B-1005.
  - 6) FOR 240VAC INPUT \*\*\* IS B-1011.
- 7) WHEN T-1072 IS USED PINS 2, 3 AND 9) EACH LED MODULE IS A 8 X 16 MATRIX. THE FRAME IS TO BE CONNECTED TO EARTH GROUND AT INSTALLATION TIME.

10) THE MODEM REQUIRES COMM MODULE OP-1146-0014 WITH JUMPER W1 IN.

11) WHEN MODEM IS NOT USED THE CABLE PLUGGED INTO J3 ON A32 PLUGS INTO J3 ON THE COMM MODULE.

12) SCHEMATIC SHOWN DEPICTS THE LARGEST LENGTH 24 ROW DISPLAY (24128). REFER TO THE CHART FOR OTHER LENGTH DISPLAYS.

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: GALAXY; OUTDOOR

TITLE: SCHEMATIC: AF-3010-24\*\*(\*)-9

DES. BY: L. KERR

DATE: 18 JUN 98

SCALE: 1:1

1185-R03B-104021

REV. DATE DESCRIPTION BY APPR.