Galaxy® Series AF-3150

Display Manual

ED-13745 ***Rev 2*** ***16 March 2004***

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DAKTRONICS®

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DAKTRONICS, INC.

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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® AF-3150 20mm louvered 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 display mounting.
- **Electrical Installation** gives general guidance on terminating power and signal cable at the display.
- **Maintenance and Troubleshooting** addresses such things as removing basic display components, troubleshooting the display, performing general maintenance, and exchanging display components.
- **Appendix A** lists the drawings referenced within this manual.
- **Appendix B** includes general information on the signal converter.
- **Appendix C** includes information on the optional temperature sensor.

Daktronics identifies manuals by an ED number located on the cover page of each manual. For example, this manual would be referred to as **ED-13745**.

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

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

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

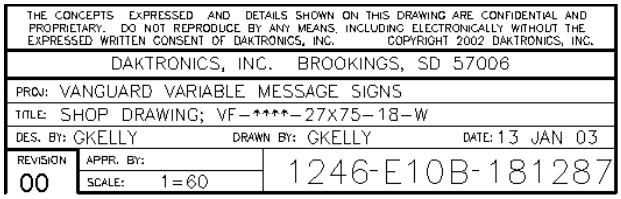


Figure 1: *Drawing Label*

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

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

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

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

Daktronics displays are built for long life, and require little maintenance. However, from time to time, certain display components will need replacing. The **Replacement Parts List** in **Section 4.11** provides the names and numbers of components that may need to be ordered during the life of the display. Most display components have a white label that lists the part number. The component part number is in the following format: 0P-_ _ _ _-_ _ _ _ (component) or 0A-_ _ _ _-_ _ _ _ multi-component assembly).

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

1.2 Safety Precautions

Important Safeguards:

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

1.3 Network Concepts

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

The common thread to most client requests is a means of programming and controlling a group of displays from a central control point. Daktronics responded by developing a powerful system of interconnecting and controlling displays. 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 display or group of displays in the network which message should run
- The ability to determine the status of any display on the network
- The ability to control multiple display technologies on the same network

There are five (5) network systems available: RS232, RS422, modem, fiber, and radio. Up to 240 displays can exist on one network.

RS232 Network

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

RS422 Network

RS422 (EIA/TIA-422-B) is a standard communication interface that utilizes a differential balanced transmission scheme that uses a typical maximum cable length of 1.2 km (approximately 4,000 feet). The main advantage to RS422 over RS232 is the longer cable length that is possible. A signal converter is needed to convert the computer's RS232 serial signal 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 at the computer uses to communicate to the modem in the 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 600 meters (approximately 2,000 feet). A signal converter is needed to convert the computer's RS232 serial signal to fiber optic signal; a minimum of two fibers is required. Refer to **Section 3** for additional information.

Radio Network

The Radio network is a standard communication method that uses radio waves at high frequencies to transmit signal. The Venus® 1500 Radio network has a maximum distance of 450 meters (approximately 1,500 feet) outdoor and 150 meters (approximately 500 feet) indoor. A nearly straight line-of-sight path must be maintained between the Server Radio attached to the building and the Client Radio connected to the display. A computer with a serial, RS232 communication port is required. Refer to **Section 3** and the Venus 1500 Gen 2 Radio manual, **ED13932,** for additional information.

1.4 Display Overview

Reference Drawings:

Shop Drawing, AF-3150-**x**-20mm-R or Amber ..... **Drawing B-183660**

Daktronics AF-3150 Galaxy® displays are designed and manufactured for performance, reliability, easy maintenance, and long life. The pixels have a 20mm center-to-center spacing, and are lit using LEDs (light emitting diodes). A light sensor on the front of the primary display is used for automatic dimming of the LEDs based on the ambient light levels. The configuration of pixels depends on the model of display ordered.

Refer to **Drawing B-183660** for the approximate size, weight, and power requirements for your model of display.

The Galaxy® model numbers are described as follows:
AF-3150-RRCCC-20-X-X(X)

AF-3150	**=**	Outdoor 20 mm Louvered Galaxy Display
RR	**=**	Number of Rows High (16-48)
CCC	**=**	Number of Columns Long (Up to 144 Columns Standard)
20	**=**	20 mm pixel to pixel spacing
X	**=**	LED Monochrome Color (Red or Amber)
X(X)	**=**	PS – Primary-Secondary or S - Secondary

A typical display system consists of a Windows® based personal computer (PC) running Venus® 1500 software, a communication system, 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 (**ED13530**) for installation and operation of the Venus® 1500 editing station.

Refer to **Sections 4.2** and **4.3** for the summaries of how signal and power are routed through the displays.

1.5 Component Identification

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

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

Com Port: A COM port is a connector on the back of the control computer. The COM port is used to control the display network through either a 9- or a 25-pin serial connector.

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

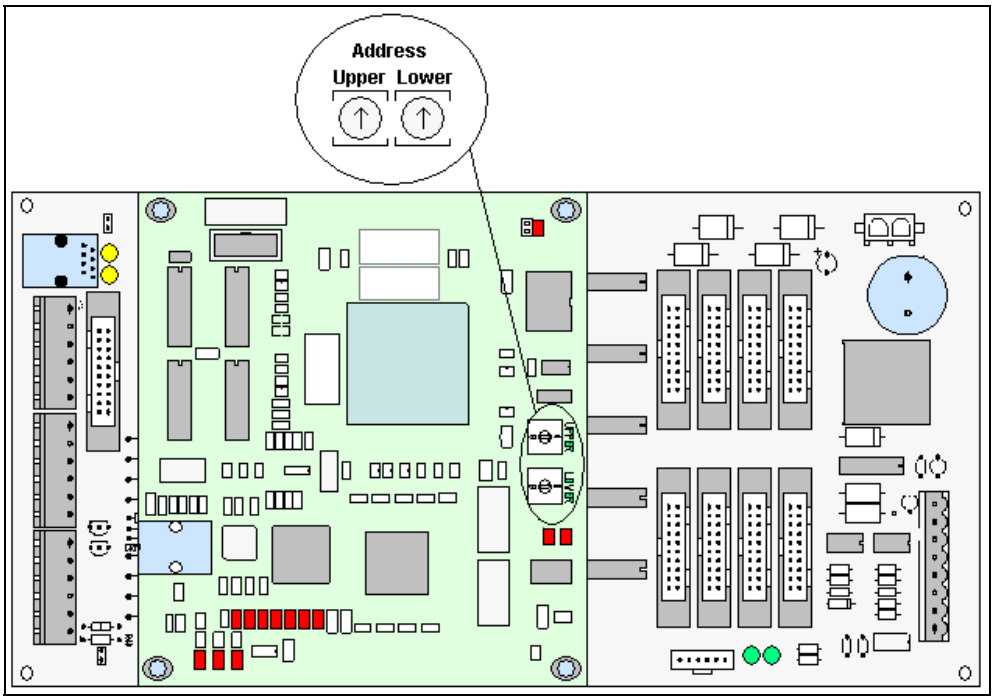


Figure 2: *Version 3 Controller*

Control Area Network: Serial Communication Protocol supporting distributed real-time control and multiplexing. The temperature and light sensors use this type of network.

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

Galaxy®: Daktronics trademarked name for LED monochrome, tri-colored, or RGB matrix displays.

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

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

Louver: Black plastic shade positioned horizontally above each pixel row. The louvers increase the level of contrast on the display face and direct LED light.

Module: 20mm Galaxy® modules are 16 pixels high by 16 pixels wide. Each is individually removable from the front of the display.

Module Latch Assembly: Device utilizing a rotating retainer bar to hold the module firmly to the display frame. There are two per module: one near the top and one near the bottom. Use a 1/8" Allen wrench to turn the retaining bar.

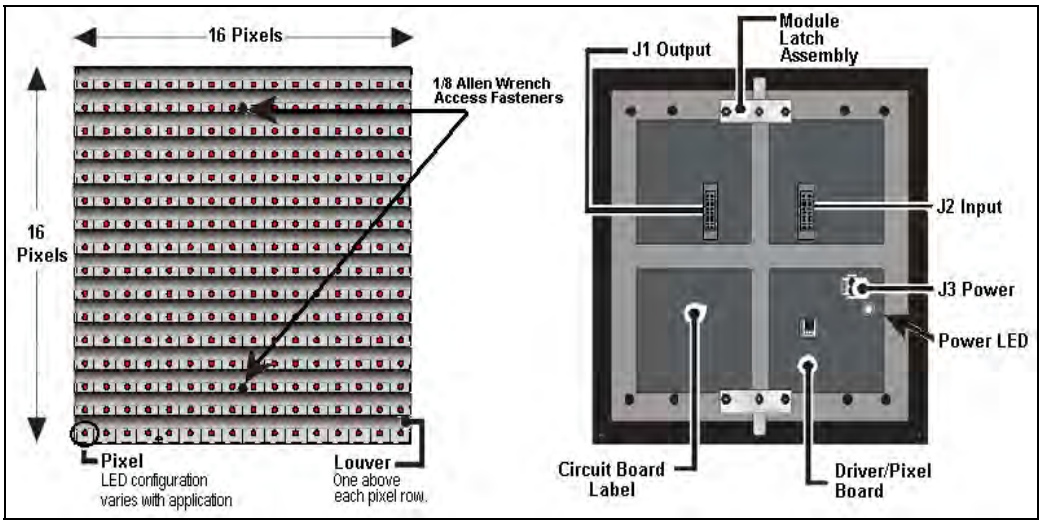


Figure 3: *16x16 Module (Front and Back)*

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

Pixel: Cluster of LEDs. The number and color of the LEDs depends on display application.

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

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

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

Serial Port: An actual serial port is required for direct connections through the j-box, signal converters or the radio j-box from the computer. Certain USB adapters create an "actual" serial port.

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

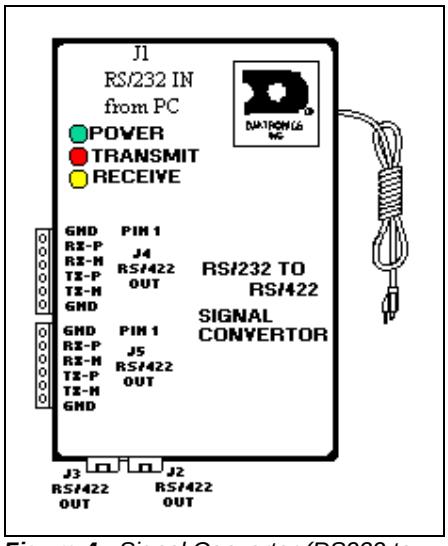


Figure 4: *Signal Converter (RS232 to RS422 Shown)*

1.6 Nomenclature

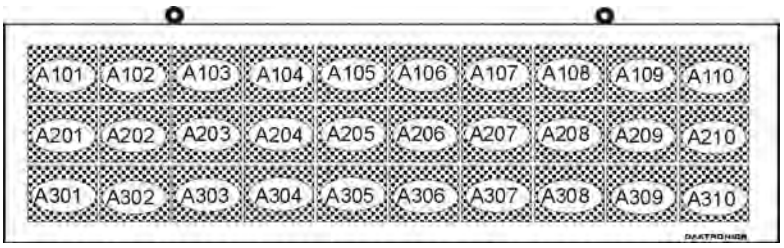


Figure 5: *Module Numbering Example – 48x160 Front*

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

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

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

- "TB_ _" signifies a termination block for power or signal cable.
- "F_ _" represents a fuse.
- "E_ _" shows a grounding point.
- "J_ _" denotes a power or signal jack.
- "P_ _" stands for a power or signal plug for the opposite jack.

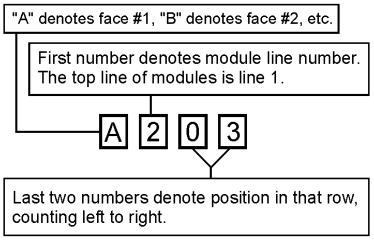


Figure 6: *Module Numbering*

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:

- "0P-_ _ _ _-_ _ _ _" indicates an individual circuit board, such as the internal fiberboard.
- "0A-_ _ _ _-_ _ _ _" stands for 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-_ _ _ _" represents a wire or cable. Cables may also carry the assembly numbering format in certain circumstances. This is especially true of ribbon cables.

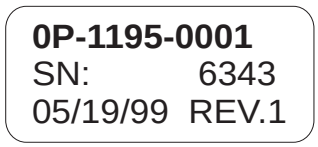


Figure 7: *Typical Label*

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

Section 2: Mechanical Installation

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

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

Daktronics is not responsible for installations or the structural integrity of support structures done by others. It is the customer's responsibility to ensure that a qualified structural engineer approves 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® displays. The information contained in this section is general information only and may or may not be appropriate for your particular installation.

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

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

2.2 Support Structure Design

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

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

Before beginning the installation process, verify the following:

- The mounting structure will provide a straight and square-mounting frame for the display.
- The mounting structure is capable of supporting the display and will not yield at any unsupported points after mounting.
- Clearance: 3" of unobstructed space is available below the display for filter removal from the display. 1-¼" of unobstructed space is available above the top of the display to remove the eyebolt and plug the hole properly.

Correct any deficiencies before installation.

2.3 Ventilation Requirements

Reference Drawing:
Shop Drawing, AF-3150-**x**-20mm-R or A..... **Drawing B-183660**

Fans are mounted in the bottom of the display for ventilation. Maintain a minimum distance of 3" (7.62cm) below the display to maintain proper airflow. Refer to **Drawing B-183660** for additional information.

If the display cabinet is completely enclosed:

- 12 square inches of unobstructed opening per module must be provided to ensure adequate cooling.
- Allowances must be made to compensate for the percentage of material covering the openings in the structure.
- For adequate cooling, forced ventilation may be required. If air is forced into the enclosed cabinet, 110 cubic feet per minute must be provided per module (12.48" x 12.48" active area).

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

2.4 Lifting the Display

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

Figure 8 below illustrates both the correct (left example) and the incorrect (right example) method of lifting a display. Lift the display as shown on the left, with the lifting bar. Use every lifting point provided.

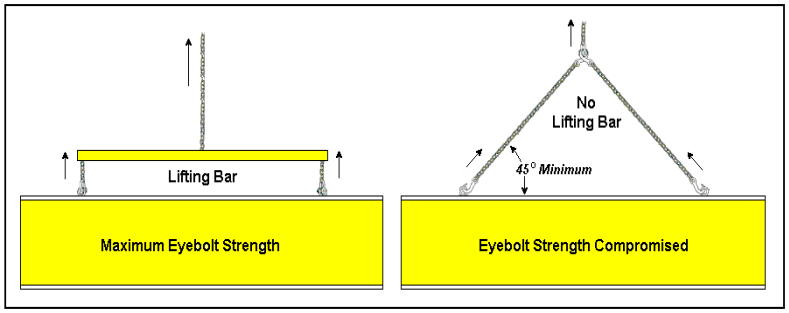


Figure 8: *Lifting the Display (Correct, Left; Incorrect, Right)*

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

If removing the eyebolts, adequately seal the holes using 13 bolts and sealing washers, ½ inch in size. Silicone along the threads to ensure that water does not enter the display.

2.5 Display Mounting

Reference Drawing:

Shop Drawing, AF-3150-**x**-20mm-R or A ..... **Drawing B-183660**

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

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

Before beginning the installation process, verify the following items:

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

The back of the display is equipped with 2 x 2 x 3 x ¼" steel clip angles. Refer to **Drawing B-183660**. These angles may be used for mounting purposes. Remember to have **all** mounted displays inspected by a qualified structural engineer. Daktronics recommends using all clip angles as attachment points.

Refer to **Drawing B-183660** for a suggested wall mount method. The number of attachment points needed and the wall structure **must** be reviewed by a qualified structural engineer and meet all national and local codes. It is the customer's responsibility to determine the proper wall mounting method and location.

1. Carefully uncrate the display. Look each side of the display over for possible damage during shipping.
2. Following the guidelines described in **Section 2.4**, lift the display into position on the support structure.
3. Weld or use ½" Grade-5 bolts and hardware to secure the clip angles to the support structure as shown in **Drawing B-183660**.
4. Refer to **Section 3** for information on routing power and signal.
5. After installation is complete, carefully inspect the display for any holes that may allow water to seep into the display. Seal any openings with silicone. If the eyebolts on the top of the display have been removed, plug the holes with bolts and the rubber-sealing washer that was removed with the eyebolt.

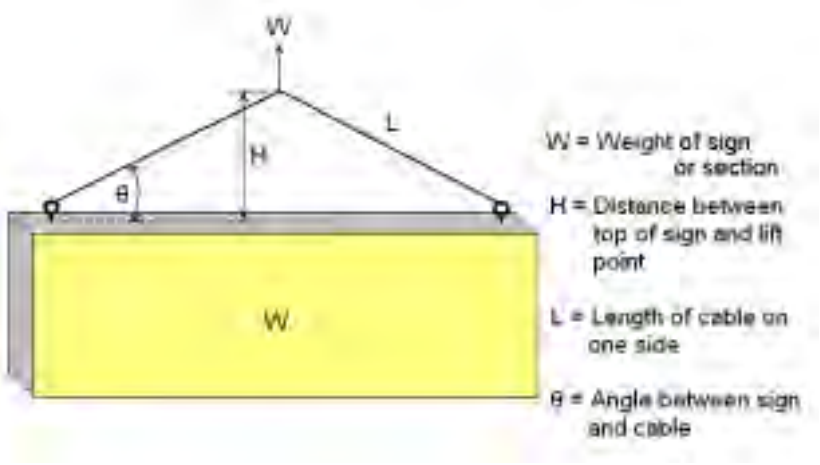
2.6 Optional Temperature Sensor Mounting

If an optional temperature sensor will be used with this display, see **Appendix C** for connections, and other additional information.

Eyebolts

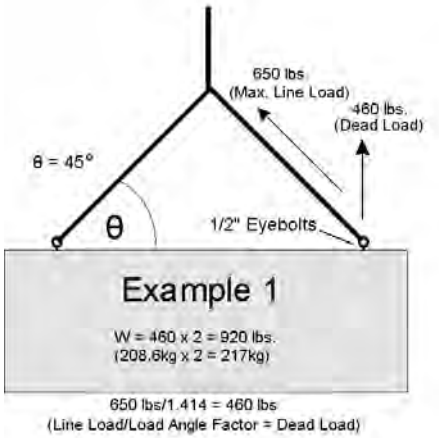
Almost every display that leaves Daktronics is equipped with eyebolts for lifting the display. There are two standard sizes of eyebolts: ½″ and ⅝″.

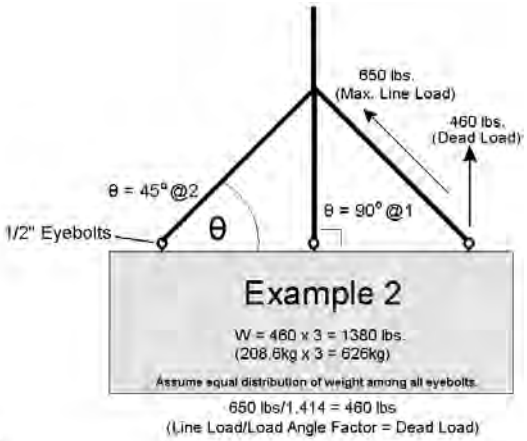
Load Increase Factor: The load increases as the lift angle (θ) decreases. The allowable load on the eyebolts also decreases with the lift angle due the bending stress on the eyebolts. In sum, the smaller the angle between the cable and the top of the display, the lighter the sign must be to safely lift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

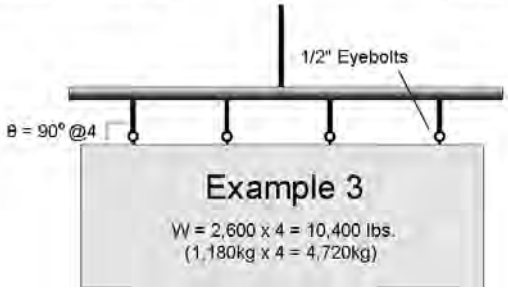


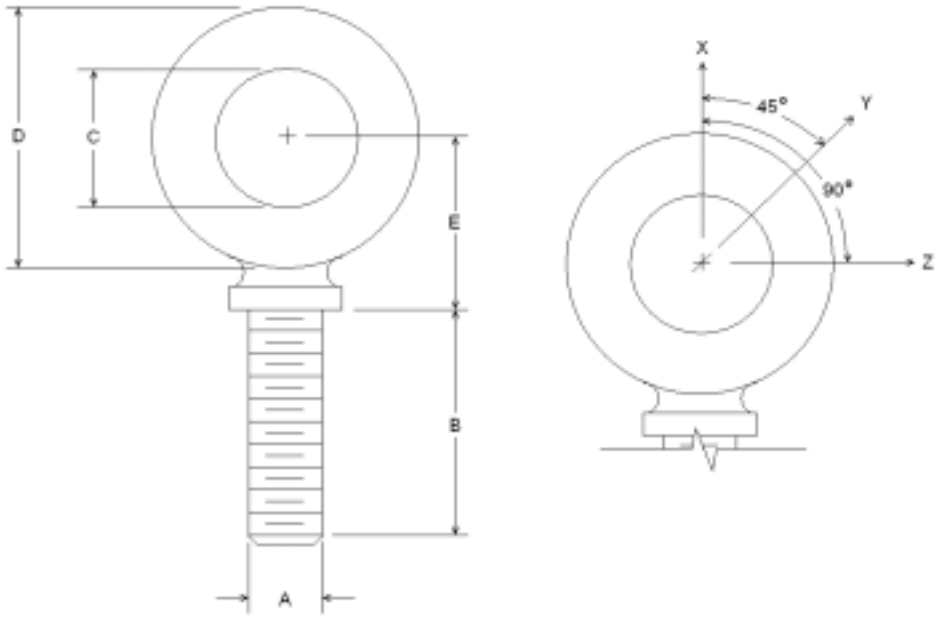
Horizontal Angle	Load Angle Factor (L/H)
90	1.00
60	1.155
50	1.305
45	1.414
30	2.00

	½"		⅝"	
θ	Line Load	Weight/ Anchor	Line Load	Weight/ Anchor
90	2600	2600	4000	4000
60	1500	1299	3300	2858
45	650	460	1000	707
30	520	260	800	400









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

A. Do not use eyebolts on angular lifts unless absolutely necessary. For angular lifts, the shoulder pattern eyebolt is preferred.

B. Load should always be applied to eyebolts in the plane of the eye, not at some angle to this plane.

C. Shoulder eyebolts must be properly seated (should bear firmly against the mating part), otherwise the working loads must be reduced to those indicated for regular eyebolts. A washer or spacer may be required to put the plane of the eye in the direction of the load when the shoulder is seated.

D. No load greater than the safe working load listed in the data table should be used.

E. To obtain the greatest strength from the eyebolt, it must fit reasonably tight in its mounting hole to prevent accidental unscrewing due to twist of cable.

F. Eyebolts should never be painted or otherwise coated when used for lifting. Such coatings may cover potential flaws in the eyebolt.

G. To attain the safe working loads listed for regular eyebolts, 90% of the thread length must be engaged.

Section 3: Electrical Installation

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

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

3.1 Common Connectors in the Display

The power and signal connections in the displays use many different types of connectors. Take special care when disengaging any connector to prevent damage to the connector, cable, or circuit board.

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

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

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

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

2. **Termination Blocks:**
   Termination blocks are usually used to connect internal power and signal wires to wires of the same type coming into the display from an external source. Power wires need to have one-half inch of insulation stripped from the end of the wire prior to termination. Tighten all screws firmly to ensure a good electrical connection. Refer to **Figure 10** on the right.

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

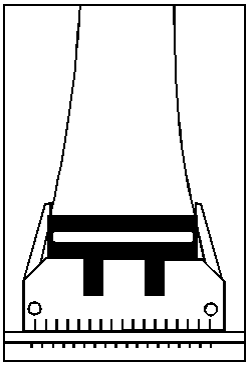


Figure 9: *Ribbon Cable Connector*

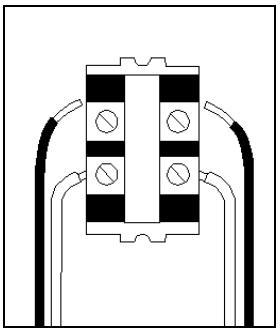


Figure 10: *Termination Block*

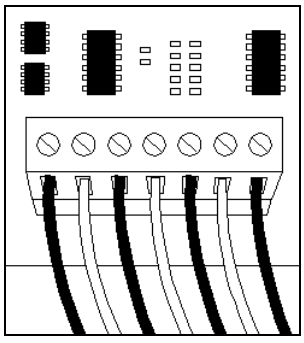


Figure 11: *Phoenix Connector*

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

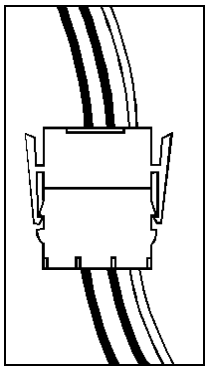


Figure 12: *Mate-n-Loc Connector*

5. **Phone Jacks (RJ Connectors):**
RJ11 or RJ45 connectors, as seen in **Figure 13** on the lower right, are similar to those on telephone and LAN connectors found in homes and businesses. They can be used on the ends of either flat cable or CAT5. 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.

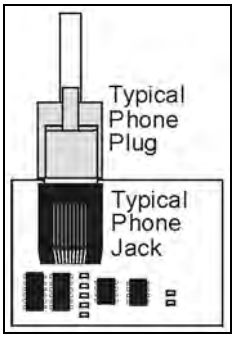


Figure 13: *RJ11*

6. **Quick Connect Jack:**
The display uses quick connect jacks for the connection of such things as the temperature sensor, a client radio, and connection of the primary to the secondary or mirror display. The quick connect jacks are located on the back of the display and when not used the attached dust cover should be kept closed.

   To attach the cable to a jack, make sure to line up the plug to match the jack, push the plug in then turn the outer collar to lock in place. **Figure 14** illustrates the 6-pin quick connect jack.

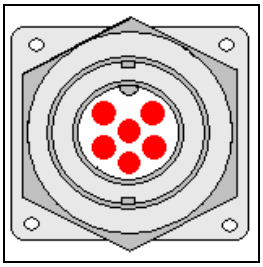


Figure 14: *RS232/6-pin Quick Connect Jack*

3.2 Control Cable Requirements

RS232

This cable is a 2-conductor shielded cable used to transmit an RS232 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 from the j-box at the base of the sign structure to the display. This cable has a maximum length of 25 feet (7.6 meters).

RS422

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

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

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

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 for the tip wire and which for the ring wire for signal connections. **Note:** The telephone line to the display must be a dedicated line 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. The maximum length of a fiber optic cable is 2,000 feet (611.6 meters).

Radio

The Server radio, connected to the computer through a J-box, requires an 18-gauge six-conductor cable (Daktronics part number W-1370). Four-conductors will be used for the signal and two for power. This cable from the J-box to the Server radio, needs to be in conduit when exposed to outdoor conditions. The maximum distance from the J-box to the Server radio is 1000 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 cannot pulled loose from the display by weather or vandalism.

3.3 RJ Connector Cables

The conductor connector used in the network is an industry standard, 6-pin RJ11or 8-pin RJ45. 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 15** 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 16** for a standard flipped cable.

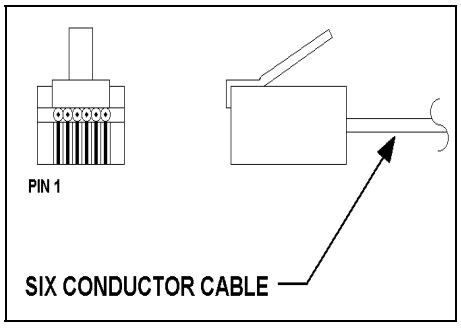


Figure 15: *6-Conductor RJ11 Connector and Cable*

Notice below in **Figure 16** 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.

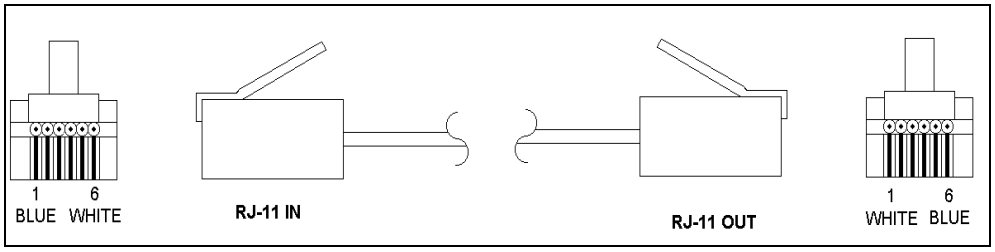


Figure 16: *Flipped Cable with RJ Connectors*

Installing an RJ Connector

Installing an RJ connector on the end of the conductor cable is a simple task when the correct tools are used. The RJ crimping tool (Daktronics part number TH-1033) performs two separate steps.

First, use the crimping tool to strip the outer insulation from the inner wires. This does not result in bare wires since only the gray outer jacket is removed. After correct stripping, the wire will appear as shown in **Figure 17** on the right.

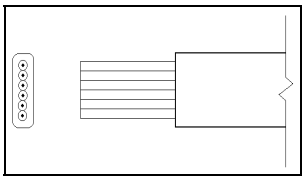


Figure 17: *Wire with Outer Jacket Stripped*

The crimping tool is then used to crimp the RJ connector onto the cable. The RJ connector is locked into a special socket in the tool. The stripped wire is inserted into the RJ connector. Finally, the tool is squeezed like a pliers to crimp the connector onto the wire. This completes the installation of an RJ connector onto the wire.

3.4 Conduit

Reference Drawings:

Shop Drawing; AF-3150-**x**-20mm-R or A..... **Drawing B-183660**

Daktronics does not include the conduit. Refer to **Drawing B-183660** for your display size and approximate locations for power and signal conduit. Separate conduit must be used to route:

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

Knockout holes for ½" conduit are located at the bottom right (rear view) of the back of the display (refer to **Drawing B-183660**).

For displays with more than one face, signal and temperature sensor wiring between displays is normally done using the quick connect interconnect cable, which does not need to be in conduit. When not using the quick connect cable, the cables for signal and temperature can be routed through the same conduit.

3.5 Preparing for Power/Signal Connection

Reference Drawings:

Component Layout Drawings..... **Refer to Appendix A**

1. Remove the two bottom left modules (AX01 and AX02) to expose the power enclosure and controller. Use a $^{1}/_{8}$" Allen wrench to turn the latch access fasteners one-quarter turn. Turn the top latch clockwise and the bottom latch counter-clockwise. Lift each module away from the display; reach behind it, and disconnect all power and signal connections.
2. Locate the controller and power termination box for these displays in the **Component Layout Diagram** located within **Appendix A**.
3. Punch or use 7/8" (0.875) holes for the desired ½" conduits. **Be careful that none of the internal components are damaged**. Attach the conduit.

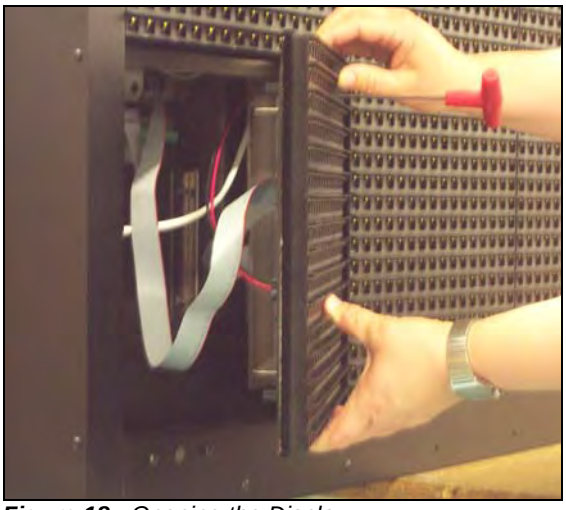


Figure 18: *Opening the Display*

4. The controller receives the incoming signal and relays it to the individual modules.
5. Route power to the display through a fused disconnect switch capable of opening all ungrounded power conductors. Install this disconnect within the line-of-sight of any personnel performing maintenance on the display. If the disconnect is located out of sight of the display, it must be capable of being locked in the open position.
6. Power conductors from the disconnect to the display should be routed through conduit in agreement with local code.
7. You may route the signal cable from the control computer to the display at this time also. Unless you are using fiber, **be sure to run the power and signal cables in a separate conduit**.

3.6 Power

Reference Drawings:

Power Termination Box..... **Drawing A-129227**
Power Specs, 16x144-48x144 Displays ..... **Drawing A-180190**
Schematics AF-3150-16x***-20mm, Mono ..... **Refer to Appendix A**

Power Requirements

Refer to **Drawing A-180190** for voltage and current requirements for your display size and pixel color. Each uses a 120VAC or 120/240 VAC single-phase power source. Depending on the module color and display size, the power supply may vary.

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

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

Grounding

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

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

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

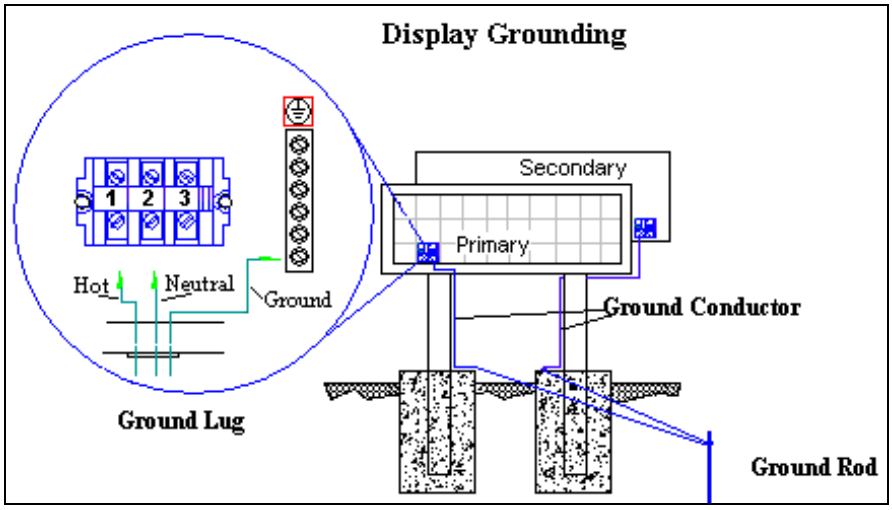


Figure 19: *Display Grounding*

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

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

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

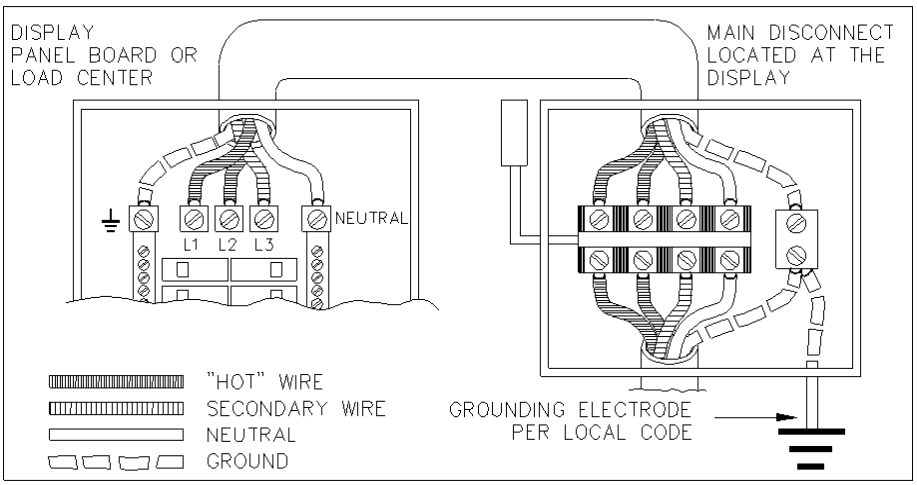


Figure 20: *Installation with Ground and Neutral Conductor Provided*

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 sign 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 sign panel board.

Refer to **Figure 21** below for installation details.

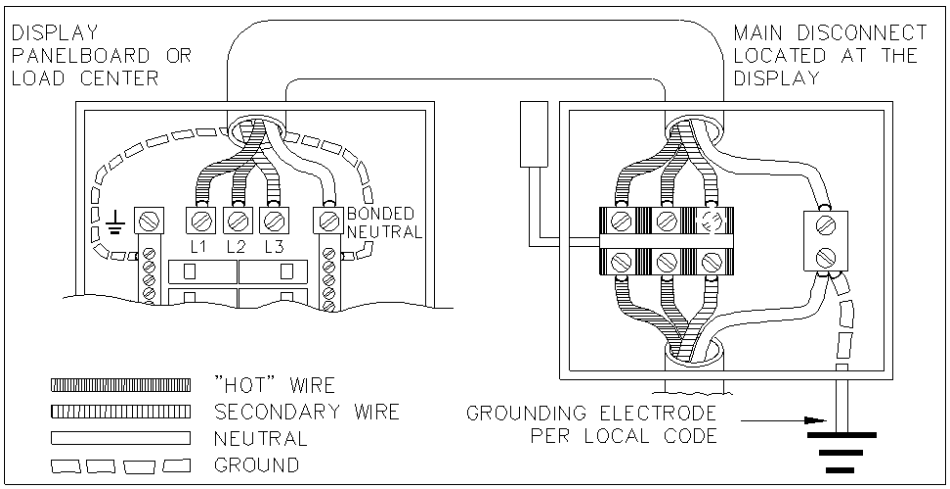


Figure 21: *Installation with only Neutral Conductor Provided*

Power Connection

Reference Drawings:

Power Termination Box ..... **Drawing A-129227**
Schematics .....**Refer to Appendix A**

Incoming power is connected within the power termination enclosure. Complete the following steps to terminate the hot and neutral wires at the termination block within the enclosure. Refer to **Drawing A-129227** and the **Schematic** listed within **Appendix A** for your display size.

1. Access the enclosure by removing the left bottom two modules as described in **Section 3.5**.
2. Route the power cables through the power conduit in the rear of the sign and to the enclosure.
3. Connect the white neutral wire to neutral bus.
4. If one power line is being terminated (120VAC), connect the black “hot” wire to L1. Make sure the jumper from L1 to L2 is in place as shown on **Drawing A-129227**.
5. If two power lines are being terminated (120/240VAC). Connect the second “hot” wire to L2. Make sure to remove the jumper between L1 and L2.
6. Connect the green grounding wire to the grounding bus E41.

Main Disconnect

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

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

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

3.7 Signal Termination from Computer to Display

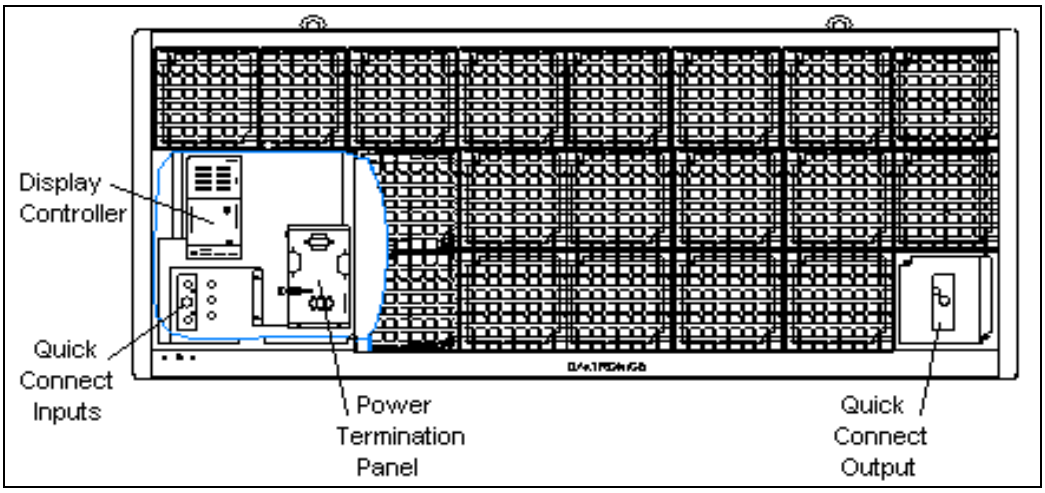


Figure 22: *Signal Termination at Display (Front View)*

Figure 22 gives the general location of various control components of the display. The location of the display controller and power termination panel may vary slightly depending on the height of the display. **Note:** The AF-3150 is designed for quicker connection to other displays, and to addition components such as a temperature sensor or a client radio. Connection of the communication equipment to the primary display can be done using a cable with a quick connect or can be wired directly to the controller in that display. Depending on the number of displays and the communication type ordered, the following cables may be provided with the displays:

1. Interconnect cable from primary display to secondary display, length 4 feet.
2. Temperature sensor with quick connect cable, length 25 feet.
3. Client radio with quick connect cable, length 25 feet.

RS232

Reference Drawings:

System Riser Diagram, RS232 ..... **Drawing A-174341**
Schematic, Internal, W/Quick Connect ..... **Drawing B-177662**

An RS232 controlled display requires the use of a J-box within 25 feet of the display as shown in **Figure 23**. From the J-box to the display, the signal may be connected using a quick connect cable or wired directly to the controller inside the display. The non-quick connect cable from the J-box to the display must be routed though conduit. **Do not** run signal and display power through the same conduit.

1. If using a quick connect cable, connect from the J-box to the RS232 top jack (J33) on the back of the display.
2. When connecting directly to the display, terminate the wire to the terminal block in the J-box and the other end to the 6-position Phoenix plug on the controller labeled “RS232 IN” (TB1). **Drawing B-177662** and **Figure 24** below shows the terminal block wiring.

The controlling laptop computer connects to the J-box through a DB9 to DB25 serial cable (refer to **Drawing A-174341**).

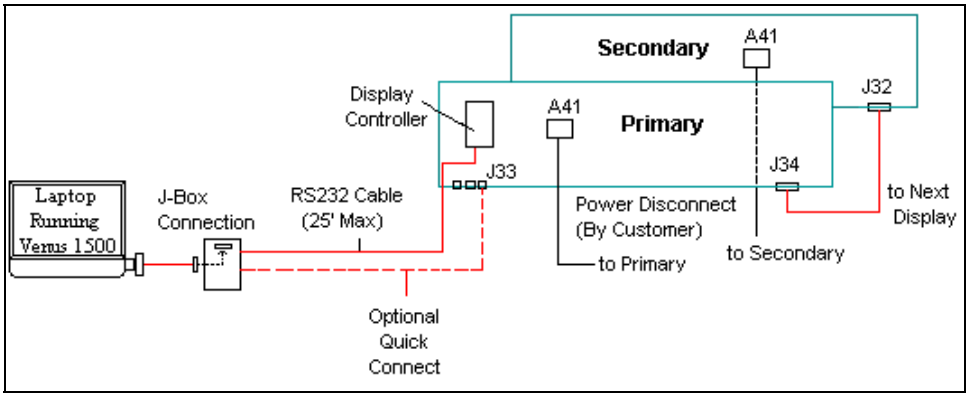


Figure 23: *RS232 Display Layout*

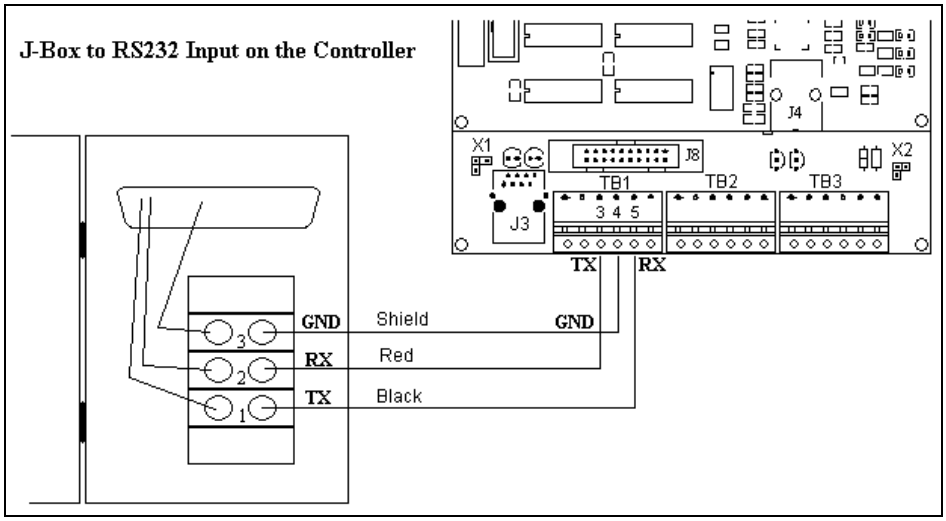


Figure 24: *J-box to RS232 IN on Controller Board*

J-Box to Controller

J-box	Wire Color	Controller (TB1)
Pin 1 (TX-P)	Black	Pin 5 (RX1)
Pin 2 (RX-P)	Clear or Red	Pin 3 (TX1)
Pin 3 (GND)	Shield	Pin 4 (GND)

RS422

Reference Drawings:

System Riser Diagram, RS422 ..... **Drawing A-174135**
Schematic, Internal, W/Quick Connect ..... **Drawing B-177662**

An RS422 controlled display requires the use of signal converter near the computer. From the signal converter, cable is run to the surge board assembly in the display or to a junction box. The junction box has a quick connect plug, which will be connected to the display. In either case, the cable from the signal converter to the surge board must be routed though conduit. **Do not** run signal and display power through the same conduit. Refer to **Figure 25** and **Drawing A-174135** for system layout.

1. If using a quick connect cable, terminate the 4-conductor shielded cable at the signal converter, and to the surge board in the junction box. A quick connect cable will then go to the RS422 middle jack (J32) on the back of the primary display.
2. When connecting directly to the display, terminate one end at the signal converter and the other end of the 4-conductor shielded cable to the 6-position terminal block on the surge board labeled "RS422 IN" (TB1). **Drawing B-177662** and **Figure 26** below show the terminal block wiring.
3. The computer connects to the signal converter using a DB9 to DB25 serial cable.

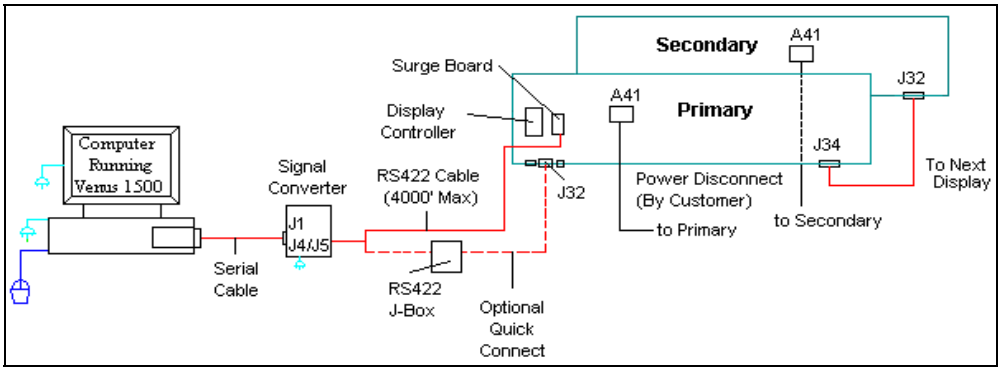


Figure 25: *RS422 Display Layout*

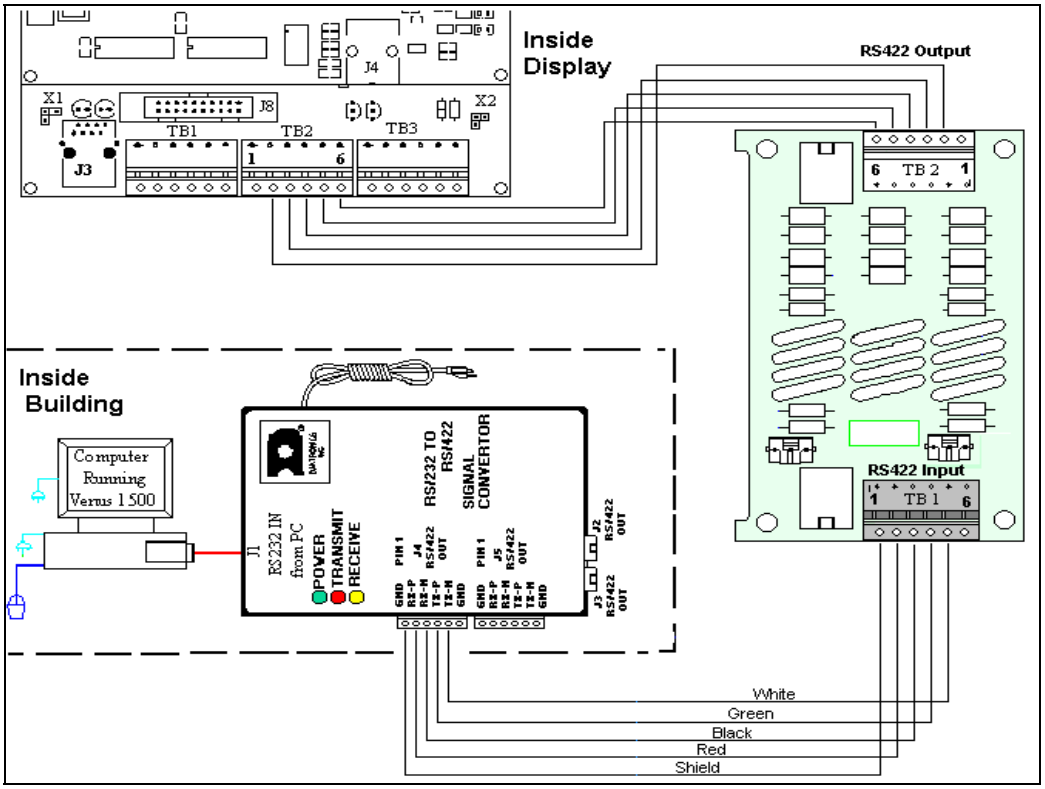


Figure 26: *Signal Converter to Surge Suppresser in Display*

Signal Converter to Surge Suppressor Board

Signal Converter (J4 or J5)	Wire Color	Surge Board Assembly (TB1)
Pin 1 (GND)	Shield	Pin 1 (N.C.)
Pin 2 (RX-P)	Red	Pin 2 (TX-P)
Pin 3 (RX-N)	Black	Pin 3 (TX-N)
Pin 4 (TX-P	Green	Pin 4 (RX-P)
Pin 5 (TX-N)	White	Pin 5 (RX-N)
Pin 6 (GND)		Pin 6 (N.C.)

Modem

Reference Drawings:

System Riser Diagram, Modem ..... **Drawing A-174342**
Schematic, Internal, W/Quick Connect..... **Drawing B-177662**

A modem-controlled display requires the use of an internal or external modem at the computer. The local phone company must provide a dedicated phone line to the display and identify the colors used by the Tip wire and the Ring wire. The telephone cable is run to the modem board in the display or is connected to a junction box with a quick connect plug that connects to the display. The phone cable must be routed though conduit. **Do not** run signal and display power through the same conduit. Refer to **Figure 27** and **Drawing A-174342** for the system layout.

1. If using a quick connect cable, connect the phone wires to the modem board, at J2, in a junction box. A quick connect cable will then go to the RS232 top jack (J33) on the back of the primary display.
2. When connecting directly to the modem in the display, terminate the tip and ring wires to TB2 on the modem board. If the phone company provided a phone termination box for the tip and ring wires in the display, a straight phone cable (Daktronics part number 0A-1137-0160) can be connected from the box to the J5 Phone IN on the modem board in the display. **Drawing B-177662** and **Figure 28** shows the terminal block wiring.
3. For modems in the display, an 8-conductor cable with RJ45 connectors (Daktronics part number 0A-1229-0054) relays the signal from J6 on the modem to J3 (RS232 IN) on the controller.

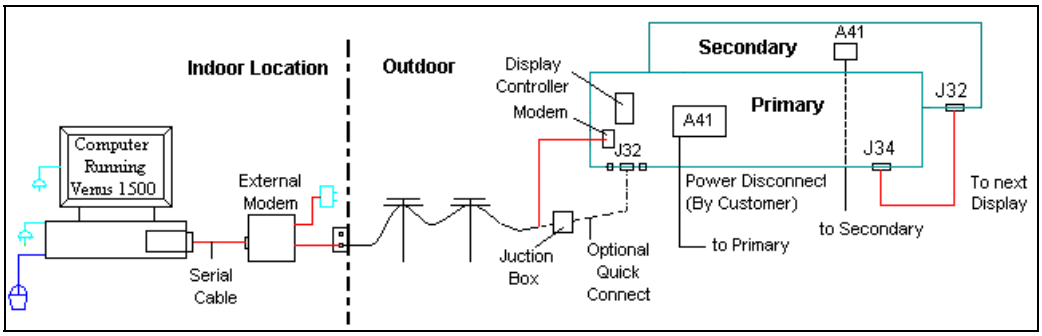


Figure 27: *Modem Display Layout*

Note: The jumper on the controller board must be closed to recognize that a modem is being used with the display. The jumper is recognized only on boot up.

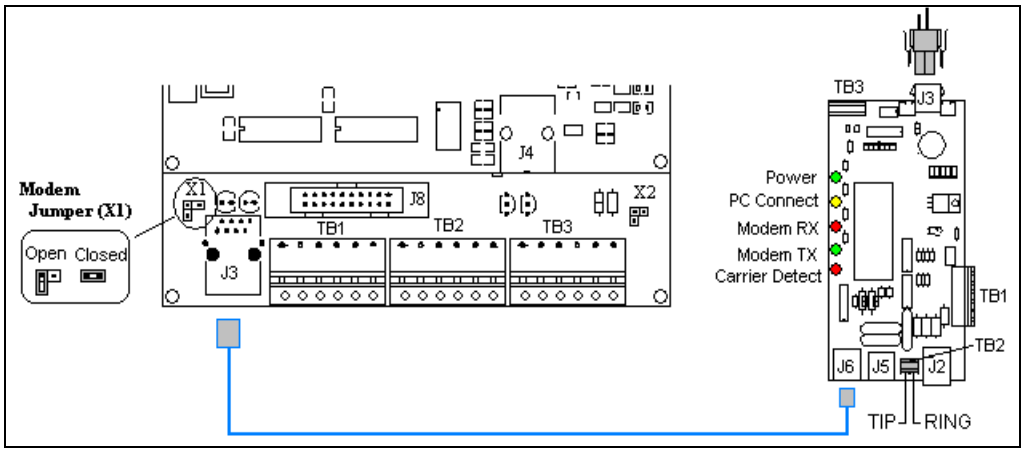


Figure 28: *Modem/ Signal Connections*

Phone Line to Phone Termination Block

Field Cabling	Phone Line (TB2)
Red	Pin 1 (Tip)
Green	Pin 2 Ring)

Fiber Optic

Reference Drawings:

System Riser Diagram Fiber ..... **Drawing A-174344**
Schematic, Internal, W/Quick Connect..... **Drawing B-177662**

A fiber-controlled display requires the use of a signal converter near the computer. From the signal converter, cables are run to the fiberboard in the display or in a junction box. The fiber cables from the signal converter to the display can be routed through conduit. In the case of fiber only, signal and display power can be run through the same conduit. Refer to **Figure 29** and **Drawing 174344** for the system layout.

1. If using a junction box with a quick connect cable, connect the two fiber cables from the signal converter (either J2 and J3, or J4 and J5) to J5 and J4 on the fiberboard. The quick connect cable will connect to the RS232 top jack (J33) on the back of the primary display.
2. When connecting directly to the fiberboard in the display, route the cable to the fiberboard and connect the two fibers to J5 and J4. Always connect transmit (TX) at the signal converter to receive (RX) on the display's fiberboard, and RX to TX as shown in **Figure 30** and **Drawing B-177662**.
3. The fiberboard in the display, connects to the display's controller via an 8-pin RJ45 cable (Daktronics part number 0A-1229-0054) from J7 on the fiberboard to J3 (RS232 IN) on the controller.
4. The computer connects to the signal converter using a DB9 to DB25 serial cable.

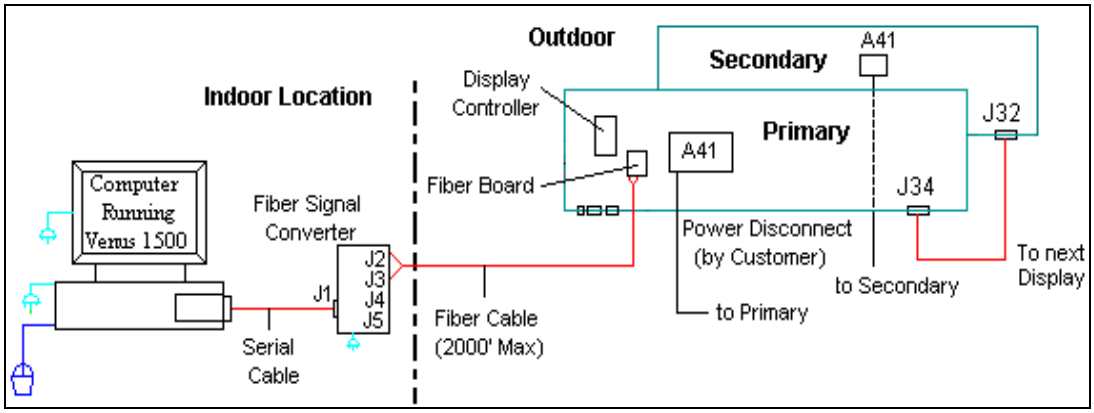


Figure 29: *Fiber Optic Display Controller*

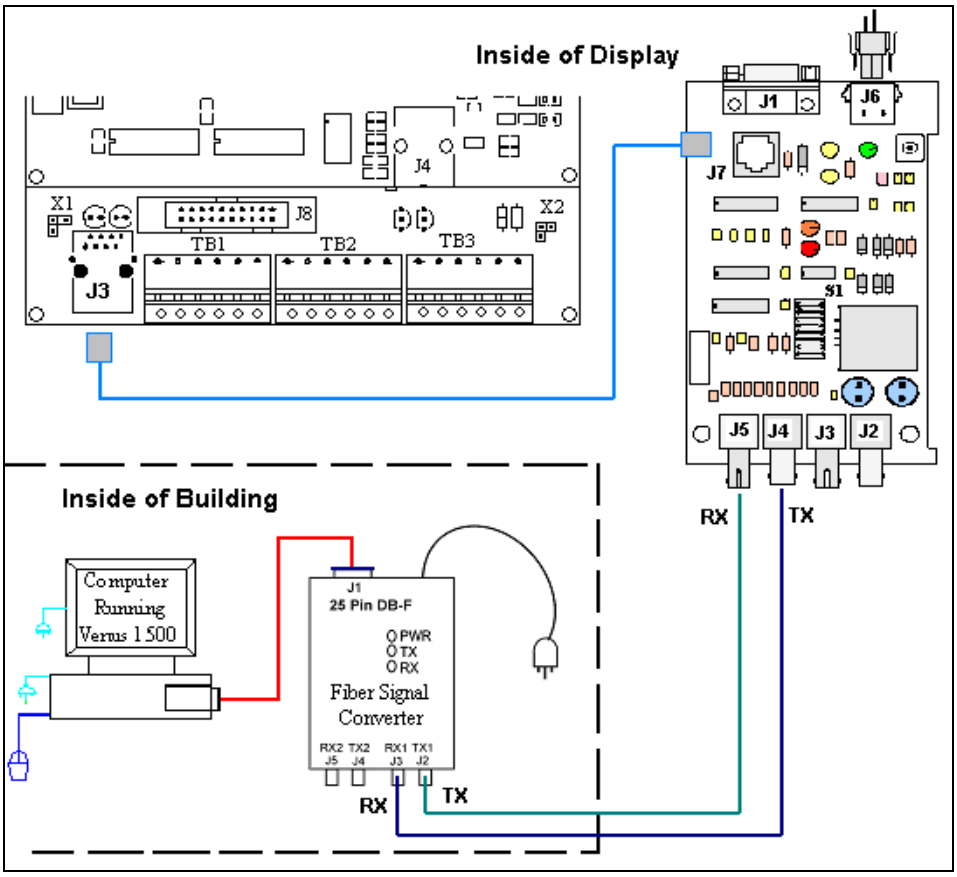


Figure 30: *Fiber Signal Connections*

Signal Converter to Display Fiber Board

Signal Converter	Field Cabling	Display Fiber Board
J2 Transmit (TX1)	(Color varies)	J5 Receive (RX2)
J3 Receive (RX1)	(Color varies)	J4 Transmit (TX2)

Venus® 1500 Radio Client

Reference Drawings:

System Riser Diagram, QC Outdoor Radio, Gen 2 ..... **Drawing A-185359**
Schematic, Internal, W/Quick Connect ..... **Drawing B-177662**

A radio-controlled display requires a Server radio connected via a J-box to the control computer, and a Client radio at the display. The radios must be within line-of-site of each other.

Figure 31 on the next page and **Drawing A-185359** shows the layout to the Server radio through a J-box. The Client radio is mounted near the display, and is supplied with 25 feet of weather resistant cable. One end of the cable is pre-terminated to TB1 inside the radio enclosure, and a quick connect plug is terminated at the other end of the cable. The quick connect cable connects to the primary display.

1. Connect the DB9M to DB9F serial cable from the computer's serial port to the J-box labeled "V1500 PC Connect"
2. Connect an 18 AWG, 6-conductor cable from the J-box near the computer to the to the Server radio. The distance from the J-box to the Server cannot

exceed 1000 feet. Refer to the Venus 1500 Radio Manual, **ED13932**, for J-box and Server connections.

3. Using the quick connect cable, as shown in **Figure 32**, connect from the Client radio to the RS232 top jack (J33) on the back of the primary display. (Secure any additional cable to prevent it from being pulled loose by weather or vandalism.)

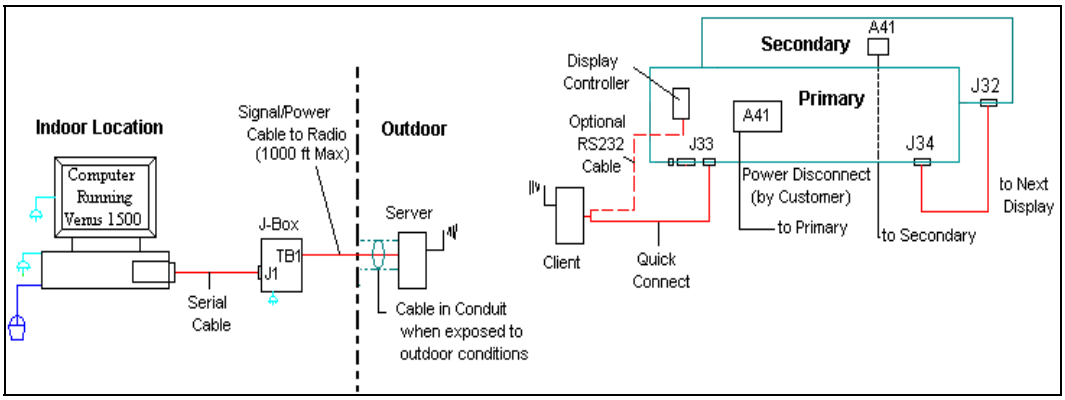


Figure 31: *Radio Display Layout*

Figure 32: *Radio Client Connection*

3.8 Signal Termination Between Two (or More) Signs

Reference Drawings:

Schematic, Internal, W/Quick Connect ..... **Drawing B-177662**
Controller, Galaxy, 8-conn., J-1087 ..... **Drawing B-177838**

RS422 Interconnection

- The quick connect cable is the most common method of terminating signal between two displays. The four-foot cable goes from the RS422 OUT (J34) on the primary display to the RS422 IN (J32) on the secondary display.
- If the displays are not back-to-back, or are too far apart for the quick connect interconnect cable to reach, a 4-conductor shielded cable can be used. One end will connect at the "RS422 OUT" 6-position terminal block (TB3) on the controller of the primary display, and the other end of the cable will terminate on the "RS422 IN" 6-position terminal block (TB2) on the controller of the secondary display.

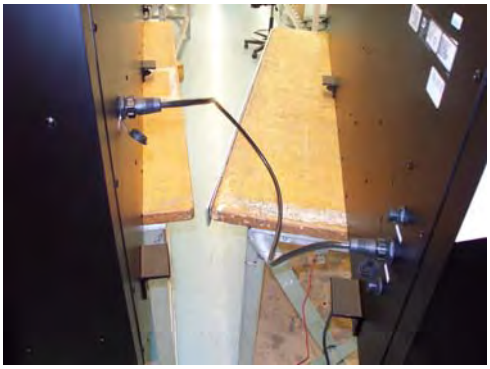


Figure 33: *Quick Connect Cable*

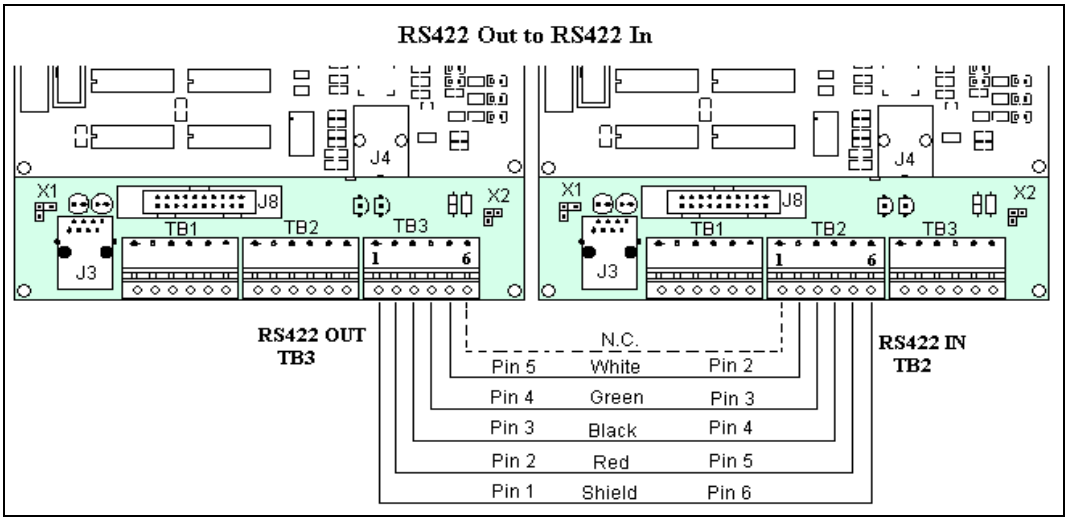


Figure 34: *RS422 Signal Termination Panels*

Primary RS422 OUT (TB3)	Field Cabling	Secondary RS422 IN (TB2)
Pin 1 (GND)	Shield	Pin 6 (GND)
Pin 2 (D2OUT-N)	Red	Pin 5 (D1IN-N)
Pin 3 (D2OUT-P)	Black	Pin 4 (D1IN-P)
Pin 4 (D2IN-N)	Green	Pin 3 (D1OUT-N)
Pin 5 (D2IN-P)	White	Pin 2 (D1OUT-P)
Pin 6 (Shield)		Pin 1 (Shield)

Fiber Interconnection

Reference Drawings:

System Riser Diagram, Fiber ..... **Drawing A-174344**

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 in **Drawing A-174344** and on the following table:

Primary - Data Out (A34)	Field Cabling	Secondary - Data In (A34)
J2 Transmit (TX1)	(color varies)	J5 Receive (RX2)
J3 Receive (RX1)	(color varies)	J4 Transmit (TX2)

3.9 Optional Temperature Sensor

If you are using an optional temperature sensor with your display, see **Appendix C** for mounting and signal information.

3.10 First Time Operation

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

1. Product Name (Galaxy®)
2. Display Size (Row x Column)
3. Shading (64 Mono)
4. Bootloader Version (OS X.XX)
5. Firmware Number (**ED13305**)
6. Firmware Revision (Rev X.XX)
7. Hardware Address (HW:XX)
8. Software Address (SW:XX)
9. IP Address: (172.16.192.25)
10. Subnet Msk: (255.255.0.0)
11. COM1 Configuration (C1:V15) ((Modem C1:V15) If a Modem is present)
12. Line Frequency (CLK:60 Hz)
13. Display Name Description

Section 4: Maintenance and Troubleshooting

Important Notes:

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

4.1 Maintenance and Troubleshooting Overview

Daktronics Galaxy® series AF-3150 displays are front accessible; meaning access to the internal components can be gained only from the front of the display.

This section provides the following Galaxy® display information.

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

4.2 Signal Summary

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

1. Data from the control computer, which runs Venus® 1500 software, travels via RS232, RS422, modem, fiber optic cable, or radio signal to the display.
2. For multiple face displays or a display network, an RS422 quick connect cable (most typical) relays signal between the controller of the primary display and the controller in the secondary display. In the case of fiber, two fibers would connect from the fiberboard in the primary display to the fiberboard in the secondary display.
3. From the controller, the signal then travels over one or more 20-conductor ribbon cables (J11 through J18 provide signal out) to J2 on the first row of modules in the display.
4. Data exits at J1 and is relayed to J2 of the next module and so on, traveling down the entire row of modules. The modules use this display data to control the LEDs.

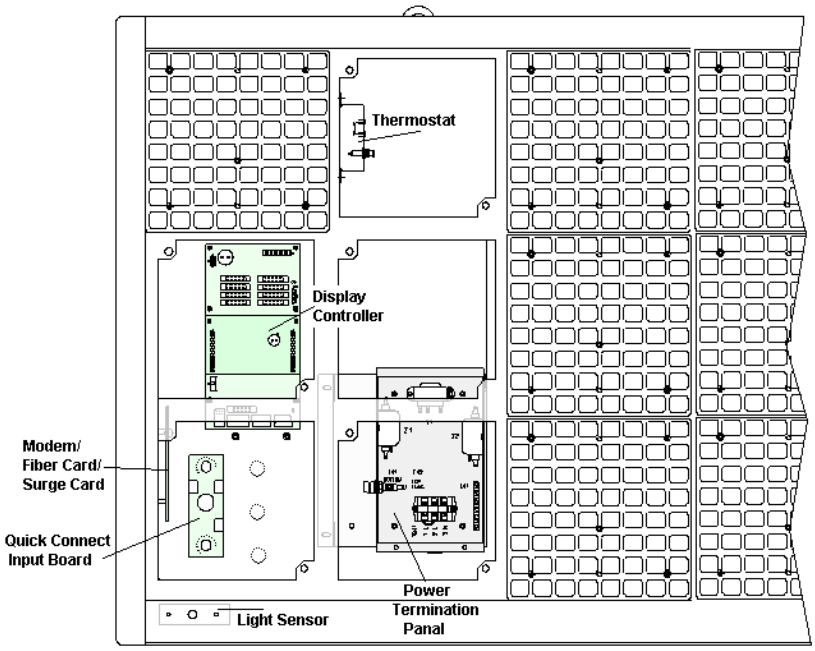


Figure 35: *Power/Control Corner*

4.3 Power Summary

Reference Drawings:

Schematics .....**Refer to Appendix A**

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

1. Incoming power terminates at the power termination enclosure. Before leaving the enclosure, power is sent through a circuit breaker and an RFI electrical filter. See display **Schematic** for details.
2. Power for the controller board passes through a transformer located in the power termination box.

3. The power supplies are set to 3.6 VDC. Power supplies are preset. Contact Daktronics Customer Service for the proper settings.

4.4 Service and Diagnostics

Reference Drawings:

Power Termination Box..... **Drawing A-129227**
Controller, Galaxy, 8-conn J-1087 ..... **Drawing B-177838**
Schematics..... **Refer to Appendix A**
Comp. Layout Diagram; ..... **Refer to Appendix A**

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

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

The sub-sections also address any diagnostic LEDs, fuses and signal/power connectors found on the unit. On the **Schematics** and **Component Layout Diagrams**, the components are denoted as follows.

Component…	Denoted As…	Location…
Filter and Transformer	0A-1289-4005	Inside the power termination box
Controller	0A-1229-0005	Depends on the size of the display. (usually behind the bottom left module, or module one row above)
Modules	Squares A101 through A309 0A-1266-2004-Red 0A-1266-2005-Amber	Over entire face of the display (includes driver)
Power Supplies	0A-1289-4011 or 0A-1289-4012	Behind modules (refer to your display's **Schematic** and **Component Layout Diagram**)
Light Detector	0A-1247-0003	Behind\below the bottom left module
Modem	0P-1279-0003	Close to the controller, usually in the left end of the display. Refer to the display's **Schematic**
Fiber Board	0P-1127-0024	Close to the controller, usually in the left end of the display. Refer to the display's **Schematic**
RS422 Surge Card	0P-1146-0031	Close to the controller, usually in the left end of the display. Refer to the display's **Schematic**

Transformer and RFI Filter

Remember: Disconnect power before servicing any internal components.

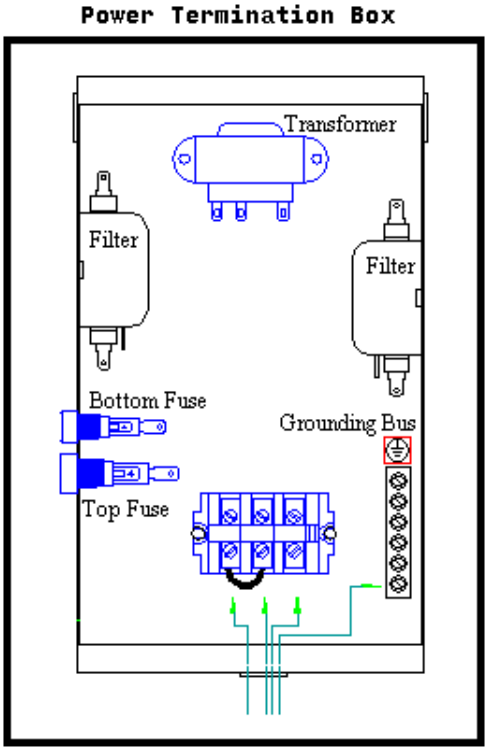


Figure 36: *Power Termination Box*

Transformer

The transformer is located in the upper portion of the power termination box. **Turn off power to the display before removing the wires**.

To replace the transformer:

1. Disconnect and label all the wires attached to it.
2. Release the hardware securing it to the inside of the enclosure.
3. Position the new transformer in its place, and tighten it down.
4. Re-connect all the wires using the display's **Schematic** as a reference.

RFI Filter

The RFI electrical filters are mounted above and to the side of the power termination box (Z1 and Z2 in **Drawing A-129227**).

To replace the RFI filter:

1. Remove all connecting wires.
2. Releasing the attachment hardware.
3. Replace the filter.
4. Install the new filter using the display's **Schematic** as a wiring reference.

Controller

The controller sends data to the modules. Refer to the signal summary in **Section 4.2** for more information and to the **Component Layout Diagrams** for the position of the controller board. **Figure 37** below illustrates a typical controller.

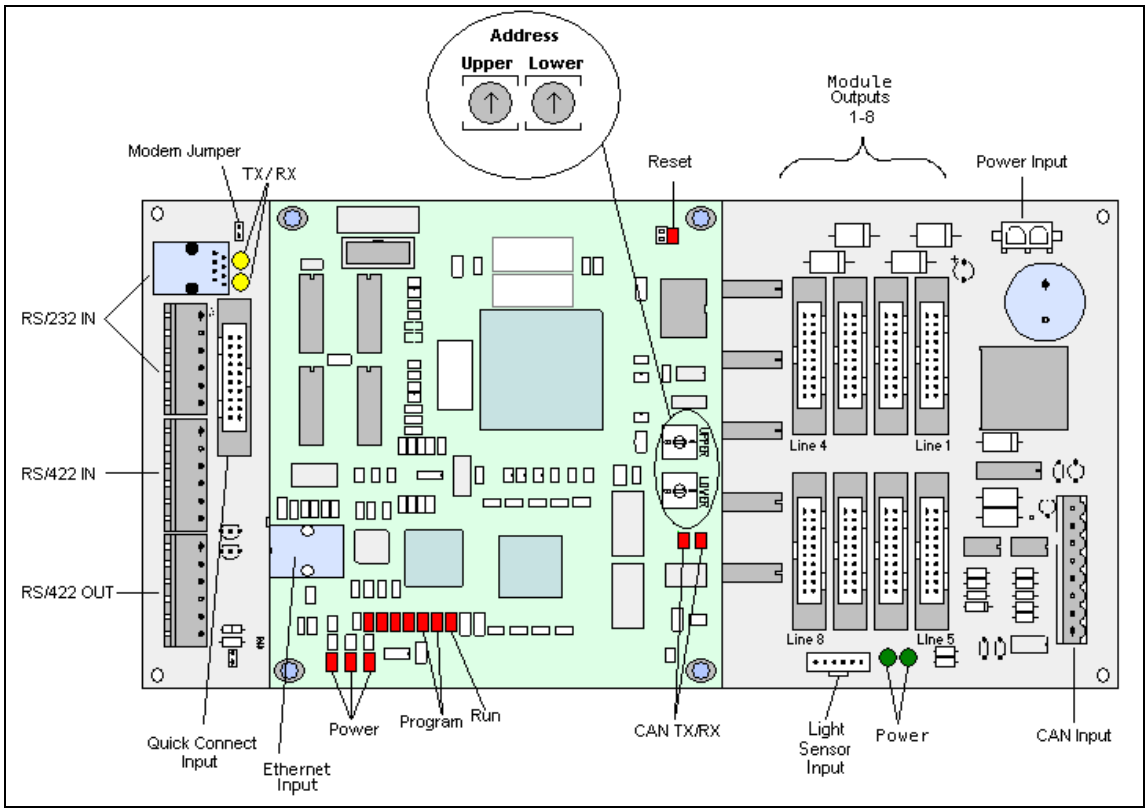


Figure 37: *Controller Component Layout*

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

Note: Setting both rotary switches to address 0 (set the switches to 0 by rotating them counter clockwise until the arrow points to 0) can set a test mode. The display's power must be turned off and then turned back on to recognize a change in address. The display can also be put into test mode using the software.

Complete the following steps to remove the controller from the display:
Tools required: 1/8" hex wrench and 3/16" nut driver

1. Remove the module directly in front of the controller.
2. Label the cables before removing them from the controller.
3. Disconnect power from J5.
4. Remove all signal connections from the board. Pushing apart the latches and carefully pulling them from the jack will release the "Locked" connectors
5. The board is held in place using six screws. Remove the screws using a 3/16" nut driver.
6. Follow the previous steps in reverse order to install a new controller board.

Controller Address Settings		
S2 Upper	**S1 Lower**	**Address**
0	0	Test Mode
0	1	1
0	2	2
0	3	3
0	4	4
0	5	5
0	6	6
0	7	7
0	8	8
0	9	9
0	A	10
0	B	11
0	C	12
0	D	13
0	E	14
0	F	15
1	0	16
1	1	17
…	…	…
F	0	240

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

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

			duplex.
DS10	Red	Collision	Flashes when the Ethernet interface detects a collision in half-duplex.
DS11	Red	+5V	On when +5V power supply is functioning.
DS12	Red	+3.3V	On when +3.3V power supply is functioning.
DS13	Red	+2.5V	On when +2.5V power supply is functioning.
Product Board			
LED	**Color**	**Function**	**Operation**
DS1	Green	+5V	On when +5V power supply is functioning.
DS2	Green	+3.3V	On when +3.3V power supply is functioning.
DS3	Yellow	COM1 TxD	Flashes when transmitting serial information.
DS4	Yellow	COM1 RxD	Flashes when receiving serial information.
Temp/Light Sensor			
LED	**Color**	**Function**	**Operation**
DS1	Green	+5V	On when +5V power supply is functioning.
DS2	Red	Run	A steady flash indicates the controller is running correctly. Normal flash rate is about once a second. Flashes faster when the sensor is transmitting temp or light information.

Modules and Drivers

The module and driver board are a single functional unit.

To remove a module, complete the following steps:
Tools required: 1/8" hex wrench

1. Locate the latch access fasteners on the module. One is centered below the second row of pixels and one is centered above the bottom row.
2. With a 1/8"hex wrench, turn the latch access fasteners a quarter turn as seen in **Figure 38**. The top one should be turned clockwise and the bottom one counter-clockwise.
3. Pull the display module far enough to reach around the back and disconnect the ribbon and power cables.

Figure 38: *Removing a Module*

When installing a module, reverse the previous steps and take note of the following points:

- The weather-stripping on the back edge of the module must be intact and in good condition if it is to prevent water from seeping into the display.
- The module latches must be fully engaged to create a watertight seal around the edge of the module. The module should be firmly seated against the display when the latches are fully engaged.

Each module assembly is made up of a module housing (containing LEDs and the driver) and a louver assembly.

Power Supplies

The LED power supplies are identified as assemblies. Each power supply unit controls four modules; a power supply assembly (two power supply units) controls eight. The LED power supplies are identified as assemblies 0A-1289-4011 and 0A-1289-4012 in the **Component Layout Diagram**.

Complete the following steps to remove a power supply from the display:
Tools required: 1/8" hex wrench and #2 Phillips screwdriver

1. Remove the module directly in front of the failed power supply.
2. Disconnect and label all the wires connected to the power supply.
3. Remove the hardware holding the power supply in place to free the unit.
4. Follow these steps in reverse order to install a new power supply. Refer to the display's S**chematic** when reconnecting the wires.

Light Detector

The light detector is internally mounted and wired at Daktronics. It is located in the bottom left corner on the front of the primary display (identified as assembly 0A-1241-4013 (LT) in the **Component Layout Diagram**). A 4-conductor cable connects the light detector to J9 on the controller (refer to your display's **Schematic**). When the displays are mounted back-to-back, only the primary side has a light sensor.

Modem

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

Complete the following steps to replace a modem in the display: **Tools required: 1/8" hex wrench and 3/16" nut driver**

1. Remove the module directly in front of the modem.
2. First disconnect and label all the wires connected to the modem (refer to **Figure 39** on the right for the cable locations).
3. The modem is held in place with four screws. Remove the screws using a 3/16" nut driver and lift the modem out of the display.
4. Follow these steps in reverse order to install a new modem.

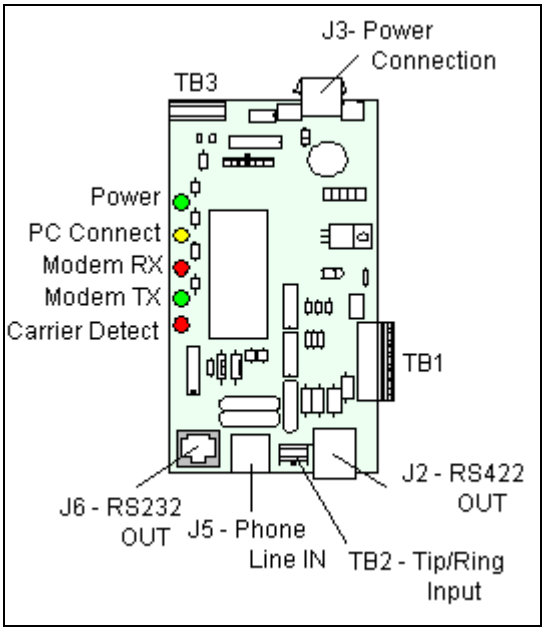


Figure 39: *Modem*

The modem module has five LEDs.

1. The Power LED should remain lit while power is applied to the modem.
2. The Carrier Detect LED will light when the modem is in the process of communicating.
3. The modem RX and TX will flash when communicating with another modem.
4. The PC Connect LED is not used when this modem is mounted in a display.

The modem board also has several input and output jacks:

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

A modem system requires a jumper (X1) to be set on the controller board. For a modem system the jumper must jump both pins. The jumper position is only recognized on power-up. Refer to the **Figure 40** below for the location, and the jumper settings.

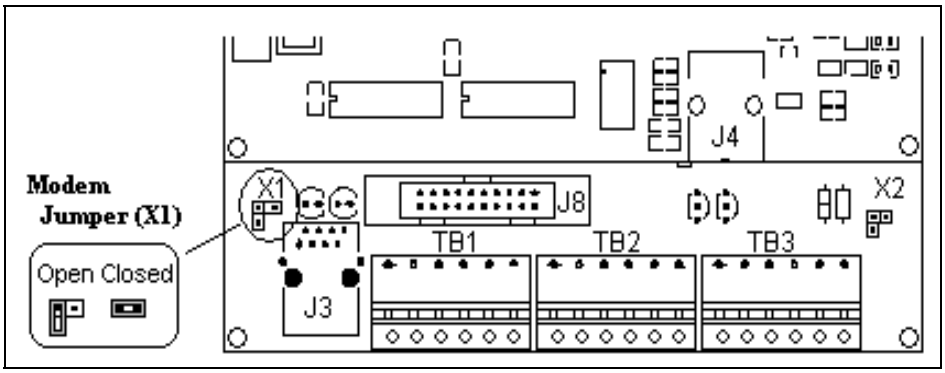


Figure 40: *Modem Jumper Location*

Fiber Board

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

Complete the following steps to replace a fiber optic board: **Tools required: 1/8" hex wrench and 3/16" nut driver**

1. Remove the module directly in front of the modem.
2. Disconnect and label the power and signal connections (refer to **Figure 41** on the right for disconnection of wires).
3. The fiber optic board is held in place with four 3/16" screws. Carefully remove them.
4. Install the new fiberboard, replace the screws, and reconnect power and signal cables.

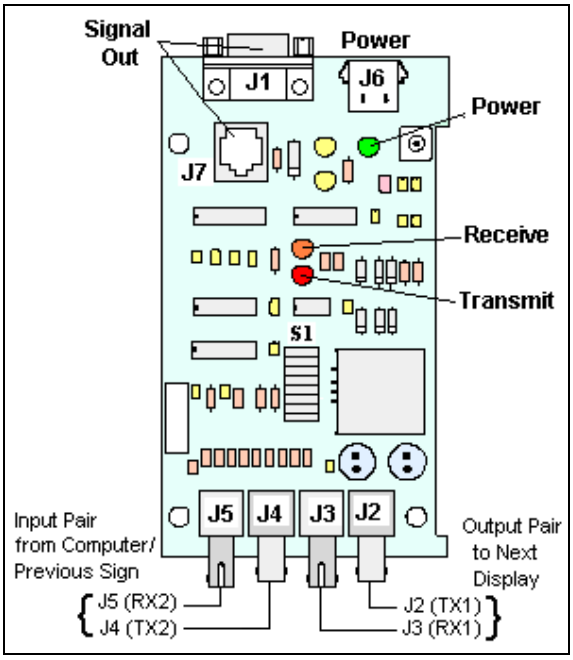


Figure 41: *Fiber Optic Board*

The fiber module has three LEDs.

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

In addition, the fiber module has several input and output jacks:

1. J6 is the power input for 12VAC.
2. J5 and J4 are the inputs from the signal converter by the computer, or the previous display connects.
3. J3 and J2 are the outputs to the fiberboard in the next display, if necessary.
4. J7 is the RS232 output that connects to the J3 on the controller board via an 8-conductor, RJ45 cable (Daktronics part number 0A-1229-0054).
5. J1 is used when the fiberboard is mounted in an enclosure.

RS422 Surge Suppressor

The surge suppressor is an inline device that is used to filter the RS422 data line. It suppresses surges down to a low voltage in order to protect the display controller's RS422 input. If a fiberboard was included with the display, it is located inside the display next to the controller board.

To replace the RS422 Surge suppressor board: **Tools required: 1/8" hex wrench and 3/16" nut driver**

1. Remove the module directly in front of the surge board.
2. Disconnect and label the signal connections (Refer to **Figure 42** on the right).
3. The surge suppressor is held in place with four 3/16" screws. Carefully remove them.
4. Install the new surge suppressor, replace the screws, and reconnect power and signal cables.

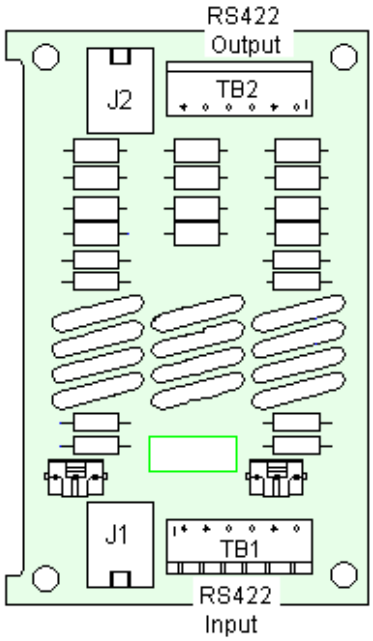


Figure 42: *Surge Suppressor, RS422*

The surge suppression board has two inputs and two outputs.

1. The cable from the signal converter by the display will connect to TB1.
2. The signal from the RS422 output (TB2) on the surge board connects to the RS422 input (TB2) on the controller.
3. J2 will used to connect to the controller board when the surge board is mounted in an enclosure.
4. J1 and J2 are more often used when the board is part of an indoor display application.

Note: 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.

Location of CAN Termination Jumper

Temperature and light sensors are controlled as part of a CAN network. For the CAN network to work correctly, the network must be terminated at both ends of the network. This is true for a single display, or for multiple displays. The correct terminations are completed during the building process. However, if the order or number of displays is changed on-site, the terminating jumper (W1) may need to be relocated.

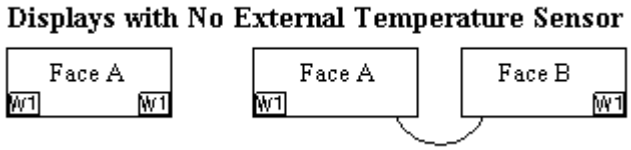


Figure 43: *Displays with No External Temperature Sensor*

In the case of those displays that utilize a temperature sensor, the sensor is internally terminated. Therefore, only one other termination needs to be made at the output of the last sign in the network. The most common input location for the temperature sensor is to the primary display in the network.

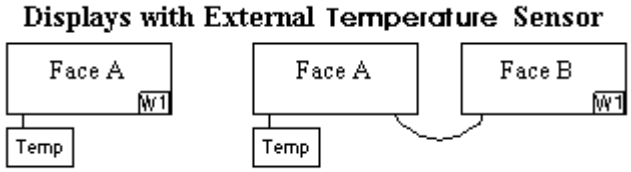


Figure 44: *Displays with External Temperature Sensor*

The terminating jumper is located on the quick connect board on the inside of the display. Most displays have both an input and an output quick connect board. When no output board is available, the terminating jumper (W1) will be placed on the input board of the last display. Therefore, both boards are shown in **Figure 43** and **Figure 44** above.

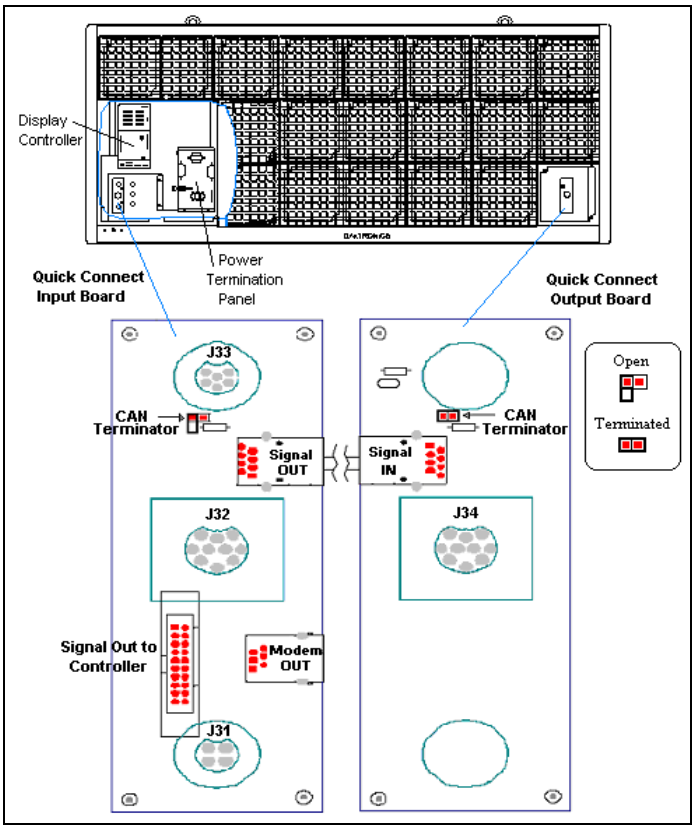


Figure 45: *Quick Connect Boards*

4.5 Ventilation Systems (With Fans and Filters)

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

- 1,500 hours is equivalent to 83 days if the display is operated for 18 hours a day, and the power to the display is turned off when not in use.
- 1,500 hours is equivalent to 62 days if the display is running non-stop for 24 hours a day.
- Each time a module is removed, for whatever reason, take a minute to inspect the fans.
- Check the fan blades for dirt and debris. If the fan blades have a large accumulation of dirt and debris, this indicates that the filters must be changed more often. Fan blades must be kept clean to maintain fan efficiency and ensure proper cooling.
- Spin the fan blades with a pen or pencil to ensure that the bearings are free and the fan is still in balance.

To check the operation of the fans, push the bypass button (momentary contact) on the thermostat enclosure to temporarily turn the fans on: (The bypass button is located behind A102, top row, and second module from the left, as shown in **Figure 35**.)

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

Filters must be checked once a year or after every 1,500 hours of operation, whichever comes first.

Filters can be cleaned with water and a mild detergent, such as dish soap. Compressed air can also be used to clean the filters provided the nozzle is held at least six inches away from the filter, the pressure is no greater than 60 psi, and the air is blown through the filter in the opposite direction from which air normally flows. The arrow stamped on the frame filter indicates airflow direction.

4.6 Thermostats

Reference Drawing:
Comp. Layout Diagram; ..... **Refer to Appendix A**

A thermostat controls when the ventilation fans are turned on in the display. Refer to the **Component Layout Diagram** and **Figure 35** for the location of the thermostat. The ventilation fans turn on when the inside of the display reaches 85° F (29° C), and turn off at 70° F (21° C).

4.7 Weather Stripping

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

4.8 Display Maintenance

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

- **Loose Hardware**
  Verify fasteners, such as bolts and rivets, have not come loose. Fasteners should be checked, tightened, or replaced as required.

- **Excessive Dust Buildup**
  Occasionally it may be necessary to vacuum the inside of the display cabinet to remove dust/dirt buildup that may interfere with airflow.

- **Water Intrusion – Water Stain Marks**
  Water can enter the display where weather stripping has come loose or deteriorated, where fasteners have come loose allowing gaps in the panels, or where moisture may be entering around hardware. Be sure to check around the lift eyes and bolts to ensure that water has not entered there. If so, replace hardware immediately to prevent more water from entering the display. Also, check electronic components for possible corrosion.

- **Corrosion**
  Check the paint, and look for possible corrosion especially at footings, structural tie points and ground rods.

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

4.9 Troubleshooting

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

Symptom/Condition	Possible Cause/Remedy
One or more LEDs on a single module fail to light.	• Replace/check ribbon cables on the module. • Replace the module.
One or more LEDs on a single module fail to turn off.	• Replace/check ribbon cables on module. • Replace the module. • **Note:** LED in bottom right hand corner will flash indicating the display has power and firmware, but no message has been sent.
A section of the display is not working. The section extends all the way to the right side of the display.	• Check/replace the ribbon cable to the first non-working module. • Check power to the modules. • Move or replace the first module to the left of the first module that is not working. • Move or replace the second module that is not working. • Check or replace the power supply assembly on the first module that is not working.
One row of modules does not work or is distorted.	• Check/replace ribbon cable to first module. • Replace or move first module. • Check for bent pins on module and controller. • Try the output from a different row on the controller. • Replace controller. • Check the fuses in the power termination box.
A group of modules, (a column of block) which share the same power supply assembly, fail to work.	• Check the wire connections at the power supply. • Measure the power (3.6 VDC) to the first module. • Replace the power supply assembly.
Entire display fails to work.	• Check for proper line voltage into the power termination panel. • Check fuse in power termination box • Check for correct power to controller (10 VAC) and modules (3.6 VDC). • Disconnect signal cables to the controller, and check for power to controller. • Check/replace the ribbon cable from the controller to the modules. • Check the voltage settings on the power supplies. • Check/replace the signal cable to the controller. • Replace the controller. • Verify proper use of the software in the operation manual (**ED13530**).
Temperature always reads –196F/-127C degrees F/0 degrees C.	• Check temperature sensor connections. • Check for bent pins or misconnection on quick connect cable.

	• Check for address 1 on the temperature sensor. • Replace the temperature sensor. • Replace the controller.
Display is stuck on bright or dim.	• Check Manual/Auto dimming in Venus 1500 software. • Check light detector cable connections. • Check light detector for obstructions. • Check for bent pins on controller connection. • Check for address 2 on the light sensor. • Replace the light detector. • Replace the controller.

4.10 Initial Operation Information

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

1. Product Name (Galaxy®)
2. Display Size (Row x Column)
3. Shading (64 Mono)
4. Bootloader Version (OS X.XX)
5. Firmware Number (**ED13305**)
6. Firmware Revision (Rev X.XX)
7. Hardware Address (HW:XX)
8. Software Address (SW:XX)
9. IP Address: (172.16.192.25)
10. Subnet Msk: (255.255.0.0)
11. COM1 Configuration (C1:V15) ((Modem C1:V15) If a Modem is present)
12. Line Frequency (CLK:60 Hz)
13. Display Name Description

4.11 Replacement Parts List

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

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

Part Description	Part Number
Controller II, 48x256, Louvered Galaxy	0A-1229-0005
Module, 1R (1:1) 16x16 (30x70), Coated, Type 2	0A-1266-2004
Module, 1A (1:1) 16x16 (30x70), Coated, Type 2	0A-1266-2005
Digital Temp Sensor	0P-1247-0007
Light Level Detector	0P-1247-0003
Filter; Air, Gasket, 7.50” x 13.50” x .88”	EN-1774
Fan; 110 CFM @120V, 60HZ, 29-24 watts	B-1006
Transformer; Pri 115V, Sec 10VCT@3A (120V Displays)	T-1119
Filter, RFI Line 10 AMP 120 VAC	Z-1007
Fan Finger Guard (for B-1006 fan)	HS-1036
Power Supply w/Harness (2, A-1620) Calibrated	0A-1289-4011
Power Supply w/Harness (1, A-1620) Calibrated	0A-1289-4012
Modem Board; 232 Coated	0P-1279-0003
Fiber Board; RS232 to Fiber, 12V	0P-1127-0024
Surge Suppression Board	0P-1146-0031
Cable; 18” RJ45; 8-Cond., Straight	0A-1229-0054
Cable; 18” RJ11; 6-Cond., Straight	0A-1137-0160
Signal Converter (RS232/RS422)	0A-1127-0237
Signal Converter (RS232/Fiber)	0A-1127-0239
Cable Assy; 20 pos Ribbon, 18”, Dual Row	W-1387
Ribbon Assy; 20 Pos, 24”	0A-1000-0016
Ribbon Assy; 20 Pos, 30”	0A-1000-0017
Ribbon Assy; 20 Pos, 36”	0A-1000-0018
Quick Connect Interface, Input	0P-1229-2001
Quick Connect Interface, Output	0P-1229-2002
10ft, RJ45; 4-pair Twisted/Black, Cat 5	W-1383
20ft, RJ45; 4-pair, Twisted, Cat 5	W-1406
Cable; 22 AWG (Light Sensor/Temp Sensor to Controller)	W-1234
Electrical Contact Cleaner Lubricant / Cal-Lube	CH-1019
Hex Wrench, T-Handle 1/8” RT	TH-1062
Manual; Venus 1500 Radio, Gen 2	**ED-13932**
Manual; Venus 1500 Operator’s, Version 3.0	**ED-13530**

4.12 Daktronics Exchange and Repair and Return Programs

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

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

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

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

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

Daktronics expects immediate return of an exchange part if it does not solve the problem. The company also reserves the right to refuse equipment that has been damaged due to acts of nature or causes other than normal wear and tear.

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

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

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

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

This is how to reach us:

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

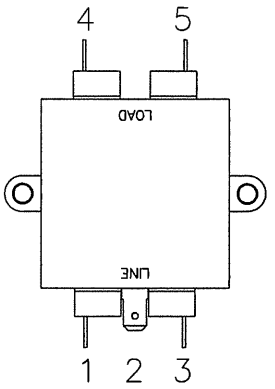
Phone: Daktronics Help Desk: 877-605-1113 (toll free)
or 605-697-4034

Fax: 605-697-4444

E-mail: helpdesk@daktronics.com

Appendix A: Reference Drawings

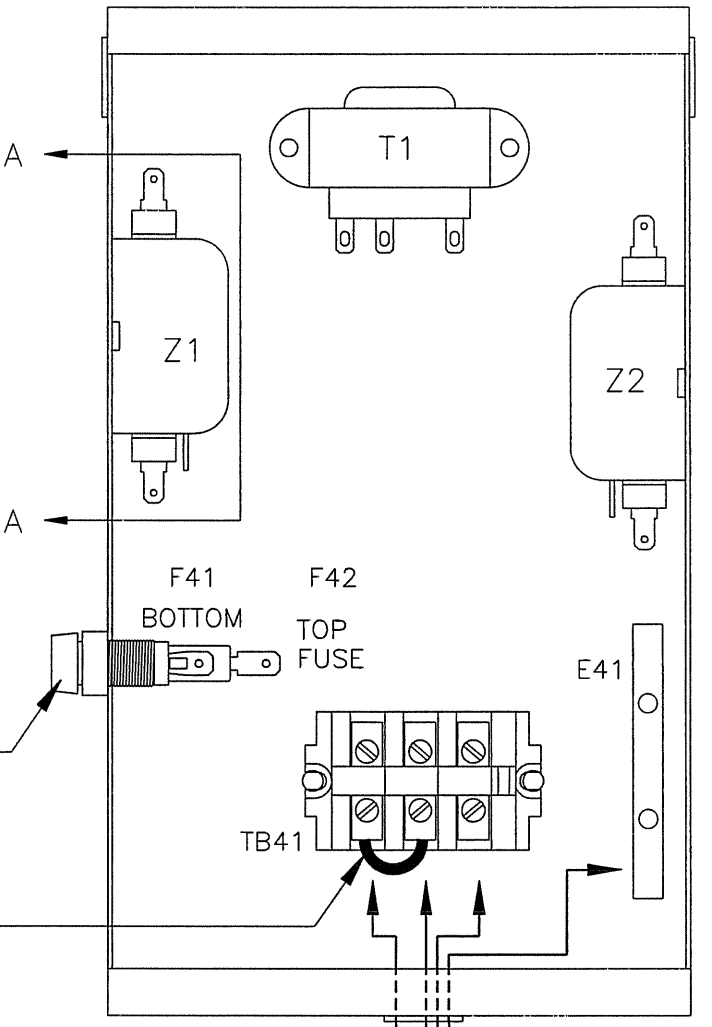
Refer to the **Section** on **How to Use This Manual** for information on reading drawing numbers. The following drawings are listed in numerical order by size (A, B, etc.).



SECTION: A–A

SCALE 1=2

Z1/Z2 PIN OUT



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

SHORTING JUMPER (REMOVE IF TWO LINES ARE TERMINATED)

120 or 240 VAC (2 Wire)
TB41–1&2 Jumpered

120/240V (3 Wire)
LINE 1
LINE 2
NEUTRAL (COMMON)
EARTH GROUND

FRONT VIEW

COVER REMOVED

FUSE REPLACEMENT INFORMATION

Voltage	Fuse Type	Daktronics part no.
120VAC	MWO–15	F–1028
120/240VAC	MWO–15	F–1028
240VAC	MDL–7	F–1031

REV.	DATE	DESCRIPTION	BY	APPR.
01	30OCT01	REPLACED E–1001 @2 WITH TB–1037.	MDM	

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: GALAXY, LOUVERED, VENUS 1500, 34MM

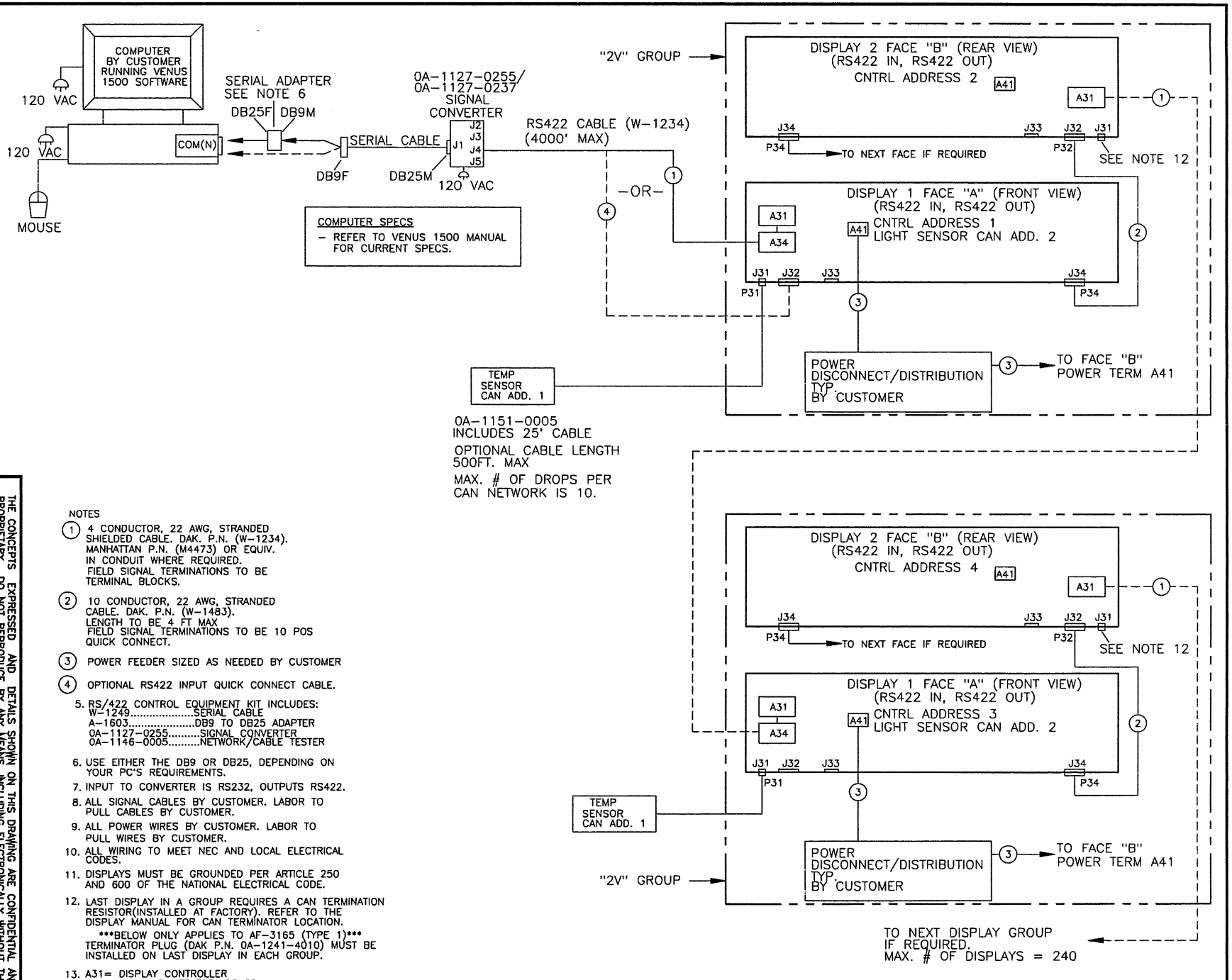
TITLE: POWER TERMINATION BOX

DES. BY: MMAMENGA DRAWN BY: KERR/WOODARD DATE: 10MAR00

REVISION APPR. BY:

SCALE: 1=2

1215-R04A-129227



REV.	DATE	DESCRIPTION	BY	APPR.
03	26 MAR 04	REPLACED 0A-1127-0237 WITH 0A-1127-0255 (INCLUDES SURGE PROTECTION)	SAI	DJM
02	26DEC03	CHANGED TEMP SENSOR PART NUMBER FROM 0A-1241-4017 TO 0A-1151-0005. REMOVED NOTE2.	DJM	
01	27JAN03	REMOVED CHART 1 (PWR, SIGNAL, SPEC). REPLACED 0A-1241-4016 WITH W-1483. ADDED TO TERM PLUG NOTE.	DJM	

NOTES

1. 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 TERMINAL BLOCKS.
2. 10 CONDUCTOR, 22 AWG, STRANDED CABLE. DAK. P.N. (W-1483). LENGTH TO BE 4 FT MAX FIELD SIGNAL TERMINATIONS TO BE 10 POS QUICK CONNECT.
3. POWER FEEDER SIZED AS NEEDED BY CUSTOMER
4. OPTIONAL RS422 INPUT QUICK CONNECT CABLE.
5. RS/422 CONTROL EQUIPMENT KIT INCLUDES:
   W-1249.....SERIAL CABLE
   A-1603.....DB9 TO DB25 ADAPTER
   0A-1127-0255.....SIGNAL CONVERTER
   0A-1146-0005.....NETWORK/CABLE TESTER
6. USE EITHER THE DB9 OR DB25, DEPENDING ON YOUR PC'S REQUIREMENTS.
7. INPUT TO CONVERTER IS RS232, OUTPUTS RS422.
8. ALL SIGNAL CABLES BY CUSTOMER. LABOR TO PULL CABLES BY CUSTOMER.
9. ALL POWER WIRES BY CUSTOMER. LABOR TO PULL WIRES BY CUSTOMER.
10. ALL WIRING TO MEET NEC AND LOCAL ELECTRICAL CODES.
11. DISPLAYS MUST BE GROUNDED PER ARTICLE 250 AND 600 OF THE NATIONAL ELECTRICAL CODE.
12. LAST DISPLAY IN A GROUP REQUIRES A CAN TERMINATION RESISTOR(INSTALLED AT FACTORY). REFER TO THE DISPLAY MANUAL FOR CAN TERMINATOR LOCATION.
    BELOW ONLY APPLIES TO AF-3165 (TYPE 1) TERMINATOR PLUG (DAK P.N. 0A-1241-4010) MUST BE INSTALLED ON LAST DISPLAY IN EACH GROUP.
13. A31= DISPLAY CONTROLLER
    A34= SURGE PROTECTOR, RS422

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: OUTDOOR LED PRODUCT LINE

TITLE: SYSTEM RISER DIAGRAM, RS422

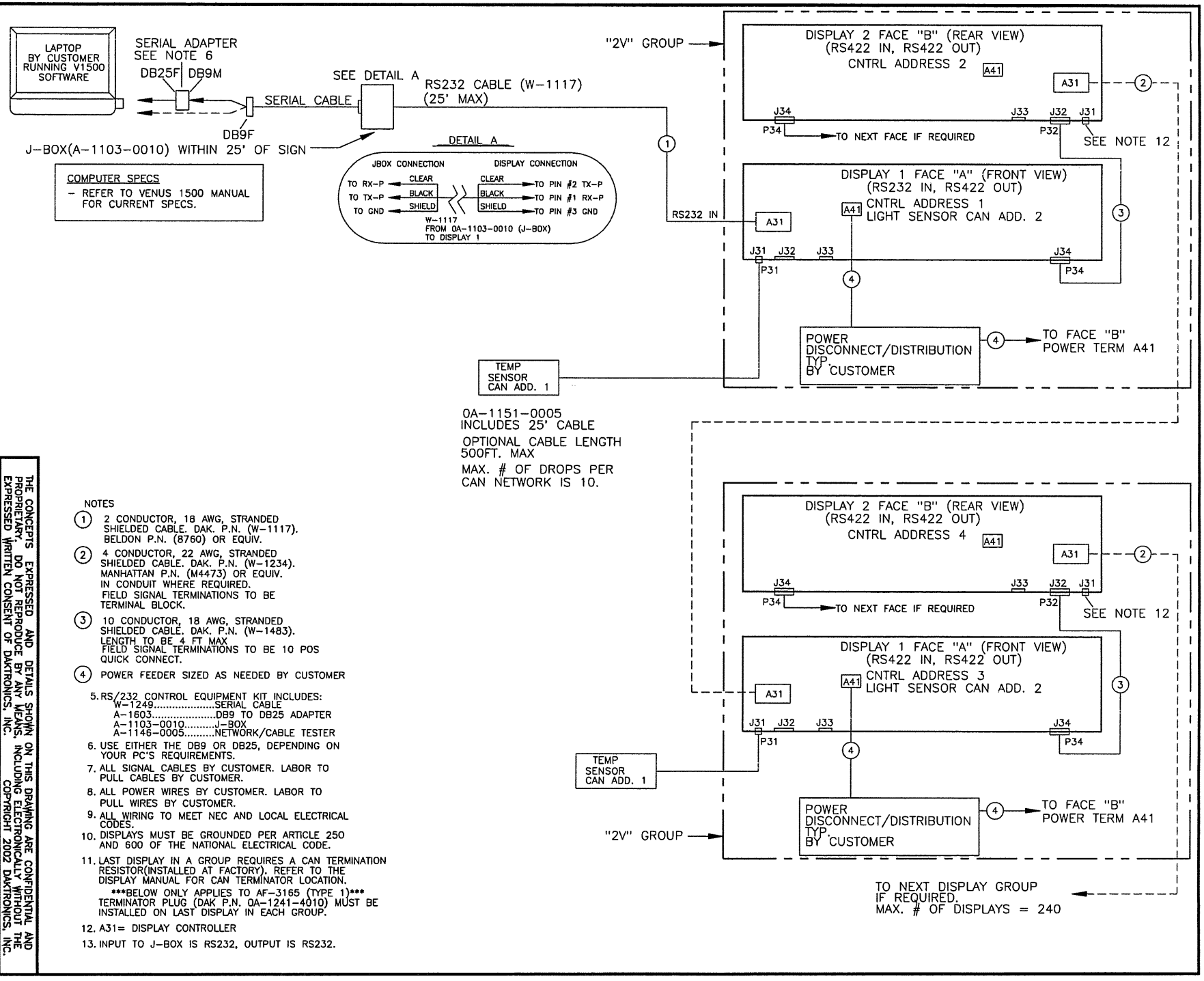
DES. BY: DRAWN BY: LKERR DATE: 22AUG02

APPR. BY:

SCALE: NONE

REVISION 03

1229-R01A-174135



NOTES

1. 2 CONDUCTOR, 18 AWG, STRANDED SHIELDED CABLE. DAK. P.N. (W-1117). BELDON P.N. (8760) OR EQUIV.
2. 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 TERMINAL BLOCK.
3. 10 CONDUCTOR, 18 AWG, STRANDED SHIELDED CABLE. DAK. P.N. (W-1483). LENGTH TO BE 4 FT MAX FIELD SIGNAL TERMINATIONS TO BE 10 POS QUICK CONNECT.
4. POWER FEEDER SIZED AS NEEDED BY CUSTOMER
5. 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
6. USE EITHER THE DB9 OR DB25, DEPENDING ON YOUR PC'S REQUIREMENTS.
7. ALL SIGNAL CABLES BY CUSTOMER. LABOR TO PULL CABLES BY CUSTOMER.
8. ALL POWER WIRES BY CUSTOMER. LABOR TO PULL WIRES BY CUSTOMER.
9. ALL WIRING TO MEET NEC AND LOCAL ELECTRICAL CODES.
10. DISPLAYS MUST BE GROUNDED PER ARTICLE 250 AND 600 OF THE NATIONAL ELECTRICAL CODE.
11. LAST DISPLAY IN A GROUP REQUIRES A CAN TERMINATION RESISTOR(INSTALLED AT FACTORY). REFER TO THE DISPLAY MANUAL FOR CAN TERMINATOR LOCATION.
    BELOW ONLY APPLIES TO AF-3165 (TYPE 1)
    TERMINATOR PLUG (DAK P.N. 0A-1241-4010) MUST BE INSTALLED ON LAST DISPLAY IN EACH GROUP.
12. A31= DISPLAY CONTROLLER
13. INPUT TO J-BOX IS RS232, OUTPUT IS RS232.

REV.	DATE	DESCRIPTION	BY	APPR.
02	26DEC03	CHANGED TEMP SENSOR PART NUMBER FROM 0A-1241-4017 TO 0A-1151-0005. REMOVED NOTE 3 AND 6.	DJM	
01	27JAN03	REMOVED CHART 1 (PWR, SIGNAL, SPEC). REPLACED 0A-1241-4016 WITH W-1483. ADDED TO TERM PLUG NOTE.	DJM	

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: OUTDOOR LED PRODUCT LINE

TITLE: SYSTEM RISER DIAGRAM, RS232

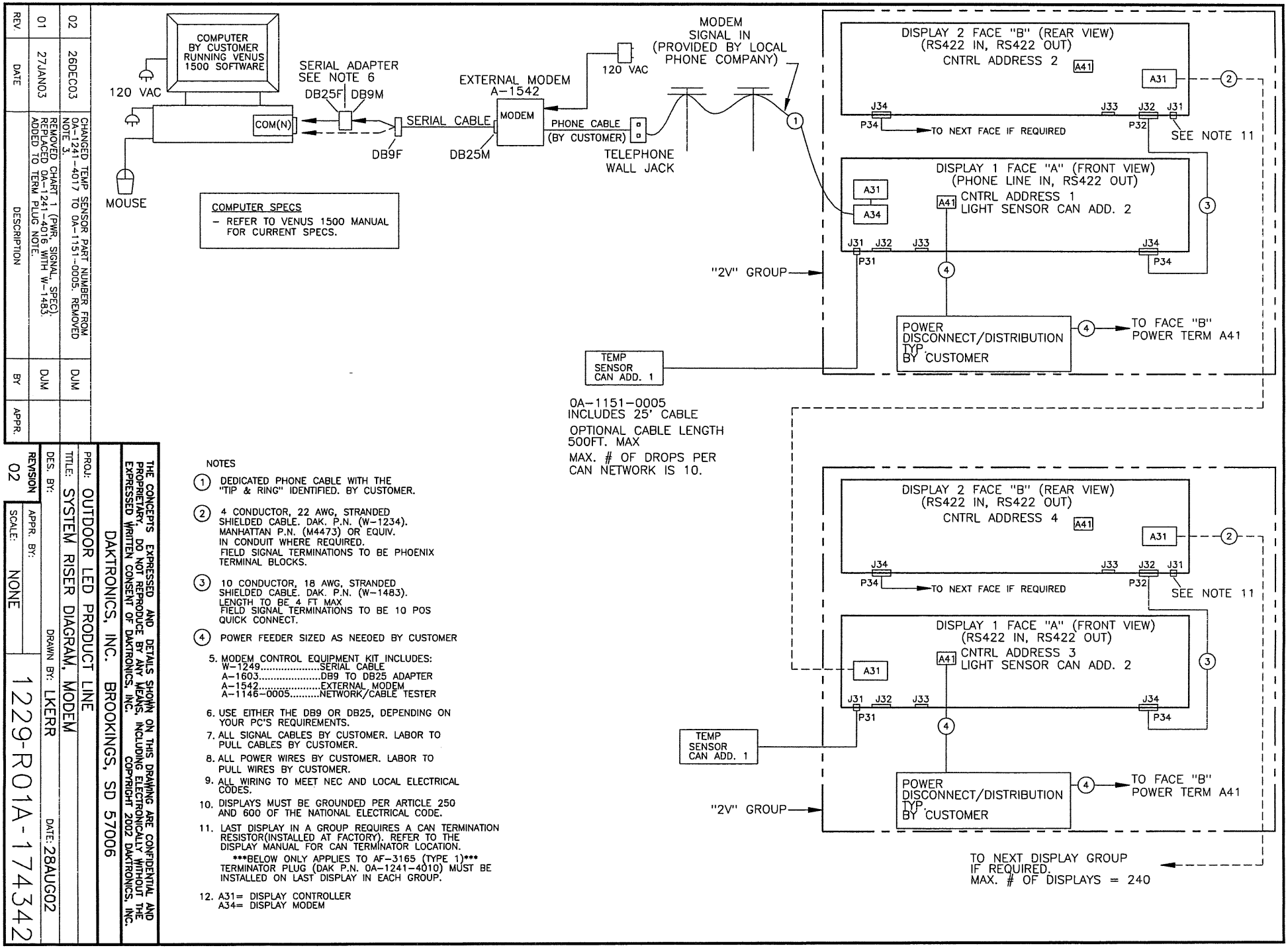
DES. BY: DRAWN BY: LKERR DATE: 28AUG02

REVISION 02

APPR. BY:

SCALE: NONE

1229-R01A-17434 1



REV.	DATE	DESCRIPTION	BY	APPR.
02	26DEC03	CHANGED TEMP SENSOR PART NUMBER FROM 0A-1241-4017 TO 0A-1151-0005. REMOVED NOTE 3.	DJM	
01	27JAN03	REMOVED CHART 1 (PWR. SIGNAL. SPEC). REPLACED 0A-1241-4016 WITH W-1483. ADDED TO TERM PLUG NOTE.	DJM	

NOTES

(1) DEDICATED PHONE CABLE WITH THE "TIP & RING" IDENTIFIED. BY CUSTOMER.

(2) 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.

(3) 10 CONDUCTOR, 18 AWG, STRANDED SHIELDED CABLE. DAK. P.N. (W-1483). LENGTH TO BE 4 FT MAX FIELD SIGNAL TERMINATIONS TO BE 10 POS QUICK CONNECT.

(4) POWER FEEDER SIZED AS NEEOED BY CUSTOMER

5. 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
6. USE EITHER THE DB9 OR DB25, DEPENDING ON YOUR PC'S REQUIREMENTS.
7. ALL SIGNAL CABLES BY CUSTOMER. LABOR TO PULL CABLES BY CUSTOMER.
8. ALL POWER WIRES BY CUSTOMER. LABOR TO PULL WIRES BY CUSTOMER.
9. ALL WIRING TO MEET NEC AND LOCAL ELECTRICAL CODES.
10. DISPLAYS MUST BE GROUNDED PER ARTICLE 250 AND 600 OF THE NATIONAL ELECTRICAL CODE.
11. LAST DISPLAY IN A GROUP REQUIRES A CAN TERMINATION RESISTOR(INSTALLED AT FACTORY). REFER TO THE DISPLAY MANUAL FOR CAN TERMINATOR LOCATION.
    BELOW ONLY APPLIES TO AF-3165 (TYPE 1)
    TERMINATOR PLUG (DAK P.N. 0A-1241-4010) MUST BE INSTALLED ON LAST DISPLAY IN EACH GROUP.
12. A31= DISPLAY CONTROLLER
    A34= DISPLAY MODEM

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: OUTDOOR LED PRODUCT LINE

TITLE: SYSTEM RISER DIAGRAM, MODEM

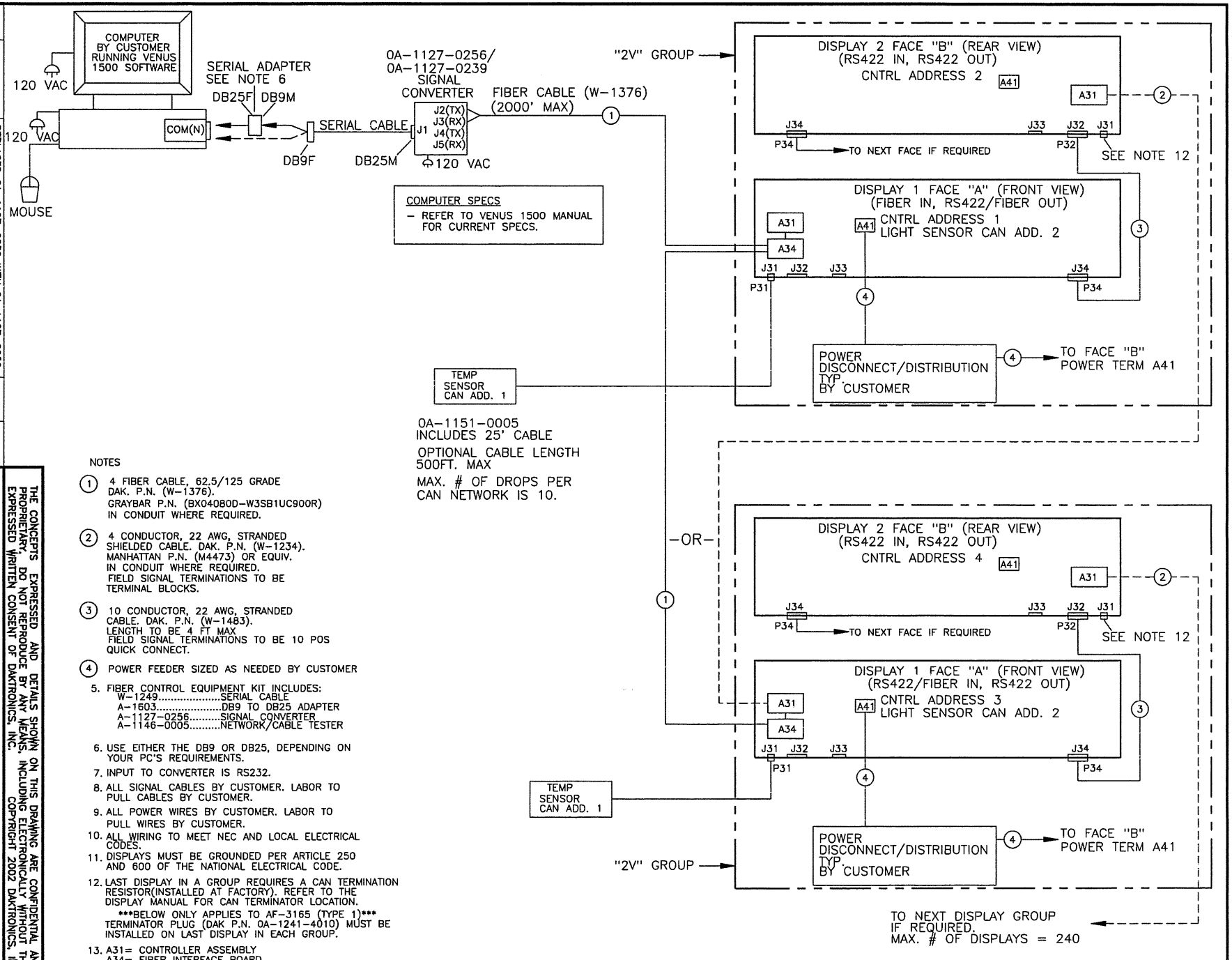
DES. BY: DRAWN BY: LKERR DATE: 28AUG02

APPR. BY:

SCALE: NONE

REVISION 02

1229-R01A-174342



REV.	DATE	DESCRIPTION	BY	APPR.
03	26 MAR 04	REPLACED 0A-1127-0239 WITH 0A-1127-0256 (INCLUDES SURGE PROTECTION)	SAI	DJM
02	26DEC03	CHANGED TEMP SENSOR PART NUMBER FROM 0A-1241-4017 TO 0A-1151-0005. REMOVED NOTE 3.	DJM	
01	27JAN03	REMOVED CHART 1 (PWR. SIGNAL. SPEC). REPLACED 0A-1241-4016 WITH W-1483. ADDED TO TERM. PLUG NOTE.	DJM	

NOTES

1. 4 FIBER CABLE, 62.5/125 GRADE DAK. P.N. (W-1376). GRAYBAR P.N. (BX04080D-W3SB1UC900R) IN CONDUIT WHERE REQUIRED.
2. 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 TERMINAL BLOCKS.
3. 10 CONDUCTOR, 22 AWG, STRANDED CABLE. DAK. P.N. (W-1483). LENGTH TO BE 4 FT MAX FIELD SIGNAL TERMINATIONS TO BE 10 POS QUICK CONNECT.
4. POWER FEEDER SIZED AS NEEDED BY CUSTOMER
5. FIBER CONTROL EQUIPMENT KIT INCLUDES:
   W-1249.....SERIAL CABLE
   A-1603.....DB9 TO DB25 ADAPTER
   A-1127-0256.....SIGNAL CONVERTER
   A-1146-0005.....NETWORK/CABLE TESTER
6. USE EITHER THE DB9 OR DB25, DEPENDING ON YOUR PC'S REQUIREMENTS.
7. INPUT TO CONVERTER IS RS232.
8. ALL SIGNAL CABLES BY CUSTOMER. LABOR TO PULL CABLES BY CUSTOMER.
9. ALL POWER WIRES BY CUSTOMER. LABOR TO PULL WIRES BY CUSTOMER.
10. ALL WIRING TO MEET NEC AND LOCAL ELECTRICAL CODES.
11. DISPLAYS MUST BE GROUNDED PER ARTICLE 250 AND 600 OF THE NATIONAL ELECTRICAL CODE.
12. LAST DISPLAY IN A GROUP REQUIRES A CAN TERMINATION RESISTOR(INSTALLED AT FACTORY). REFER TO THE DISPLAY MANUAL FOR CAN TERMINATOR LOCATION.
    BELOW ONLY APPLIES TO AF-3165 (TYPE 1) TERMINATOR PLUG (DAK P.N. 0A-1241-4010) MUST BE INSTALLED ON LAST DISPLAY IN EACH GROUP.
13. A31= CONTROLLER ASSEMBLY
    A34= FIBER INTERFACE BOARD

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: OUTDOOR LED PRODUCT LINE

TITLE: SYSTEM RISER DIAGRAM, FIBER

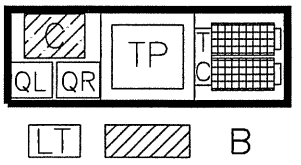
DES. BY: DRAWN BY: LKERR DATE: 06SEP02

APPR. BY:

SCALE: NONE

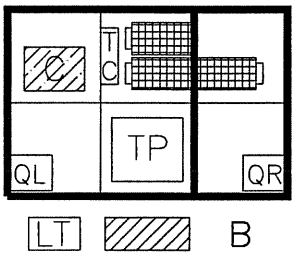
REVISION 03

1229-R01A-17434



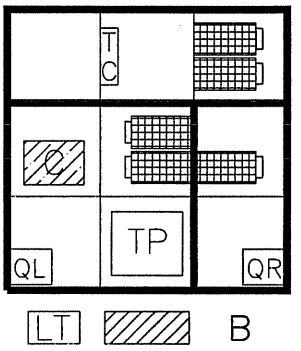
FRONT VIEW

AF-315*-1648-20MM



FRONT VIEW

AF-315*-3248-20MM



FRONT VIEW

AF-315*-4848-20MM

NOTE:
VERTICAL ORIENTATIONS
SHOWN ABOVE FRONT VIEW.

REV.	DATE	DESCRIPTION	BY	APPR.
01	24FEB03	UPDATED LABELS AND TITLE FROM 3150 SPECIFIC TO 315* SPECIFIC.	EJY	

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: GALAXY, AF-315*, 20MM

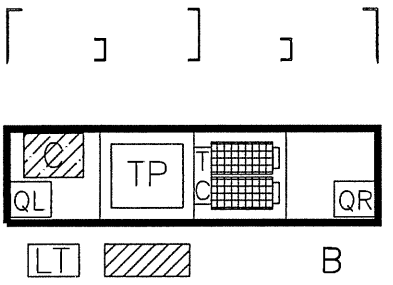
TITLE: COMP. LAYOUT, AF-315*-16/32/48X48-20MM-G2

DES. BY: WTUCKER DRAWN BY: RVOSS DATE: 03 JAN 03

REVISION APPR. BY:

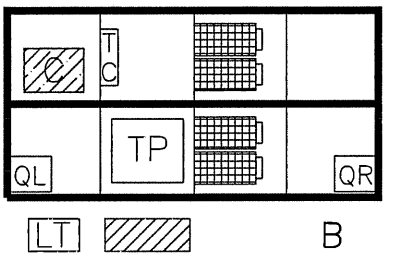
SCALE: 1=25

1289-E10A-178259



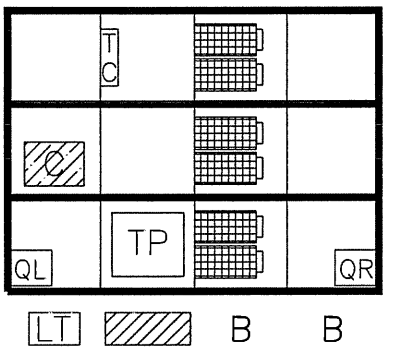
FRONT VIEW

AF-315*-1664-20MM



FRONT VIEW

AF-315*-3264-20MM



FRONT VIEW

AF-315*-4864-20MM

NOTE:
VERTICAL ORIENTATIONS
SHOWN ABOVE FRONT VIEW.

REV.	DATE	DESCRIPTION	BY	APPR.
01	24FEB03	UPDATED LABELS AND TITLE FROM 3150 SPECIFIC TO 315* SPECIFIC.	EJY	

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: GALAXY, AF-315*, 20MM

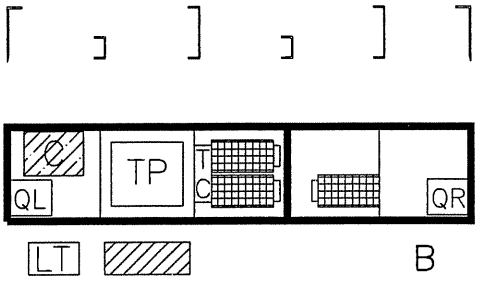
TITLE: COMP. LAYOUT, AF-315*-16/32/48X64-20MM-G2

DES. BY: WTUCKER DRAWN BY: RVOSS DATE: 03 JAN 03

REVISION APPR. BY:

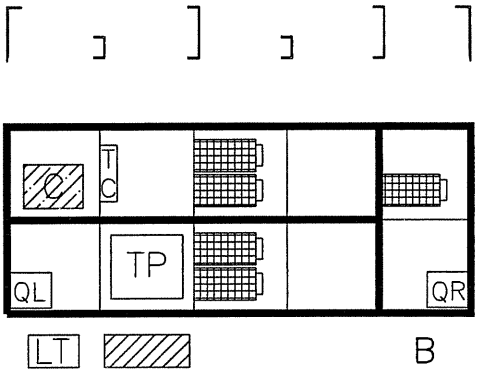
SCALE: 1=25

1289-E10A-178261



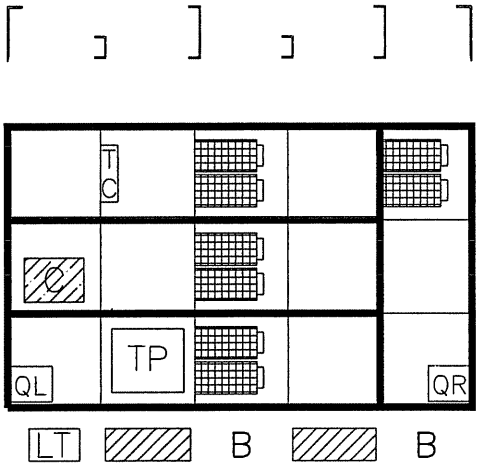
FRONT VIEW

AF-315*-1680-20MM



FRONT VIEW

AF-315*-3280-20MM



FRONT VIEW

AF-315*-4880-20MM

NOTE:
VERTICAL ORIENTATIONS
SHOWN ABOVE FRONT VIEW.

REV.	DATE	DESCRIPTION	BY	APPR.
01	24FEB03	UPDATED LABELS AND TITLE FROM 3150 SPECIFIC TO 315* SPECIFIC.	EJY	

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: GALAXY, AF-315*, 20MM

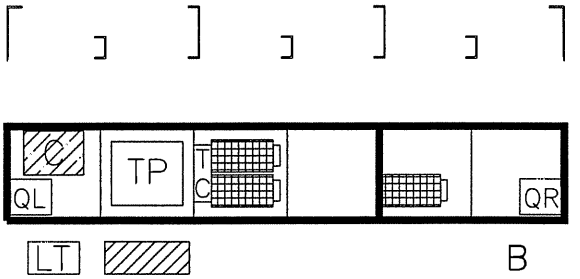
TITLE: COMP. LAYOUT, AF-315*-16/32/48X80-20MM-G2

DES. BY: WTUCKER DRAWN BY: RVOSS DATE: 03 JAN 03

REVISION APPR. BY:

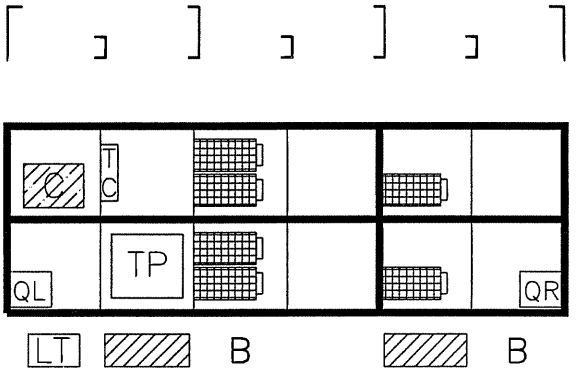
SCALE: 1=25

1289-E10A-178262



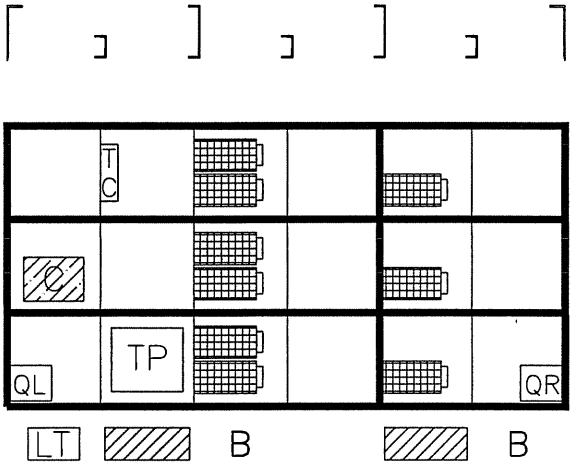
FRONT VIEW

AF-315*-1696-20MM



FRONT VIEW

AF-315*-3296-20MM



FRONT VIEW

AF-315*-4896-20MM

NOTE:
VERTICAL ORIENTATIONS
SHOWN ABOVE FRONT VIEW.

REV.	DATE	DESCRIPTION	BY	APPR.
01	24FEB03	UPDATED LABELS AND TITLE FROM 3150 SPECIFIC TO 315* SPECIFIC.	EJY	

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: GALAXY, AF-315*, 20MM

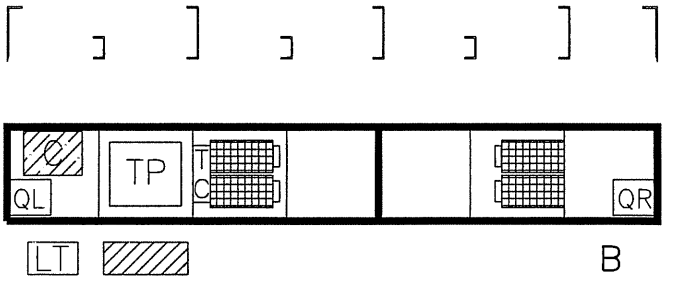
TITLE: COMP. LAYOUT, AF-315*-16/32/48X96-20MM-G2

DES. BY: WTUCKER DRAWN BY: RVOSS DATE: 03 JAN 03

REVISION APPR. BY:

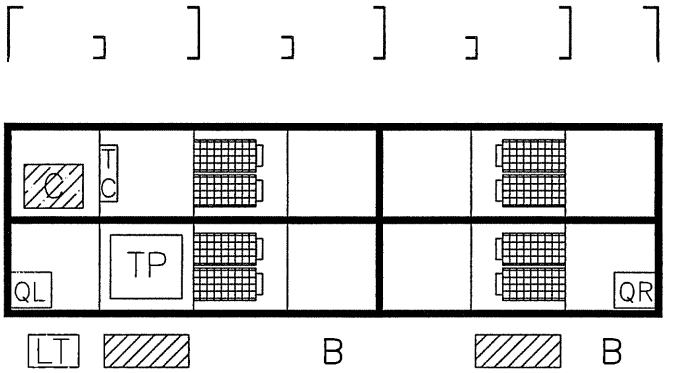
SCALE: 1=25

1289-E10A-178263



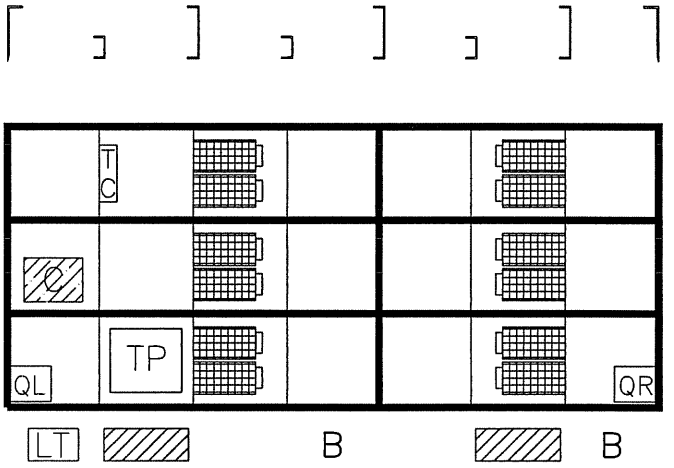
FRONT VIEW

AF-315*-16112-20MM



FRONT VIEW

AF-315*-32112-20MM



FRONT VIEW

AF-315*-48112-20MM

NOTE:
VERTICAL ORIENTATIONS
SHOWN ABOVE FRONT VIEW.

REV.	DATE	DESCRIPTION	BY	APPR.
01	24FEB03	UPDATED LABELS AND TITLE FROM 3150 SPECIFIC TO 315* SPECIFIC.	EJY	

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: GALAXY, AF-315*, 20MM

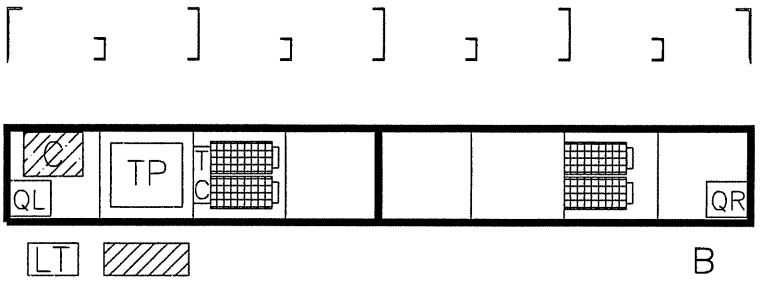
TITLE: COMP. LAYOUT, AF-315*-16/32/48X112-20MM-G2

DES. BY: WTUCKER DRAWN BY: RVOSS DATE: 03 JAN 03

REVISION APPR. BY:

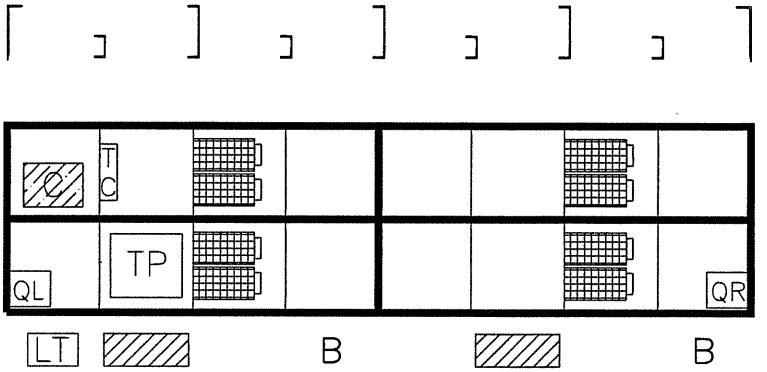
SCALE: 1=25

1289-E10A-178264



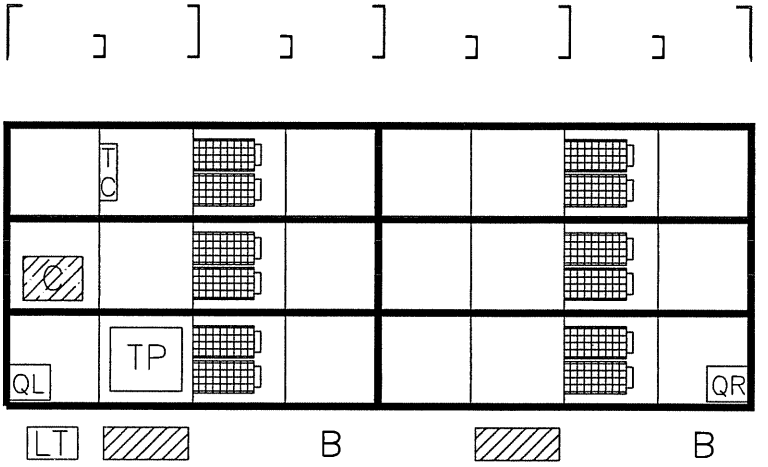
FRONT VIEW

AF-315*-16128-20MM



FRONT VIEW

AF-315*-32128-20MM



FRONT VIEW

AF-315*-48128-20MM

NOTE:
VERTICAL ORIENTATIONS
SHOWN ABOVE FRONT VIEW.

REV.	DATE	DESCRIPTION	BY	APPR.
01	24FEB03	UPDATED LABELS AND TITLE FROM 3150 SPECIFIC TO 315* SPECIFIC.	EJY	

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: GALAXY, AF-315*, 20MM

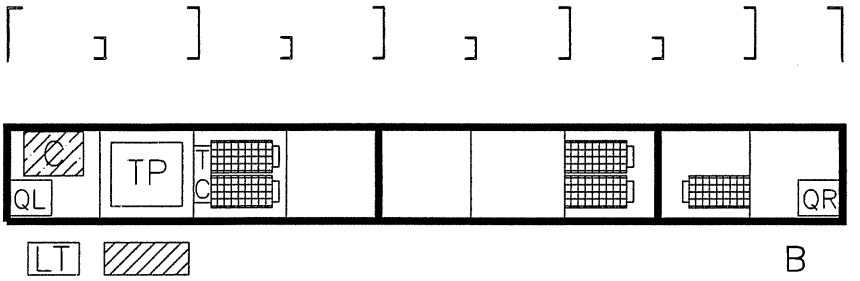
TITLE: COMP. LAYOUT, AF-315*-16/32/48X128-20MM-G2

DES. BY: WTUCKER DRAWN BY: RVOSS DATE: 03 JAN 03

REVISION APPR. BY:

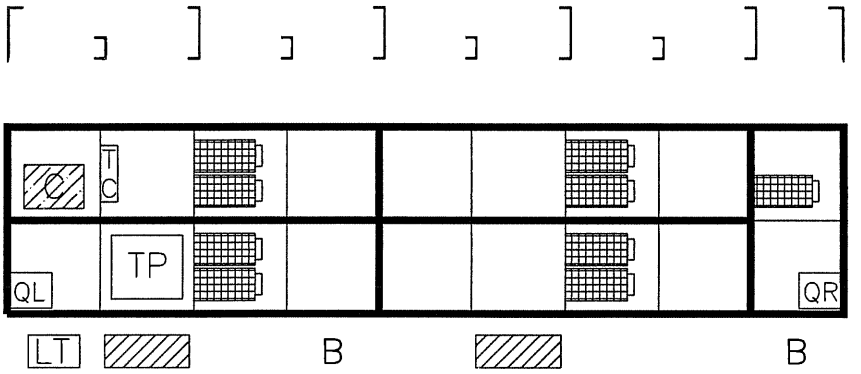
SCALE: 1=25

1289-E10A-178265



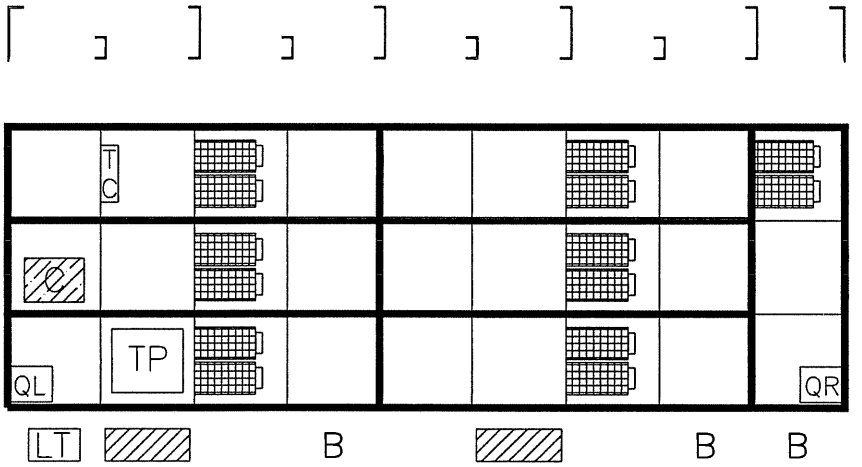
FRONT VIEW

AF-315*-16144-20MM



FRONT VIEW

AF-315*-32144-20MM



FRONT VIEW

AF-315*-48144-20MM

NOTE:
VERTICAL ORIENTATIONS
SHOWN ABOVE FRONT VIEW.

REV.	DATE	DESCRIPTION	BY	APPR.
01	24FEB03	UPDATED LABELS AND TITLE FROM 3150 SPECIFIC TO 315* SPECIFIC.	EJY	

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: GALAXY, AF-315*,20MM

TITLE: COMP. LAYOUT, AF-315*-16/32/48X144-20MM-G2

DES. BY: WTUCKER DRAWN BY: RVOSS DATE: 03 JAN 03

REVISION APPR. BY:

SCALE: 1=25

1289-E10A-178266

TP	POWER TERMINATION BOX 0A-1289-4005
LT	LIGHT DETECTOR 0A-1241-4013 (MASTER) 0A-1213-4009 (SLAVE)
QR	QUICK CONNECT PANEL (RIGHT SIDE) 0P-1229-2002
QL	QUICK CONNECT PANEL (LEFT SIDE) 0P-1229-2001
	MODULE 12.48" X 12.48" 16 PIXEL X 16 PIXEL 20mm C-C / 0.78" C-C

POWER SUPPLY CONFIGURATIONS	0A-1289-4012 (A-1620@2) OR 0A-1289-4014 (A-1577@2)
	CONTROLLER 0A-1229-0005
	AIR FILTER EN-1774

POWER SUPPLY CONFIGURATIONS	0A-1289-4011 (A-1620@1) OR 0A-1289-4013 (A-1577@1)
T	THERMOSTAT 0A-1213-4024
B	FAN 0A-1213-4014 B-1006 W/ HARDWARE

DARKER GRID LINES REPRESENT A GROUPING OF MODULES
THAT ARE POWERED BY A GROUPING OF POWER SUPPLIES.
ABOVE EXAMPLES SHOW GROUPING POSSIBILITIES.

REV.	DATE	DESCRIPTION	BY	APPR.
01	24FEB03	UPDATED POWER SUPPLY OPTION TO ACCOMMODATE RGB DISPALYS.	EJY	

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: GALAXY, AF-315*, 20MM

TITLE: SYMBOLS, AF-315* COMPONENT LAYOUT

DES. BY: MMAMMENGA DRAWN BY: RVOSS DATE: 03 JAN 03

REVISION 01 | APPR. BY: | SCALE: 1=30

1289-E10A-179505

20mm LOUVERED MONOCHROME GALAXY DISPLAYS
POWER SPECIFICATION CHART

MATRIX SIZE	TOTAL WATTS	120V AMPS	120/240 3, wire LINE 1 AMPS	120/240 3, wire LINE 2 AMPS	240V AMPS
16X48	137	1.14	120/240 VAC IS NOT		0.57
16X64	170	1.42	AVAILABLE FOR SIZE		0.71
16X80	203	1.69	1.14	0.55	0.85
16X96	236	1.96	1.42	0.55	0.98
16X112	268	2.24	1.42	0.82	1.12
16X128	301	2.51	1.42	1.09	1.25
16X144	334	2.78	1.42	1.36	1.39
32X48	236	1.96	1.09	0.87	0.98
32X64	301	2.51	1.09	1.42	1.25
32X80	367	3.05	1.09	1.96	1.53
32X96	456	3.80	2.18	1.62	1.90
32X112	522	4.35	2.18	2.16	2.17
32X128	587	4.89	2.18	2.71	2.45
32X144	653	5.44	2.18	3.26	2.72
48X48	334	2.78	1.09	1.69	1.39
48X64	456	3.80	1.09	2.71	1.90
48X80	554	4.62	2.18	2.44	2.31
48X96	653	5.44	3.27	2.16	2.72
48X112	751	6.26	3.27	2.98	3.13
48X128	849	7.08	3.27	3.80	3.54
48X144	971	8.10	3.27	4.82	4.05
48X160	1070	8.91	4.91	4.00	4.46
64x176	1528	12.73	8.37	4.37	6.37
80X112	1281	10.67	5.46	4.82	5.34

THE ABOVE DISPLAY SIZES CAN BE POWERED BY EITHER 120VAC (2 WIRE + GND), 120/240 (3 WIRE + GND) OR 240VAC (2 WIRE + GND) SERVICES (EXCEPT WHERE NOTED).

REV.	DATE	DESCRIPTION	BY	APPR.
03	18DEC03	ADDED 64X176	LLK	LLK
02	16OCT03	ADDED 80X112	LLK	LLK
01	07MAY03	ADDED 48X160	LLK	LLK

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: GALAXY, LOUVERED, VENUS 1500, 20MM, AF-3150

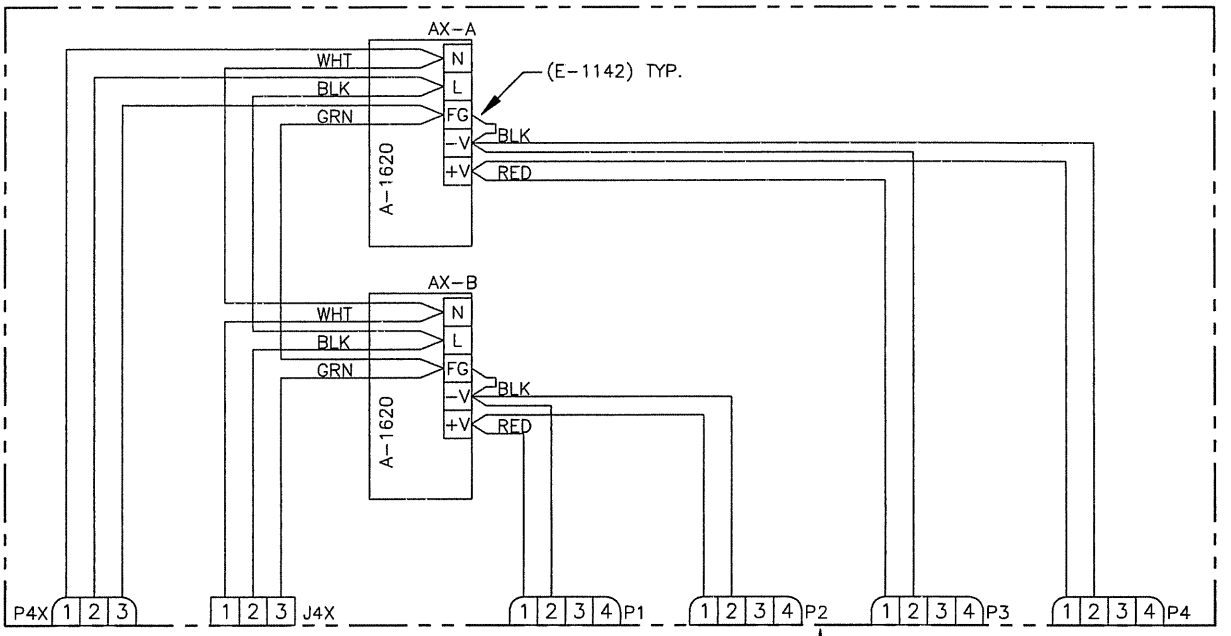
TITLE: POWER SPECS, 16X144-48X160/80X112 DISPLAYS

DES. BY: DRAWN BY: DMATHERN DATE: 17 DEC 02

REVISION 03 | APPR. BY: | SCALE: 1=1

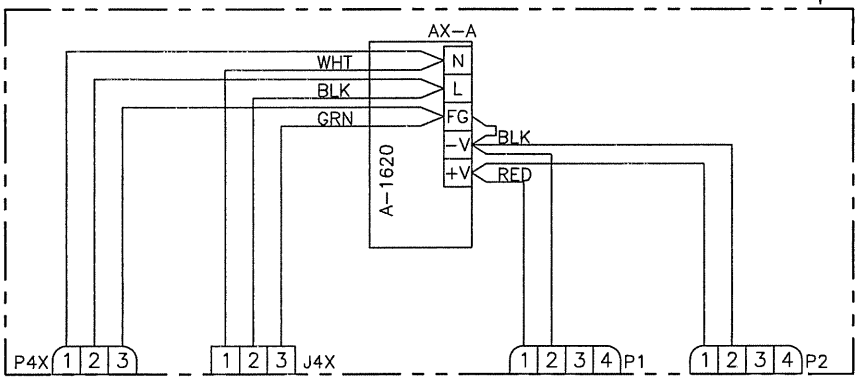
1289-R10A-180190

DUAL 3.6VDC VERSION (MONO RED OR AMB)
0A-1289-4012
(SET POWER SUPPLIES TO 3.6VDC)



BE CERTAIN ALL TERMINALS ON POWER SUPPLY ARE TIGHTENED.

SINGLE 3.6VDC VERSION (MONO RED OR AMB)
0A-1289-4011
(SET POWER SUPPLY TO 3.6VDC)



NOTES

1) ALL WIRE IS 14 AWG EXCEPT * IS 18 AWG UNLESS OTHERWISE NOTED.
2) REFER TO ASSEMBLY PACKET FOR WIRE ROUTING COMING OFF OF POWER SUPPLIES.

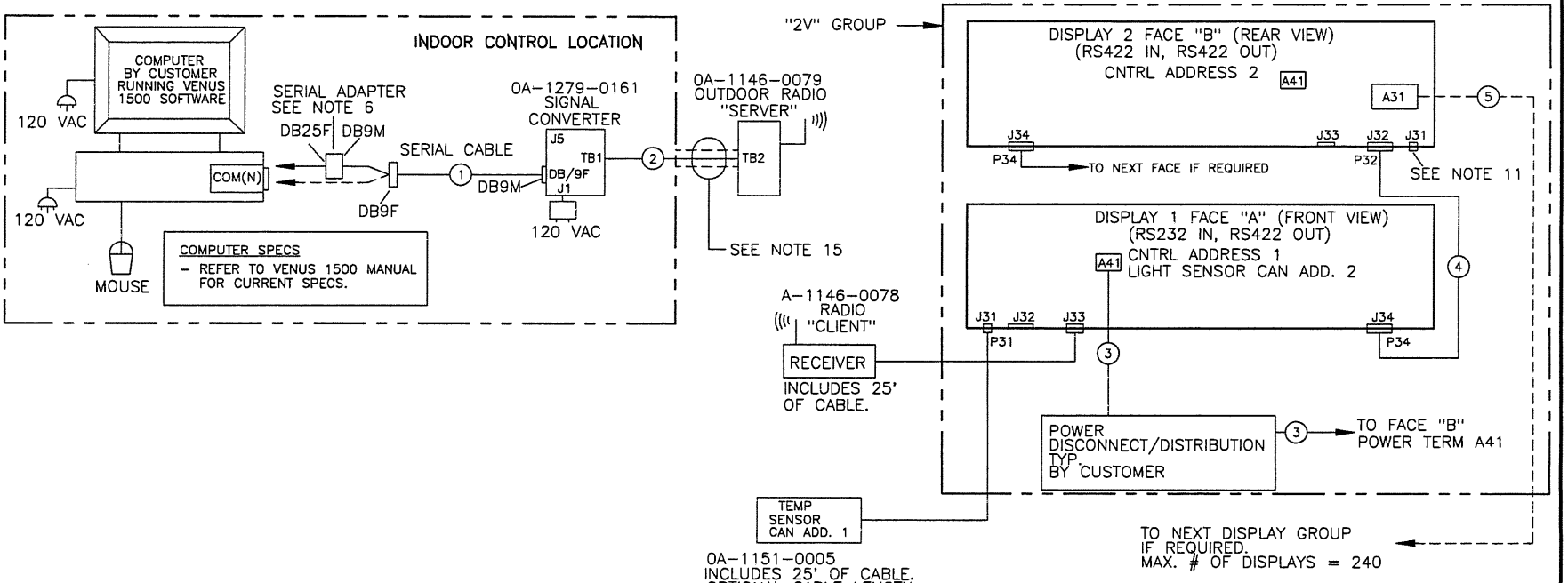
REV.	DATE	DESCRIPTION	BY	APPR.
02	17MAR03	CORRECTED TERMINAL BLOCK ON POWER SUPPLY. MADE MODULE HARNESS INTO ONE.	DJM	
01	13JAN03	CHANGED TWO PIN MATE-N-LOCKS TO FOUR PINS. CHANGED J41 & P41 TO J4X & P4X.	DJM	

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: GALAXY; LOUVERED, 20MM
TITLE: SCHEMATIC; POWER SUPPLY CONFIGURATIONS
DES. BY: LKERR DRAWN BY: DMATHERN DATE: 18 DEC 02
REVISION APPR. BY:
SCALE: 1=1

1289-R03A-180225

REV.	DATE	DESCRIPTION	BY	APPR.
02	26DEC03	CHANGED TEMP SENSOR PART NUMBER FROM 0A-1241-4017 TO 0A-1151-0005.	DJM	
01	25JUN03	REVISED NOTE 2 FROM W-1210 22 AWG TO W-1370 18 AWG. ADDED MAX LENGTH OF W-1370 TO 1000'.	KAP	



NOTES

1. DB9F TO DB9M SERIAL CABLE DAK. P.N. (W-1267)
2. 6 CONDUCTOR, 18 AWG, STRANDED SHIELDED CABLE. DAK. P.N (W-1370). 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, TO A MAXIMUM OF 1000'.
3. POWER FEEDER SIZED AS NEEDED BY CUSTOMER
4. 10 CONDUCTOR, 18 AWG, STRANDED SHIELDED CABLE. DAK. P.N. (W-1483). LENGTH TO BE 4 FT MAX FIELD SIGNAL TERMINATIONS TO BE 10 POS QUICK CONNECT. SUPPLIED WITH FACE "B".
5. 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 TERMINAL BLOCK.
6. USE EITHER THE DB9 OR DB25, DEPENDING ON YOUR PC'S REQUIREMENTS. DAK. P.N. (A-1603)
7. ALL SIGNAL CABLES BY CUSTOMER. LABOR TO PULL CABLES BY CUSTOMER.
8. ALL POWER WIRES BY CUSTOMER. LABOR TO PULL WIRES BY CUSTOMER.
9. ALL WIRING TO MEET NEC AND LOCAL ELECTRICAL CODES.
10. DISPLAYS MUST BE GROUNDED PER ARTICLE 250 AND 600 OF THE NATIONAL ELECTRICAL CODE.
11. LAST DISPLAY IN A GROUP REQUIRES A CAN TERMINATION RESISTOR(INSTALLED AT FACTORY). REFER TO THE DISPLAY MANUAL FOR CAN TERMINATOR LOCATION.
    BELOW ONLY APPLIES TO AF-3165 (TYPE 1) TERMINATOR PLUG (DAK P.N. 0A-1241-4010) MUST BE INSTALLED ON LAST DISPLAY IN EACH GROUP.
12. A31= DISPLAY CONTROLLER
    A41= POWER TERMINATION PANEL
13. **SERVER AND CLIENT(S) MUST BE SET TO SAME CHANNEL. (VIA SOFTWARE OR ON-BOARD SWITCHES) ALL CLIENT DISPLAYS MUST HAVE A UNIQUE ADDRESS. TOTAL SYSTEM CANNOT EXCEED 240 DISPLAYS.**
14. **IN AREAS USING MULTIPLE SERVER/CLIENT SYSTEMS WITHIN CLOSE PROXIMITY OF EACH OTHER, ALTERNATE CHANNELS MUST BE USED, TO AVOID INTERFERENCE BETWEEN SYSTEMS.**
15. CABLE TO BE IN CONDUIT WHERE EXPOSED TO OUTDOOR ELEMENTS.

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: OUTDOOR LED PRODUCT LINE

TITLE: SYSTEM RISER DIAGRAM, QC OUTDOOR RADIO, GEN 2

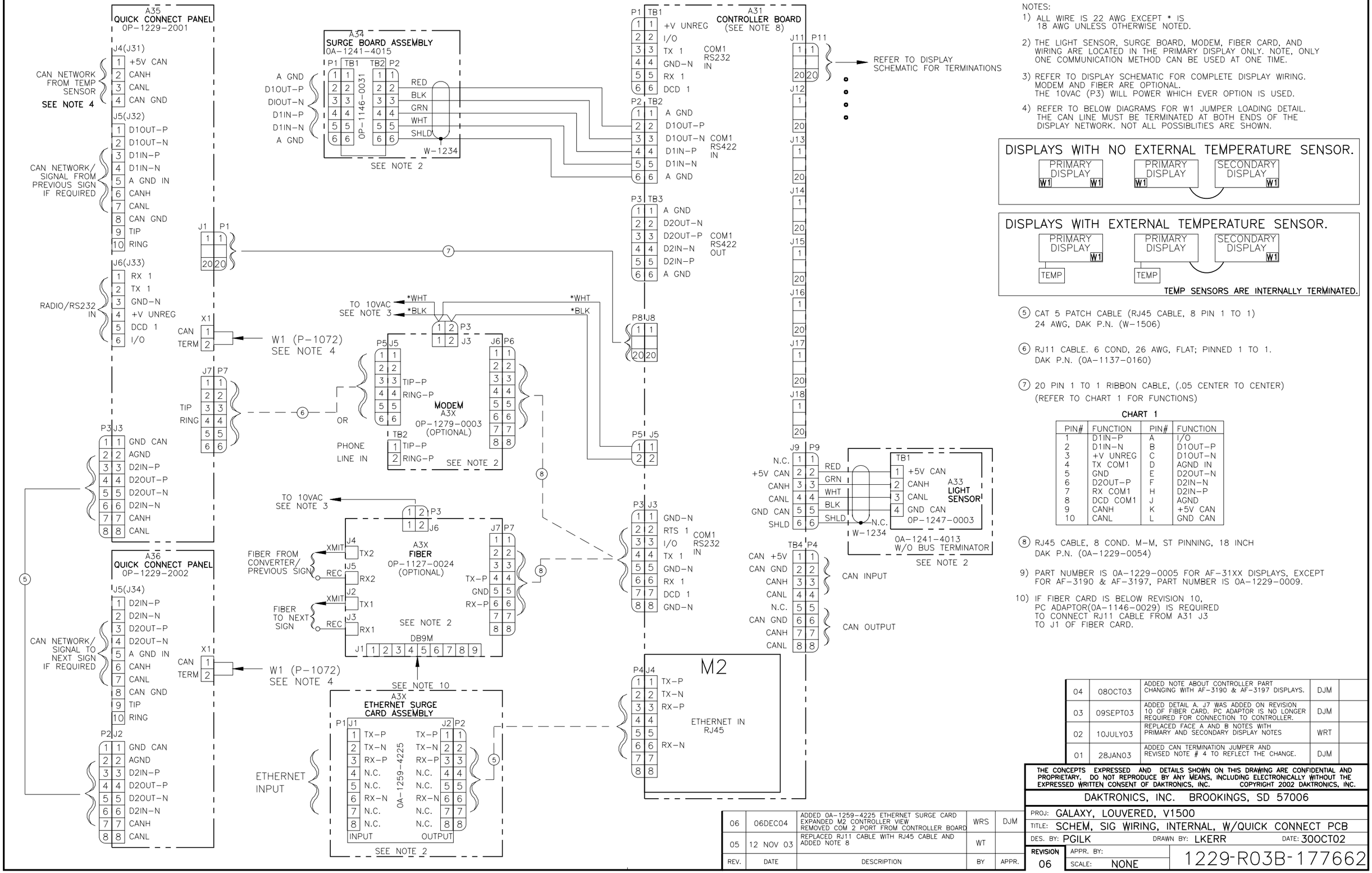
DES. BY: DRAWN BY: LKERR DATE: 20MAR03

REVISION 02

APPR. BY:

SCALE: NONE

1229-R01A-185359



NOTES:

1) ALL WIRE IS 22 AWG EXCEPT * IS 18 AWG UNLESS OTHERWISE NOTED.
2) THE LIGHT SENSOR, SURGE BOARD, MODEM, FIBER CARD, AND WIRING ARE LOCATED IN THE PRIMARY DISPLAY ONLY. NOTE, ONLY ONE COMMUNICATION METHOD CAN BE USED AT ONE TIME.
3) REFER TO DISPLAY SCHEMATIC FOR COMPLETE DISPLAY WIRING. MODEM AND FIBER ARE OPTIONAL. THE 10VAC (P3) WILL POWER WHICH EVER OPTION IS USED.
4) REFER TO BELOW DIAGRAMS FOR W1 JUMPER LOADING DETAIL. THE CAN LINE MUST BE TERMINATED AT BOTH ENDS OF THE DISPLAY NETWORK. NOT ALL POSSIBLITIES ARE SHOWN.

DISPLAYS WITH NO EXTERNAL TEMPERATURE SENSOR.

DISPLAYS WITH EXTERNAL TEMPERATURE SENSOR.

TEMP SENSORS ARE INTERNALLY TERMINATED.

(5) CAT 5 PATCH CABLE (RJ45 CABLE, 8 PIN 1 TO 1) 24 AWG, DAK P.N. (W-1506)

(6) RJ11 CABLE. 6 COND, 26 AWG, FLAT; PINNED 1 TO 1. DAK P.N. (0A-1137-0160)

(7) 20 PIN 1 TO 1 RIBBON CABLE, (.05 CENTER TO CENTER) (REFER TO CHART 1 FOR FUNCTIONS)

CHART 1

PIN#	FUNCTION	PIN#	FUNCTION
1	D1IN-P	A	I/O
2	D1IN-N	B	D1OUT-P
3	+V UNREG	C	D1OUT-N
4	TX COM1	D	AGND IN
5	GND	E	D2OUT-N
6	D2OUT-P	F	D2IN-N
7	RX COM1	H	D2IN-P
8	DCD COM1	J	AGND
9	CANH	K	+5V CAN
10	CANL	L	GND CAN

(8) RJ45 CABLE, 8 COND. M-M, ST PINNING, 18 INCH DAK P.N. (0A-1229-0054)

9) PART NUMBER IS 0A-1229-0005 FOR AF-31XX DISPLAYS, EXCEPT FOR AF-3190 & AF-3197, PART NUMBER IS 0A-1229-0009.

10) IF FIBER CARD IS BELOW REVISION 10, PC ADAPTOR(0A-1146-0029) IS REQUIRED TO CONNECT RJ11 CABLE FROM A31 J3 TO J1 OF FIBER CARD.

REV.	DATE	DESCRIPTION	BY	APPR.
04	08OCT03	ADDED NOTE ABOUT CONTROLLER PART CHANGING WITH AF-3190 & AF-3197 DISPLAYS.	DJM	
03	09SEPT03	ADDED DETAIL A. J7 WAS ADDED ON REVISION 10 OF FIBER CARD. PC ADAPTOR IS NO LONGER REQUIRED FOR CONNECTION TO CONTROLLER.	DJM	
02	10JULY03	REPLACED FACE A AND B NOTES WITH PRIMARY AND SECONDARY DISPLAY NOTES	WRT	
01	28JAN03	ADDED CAN TERMINATION JUMPER AND REVISED NOTE # 4 TO REFLECT THE CHANGE.	DJM	
06	06DEC04	ADDED 0A-1259-4225 ETHERNET SURGE CARD EXPANDED M2 CONTROLLER VIEW REMOVED COM 2 PORT FROM CONTROLLER BOARD	WRS	DJM
05	12 NOV 03	REPLACED RJ11 CABLE WITH RJ45 CABLE AND ADDED NOTE 8	WT	

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: GALAXY, LOUVERED, V1500
TITLE: SCHEM, SIG WIRING, INTERNAL, W/QUICK CONNECT PCB
DES. BY: PGILK DRAWN BY: LKERR DATE: 30OCT02
REVISION 06 APPR. BY: SCALE: NONE
1229-R03B-177662

J8		
PIN	FUNCTION	
1	A	I/O_00
2	B	D1OUT-P
3	C	D1OUT-N
4	D	AGND_IN
5	E	D2_OOUT-N
6	F	D2IN-P
7	H	D2IN-N
8	J	AGND
9	K	+5V_CAN
10	L	GND_CAN

		FUNCTION
		D1IN-P
		D1IN-N
		+V_UNREG
		TX_COM1
		GND
		D2OUT-P
		RX_COM1
		DCD_COM1
		CANH
		CANL

J1		
PIN	FUNCTION	
1	2	GND
3	4	+3.3V
5	6	N.C.
7	8	N.C.
9	10	GND

		FUNCTION
		TCK
		TDO
		TMS
		N.C.
		TDI

J3		
PIN	FUNCTION	
1	2	N.C.
3	4	\TRST1
5	6	+3.3V
7	8	N.C.
9	10	N.C.
11	12	N.C.
13	14	KEYING PIN
15	16	GND

		FUNCTION
		TDO1
		TDI1
		N.C.
		TCK1
		TMS1
		\HALT
		N.C.
		N.C.

PRODUCT BOARD

OP 1229 0006

HC 1395 — HC 1149 — HE 1071 — M2 CNTRLR COATED OP 1229 1001 — HC 1395

TYPICALLY @4 PLACES

J5	
PIN	FUNCTION
2	10VAC
1	10VAC

LL 1002 — ASSY # SERIAL # DATE: REV X

LL 1002 — TESTED BY DATE

INSTALL JUMPER FOR MODEM USE.

RS232 IN

J3	
PIN	FUNCTION
1	GND
2	RTS
3	I/O
4	TX
5	GND
6	RX
7	DCD
8	GND

RS232 IN

TB1

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

RS422 IN

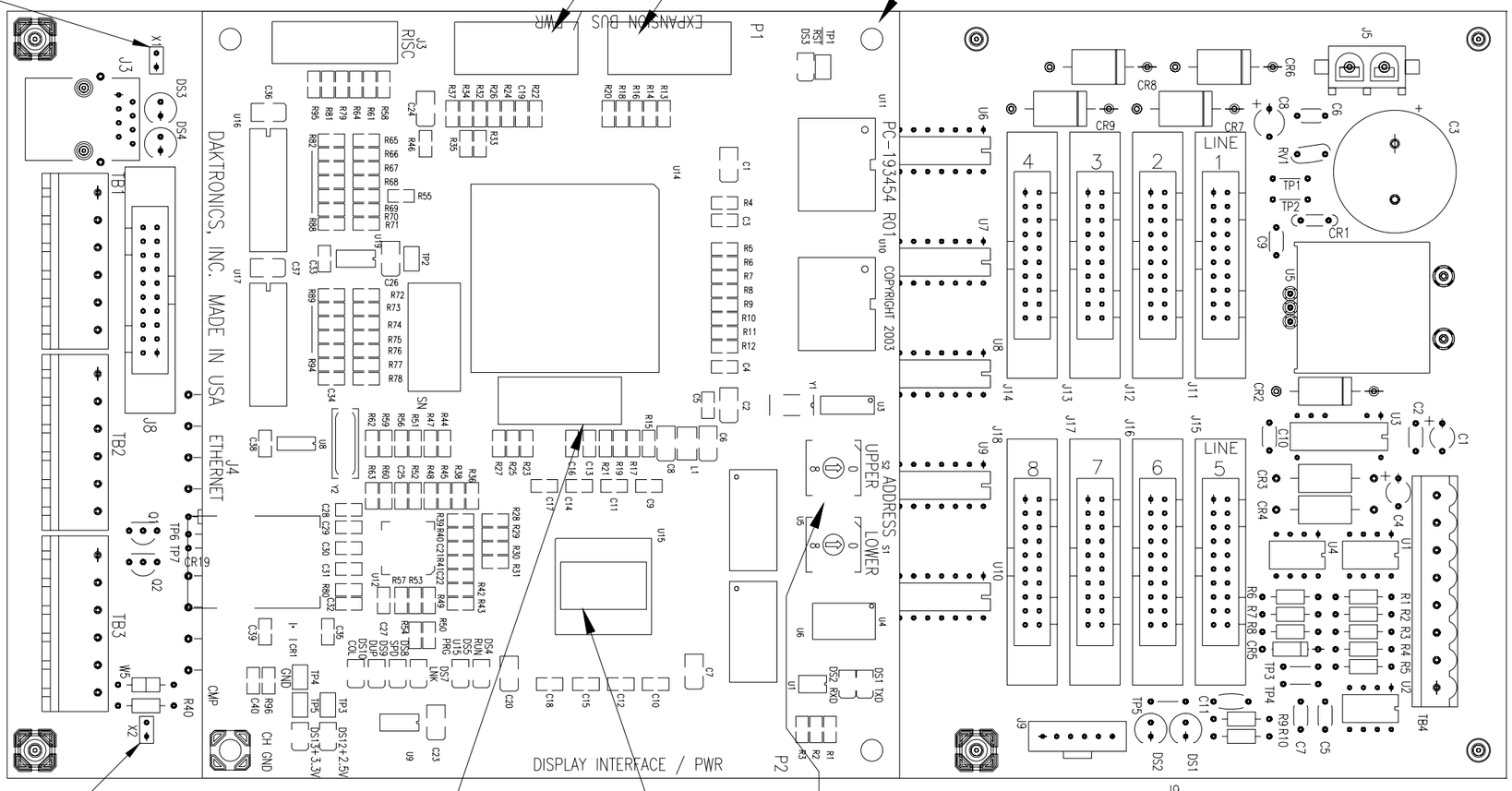
TB2

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

RS422 OUT

TB3

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



TB4	
PIN	FUNCTION
8	CANL
7	CANH
6	CAN_GND
5	RELAY
4	CANL
3	CANH
2	CAN_GND
1	CAN_+5V

INSTALL JUMPER FOR RESET USE.

ETHERNET J4

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

LL 1002 — FIRMWARE REVISION DATE

LL 1002 — EPLD PROGRAM REVISION DATE

UPPER / LOWER ADDRESS SWITCHES

J9

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

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

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ:

TITLE: CNTRLR, GALAXY, 8 CONN, J1087

DES. BY: DRAWN BY: WTAYLOR DATE: 04 NOV 02

REVISION 03 | APPR. BY: | SCALE: 1=1

1229-R10B-177838

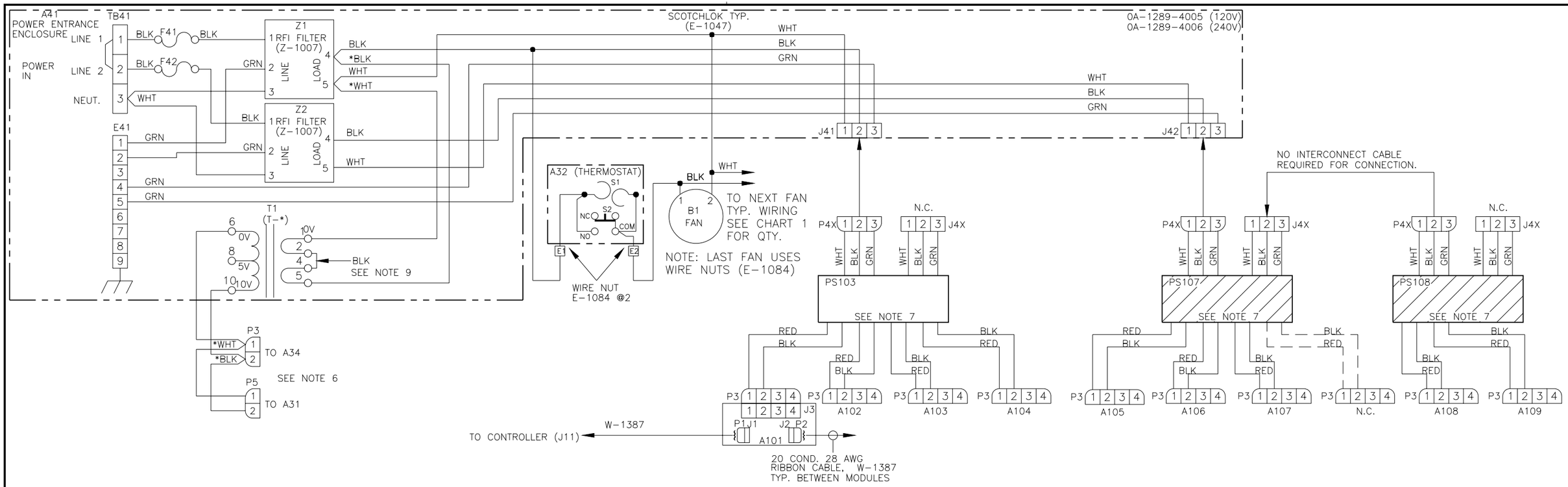


FIGURE 1
DEPICTS LARGEST 16 BY 144 COLUMNS.
SELECT CORRESPONDING DISPLAY SIZE.

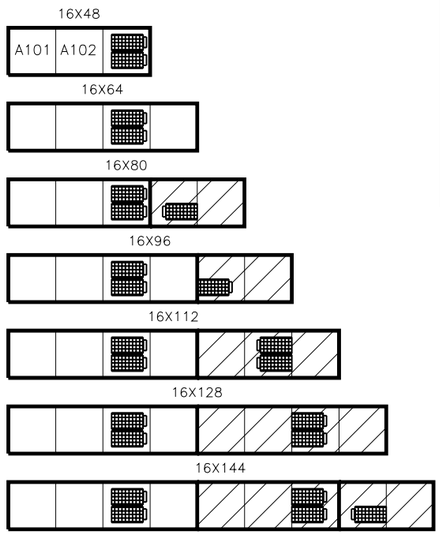


CHART 1

DISPLAY LENGTH (PIXELS)	POWER SUPPLY ASSEMBLY QTY.	MODULE QTY.	FAN QTY.
48	1	3	1
64	1	4	1
80	2	5	1
96	2	6	1
112	2	7	1
128	2	8	1
144	3	9	1

ONE POWER SUPPLY ASSEMBLY

TWO POWER SUPPLY ASSEMBLY

MODULE POWERED BY LINE 1

MODULE POWERED BY LINE 2

NOTES

1) ALL WIRE IS 14 AWG EXCEPT * IS 18 AWG UNLESS OTHERWISE NOTED.
2) FOR 120VAC INPUT F41 AND F42 ARE MWO-15 FUSES (DAK.# F-1028).
   FOR 240VAC INPUT F41 AND F42 ARE MDL-7 FUSES (DAK.# F-1031).
3) FOR 120VAC INPUT * IS T-1119.
   FOR 240VAC INPUT * IS T-1082.
4) EACH LED MODULE IS A 16X16 MATRIX.
5) THE FRAME IS TO BE CONNECTED TO EARTH GROUND AT INSTALLATION TIME.
6) AC POWER FOR CONTROLLER, INTERNAL INTERFACE CARD IE MODEM, FIBER (IF REQUIRED).
7) REFER TO DWG. A-180225 FOR POWER SUPPLY CONFIGURATIONS.
8) REFER TO DWG. A-180190 FOR POWER SPECS.
9) WHEN T-1119 IS USED PINS 2 & 3 AND THE JUMPER SHOWN DO NOT EXIST.
10) FOR 120/240VAC CONNECT LINE(S) TO TB41-1(2) NEUT. TO TB41-3.
    FOR 240VAC CONNECT TB41-1 (LINE 1) TO TB41-2 (LINE 2) AND CONNECT INCOMING LINE TO TB41-1 AND NEUT. TO TB41-3.
11) SCHEMATIC SHOWN DEPICTS THE LARGEST LENGTH 16 HIGH DISPLAY (16X144). REFER TO CHART 1 AND FIGURE 1 FOR DETAILS ON ALL LENGTH DISPLAYS.
12) REFER TO DWG. B-177662 FOR CONTROLLER SIGNAL WIRING.

REV.	DATE	DESCRIPTION	BY	APPR.
01	17MAR03	ADDED POWER TERM BOX PART NUMBERS TO DRAWING.	DJM	

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: GALAXY; LOUVERED VENUS 1500, 20MM
TITLE: SCHEMATIC, AF-3150-16X***-20mm, MONO
DES. BY: LKERR DRAWN BY: DMATHERN DATE: 18 DEC 02
REVISION APPR. BY:
SCALE: 1=1

1289-R03B-180095

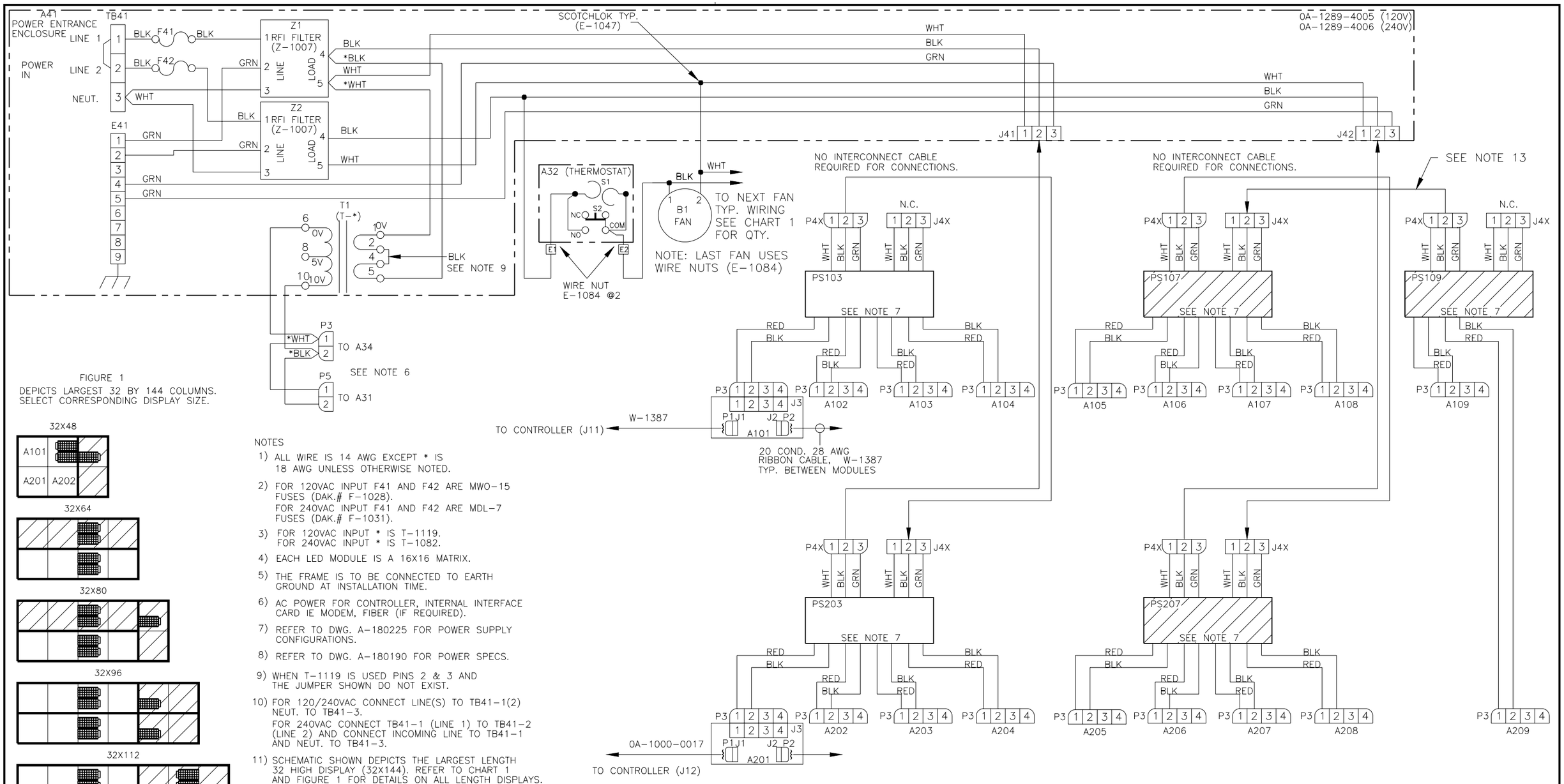
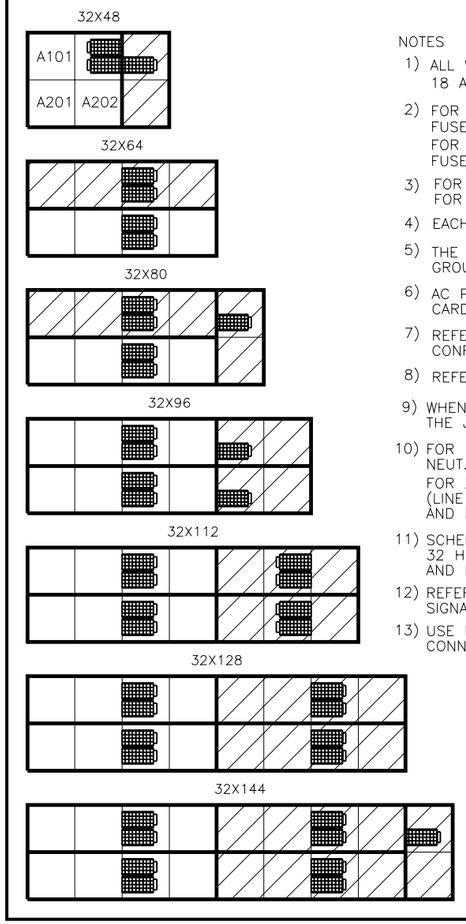


FIGURE 1
DEPICTS LARGEST 32 BY 144 COLUMNS.
SELECT CORRESPONDING DISPLAY SIZE.



NOTES

1) ALL WIRE IS 14 AWG EXCEPT * IS 18 AWG UNLESS OTHERWISE NOTED.
2) FOR 120VAC INPUT F41 AND F42 ARE MWO-15 FUSES (DAK.# F-1028).
   FOR 240VAC INPUT F41 AND F42 ARE MDL-7 FUSES (DAK.# F-1031).
3) FOR 120VAC INPUT * IS T-1119.
   FOR 240VAC INPUT * IS T-1082.
4) EACH LED MODULE IS A 16X16 MATRIX.
5) THE FRAME IS TO BE CONNECTED TO EARTH GROUND AT INSTALLATION TIME.
6) AC POWER FOR CONTROLLER, INTERNAL INTERFACE CARD IE MODEM, FIBER (IF REQUIRED).
7) REFER TO DWG. A-180225 FOR POWER SUPPLY CONFIGURATIONS.
8) REFER TO DWG. A-180190 FOR POWER SPECS.
9) WHEN T-1119 IS USED PINS 2 & 3 AND THE JUMPER SHOWN DO NOT EXIST.
10) FOR 120/240VAC CONNECT LINE(S) TO TB41-1(2) NEUT. TO TB41-3.
    FOR 240VAC CONNECT TB41-1 (LINE 1) TO TB41-2 (LINE 2) AND CONNECT INCOMING LINE TO TB41-1 AND NEUT. TO TB41-3.
11) SCHEMATIC SHOWN DEPICTS THE LARGEST LENGTH 32 HIGH DISPLAY (32X144). REFER TO CHART 1 AND FIGURE 1 FOR DETAILS ON ALL LENGTH DISPLAYS.
12) REFER TO DWG. B-177662 FOR CONTROLLER SIGNAL WIRING.
13) USE INTERCONNECT CABLE (0A-1289-4010) FOR CONNECTION ON SIZES; 32X80 & 32X144.

ONE POWER SUPPLY ASSEMBLY

TWO POWER SUPPLY ASSEMBLY

MODULE POWERED BY LINE 1

MODULE POWERED BY LINE 2

CHART 1

DISPLAY LENGTH (PIXELS)	POWER SUPPLY ASSEMBLY QTY.	MODULE QTY.	FAN QTY.
48	2	6	1
64	2	8	1
80	3	10	1
96	4	12	2
112	4	14	2
128	4	16	2
144	5	18	2

REV.	DATE	DESCRIPTION	BY	APPR.
01	17MAR03	ADDED POWER TERM BOX PART NUMBERS. ADDED SIZES TO NOTE 13. MOVED FANS TO LINE TWO.	DJM	

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: GALAXY; LOUVERED VENUS 1500, 20MM
TITLE: SCHEMATIC, AF-3150-32X***-20mm, MONO
DES. BY: LKERR DRAWN BY: DMATHERN DATE: 18 DEC 02
REVISION APPR. BY:
SCALE: 1=1

1289-R03B-180096

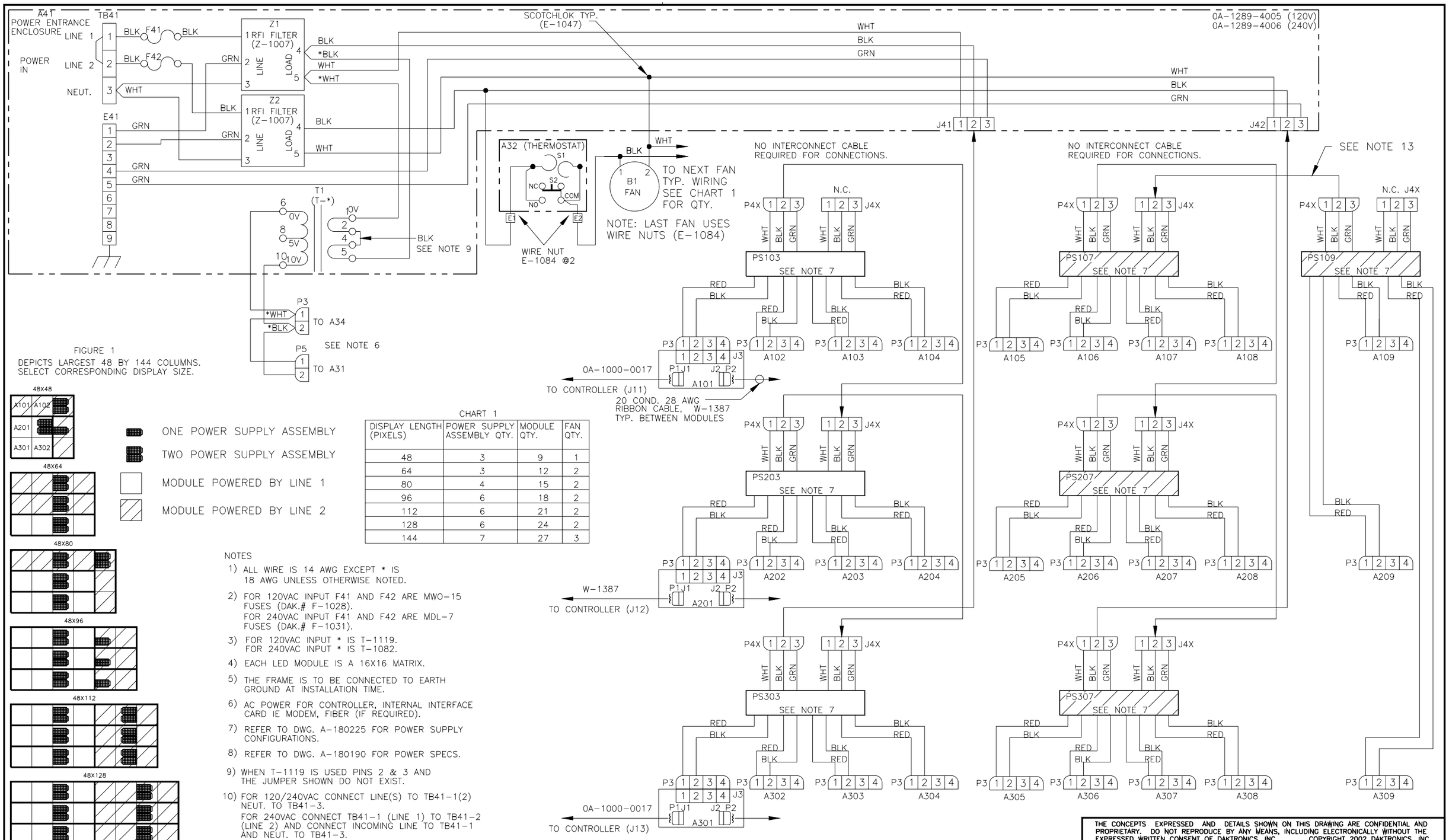


FIGURE 1
DEPICTS LARGEST 48 BY 144 COLUMNS.
SELECT CORRESPONDING DISPLAY SIZE.

ONE POWER SUPPLY ASSEMBLY

TWO POWER SUPPLY ASSEMBLY

MODULE POWERED BY LINE 1

MODULE POWERED BY LINE 2

CHART 1

DISPLAY LENGTH (PIXELS)	POWER SUPPLY ASSEMBLY QTY.	MODULE QTY.	FAN QTY.
48	3	9	1
64	3	12	2
80	4	15	2
96	6	18	2
112	6	21	2
128	6	24	2
144	7	27	3

NOTES

1) ALL WIRE IS 14 AWG EXCEPT * IS 18 AWG UNLESS OTHERWISE NOTED.
2) FOR 120VAC INPUT F41 AND F42 ARE MWO-15 FUSES (DAK.# F-1028).
   FOR 240VAC INPUT F41 AND F42 ARE MDL-7 FUSES (DAK.# F-1031).
3) FOR 120VAC INPUT * IS T-1119.
   FOR 240VAC INPUT * IS T-1082.
4) EACH LED MODULE IS A 16X16 MATRIX.
5) THE FRAME IS TO BE CONNECTED TO EARTH GROUND AT INSTALLATION TIME.
6) AC POWER FOR CONTROLLER, INTERNAL INTERFACE CARD IE MODEM, FIBER (IF REQUIRED).
7) REFER TO DWG. A-180225 FOR POWER SUPPLY CONFIGURATIONS.
8) REFER TO DWG. A-180190 FOR POWER SPECS.
9) WHEN T-1119 IS USED PINS 2 & 3 AND THE JUMPER SHOWN DO NOT EXIST.
10) FOR 120/240VAC CONNECT LINE(S) TO TB41-1(2) NEUT. TO TB41-3.
    FOR 240VAC CONNECT TB41-1 (LINE 1) TO TB41-2 (LINE 2) AND CONNECT INCOMING LINE TO TB41-1 AND NEUT. TO TB41-3.
11) SCHEMATIC SHOWN DEPICTS THE LARGEST LENGTH 48 HIGH DISPLAY (48X144). REFER TO CHART 1 AND FIGURE 1 FOR DETAILS ON ALL LENGTH DISPLAYS.
12) REFER TO DWG. B-177662 FOR CONTROLLER SIGNAL WIRING.
13) USE INTERCONNECT CABLE (0A-1289-4010) FOR CONNECTION ON SIZES; 48X80 & 48X144.

REV.	DATE	DESCRIPTION	BY	APPR.
01	17MAR03	ADDED POWER TERM BOX PART NUMBERS. ADDED SIZES TO NOTE 13. MOVED FANS TO LINE TWO.	DJM	

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: GALAXY; LOUVERED VENUS 1500, 20MM

TITLE: SCHEMATIC, AF-3150-48X***-20mm, MONO

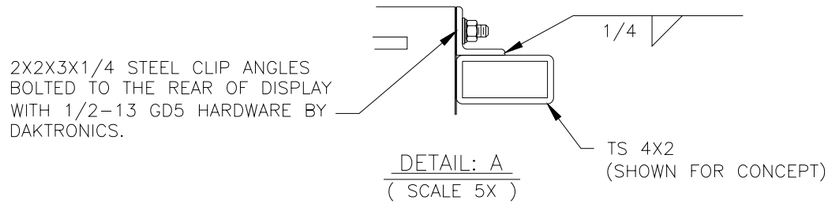
DES. BY: LKERR DRAWN BY: DMATHERN DATE: 18 DEC 02

REVISION

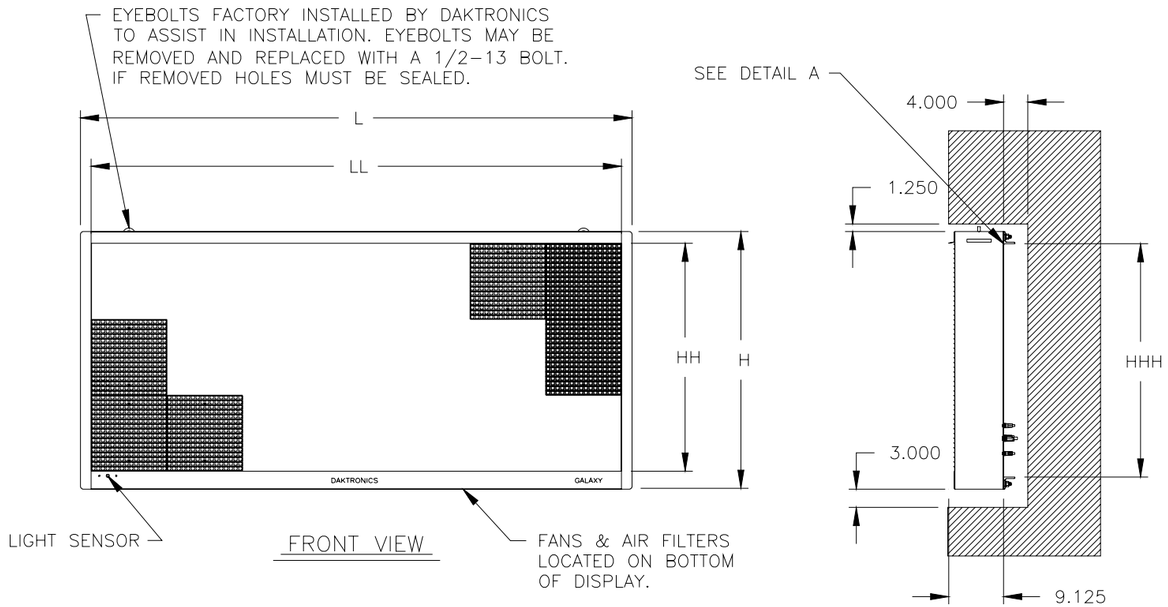
APPR. BY:

SCALE: 1=1

1289-R03B-180097

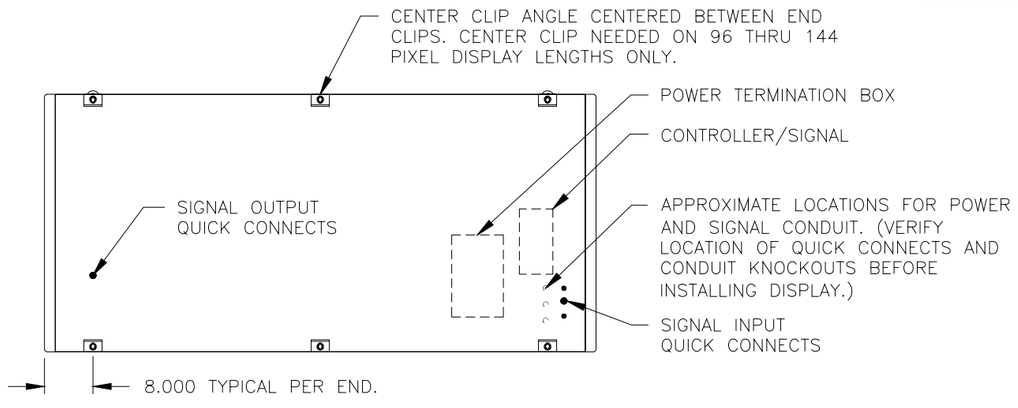


DETAIL: A
(SCALE 5X)



FRONT VIEW

SIDE VIEW



REAR VIEW

SIZES AND WEIGHTS FOR 20MM DISPLAYS
AF-3150-**X**-20MM-RED OR AMBER

SIZE	NUMBER OF MODULES	TOTAL WATTS	NUMBER OF FANS	TOTAL DISPLAY H	TOTAL DISPLAY L	ACTIVE AREA HH	ACTIVE AREA LL	CLIP DISTANCE HHH	UNCRATED WEIGHT
16X48	3	137	1	17.480	40.940	12.480	37.440	13.480	42 lbs
16X64	4	170	1	17.480	53.420	12.480	49.920	13.480	56 lbs
16X80	5	203	1	17.480	65.900	12.480	62.400	13.480	70 lbs
16X96	6	236	1	17.480	78.380	12.480	74.880	13.480	84 lbs
16X112	7	268	1	17.480	90.860	12.480	87.360	13.480	98 lbs
16X128	8	301	1	17.480	103.340	12.480	99.840	13.480	112 lbs
16X144	9	334	1	17.480	115.820	12.480	112.320	13.480	126 lbs
32X48	6	236	1	29.960	40.940	24.960	37.440	25.960	84 lbs
32X64	8	301	1	29.960	53.420	24.960	49.920	25.960	112 lbs
32X80	10	367	1	29.960	65.900	24.960	62.400	25.960	140 lbs
32X96	12	456	2	29.960	78.380	24.960	74.880	25.960	168 lbs
32X112	14	522	2	29.960	90.860	24.960	87.360	25.960	196 lbs
32X128	16	587	2	29.960	103.340	24.960	99.840	25.960	224 lbs
32X144	18	653	2	29.960	115.820	24.960	112.320	25.960	252 lbs
48X48	9	334	1	42.440	40.940	37.440	37.440	38.440	126 lbs
48X64	12	456	2	42.440	53.420	37.440	49.920	38.440	168 lbs
48X80	15	554	2	42.440	65.900	37.440	62.400	38.440	210 lbs
48X96	18	653	2	42.440	78.380	37.440	74.880	38.440	252 lbs
48X112	21	751	2	42.440	90.860	37.440	87.360	38.440	294 lbs
48X128	24	849	2	42.440	103.340	37.440	99.840	38.440	336 lbs
48X144	27	971	3	42.440	115.820	37.440	112.320	38.440	378 lbs

NOTES:

1. FOR DISPLAY SIZE AND WEIGHT SPECIFICATIONS SEE TABLE.
2. ALL DIMENSIONS ARE IN INCHES.
3. DISPLAY CABINET IS ALUMINUM.
4. DISPLAY CABINET COLOR IS FLAT BLACK.
5. FRONT ACCESS FOR SERVICE.
6. MINIMUM TOP CLEARANCE IS 1.25" TO ACCOMMODATE EYEBOLT.
7. MINIMUM REAR CLEARANCE IS 4.00" TO ACCOMMODATE QUICK CONNECT.
8. MINIMUM BOTTOM CLEARANCE IS 3.00" FOR FILTER REPLACEMENT.
9. THE DISPLAY IS BOTTOM VENTED. A MINIMUM OF 12 SQUARE INCHES OF OPEN AREA PER MODULE MUST BE PROVIDED AT BOTTOM OF DISPLAY NEAR FAN & FILTER ASSEMBLIES TO ACCOMMODATE VENTILATION.
10. 110 CUBIC FEET PER MINUTE OF FRESH AIR EXCHANGE PER FAN MUST BE PROVIDED BY MEANS OF FORCED VENTILATION WHEN CABINET IS MOUNTED IN AN ENCLOSED STRUCTURE.
11. DAKTRONICS IS NOT RESPONSIBLE FOR MOUNTING HARDWARE.
12. DO NOT MOUNT THROUGH THE CHANNEL IN THE FILTER AREA.
13. MAIN ELECTRICAL DISCONNECTS TO BE FURNISHED BY CUSTOMER.

REV.	DATE	DESCRIPTION	BY	APPR.

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: GALAXY, AF-3150, 20MM

TITLE: SHOP DRAWING, AF-3150-**X**-20MM-R OR A

DES. BY: MMAMMENGA DRAWN BY: EYOUNG DATE: 19 FEB 03

REVISION

APPR. BY:

SCALE: 1=25

1289-E10B-183660

Appendix B: Signal Converter

Signal Converters and Loop-back Testing for Direct Connections

The following table gives the typical state of the signal converter when the LEDs are either on or off. Refer to **Figure 1** and **Figure 2** on next the page for an illustration of the signal converters and the locations of the various components.

LED Indicators	Typical States		Troubleshooting
Power	ON	Signal Converter (SC) is receiving power	
	OFF	SC is not receiving power	Check power/Replace fuse
		Internal 1 AMP fuse is bad	Replace fuse
TX	On Steady	SC is not connected to a serial port	Connect to open computer COM port (COM port could be sleep mode.)
		1. Serial port or serial cable is bad 2. Computer COM port is in sleep mode	1. Try another port or replace serial cable 2. Communicate with display
	OFF Steady	Normal state, SC is not transmitting data	
	Brief Flicker	SC is transmitting data	
RX	ON Steady	1. Field cabling between SC and display is bad 2. Is connected to display output jack or terminated incorrectly 3. Bad COM port is on display controller	1. Eliminate cabling by disconnecting wire/cable from SC to display controller 2. Check connections and terminations 3. Eliminate by disconnecting wire/cable to display controller
	OFF Steady	Normal state, SC is not receiving data	
	Brief Flicker	SC is receiving data	
TX/RX	ON Steady	(If serial cable is connected) Bad SC	Replace SC

RS422 Wire Signal Converter

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

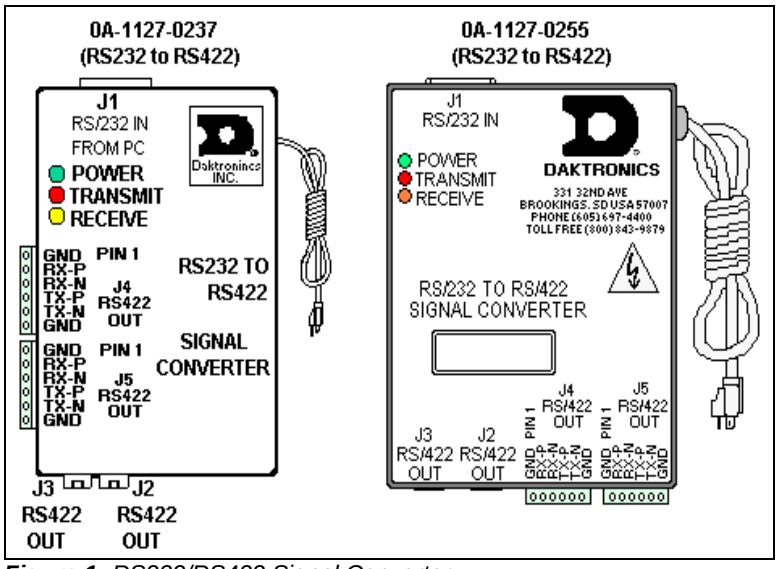


Figure 1: *RS232/RS422 Signal Converter*

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

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

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

Fiber Signal Converter

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

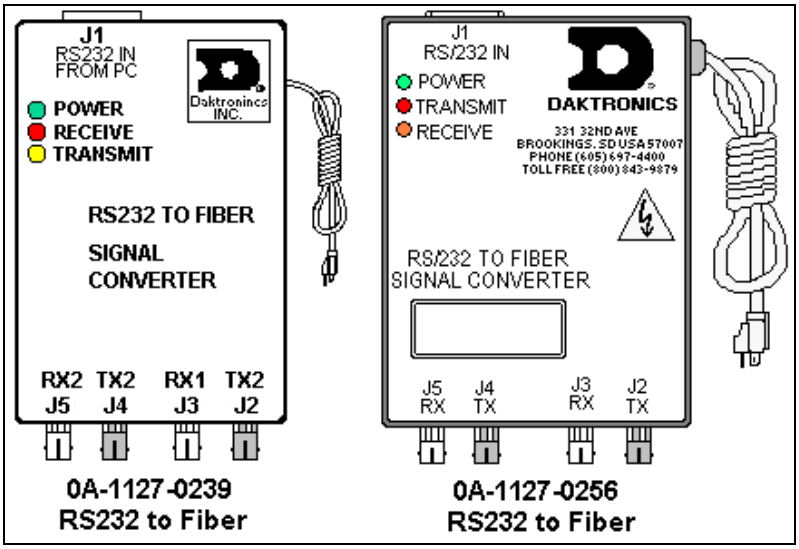


Figure 2: *RS232IFiber Signal Converter*

RS422 Loop-Back Test (Outdoor Displays)

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

Serial Cable (W-1249)

To complete the test, the serial cable must be plugged into the signal converter. The table below lists the pin connections when using a serial cable (Daktronics part# -1249).

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

Loop-Back Test: To perform a loop-back for testing purposes only, use the spare plug in the signal converter and connect the copper conductor jumpers using the following table. Refer to **Figure 3**. (To eliminate the display, pull out the phoenix plug with the signal wires connected into it.)

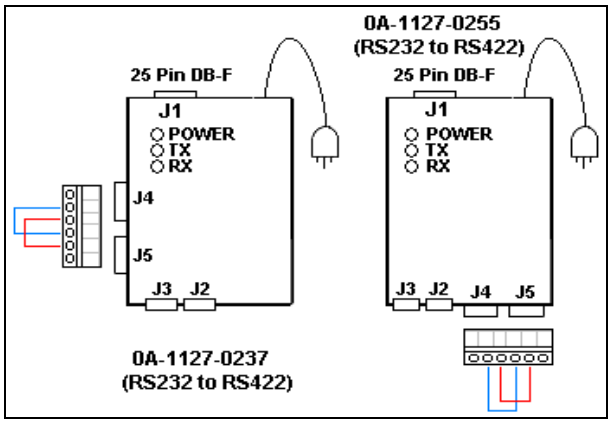


Figure 3: *Jumpers at RS232/RS422 Signal Converter*

J2 and J3		J4 and J5
(Pin 5) TX-N to (Pin 3) RX-N	**OR**	(Pin 2) RX-P to (Pin 4) TX-P
(Pin 4) TX-P to (Pin 2) RX-P		(Pin 3) RX-N to (Pin 5) TX-N

When the wires are connected, perform the loop-back test using the Venus 1500 software as described in **Conducting the Venus 1500 Software Test**

This test can also be done at the signal termination enclosure on the surge board assembly, as shown in **Figure 4**, or, on some displays, at the controller board input. In that case, the wires coming from the signal converter must remain connected, and the jumpers will be inserted along with them. **Leave the plug disconnected from the surge board while conducting the test.**

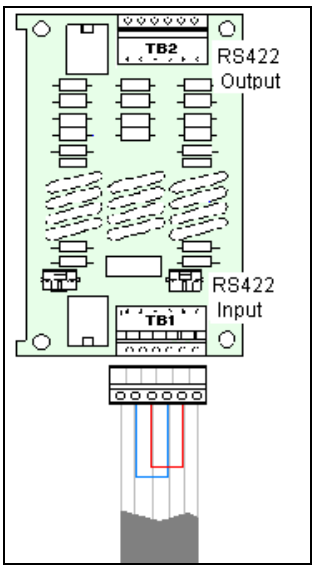


Figure 4: *Jumpers at Surge Board*

TB1 - RS422 In
(Pin 4) RX-P to (Pin 2) TX-P
(Pin 5) RX-N to (Pin 3) TX-N

When the wires are connected, perform the loop-back test using the Venus 1500 software as described in **Conducting the Venus 1500 Software Test**

RS422 Loop-Back Test (Indoor/Outdoor Displays)

All indoor displays and some outdoor displays (AE-3010, AF-3010, AF-3020, and X-1000) use RJ11 plugs or connectors. In those cases, a "Network Cable Tester" (**Figure 7**) is provided to conduct the test.

The Network cable tester is used to test for two things:

1. A flipped RJ11 cable used instead of a straight through cable.
2. A good connection from a computer or signal converter to a through the connecting cable.

The use of a flipped (reversed) or straight cable can be determined visually. Use the figures below as a guide, or use the Network Cable Tester box for assistance.

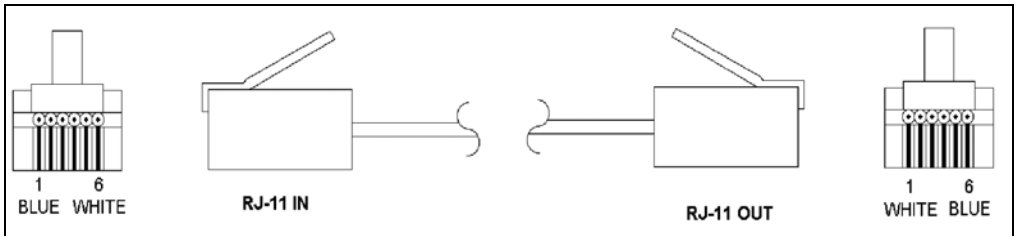


Figure 5: *Flipped Cable (Reversed)*

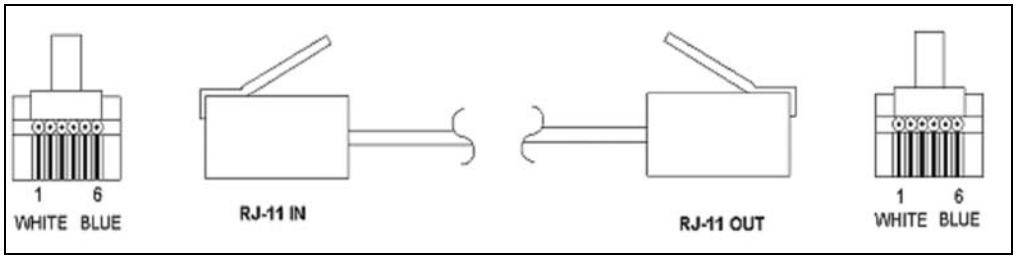


Figure 6: *Straight Cable*

1. Plug one end of the **flipped** cable into the output from the computer or signal converter.
2. Plug one end of the flipped cable into J2 (Loopback Connector) on the Network cable tester box.
3. When both ends are connected, perform the loop-back test using the Venus 1500 software as described in **Conducting the Venus 1500 Software Test.**

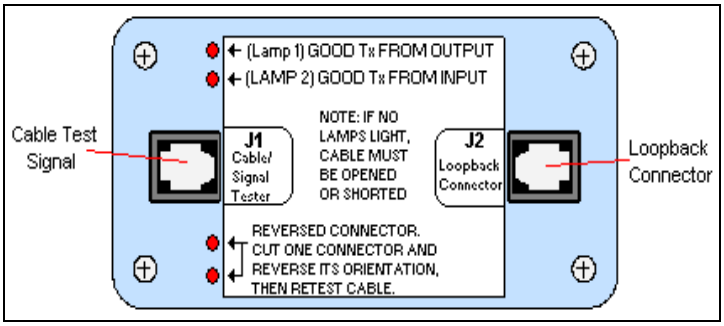


Figure 7: *Network Cable Tester*

4. For AE-3010, AF-3010, AF-3020, and X-1000 displays only, disconnect the cable going into the COM module input (J3) on the controller and connect to J2 on the loop-back box. See **Figure 8** for location of the RJ11 connector.

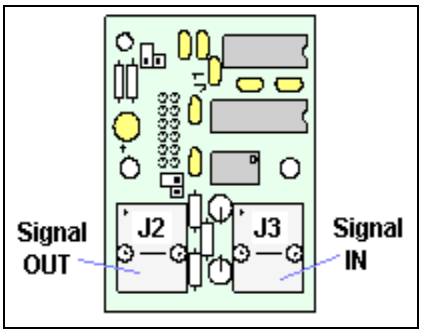


Figure 8: *AF-3010/X-1000 COM Module*

Loop-Back test with Fiber

1. Locate the signal termination enclosure or open the bottom left corner of the display

2. Locate the fiberboard, as shown in **Figure 9,** and label the fiber ends connected to the board.

3. Remove the ends from the board that are in jacks J5 and J4.

4. Connect the ends into the fiber splice (Daktronics part# P-1197), as shown in **Figure 10.**

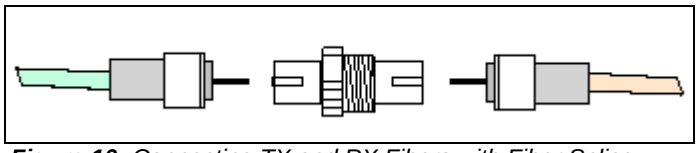


Figure 10: *Connecting TX and RX Fibers with Fiber Splice*

5. When the fibers are connected, perform the loop-back test using the Venus 1500 software as described in **Conducting the Venus 1500 Software Test**

6. For AF-3010 and X-1000 displays only, the cable that connects the fiberboard to the controller board input uses a RJ11 jack at the controller and can be connected to a loop-back box at J2 to run the test as usual.

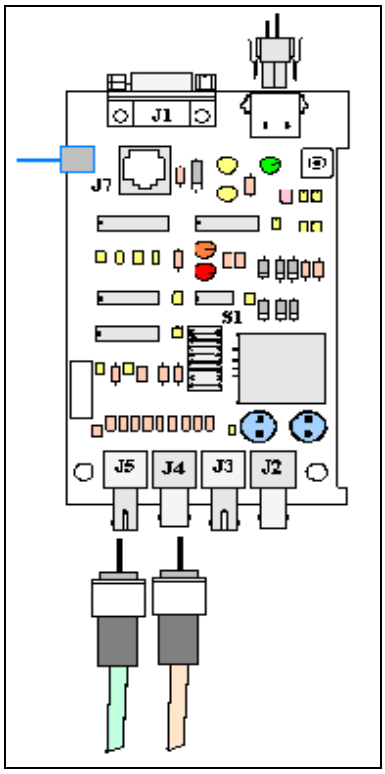
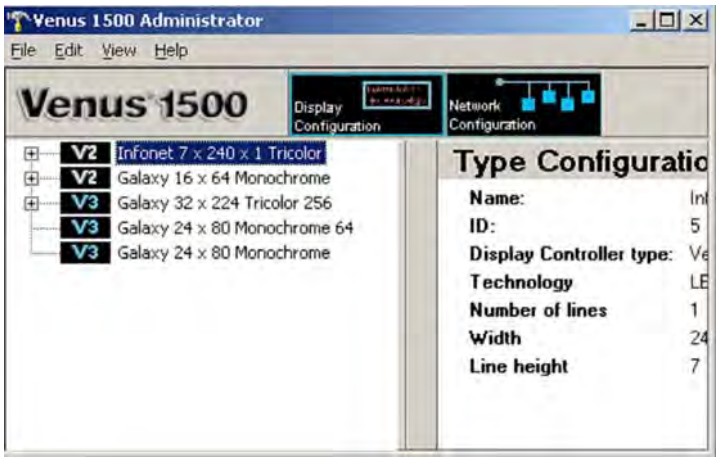


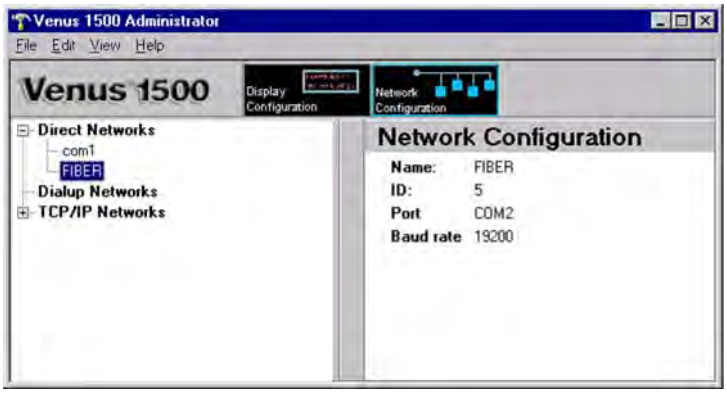
Figure 9: *Fiber Optic Board*

Conducting the Venus 1500 Software Test

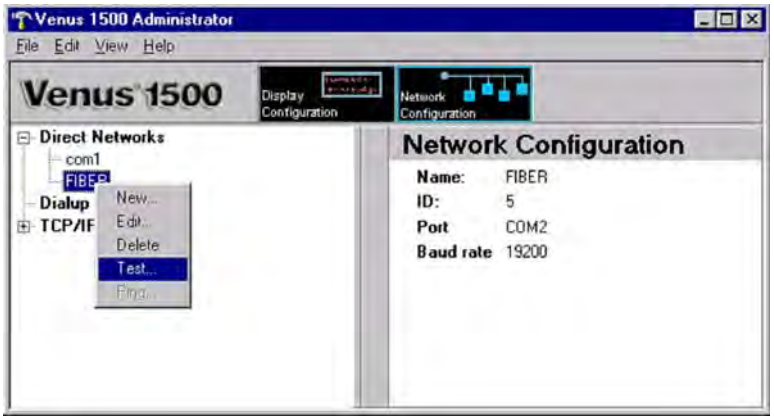
1. Open Venus 1500 Administrator.



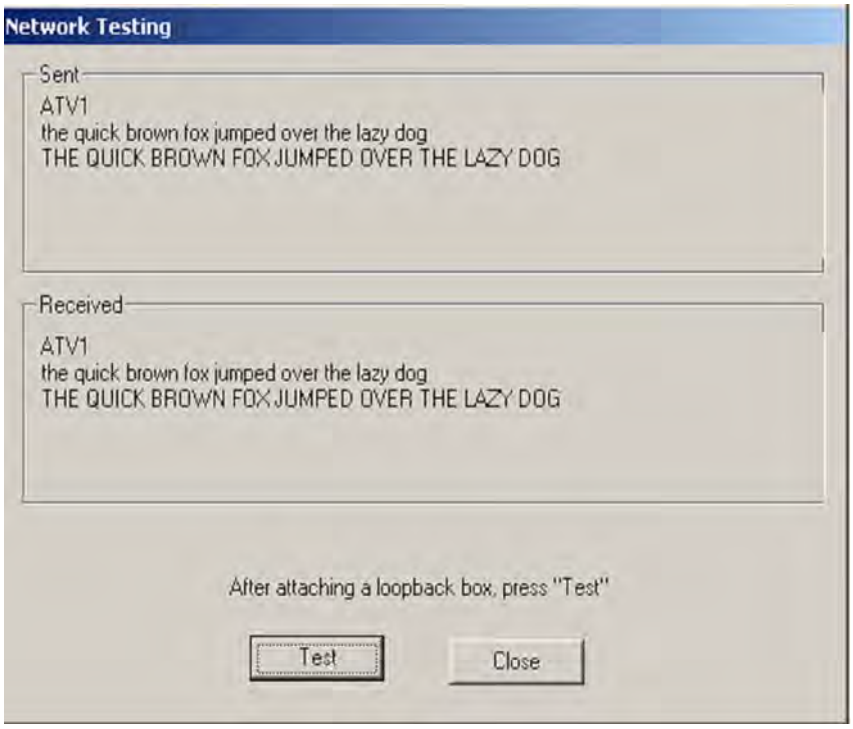
2. Click Network Configuration and open the direct network by clicking on the **[+]** in front of Direct Network.



3. Right click the network you want to test.



4. Click [**TEST**].



5. If the Transmit LED on the signal converter flickers, the signal is getting to the signal converter. That means that the right Com port is being used. However, if it does not flicker, the computer has either a software or hardware problem.
6. If you get the same message in the "Received" box as in the "Sent" box, the loop-back test was successful, implying that the cable has continuity to the point of the connection.
   Note: Flipped and straight cables will provide the same results. Check for correct order of the wires.
7. If "No Response" appears in the "Received" box, the test failed due to one of the following problems:
   a. The correct computer COM port is not being used, or USB port is not configured as a "serial" port. (If the Transmit LED flickered, this was not the problem.)
   b. A communication problem exists:
      - The fiber or the ends on the fiber are bad.
      - (or) The wire or the terminations are bad.
   c. There was a problem conducting the test:
      - The serial cable to the signal converter is bad or not plugged in.
      - The signal converter is not plugged in.
8. If the words "It appears as if this port has a modem attached" appear, the modem will need to be moved, or you need to use a different COM port.

After the test is complete:

1. Remove the wire jumpers and make sure terminations are correct.
2. (or) Remove the fiber splice, and reconnect fiber to fiberboard.
3. Run the test again without the jumpers, splice, or loop-back box. The test should fail.
4. Use Venus 1500 Display Manager to receive the status to ensure communication now works correctly.