

Galaxy Outdoor 7.62mm Series AF-3020

Installation, Maintenance, & Troubleshooting Manual

ED13518

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Section 1 : Introduction

1.1 How to Use this Manual

This manual explains the installation, maintenance and troubleshooting of a Daktronics Galaxy outdoor LED (light emitting diode) displays controlled by a Venus® 1500 controller. 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 & Troubleshooting and Appendices A, B and 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** provides general guidance on terminating power and signal cable at the sign.
- **Maintenance & Troubleshooting** addresses such things as removing basic sign components, troubleshooting the sign, performing general maintenance and exchanging sign components.
- **Appendix A** provides information for the optional temperature sensor.
- **Appendix B** covers information pertaining to 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 **ED13518**.

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 illustrates 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 A-114667**. Reference drawings are inserted in **Appendix C** at the end of the manual.

DAKTRONICS, INC. BROOKINGS, SD 57006			
PROJ: 1600 SERIES MESSAGE BOARDS, 2 1/2"			
TITLE: SHOP DWG, 16 HIGH 2 1/2" SMALL MATRIX DISPLAY			
DES. BY:	DRAWN BY: JRT	DATE: 16APR99	
APPR. BY:	1195-R10A-114667		
SCALE: 1=30			

Figure 1: Drawing Label

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

“Refer to **Drawing A-114667** 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 Drawings:

Component Placement Diagram **Drawing A-114667**

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 4.11** provides the names and part number of components that may need to be ordered during the life of the sign.

Following the **Replacement Parts List** is the **Exchange/Replacement Procedure** in **Section 4.12**. Refer to these instructions if any sign component needs replacement or repair.

1.2 Safety Precautions



1. Read and understand these instructions before installing.
2. Be sure that the display is properly grounded.
3. Disconnect power before working on the display.
4. Do not modify the display structure or attach any panels or coverings to the display without the written consent of Daktronics, Inc.
5. *Care must be taken when handling the display's face panel to prevent any injuries or damage, especially in windy conditions.*

1.3 Daktronics Nomenclature

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 16 pixels high by 48 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 2** illustrates how Daktronics numbers modules on a Galaxy sign. **Figure 3** breaks down the module numbering method.

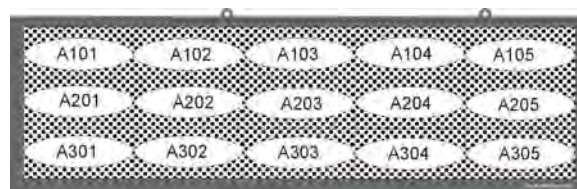


Figure 2: Module Numbering Example – 48x240
Front

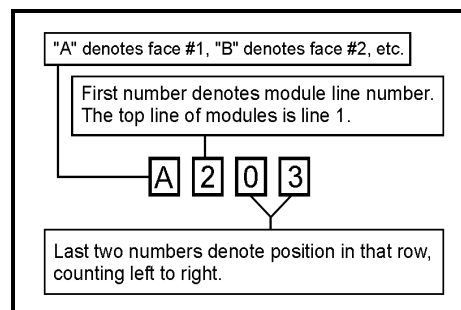


Figure 3: Module Numbering

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

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.
- “0A-????-????” denotes an assembly, such as a circuit board and the plate or bracket to which it is mounted. A collection of circuit boards working as a single unit may also carry an assembly label.
- “W-????” denotes a wire or cable. Cables may also carry the assembly numbering format in certain circumstances. This is especially true of ribbon cables.
- “F-????” denotes a fuse.

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**, use the label to order a replacement. A typical label is shown in **Figure 4**. The part number is in bold.

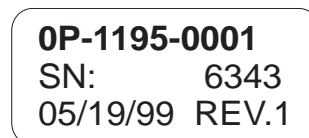


Figure 4: Typical Label

1.4 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 complexity of multiple sign installations has emerged, and 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 powerful system of interconnecting and controlling signs. One network of signs can consist of a maximum of 240 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 a network which message should be run
- The ability to determine the status of any sign on the network
- The ability to control multiple sign technologies on the same network

There are four network systems available: RS/232, RS/422, modem and fiber optic.

RS/232 Network

RS/232 (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 RS/232 communications port. Refer to **Section 3** for additional information.

RS/422 Network

RS/422 (EIA/TIA-422-B) is a standard communication interface that utilizes a differential balanced transmission scheme that uses a typical maximum cable length of 1.2 km (approximately 4000 feet). The main advantage to RS/422 over RS/232 is the longer cable length that is possible. A signal converter is needed to convert the computer's RS/232 to RS/422. 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 controller and the display. The display must have a dedicated phone line. 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 converter is required to convert the computer's RS/232 interface to a light signal.

1.5 Display Overview

Refer to project specific shop drawings for details of the display.

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 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 displays, which are single-sided stand-alone units. The AF-3020 can be a double-sided display with two singles back to back each using a separate controller.

The Venus 1500 is a software package that runs under Windows[®] 95, Windows[®] 98 or Windows NT[®] operating systems on an IBM[®]-compatible computer. Refer to the Venus 1500 controller manual for installation and maintenance of the Venus 1500 editing station.

The Galaxy Series AF-3020 displays are matrix-based outdoor LED displays that are available in monochrome red or amber characters. They are offered as 16, 32, or 48 pixel high displays with a standard 7 high 7.62mm minimum character in different lengths. The Galaxy model numbers are described as follows: **AF-3020-RRxCCC-7.62-SF-Z**

AF-3020	=	Outdoor Galaxy Display
RR	=	16, 32 or 48 Rows High
CCC	=	Number of Columns Long (96, 144, 192 and 240 are available)
7.62	=	7.62mm Character Height
SF	=	Single Face (SF)
Z	=	Monochrome Red (R) or Monochrome Amber (A)

1.6 Part Definitions

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.

Column: Vertical group of pixels.

Com Port – Serial Port: Connector on the back of the controller PC. The Com Port is used to control the sign network through either a DB9 or DB25-pin serial connector.

Controller Board: Controls the data for the entire display. It is located behind the bottom left module.

Display Board: 16 row by 48-column array of pixels.

Display Configuration: Refers to a display's model number, address, etc. This information will be automatically displayed when the display is powered up.

Driver: Located on the back of the display board.

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

Face Panel: Latching, hinged door that hinges downward, which the modules are mounted to.

Fiber Optic: Standard communication method using light (signal) transmitted through a glass fiber. Fiber optic cable has a maximum length of 2,000 feet. A signal converter is required.

LED (Light Emitting Diode): Electrical component which creates a single point of light on the display. There are 768 LEDs per module.

Modem: Uses standard telephone cable routed through conduit. Ask the telephone company which colors are used by the TIP, and the RING for signal hook up. **Note:** The telephone lines must be dedicated lines and *not* run through a switch board/communications system.

Module: Unit of the display that contains the LEDs, display board and driver board.

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

Pixel: Single LED in the display.

RS/232: Standard PC communication type with a maximum cable length of 25 feet (8 meters).

RS/422: Standard differential communication type with a maximum cable length of 4000 feet (1.2 kilometers).

Row: Horizontal group of pixels.

RX LED: LED on the signal converter that indicates if the display is sending data back to the signal converter.

Sign Address: Identification number assigned to each sign in a network. The control software uses the address to locate and communicate with each display independently. Displays that are on the same network cannot have the same address.

Signal Cable Tester: Used to test the cable connections and data communication.

Signal Converter: Daktronics supplied unit which converts the data from RS/232 to RS/422 (wire converter) or RS/232 to light signals (fiber converter). The signal converter is used in RS/422 systems or fiber systems respectively.

Surge Suppressor (Surge Protector): Device inserted in the alternating current utility line and/or telephone line to prevent damage to electronic equipment from voltage "spikes" called transients.

TX LED: LED on the signal converter, which indicates the control PC, is sending data to the display.

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

Section 2 : Mechanical Installation

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

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

2.1 Support Structure Design

Support structure design depends on the mounting methods, display size and weight. The structure design is critical and should be done only by a qualified individual. 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.*

Note: Project specific **Shop Drawings** are provided for special circumstances where there is a special mounting method used.

2.2 Display Mounting

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 the project specific shop drawings 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 recommends a wall/pole mounting method. Remember to have *all* mounted displays inspected by a qualified structural engineer.

Note: The display has a hinged face panel. Care must be taken to allow the door to properly open (refer to the project specific shop drawing).

Wall/Pole Mount

Note: It is the customer's responsibility to determine the proper wall/pole mounting method and location of the display. The number of attachment points needed and the structure *must* be reviewed by a qualified structural engineer and meet all national and local codes. *Daktronics is not responsible for the installations or the structural integrity of support structures installed by others.*

Mounting channels/angles on the back of the display may be used as a wall/pole mount method. There are 1/4" bolts tightened into the rear of the display (Refer to the rear view of the shop drawing) to assist with mounting. Once the proper mounting method and mounting channels/angles are determined, attach the mounting channels/angles to the back of the display using the 1/4" bolts. Sealing washers or waterproof sealant must be placed between the display and the mounting channel/angle to prevent water leaking into the display. (Refer to the rear view on the shop drawing.)

There are five conduit knockouts for power or signal cables on the rear of the display as noted in the display's shop drawing. Any hole that is punched or drilled in the display must be waterproofed (either using a waterproof plug or conduit) to prevent water from entering the sign.

Section 3 : Electrical Installation

Note: Only a qualified individual should terminate power and signal cable within this Daktronics display.

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

3.1 Common Connectors in Galaxy Displays

Many different types of connectors are used for power and signal connection in this display. Take special care when disengaging any connector so as not to damage the connector, the cable or the circuit board.

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

The following information presents some common connectors encountered during display installation and maintenance.

1. Ribbon Cable Connectors:

Daktronics uses a variety of ribbon cables and ribbon cable connectors. The most commonly used ribbon cable connector is seen in **Figure 5**. To disconnect ribbon cable connector #2, pull each of the plastic locking arms outward and remove the plug.

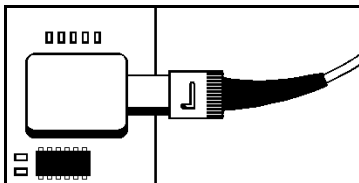


Figure 6: Fiber Optic Connector

2. Fiber Optic Connectors:

At each end of a fiber optic cable is a “twist-on” connector. To remove the fiber plug from its jack, push it toward the jack and twist it counter-clockwise until the plug can be pulled free. **Figure 6** illustrates a common type of fiber optic connector.

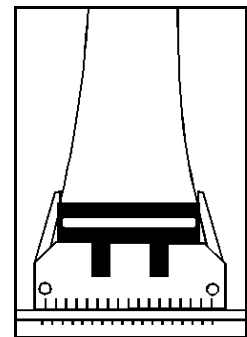


Figure 5: Ribbon Cable Connector #2

3. Phone Jacks (RJ11 Connector):

RJ connectors, as seen in **Figure 7**: RJ11 Connector, are similar to the telephone connectors found in homes. In order to remove this plug from the jack, depress the small clip on the underside of the plug.

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

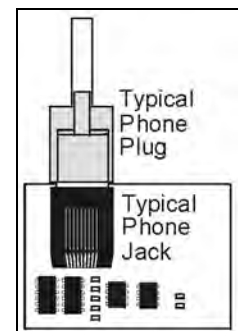


Figure 7: RJ11 Connector

4. Termination Panels & Termination Blocks:

Termination panels and termination blocks are most often used to connect internal power and signal wires to wires of the same type coming into the display from an external source. Most signal wires will come with forked connectors crimped to the ends of the wire. Power wires need to have one-half inch of insulation stripped from the end of the wire prior to termination. Tighten all screws firmly to ensure a good electrical connection. Refer to **Figure 8**.

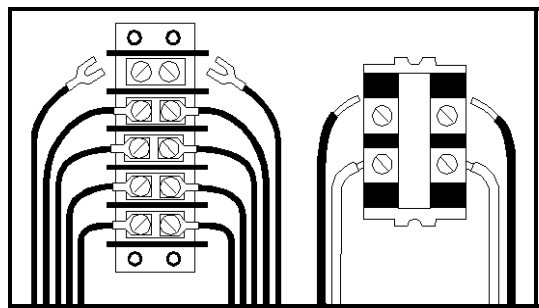


Figure 8: Termination Panel (Left) and Termination Block (Right)

5. Phoenix-Style Connectors:

Phoenix-style connectors, which are usually green, are often used for signal termination on circuit boards. Refer to **Figure 9**. One-quarter inch of insulation must be stripped from the wire prior to termination. To remove a wire, turn the above screw counter-clockwise to loose the connectors grip on the wire. To insert a wire, push the bare wire into the connector and turn the above screw clockwise to lock the wire into place.

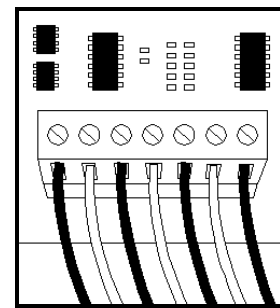


Figure 9: Phoenix Connector

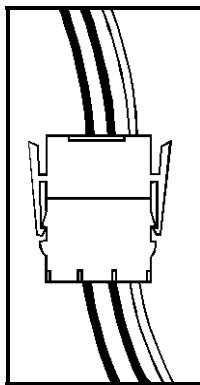


Figure 10: Mate-n-Lok Connector

6. Mate-n-Lok™ Connectors:

The Mate-n-Lok connectors found in this display are white and come in a variety of sizes. **Figure 10** illustrates a four-pin Mate-n-Lok connector. To remove the plug from the jack, squeeze the plastics locking clasps of the side of the plug and pull it from the jack.

7. Tab Connectors:

The tab connector, illustrated in **Figure 11**, is found in most Daktronics displays. Grab the connector on the plastic terminal cover when removing. Do **not** pull it off the tab by pulling on the wire.

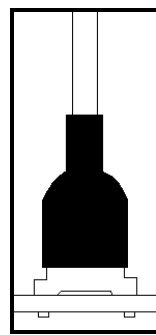


Figure 11: Tab Connector

3.2 Conduit

Reference Drawings:

System Riser Diagram (Modem)	Drawing A-88426
Power/Signal Termination Panel	Drawing A-88427
System Riser Diagram (422)	Drawing A-92681
System Riser Diagram, Fiber	Drawing A-110559
Power Termination Box	Drawing A-140262

Daktronics does not include the conduit. Possible power and signal entrances are designated by center punches. Refer to the project specific shop drawing for the placement of the center punches. Separate conduit must be used to route the following:

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

To prepare for power and signal entrance:

1. Release the face panel latches using a tubular key (provided by Daktronics).
2. Open the face panel.
3. Clear the center punch area for drilling.

Punch or drill out the desired center punch. *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** and **A-140262** for an illustration of the power and signal termination panels.

3.3 Power

The body of this paragraph will give installation specific details for each manual receiving this section. It will include system risers, shop drawings and assembly drawings. It will also include voltage requirements if the manual is for a specific location.

Proper power installation is imperative for proper display operation. The following sub-sections give details of display power installation. Qualified personnel must perform electrical installations. Unqualified personnel should not attempt to install the electrical equipment. Serious danger to equipment and personnel could occur if equipment is improperly installed.

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. Scoreboard 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 12** for installation details. The National Electrical Code requires the use of a lockable power disconnect within sight of or at the display.

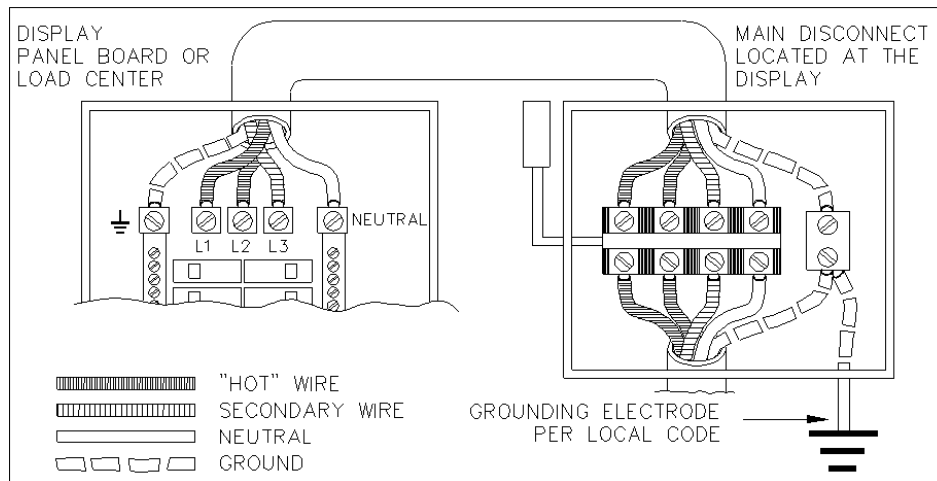


Figure 12: Installation with Ground and Neutral Conductor Provided

Installation with Only a Neutral Conductor Provided

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

- Connect the grounding electrode cable at the local disconnect, never at the display panel board.
- 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 panel board.

Refer to **Figure 13** for installation details.

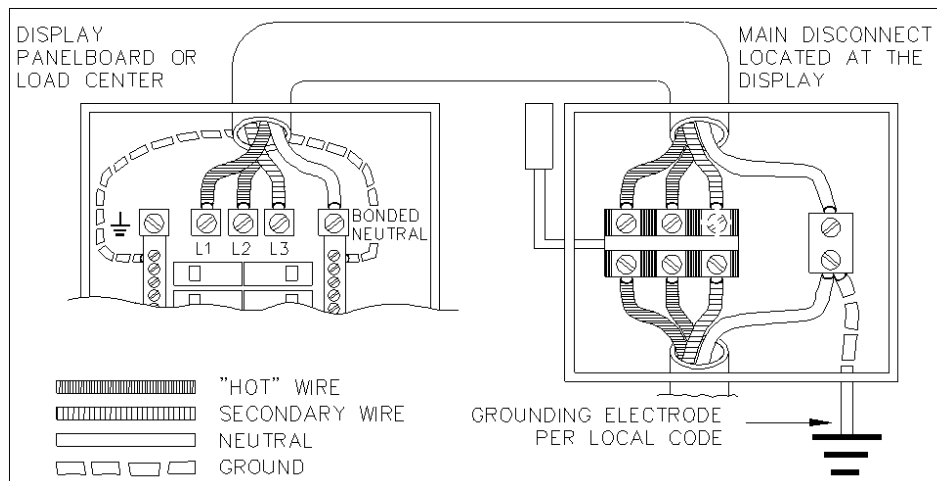


Figure 13: Installation with only Neutral Conductor provided

3.4 Control Cable Requirements

RS/232

This cable is a 2-conductor shielded cable used to transmit an RS/232 signal (Daktronics part number W-1117). This shielded 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.

RS/422

This cable is a 6-conductor shielded cable used to transmit an RS/422 signal (Daktronics part number W-1210). This shielded cable consists of unpaired 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 standard telephone cable routed through conduit. The local telephone company will need to assist in this installation.

Ask the telephone company which colors are used by the TIP, 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, leaving the other two as spares. The cable may be either direct burial or routed in conduit but it should not be subjected to mechanical flexing.

3.5 Signal Termination from Computer to Display

Reference Drawings:

System Riser Diagram (Modem)	Drawing A-88426
Signal/Power Termination Panel	Drawing A-88427
System Riser Diagram (422)	Drawing A-92681
System Riser Diagram (232)	Drawing A-96058
Sys. Riser Diag., Fiber	Drawing A-110559

RS/232

One end of the signal cable should be terminated to the 10 position terminal block in the display labeled “IN RS/232” (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**).

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.)

RS/422

One end of the signal cable should be terminated to the 10-position terminal block in the display labeled “IN RS/422” (TB42). **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) in the control room.

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:

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

Fiber Optic

Route conduit and fiber cable from the PC to the left end of the master display. Continue routing fiber to the controller box. Connect fiber cable from the signal converter of the PC to the fiber card in the display as described on the following table.

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

3.6 Signal Termination Between Two (or More) Displays

Reference Drawings:

System Riser Diagram (Modem)	Drawing A-88426
Signal/Power Termination Panel	Drawing A-88427
System Riser Diagram (422)	Drawing A-92681
System Riser Diagram (232)	Drawing A-96058
System Riser Diagram (Fiber)	Drawing A-110559

The sign-to-sign connections are the same for the RS/232 system, RS/422 system and modem system. These systems use a RS/422 interconnect method as described below in **RS/422 Interconnection**. The fiber system can use either a RS/422 interconnect method or fiber interconnect method as described in **RS/422 Interconnection** and **Fiber Connection**.

RS/422 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 RS/422” 10-position terminal block (TB43) on the first display. The other end terminates at the “IN RS/422” 10-position terminal block (TB42) in the second display.

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 table.

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


3.7 First Time Turn On

When first powered up, 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 modem is present)

Section 4 : Maintenance & Troubleshooting

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. 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 or water may leak into the display and damage the components.

4.2 Display Access/LED Module Removal

To access the display's interior electronic components, complete the following steps:

1. Open the face panel using a 5/32" allen wrench
2. Once the latches are loosened, lift the face panel from the bottom of the display and prop open with the prop bar located on the ends of the display. The modules will now be accessible.
3. To reach the internal components of the display, loosen the ¼ turns on the top edge of the module panel and lower the module panel to the full length of the lanyard. The internal components are now accessible.

4.3 Power Supply

Each sign uses +5 volt DC power supplies. Each power supply can run up to five (5) modules. The power supplies are each attached to a support bracket that is then secured to a mounting panel in the rear of the sign (refer to **Drawing B-98318**). To replace a failed power supply:

1. Open the sign as described in **Section 4.2**.
2. Using a 3/16" nutdriver, remove the screws securing the power supply-mounting bracket to the mounting panel. Lift the power supply/bracket assembly from the display.
3. Carefully disconnect all power cables from the power supply. Refer to the project specific schematic drawing for wiring information.
4. Turn the mounting bracket over to access the two M3x10 mounting screws. Remove the screws to release the power supply from the bracket.
5. Position the fresh power supply on the mounting bracket and then secure it using M3x10 screws.
6. Connect the appropriate wires according to the project specific schematic.

7. Attach the bracket to the mounting panel using the screws, close the sign door and test the display.
8. The power supply voltage may need to be adjusted to match the voltage setting off the existing power supplies.

4.4 Controller Board

Display Controller

The display controller is the “brains” of the sign. It is attached to a mounting panel and is in the bottom left side of each sign.

1. Open the sign as described in **Section 4.2**.
2. Remove all power and signal connections. “Locked” connectors are released by squeezing together the tabs, then carefully pulling them from the jack.
3. Remove the six (6) securing screws and then lift the controller from the sign.
4. Contact Daktronics Customer Service for the repair/replacement of the controller (refer to **Section 4.11**).
5. Follow the above steps in reverse order to install a new display controller.

LEDs & 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 jump both pins for a modem system. For all other applications, the jumpers must be removed.

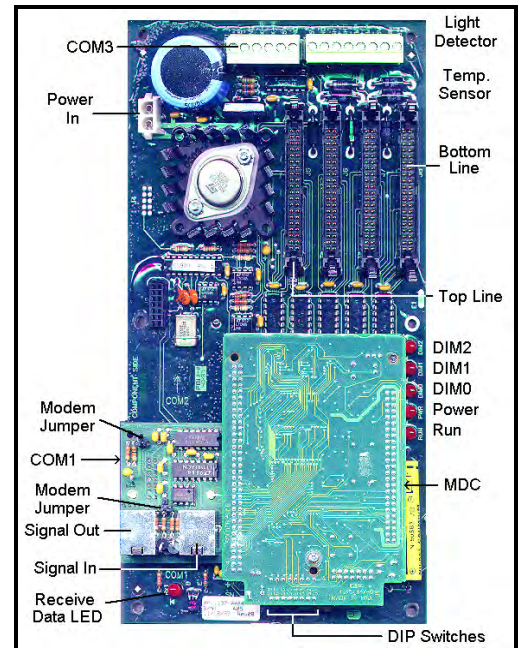


Figure 14: Display Controller

LED	Normal State
DIM 0, 1, 2	On state dependant on light level
Power	On steady when controller is receiving 10VAC power.
Run	Flashes at rate of once per second when the controller is running.
Receive Data	Flashes only during data transmission.

Controller Address & 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 15** 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: A test mode can be activated by setting the DIP switches to address 0 (flip all the switches toward the numbers on the circuit board). The display’s power must be disconnected, and then reconnected to run the test mode.

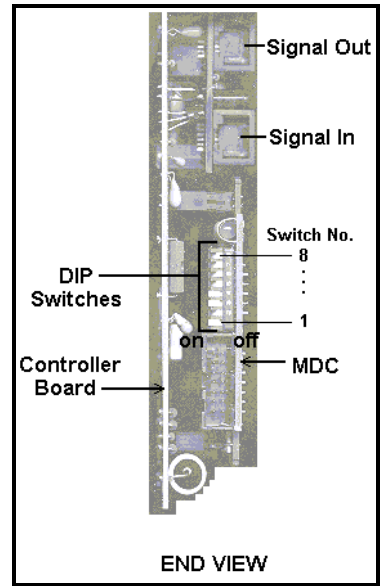


Figure 15: Location of DIP Switches

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

4.5 Light Detector

Reference Drawing:

Assembly, Photo Cell Bracket **Drawing A-169332**

The light detector assembly is mounted inside the bottom left of the cabinet. The entire assembly fits over two stud-welded screws. If the light detector should fail, only the circuit board (Daktronics part no. 0P-1151-0002) needs to be replaced. To replace a failed light detector, refer to the following steps:

1. Remove the #8-32 nuts (HC-1354) behind the circuit board plate (øM-165978) and then remove the plate and circuit board from the assembly.
2. Remove the #4-40 nuts (HC-1352) securing the circuit board to the plate.
3. Disconnect the electrical connections to the light detector.
4. Contact Daktronics for a replacement part (refer to **Section 4.11**).

5. Reattach the new circuit board as shown in **Drawing A-169332** and the project specific schematic. Note the orientation of the new circuit board. The photocell must line up with the ½" circular opening in the front of the display when the assembly is in place.

4.6 Transformer

The transformer is used to provide power to the controller board. It is located in the bottom left corner (front view) of the display in the power termination box.

4.7 Communicate Accessories

Accessing and Replacing the Modem

If a modem is included with the display, it is located inside the sign next to the controller board.

1. To replace a modem, first disconnect the power and signal connections (Refer to **Figure 16** for the location of the power jack).
2. The modem is held in place with four screws. Carefully remove them.
3. Install the new modem, replace the screws and reconnect power and signal cables.

Fiber Board

The fiber module has three LEDs. The power LED (DS1) should remain lit while power is applied to the module. The receive LED (DS2) will light when the display fiberboard is accepting signal from the computer fiberboard. The transmit LED (DS3) will light when the display fiberboard is sending to the computer fiberboard. In addition, the fiberboard has two incoming fiber connectors and two outgoing fiber connectors. The fiberboard connects to the controller board with a small DB9 to RJ11 flipped adaptor and a straight through RJ11 cable.

To replace a fiber optic board:

1. Disconnect the power and signal connections (Refer to **Figure 17** for disconnection of power).
2. The fiber optic board is held in place with four screws. Carefully remove them.
3. Install the new fiber optic board, replace the screws and reconnect power and signal cables.

LEDs & 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 **LEDs & Jumpers** in **Section 4.4** for these jumper settings.

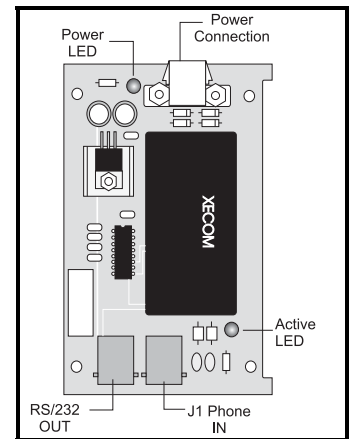


Figure 16: Modem

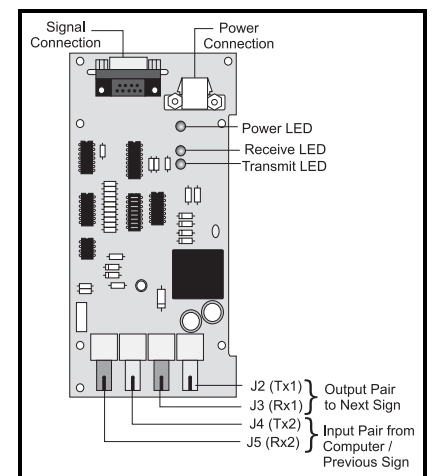


Figure 17: Fiber Optic Board

Surge Suppressor, RS422

1. Disconnect the signal connections (Refer to **Figure 18**).
2. The surge suppressor is held in place with four screws. Carefully remove them.
3. Install the new surge suppressor, replace the screws and reconnect power and signal cables.

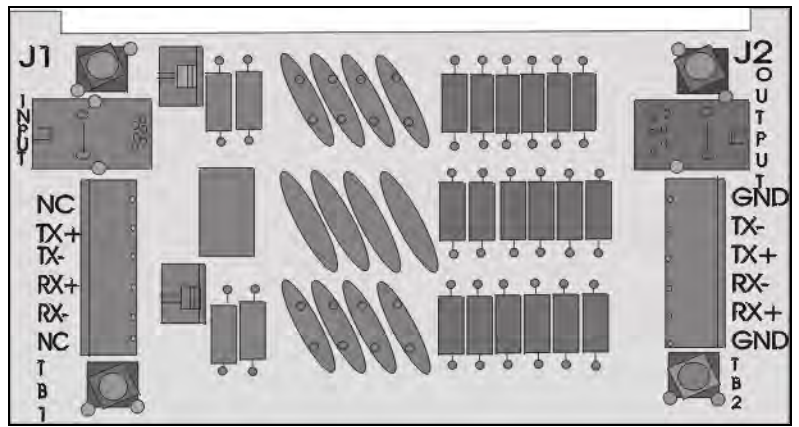


Figure 18: Surge Protector, RS422

The surge suppressor is an inline device that is used to filter the RS422 data line. It suppresses surges down to a low voltage in order to protect the display controllers RS422 input. The surge suppressor must be firmly connected to the display chassis in order to be effective. The mounting hardware used to secure the surge suppressor is sufficient if it is fastened properly.

4.8 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 and 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.

4.9 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 4.12**).

Symptom/Condition	Possible Corrective Action
One or more individual LED pixels will not light.	<ul style="list-style-type: none">• Replace display board.
A column of LED pixels will not light.	<ul style="list-style-type: none">• Replace driver board.
A row of pixels will not light.	<ul style="list-style-type: none">• Replace driver board.
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">• Replace the first driver on the left side of the module that is not working.• Replace the second driver that isn't working.• Replace the power supply on the first module on the left side of the module that is not working.• Replace the ribbon cable.
Entire display is garbled.	<ul style="list-style-type: none">• Replace the controller board.
A single line is garbled.	<ul style="list-style-type: none">• Replace the first driver on the left side of the display of the bad line.• Replace the ribbon cable.• Replace the controller board.
Two modules (which share power supplies) will not light.	<ul style="list-style-type: none">• Replace the power supply.
Entire display does not work.	<ul style="list-style-type: none">• Check 120 VAC to the display.• Check 12 VAC to the controller board.
Controller not operating properly.	<ul style="list-style-type: none">• Refer to the Venus 1500 operator's manual (ED12717)
Temperature always reads 32°F/0°C	<ul style="list-style-type: none">• Check temperature sensor connections.• Replace temperature sensor.• Replace controller board.
Display is stuck on bright or dim.	<ul style="list-style-type: none">• Check Manual/Auto dimming.• Check light detector cable.• Replace light detector.• Replace controller board.

4.10 Boot Up Initialization Information

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

1. Output Test (DDD)
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)

4.11 Replacement Parts

Part Description	Daktronics Part No.
Controller Board (232 or Modem, Single Face)	0A-1193-0004
Controller Board (232 or Modem, Double Face)	0A-1193-0045
Controller Board (422, Single Face)	0A-1193-0005
Controller Board (422, Double Face)	0A-1193-0046
LED Driver Board	0P-1154-0003
LED Display Board (red)	0P-1154-0013
LED Display Board (amber)	0P-1154-0007
Light Detector	0P-1151-0002
Modem	0P-1146-0003
Power Supply; +5V DC	A-1568
Ribbon Cable; Controller to Bottom Modules	W-1362
Ribbon Cable; Controller to Top Module	0A-1000-0004
Ribbon Cable; Between Modules	W-1341
Adapter; DB9M to DB25F	A-1603
Temperature Sensor	0P-1151-0003
Signal Converter (RS/232/RS/422)	0A-1127-0237
Fuse; MDL-7 (F41, 120 VAC)	F-1031
Fuse; MDL-4 (F41, 240 VAC)	F-1043
Signal Converter (RS/232; Fiber)	0A-1127-0239
RFI Filter	Z-1003
Transformer (120 VAC Input)	T-1072
Transformer (240 VAC Input)	T-1106
Surge Suppressor, RS422	0P-1146-0031

4.12 Daktronics Exchange/Repair & Return Programs

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

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

If the replacement part fixes the problem, package the defective part in the same packaging the replacement part arrived in, fill out and attach the enclosed UPS shipping document and **RETURN THE PART TO DAKTRONICS**. (You may use the same box and packing the exchange part was sent in.) This will speed up the transaction and alleviate confusion when the failed component arrives at Daktronics. (Daktronics expects immediate return of the exchange part if it does not solve the

problem.) For most equipment, you will be invoiced for the replacement part at the time it is shipped. This invoice is due when you receive it.

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

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

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

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

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

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

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

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

Customer Service Fax: 1-605 / 697-4444

E-mail: helpdesk@daktronics.com

Appendix A: 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 which 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.

A first-choice temperature sensor location is a north eave or northern exposure away from direct sun light and above grass. This location gives extra stability and accuracy to the sensor because of the added shading usually obtained on a northern exposure. 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 19**.

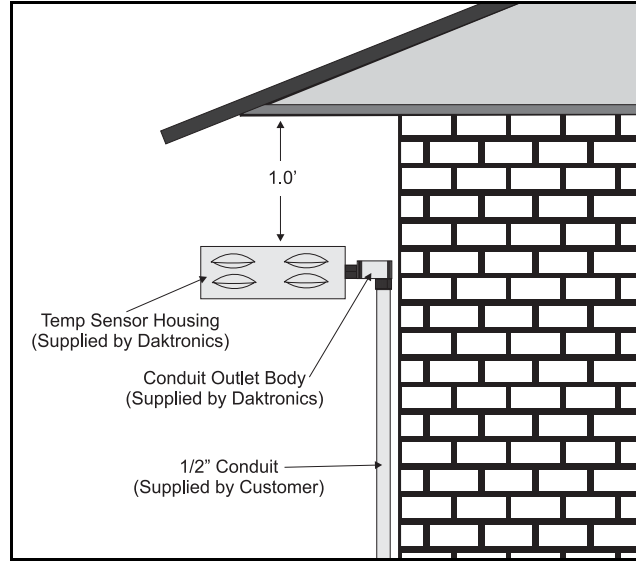


Figure 19: Temperature Sensor Eave/Wall Mount

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).

The second choice for locating a temperature sensor is on the display itself, or somewhere on the display structure. A light-colored display is preferred in this application. Location of the sensor should be above, below, or on a northern edge to try to keep the sensor shaded. If mounting above the display, a minimum height above of six feet is required. If mounting below the display, a minimum of eight feet above ground and a minimum of one foot between sensor and display are required, as seen **Figure 20** Greater accuracy is obtained if there is grass below the display rather than concrete or some other material.

Refer to **Figure 20** for wiring instructions.

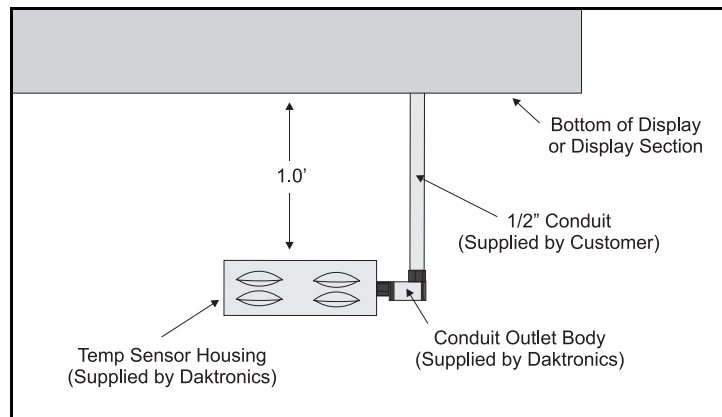


Figure 20: Temperature Sensor Mounting to Bottom of Display

Reference Drawings:

System Riser Diagram (Modem) **Drawing A-88426**
Power / Signal Termination Panel **Drawing A-88427**
System Riser Diagram (422) **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.”

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 **Drawings A-88426, A-88427 and A-92681** (located at the end of **Section 3**) for connections. **Note:** Do *not* connect the red, black or shield wires in the jumper to the second sign.

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 19** 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.

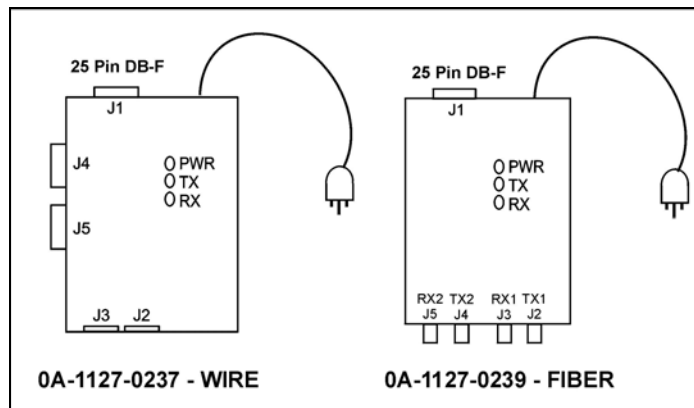


Figure 21: Signal Converters

0A-1127-0237 – Wire

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

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

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

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

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

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

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

0A-1127-0239 – Fiber

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

JACK	OPERATION
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.

J2 & J3 or J4 & J5
TX to RX

Serial Cable (W-1249)

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

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

Serial Adaptor (A-1603)

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

Appendix C: Reference Drawings

The following drawings are reference throughout this manual. There may also be project specific drawings that pertain to certain systems.

System Riser Diagram, Modem	Drawing A-88426
System Riser Diagram; Pwr & Sig V1500 Displays	Drawing A-88427
System Riser Diagram, RS422	Drawing A-92681
System Riser Diagram, RS232	Drawing A-96058
Assembly, Photocell Bracket.....	Drawing A-169332
System Riser Diagram, Fiber	Drawing A-110559
Power Termination Box.....	Drawing A-140262
Shop Drawing, AF-3020-**96, 144-7.62-* -SF.....	Drawing A-169828
Shop Drawing, AF-3020-**192, 240-7.62-* -SF.....	Drawing A-170081

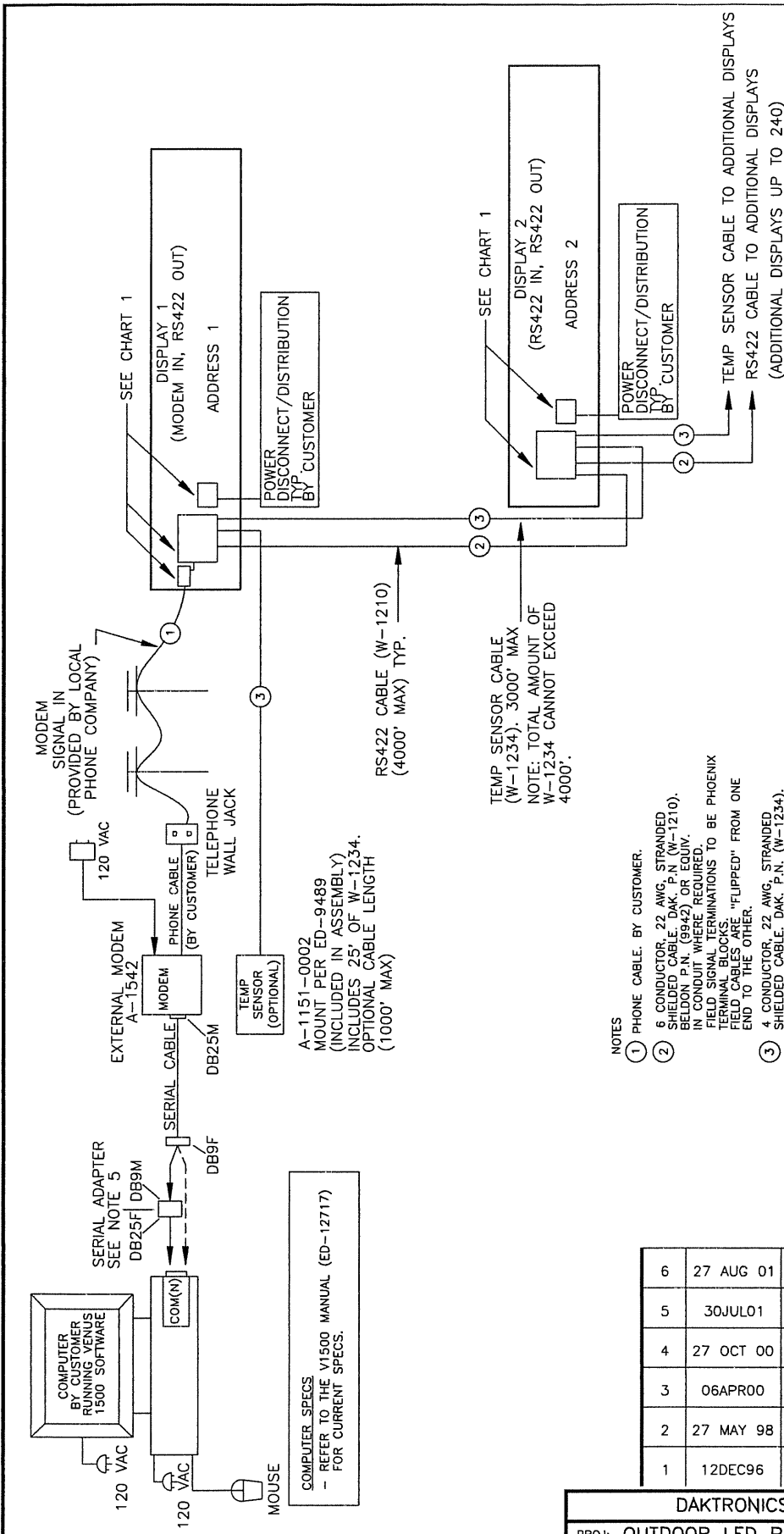


CHART 1

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

- NOTES
- PHONE CABLE BY CUSTOMER.
 - 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 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 (M4475) OR EQUIV. IN CONDUIT WHERE REQUIRED. FIELD SIGNAL TERMINATIONS TO BE PHOENIX FIELD CABLES (OPTIONAL WITH TEMP SENSOR).
 - MODEM CONTROL EQUIPMENT KIT INCLUDES: W-1503.....DB9 TO DB25 ADAPTER A-1545.....EXTERNAL MODEM A-1146-0005.....NETWORK/CABLE TESTER USE EITHER THE DB9 OR DB25, DEPENDING ON YOUR PC'S REQUIREMENTS.
 - INPUT TO MODEM 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.

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

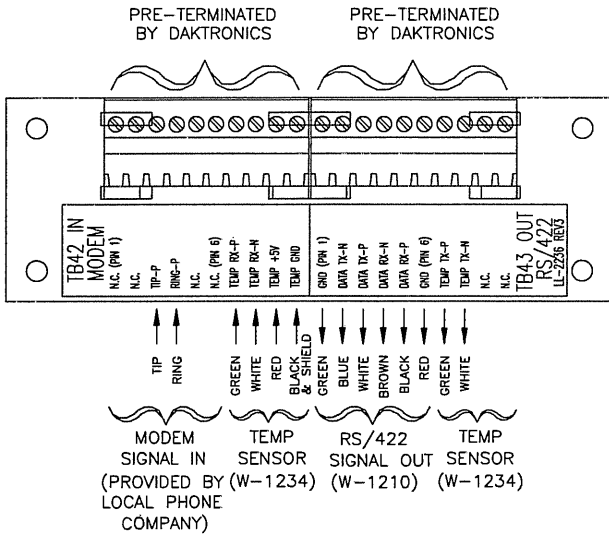
DATE: 21 NOV 96

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

REVISION	APPR. BY:
	NONE

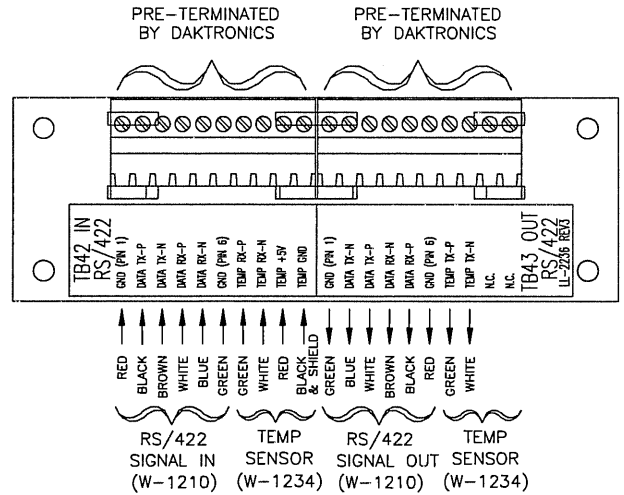
1137-R01A-88426

MODEM SIGNAL CONNECTIONS



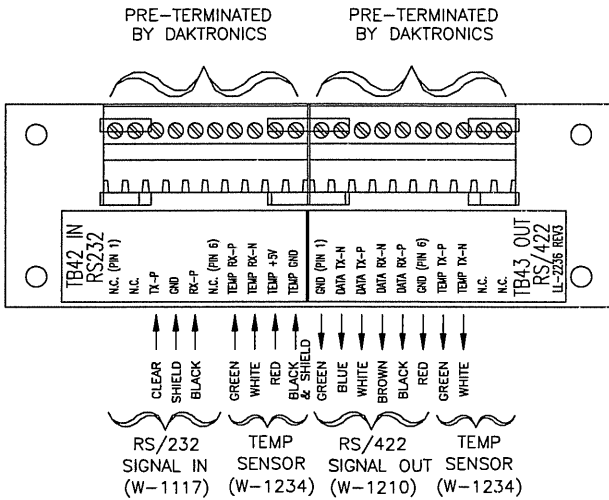
DETAIL F
SIGNAL CONNECTIONS

RS/422 SIGNAL CONNECTIONS



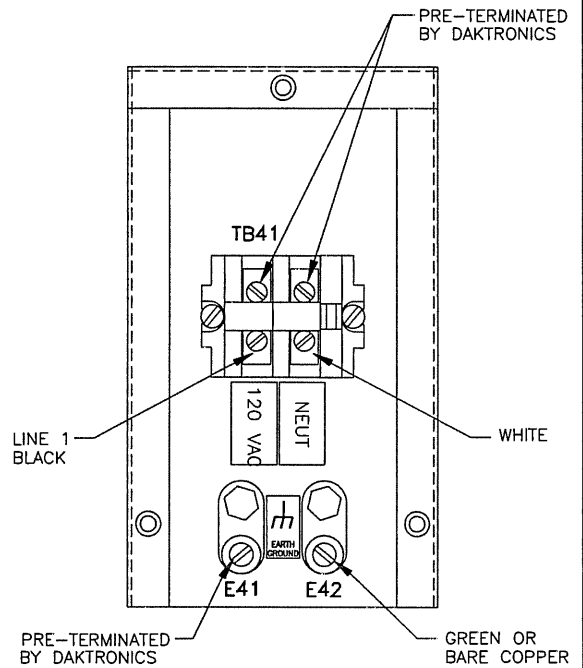
DETAIL D
SIGNAL CONNECTIONS

RS/232 SIGNAL CONNECTIONS



DETAIL G
SIGNAL CONNECTIONS

"ONLY USED IN G-1000 DISPLAYS"



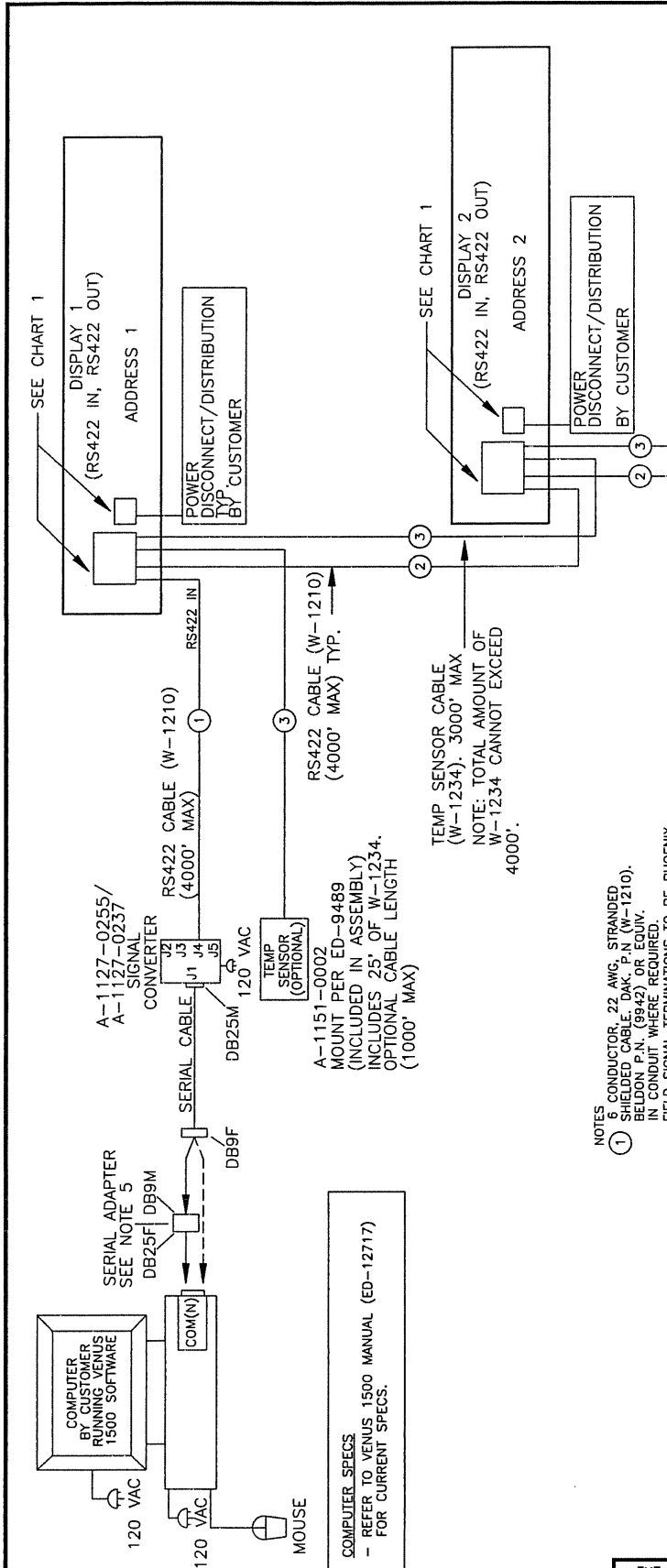
DETAIL E
POWER CONNECTIONS

** 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	

DAKTRONICS, INC. BROOKINGS, SD 57006	
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
1137-R01A-88427	



- 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-1234), 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-1092.....SERIAL ADAPTER
 A-1093.....DB9 TO DB25 ADAPTER
 A-1146-0005.....NETWORK CABLE TESTER
 - USE EITHER THE DB9 OR DB25, DEPENDING ON 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

COMPUTER SPECS
 - REFER TO VENUS 1500 MANUAL (ED-12717)
 - FOR CURRENT SPECS.

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 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

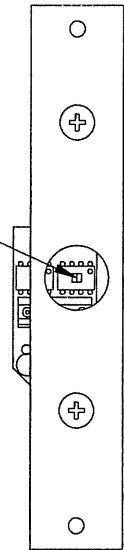
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DAKTRONICS, INC. BROOKINGS, SD 57006

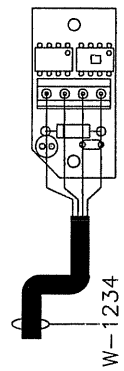
PROJ:	OUTDOOR LED PRODUCT LINE		
TITLE:	SYSTEM RISER DIAGRAM, RS422		
DES. BY:	JCOOK	DRAWN BY:	AMEYER
DATE:	30APR97		
REVISION	APPR. BY:	1137-R01A-92681	
06	SCALE: NONE		

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	

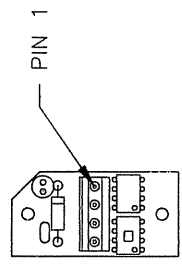
LIGHT SENSOR EYE MUST BE CENTERED IN THE HOLE.



FRONT VIEW
SHOWN WITHOUT HS-1240

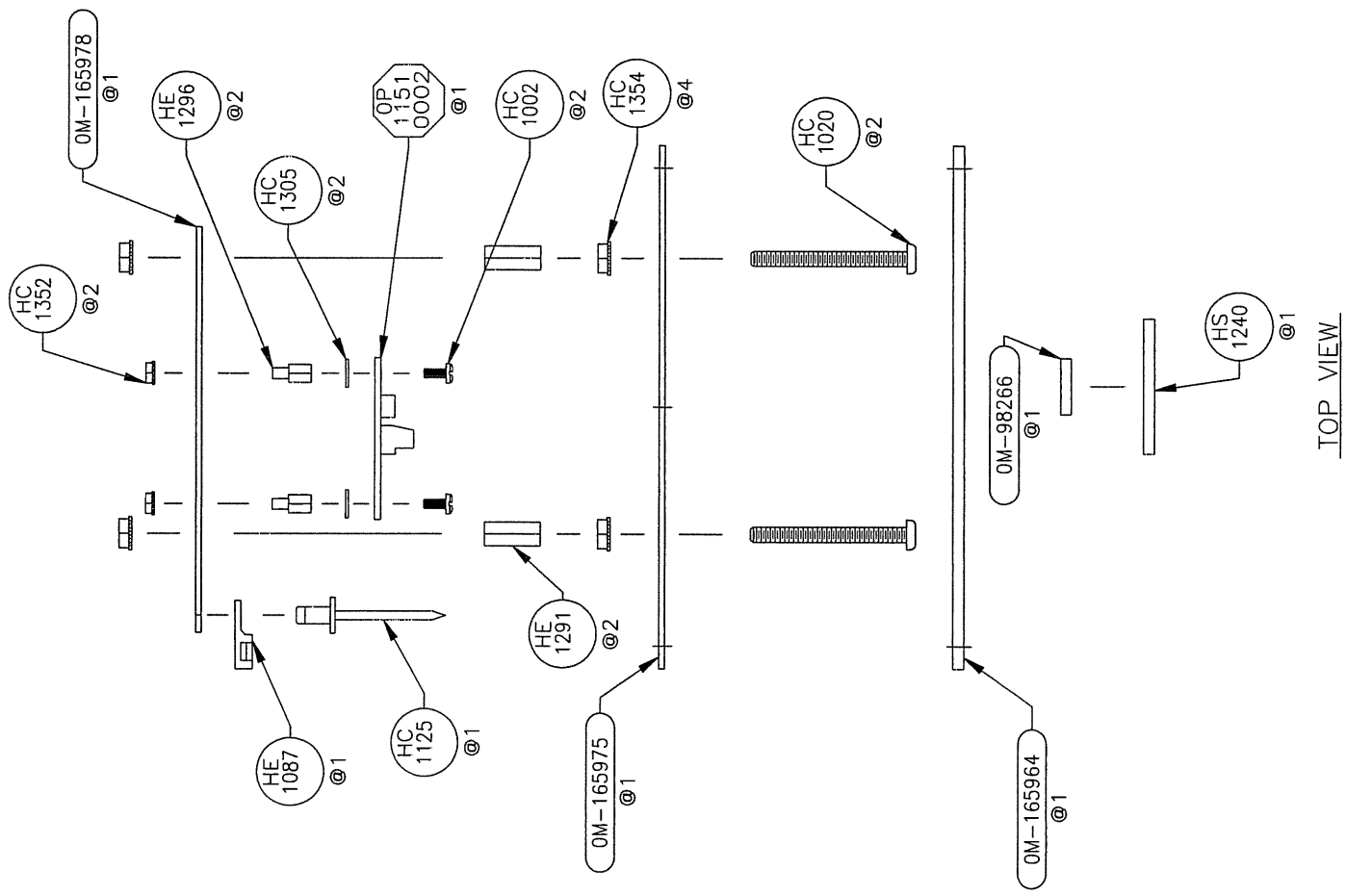


FRONT VIEW
ONLY OP-1151-0002 SHOWN



WIRING DETAIL

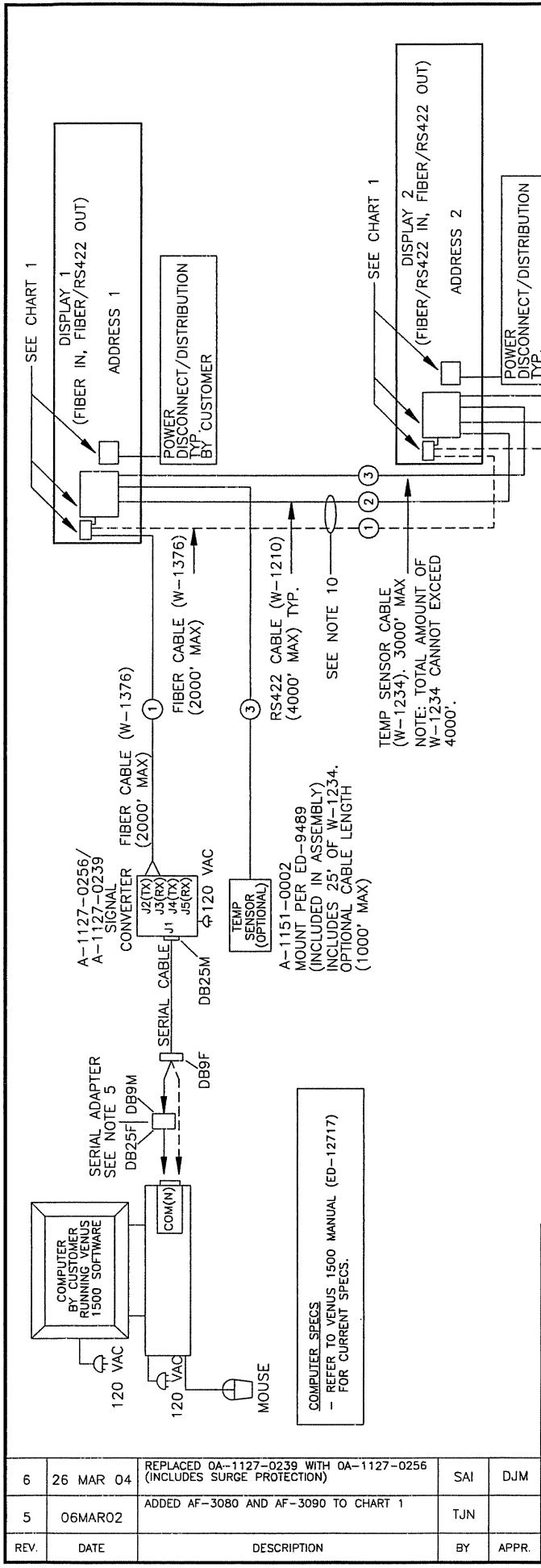
PIN	LABEL	COLOR
1	SIG -P	GRN
2	SIG -N	WHT
3	+V -P	RED
4	GND -N	BLK



TOP VIEW

<p>THE CONCEPTS EXPRESSED AND DETAILS SHOWN ON THIS DRAWING ARE CONFIDENTIAL AND PROPRIETARY. DO NOT REPRODUCE BY ANY MEANS, INCLUDING ELECTRONICALLY WITHOUT THE EXPRESSED WRITTEN CONSENT OF DAKTRONICS, INC. COPYRIGHT 2002 DAKTRONICS, INC.</p>			
<p>DAKTRONICS, INC. BROOKINGS, SD 57006</p>			
<p>PROJ: OUTDOOR GALAXY DISPLAYS</p>			
<p>TITLE: ASSEMBLY, PHOTOCELL BRACKET</p>			
<p>DES. BY: DDAGGITT</p>		<p>DRAWN BY: JMAMMENGA</p>	
<p>DATE: 18 JUN 02</p>		<p>REVISION 03</p>	
<p>APPR. BY:</p>		<p>SCALE: 1=2</p>	
<p>1272-E10A-169332</p>			

REV.	DATE	DESCRIPTION	BY	APPR.
3	27SEP04	PER MANUFACTURING REQUEST, ROTATED HE-1087.	DJD	
2	05 JUN 03	MADE OM-165978 WITHOUT BEND. UPDATED RELATED GRAPHICS.	JMM	
1	11NOV02	REARRANGED TOP VIEW TO MORE CLOSELY MATCH ACTUAL ASSEMBLY PROCESS.	DJD	



SEE CHART 1

DISPLAY 1
(FIBER IN, FIBER/RS422 OUT)
ADDRESS 1

POWER DISCONNECT/DISTRIBUTION TYP. BY CUSTOMER

FIBER CABLE (W-1376)
(2000' MAX)

TEMP SENSOR (OPTIONAL)

A-1151-0002
MOUNT PER ED-9489
(INCLUDED IN ASSEMBLY)
INCLUDES 25' OF W-1234,
OPTIONAL CABLE LENGTH
(1000' MAX)

RS422 CABLE (W-1210)
(4000' MAX) TYP.

SEE NOTE 10

TEMP SENSOR CABLE
(W-1234), 3000' MAX
NOTE: TOTAL AMOUNT OF
W-1234 CANNOT EXCEED
4000'.

DISPLAY 2
(FIBER/RS422 IN, FIBER/RS422 OUT)
ADDRESS 2

POWER DISCONNECT/DISTRIBUTION TYP. BY CUSTOMER

TEMP SENSOR CABLE TO ADDITIONAL DISPLAYS
RS422 CABLE TO ADDITIONAL DISPLAYS
FIBER CABLE TO ADDITIONAL DISPLAYS
(ADDITIONAL DISPLAYS UP TO 240)

SEE NOTE 10

- 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). BELCON P.N. (9942) OR EQUIV. IN CONDUIT WHERE REQUIRED. FIELD SIGNAL TERMINATIONS TO BE PHOENIX FIELD 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-1603.....FIBER CABLE
A-1127-0256.....DB9 TO DB25 ADAPTER
A-1146-0005.....SIGNAL CONVERTER
A-1146-0005.....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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DAKTRONICS, INC. BROOKINGS, SD 57006

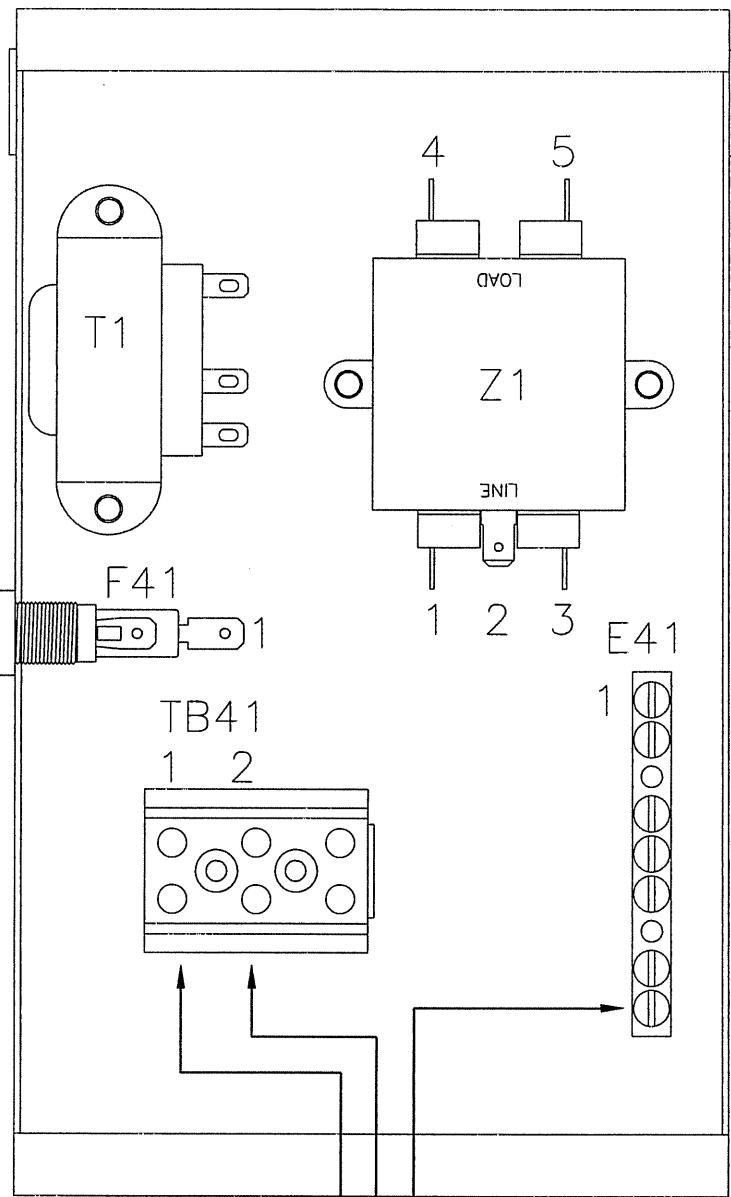
PROJ: OUTDOOR LED PRODUCT LINE	
TITLE: SYSTEM RISER DIAGRAM, FIBER	
DES. BY:	DRAWN BY: LKERR DATE: 29DEC98
REVISION	APPR. BY:
06	SCALE: NONE
1137-R01A-110559	

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

REPLACE FUSE WITH THE SAME TYPE AND RATING. SEE BELOW.

120 OR 240 VAC
(2 WIRE + GND.)
SEE BELOW FOR
ASSEMBLY NUMBER

LINE
NEUTRAL
EARTH GND.



FRONT VIEW

COVER REMOVED

COMPONENT REPLACEMENT INFORMATION

ASSY NO.	VOLTAGE	TRANSFORMER	FUSE TYPE	FUSE P.N.	CAUTION LABEL
A-1193-0002	120V	T-1072	MDL-7	F-1031	LL-1064
A-1193-0003	240V	T-1106	MDL-4	F-1043	LL-1882

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: GALAXY, OUTDOOR

TITLE: POWER TERMINATION BOX

DES. BY:

DRAWN BY: LKERR

DATE: 24OCT00

REVISION

APPR. BY:

SCALE: NONE

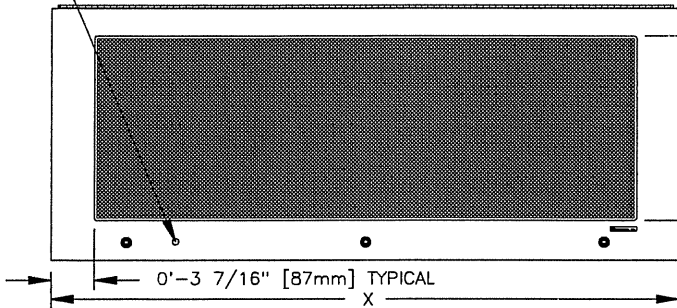
1185-R04A-140262

REV.	DATE	DESCRIPTION	BY	APPR.
01	13NOV01	REPLACED TB41 AND E41 FROM TB-1025 AND E-1001 TO TB-1069 AND TB-1037.	LLK	

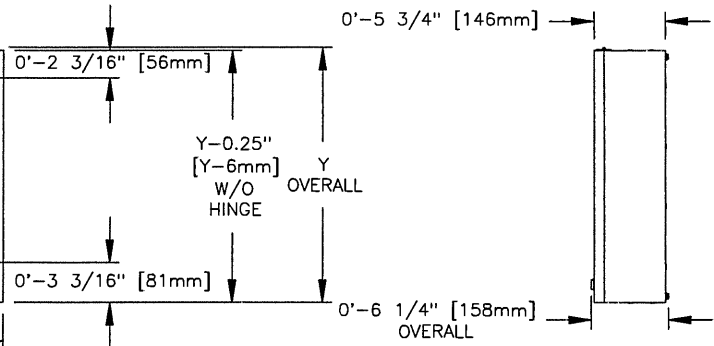


TOP VIEW

1/2" [12mm] DIA HOLE WITH LENS FOR AUTOMATIC LIGHT LEVEL SENSOR.



FRONT VIEW



RIGHT SIDE

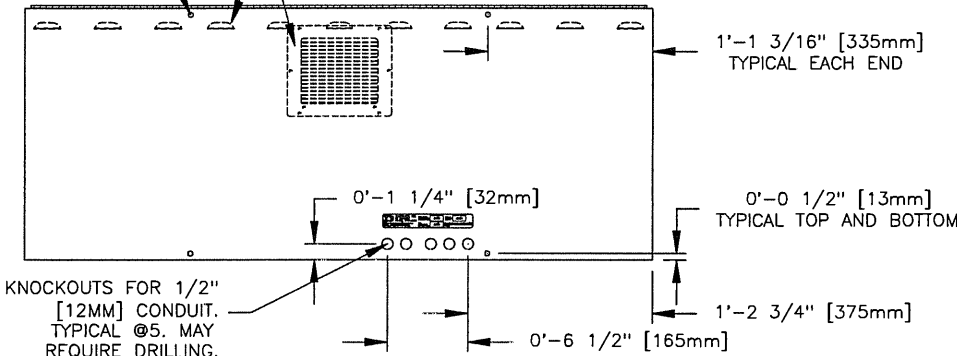


BOTTOM VIEW

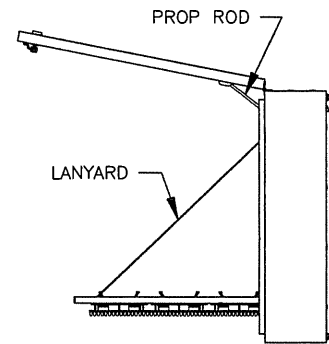
SLOTTED INLETS FOR VENTILATION. TYPICAL ON ALL DISPLAYS. DO NOT BLOCK.

1/4-20 X 1 HEX HEAD BOLT TIGHTENED INTO A SEALING WASHER AND NUT INSERT. TYPICAL @4. MAY BE USED FOR DISPLAY MOUNTING. SEALING WASHER MUST BE REUSED.

LOUVERS OR FAN FOR EXHAUST VENTILATION. EITHER, NOT BOTH, ARE USED ON EACH DISPLAY. SEE CHART BELOW TO DETERMINE WHICH IS USED. DO NOT BLOCK.



REAR VIEW



RIGHT SIDE

SHOWN WITH DOOR HINGED OPEN AND MODULE MOUNTING PANEL HINGED DOWN.

NOTES:

- 1) ALL DIMENSIONS ARE IN FEET AND INCHES [MILLIMETERS].
- 2) ALL ALUMINUM CONSTRUCTION.
- 3) DISPLAY CABINET COLOR IS FLAT BLACK.
- 4) COMPRESSION LATCH COLOR IS POWDER COATED BLACK.
- 5) DISPLAY L.E.D. COLOR IS MONOCHROME RED OR MONOCHROME AMBER.

- 6) FACE PANEL IS 0.118" [3mm] (1/8" NOMINAL) THICK POLYCARBONATE.
- 7) FACE PANEL HAS A NON-GLARE MATTE FINISH.
- 8) FRONT ACCESS FOR SERVICING BY USING A 5/32" [4mm] ALLEN (HEX) WRENCH. WRENCH IS NOT PROVIDED.
- 9) DO NOT BLOCK INLET AND EXHAUST VENTILATION OR WARRANTY WILL BE VOID.

DISPLAY	DIMENSIONS		EXHAUST VENTILATION	APPROXIMATE		
	X	Y		WEIGHT	WATTS	AMPS @120VAC
AF-3020-1696-7.62-SF-*	3'-0" [914mm]	0'-10 3/4" [273mm]	LOUVERS	25 LBS [11 kg]	55	0.46
AF-3020-16144-7.62-SF-*	4'-2 3/8" [1280mm]	0'-10 3/4" [273mm]	LOUVERS	33 LBS [15 kg]	80	0.70
AF-3020-3296-7.62-SF-*	3'-0" [914mm]	1'-3 9/16" [395mm]	LOUVERS	32 LBS [15 kg]	105	0.90
AF-3020-32144-7.62-SF-*	4'-2 3/8" [1280mm]	1'-3 9/16" [395mm]	LOUVERS	44 LBS [20 kg]	150	1.30
AF-3020-4896-7.62-SF-*	3'-0" [914mm]	1'-8 3/8" [517mm]	LOUVERS	39 LBS [18 kg]	155	1.30
AF-3020-48144-7.62-SF-*	4'-2 3/8" [1280mm]	1'-8 3/8" [517mm]	FAN	56 LBS [25 kg]	225	1.90

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DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: OUTDOOR GALAXY DISPLAYS

TITLE: SHOP DRAWING, AF-3020-**96,144-7.62-SF-*

DES. BY: DDAGGITT

DRAWN BY: DDAGGITT

DATE: 26JUN02

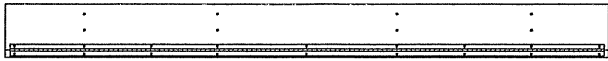
REV.	DATE	DESCRIPTION	BY	APPR.
1	3MAR03	ADDED BORDER DIMENSIONS TO FRONT VIEW.	DJD	

REVISION

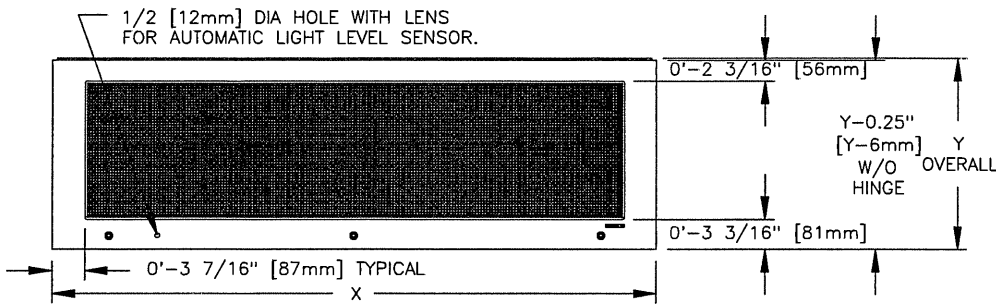
APPR. BY:

SCALE: 1=15

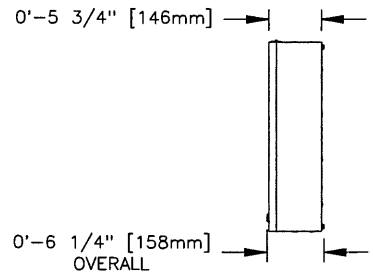
1272-E10A-169828



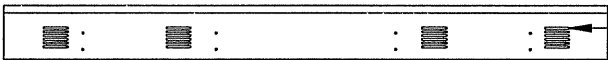
TOP VIEW



FRONT VIEW

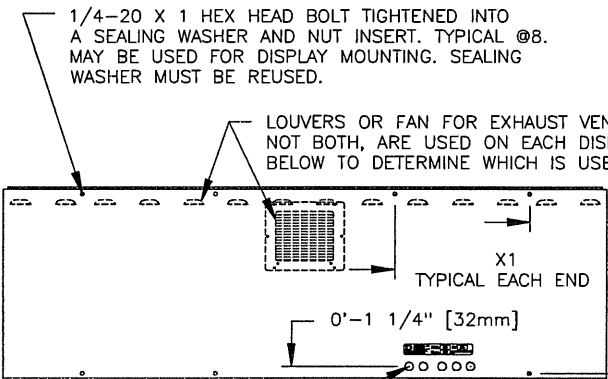


RIGHT SIDE

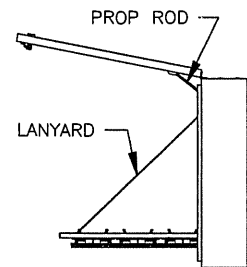


BOTTOM VIEW

SLOTTED INLETS FOR VENTILATION. TYPICAL ON ALL DISPLAYS. DO NOT BLOCK.



REAR VIEW



RIGHT SIDE

SHOWN WITH DOOR HINGED OPEN AND MODULE MOUNTING PANEL HINGED DOWN.

NOTES:

- 1) ALL DIMENSIONS ARE IN FEET AND INCHES [MILLIMETERS].
- 2) ALL ALUMINUM CONSTRUCTION.
- 3) DISPLAY CABINET COLOR IS FLAT BLACK.
- 4) COMPRESSION LATCH COLOR IS POWDER COATED BLACK.
- 5) DISPLAY L.E.D. IS MONOCHROME RED OR MONOCHROME AMBER.

- 6) FACE PANEL IS 0.118" [3mm] (1/8" NOMINAL) THICK POLYCARBONATE.
- 7) FACE PANEL HAS A NON-GLARE MATTE FINISH.
- 8) FRONT ACCESS FOR SERVICING BY USING A 5/32" [4mm] ALLEN (HEX) WRENCH. WRENCH IS NOT PROVIDED.
- 9) DO NOT BLOCK INLET AND EXHAUST VENTILATION OR WARRANTY WILL BE VOID.

DISPLAY	DIMENSIONS			EXHAUST VENTILATION	APPROXIMATE		
	X	X1	Y		WEIGHT	WATTS	AMPS @120VAC
AF-3020-16192-7.62-SF-*	5'-4 13/16" [1646mm]	1'-10 13/16" [579mm]	0'-10 3/4" [273mm]	LOUVERS	40 LBS [18 kg]	105	0.90
AF-3020-16240-7.62-SF-*	6'-7 3/16" [2012mm]	2'-3 5/8" [701mm]	0'-10 3/4" [273mm]	LOUVERS	47 LBS [22 kg]	130	1.10
AF-3020-32192-7.62-SF-*	5'-4 13/16" [1646mm]	1'-10 13/16" [579mm]	1'-3 9/16" [395mm]	FAN	54 LBS [25 kg]	200	1.60
AF-3020-32240-7.62-SF-*	6'-7 3/16" [2012mm]	2'-3 5/8" [701mm]	1'-3 9/16" [395mm]	FAN	64 LBS [29 kg]	250	2.10
AF-3020-48192-7.62-SF-*	5'-4 13/16" [1646mm]	1'-10 13/16" [579mm]	1'-8 3/8" [517mm]	FAN	69 LBS [31 kg]	300	2.50
AF-3020-48240-7.62-SF-*	6'-7 3/16" [2012mm]	2'-3 5/8" [701mm]	1'-8 3/8" [517mm]	FAN	82 LBS [37 kg]	370	3.10

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DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: OUTDOOR GALAXY DISPLAYS

TITLE: SHOP DRAWING, AF-3020-**192,240-7.62-SF-*

DES. BY: DDAGGITT

DRAWN BY: DDAGGITT

DATE: 26JUN02

REV.	DATE	DESCRIPTION	BY	APPR.
1	3MAR03	ADDED BORDER DIMENSIONS TO FRONT VIEW.	DJD	

REVISION	APPR. BY:
	1=20

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