



# **SunSpot® 100 Series Incandescent Displays**

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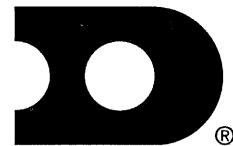
## **Installation / Maintenance Manual**

ED-5216

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**ED#5216  
Product 1082  
Rev. 6 - 12 Jan 1999**

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***Setting New Standards Worldwide***

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# Section 1: Introduction

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This manual is designed to explain the installation and maintenance of Daktronics 100 Series Incandescent Displays. It specifies details and dimensions and gives guidance for mounting and wiring these displays. The manual is divided into mechanical, electrical, and maintenance sections. Please refer to the appropriate controller manual for controller installation.

## Important Safeguards:

1. Read and understand these instructions before installing.
2. Do not drop the control console or allow it to get wet.
3. Be sure that the display is properly grounded with a ground rod at the display location.
4. *Disconnect power to the display when it is not in use.*
5. *Disconnect power when servicing the display.*
6. Do not modify the display structure or attach any panels or coverings to the display without the express written consent of Daktronics, Inc.

The box below illustrates Daktronics drawing numbering system. Daktronics identifies individual drawings by drawing number (7087-P08A-69945, below), located in the title box in the lower right corner of the drawing. The manual refers to drawings by the last set of digits and the letter preceding them. The example below shows **Drawing A-69945**. All reference drawings are inserted at the end of each section.

DAKTRONICS, INC		BROOKINGS, SD 57006	
PROJ.			
TITLE.			
DES BY		DRAWN BY DOK	DATE 04-20-95
APPR BY.		7087-P08A-69945	
SCALE 1=80			



# SUNSPOT® 100 SERIES INCANDESCENT DISPLAYS



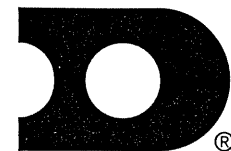
## Features and Specifications

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### DISPLAY FEATURES:

- **Matrix Sizes:**
  - 18" Character: 7 or 16 rows, 112 columns maximum.
  - 21" Character: 7 or 16 rows, 96 columns maximum.
  - 24" Character: 7 or 16 rows, 80 columns maximum.
- **Construction:**
  - All aluminum cabinet with welded extrusion frame.
  - Louvered egg crate light dividers attached directly to each lampbank section. Displays ordered with reflectorized lamps do not have light dividers.
  - Lift eyes provided.
  - Center cabinets not included.
- **Finish:**
  - Flat black acrylic enamel paint. Optional colors are available upon request.
- **Lamps:**
  - 18" character models:
    - Standard 15 watt (15S14 clear) lamp.
    - Optional 30 watt (30A15) lamp.
  - 21" & 24" character models:
    - Standard 33 watt (33A19 clear) lamp.
    - Optional 30 watt (30R20) 6000 hour reflector lamp.
    - Optional 30 watt (30R20) 2000 hour reflector lamp (for non-marque applications only).

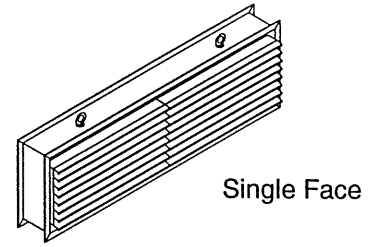
Standard 2/3 dimming; optional 1/2 dimming carries an additional fee (see List Prices, SL 1090-2158 for price adder).
- **Electrical:**
  - Standard 120/208 3-phase power; optional 120/240 single phase power on some models (see page 3 for models that allow this option).
  - Internally mounted load centers and signal junction panels completely wired and assembled.
  - External mounted fused main disconnect(s) not included.
  - Power cable requirements determined by local codes; conduit size depends upon cable used.
- **Cooling:**
  - Cooling fans are a standard display feature. Fan air inlets are located in the bottom of the cabinet and cannot be covered or blocked to insure airflow through the bottom of the display.
- **Service Access:**
  - Each lampbank section hinges upward for front access to lamp drivers.
  - Front access to lamps for replacement; lamp dividers may be removed for easier lamp access.
- **Interconnect Harness:**
  - The standard interconnect harness, 24" in length, will accommodate a 2V apex display at any angle between 0 and 90 degrees, and a 2V back to back display up to 24" between backs.
  - For those 2V displays which deviate from these specifications and therefore require a longer harness, there will be an added harness cost (see List Prices, SL 1090-2158 for price adder). Sheet metal wireways are provided for 2V displays to protect electrical wiring between displays.
- **Control Cable:**
  - Control cable is dependent on controller used. See controller specifications for cable requirements.



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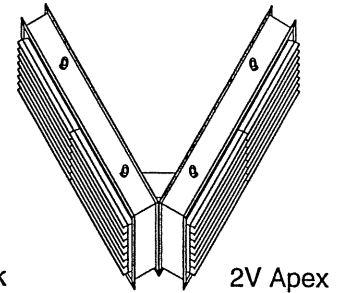
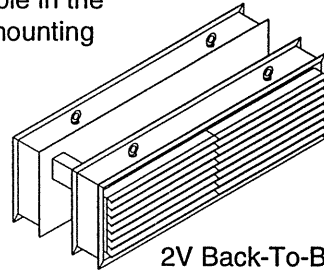
• **Display Configurations:**

**Single Face** - This display is a single sided, stand alone unit, incapable of driving a slave display.



**2V Display** - Consists of two single face units, one master and one slave. Available in the **2V Back-To-Back** and **2V-Apex** mounting configurations.

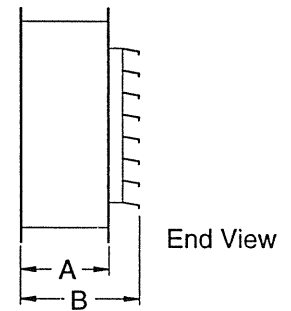
**Note:** 2V Back-To-Back or 2V Apex mounting configuration must be specified at order entry to determine the correct wireway to be used.



• **Display Dimensions:**

Display cabinet height and width dimensions are specified in the tables on page 3. Display depth dimensions are as follows:

Display Character Height	Dim. A	Dim. B
18"	10.00"	14.38"
21"	10.00"	15.00"
24"	10.00"	15.00"

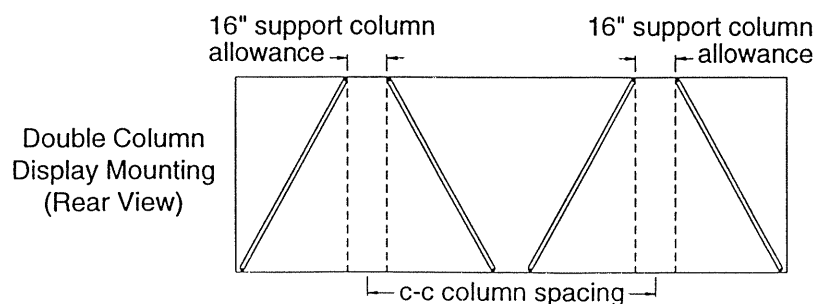
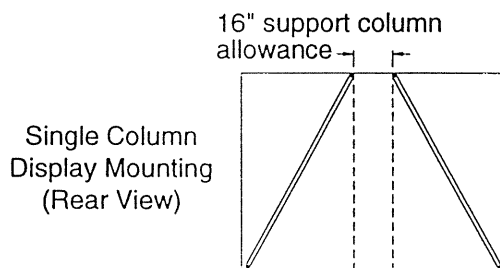


• **Support Column Selection:**

Support column size is dependent on the height and total wind loading of the entire display including any identification signage. Column selection is critical and should be done only by a qualified individual. Only pipe and square or rectangular tubing are recommended for single column displays. Wide flange members have low torque resisting properties and wind flutter may result. It is the responsibility of the installer to determine the column size required to support all the components to be mounted.

• **Support Column Limitations:**

Each Display size is designed to allow for a specific number of support columns and center to center column spacing to provide a durable structure. Standard display column requirements are listed in the tables on page 3. Also refer to single and double column display diagrams below. Any deviations from these requirements will carry an additional fee (see List Prices, SL 1090-2158). Support columns cannot be located within 12" of the display cabinet ends on 2V displays to insure adequate room for the wireway and interconnect harnesses.





# SUNSPOT® 100 SERIES INCANDESCENT DISPLAYS

## Model Specifications

### 18" Characters (15S14 Lamps on 2.6" centers)

MODEL NUMBER	CABINET DIMENSIONS (H x W)	CHAR. HEIGHTS (NOMINAL)	AVG. # CHAR. PER LINE	MAX. POWER WATTS/ FACE	AVG. POWER WATTS/ FACE	UNCRATED SF DISPLAY WEIGHT/ LBS.	CRATED SF DISPLAY WEIGHT/ LBS.	NO. OF SUPPORT COLUMNS	C-C COLUMN SPACING	120/240 POWER OPTION SF / 2V	
732-18IOCL	2'-4.2" x 7'-7.8"	18"	6	3,360	1,340	270	395	1	n/a	Y	Y
748-18IOCL	2'-4.2" x 10'-10.5"	18"	9	5,040	2,020	405	615	1	n/a	Y	Y
764-18IOCL	2'-4.2" x 14'-4.1"	18"	12	6,720	2,690	495	795	1	n/a	Y	Y
780-18IOCL	2'-4.2" x 17'-9.7"	18"	16	8,400	3,360	630	1,005	2	9'-6"	Y	N
796-18IOCL	2'-4.2" x 21'-3.3"	18"	19	10,080	4,030	720	1,195	2	11'-0"	Y	N
7112-18IOCL	2'-4.2" x 24'-8.9"	18"	22	11,760	4,700	855	1,405	2	12'-6"	Y	N
1648-18IOCL	4'-1.6" x 10'-10.5"	13"-40"	2 - 9	11,520	4,610	675	925	1	n/a	Y	N
1664-18IOCL	4'-1.6" x 14'-4.1"	13"-40"	2 - 12	15,360	6,140	900	1,250	1	n/a	Y	N
1680-18IOCL	4'-1.6" x 17'-9.7"	13"-40"	2 - 16	19,200	7,680	1,125	1,550	2	9'-6"	Y	N
1696-18IOCL	4'-1.6" x 21'-3.3"	13"-40"	2 - 19	23,040	9,220	1,350	1,860	2	11'-0"	Y	N
16112-18IOCL	4'-1.6" x 24'-8.9"	13"-40"	2 - 22	26,880	10,750	1,575	2,175	2	12'-6"	N	N

### 21" Characters (33A19 Lamps on 3.0" centers) - Standard 33A19 Lamp

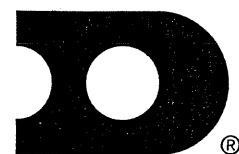
MODEL NUMBER	CABINET DIMENSIONS (H x W)	CHAR. HEIGHTS (NOMINAL)	AVG. # CHAR. PER LINE	MAX. POWER WATTS/ FACE	AVG. POWER WATTS/ FACE	UNCRATED SF DISPLAY WEIGHT/ LBS.	CRATED SF DISPLAY WEIGHT/ LBS.	NO. OF SUPPORT COLUMNS	C-C COLUMN SPACING	120/240 POWER OPTION SF / 2V	
732-21IOCL	2'-6.0" x 8'-5.7"	21"	6	7,390	2,960	300	450	1	n/a	Y	Y
748-21IOCL	2'-6.0" x 12'-5.7"	21"	9	11,090	4,440	425	675	1	n/a	Y	Y
764-21IOCL	2'-6.0" x 16'-5.7"	21"	12	14,780	5,910	550	900	2	9'-6"	Y	Y
780-21IOCL	2'-6.0" x 20'-5.7"	21"	16	18,480	7,390	680	1,130	2	11'-0"	Y	N
796-21IOCL	2'-6.0" x 24'-5.7"	21"	19	22,180	8,870	810	1,360	2	12'-6"	Y	N
1648-21IOCL	4'-7.3" x 12'-5.7"	15"-48"	2 - 9	25,340	10,140	775	1,075	1	n/a	Y	N
1664-21IOCL	4'-7.3" x 16'-5.7"	15"-48"	2 - 12	33,790	13,520	975	1,550	2	9'-6"	Y	N
1680-21IOCL	4'-7.3" x 20'-5.7"	15"-48"	2 - 16	42,240	16,900	1,190	1,690	2	11'-0"	Y	N
1696-21IOCL	4'-7.3" x 24'-5.7"	15"-48"	2 - 19	50,690	20,280	1,450	2,050	2	12'-6"	N	N

### 24" Characters (33A19 Lamps on 3.5" centers) - Standard 33A19 Lamp

MODEL NUMBER	CABINET DIMENSIONS (H x W)	CHAR. HEIGHTS (NOMINAL)	AVG. # CHAR. PER LINE	MAX. POWER WATTS/ FACE	AVG. POWER WATTS/ FACE	UNCRATED SF DISPLAY WEIGHT/ LBS.	CRATED SF DISPLAY WEIGHT/ LBS.	NO. OF SUPPORT COLUMNS	C-C COLUMN SPACING	120/240 POWER OPTION SF / 2V	
732-24IOCL	2'-7.8" x 9'-9.7"	24"	6	7,390	2,960	340	540	1	n/a	Y	Y
748-24IOCL	2'-7.8" x 14'-5.7"	24"	9	11,090	4,440	475	750	1	n/a	Y	Y
764-24IOCL	2'-7.8" x 19'-1.7"	24"	12	14,780	5,910	600	1,025	2	10'-0"	Y	Y
780-24IOCL	2'-7.8" x 23'-9.7"	24"	16	18,480	7,390	765	1,290	2	12'-6"	Y	N
1648-24IOCL	5'-3.3" x 14'-5.7"	18"-56"	2 - 9	25,340	10,140	825	1,175	1	n/a	Y	N
1664-24IOCL	5'-3.3" x 19'-1.7"	18"-56"	2 - 12	33,790	13,520	1,075	1,550	2	10'-0"	Y	N
1680-24IOCL	5'-3.3" x 23'-9.7"	18"-56"	2 - 16	42,240	16,900	1,325	1,900	2	12'-6"	Y	N

#### NOTES:

- Maximum and average lamp wattage is calculated using the standard lamp for that display. Multiply power figure by 2 for 2V displays. To calculate amps, divide watts by 120. Average lamp wattage is approximately 40% of the maximum lamp wattage.
- Multiply single face display weights by 2 for the approximate 2V display weights.



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# Section 2: Mechanical Installation

## 2.1 Display Definitions

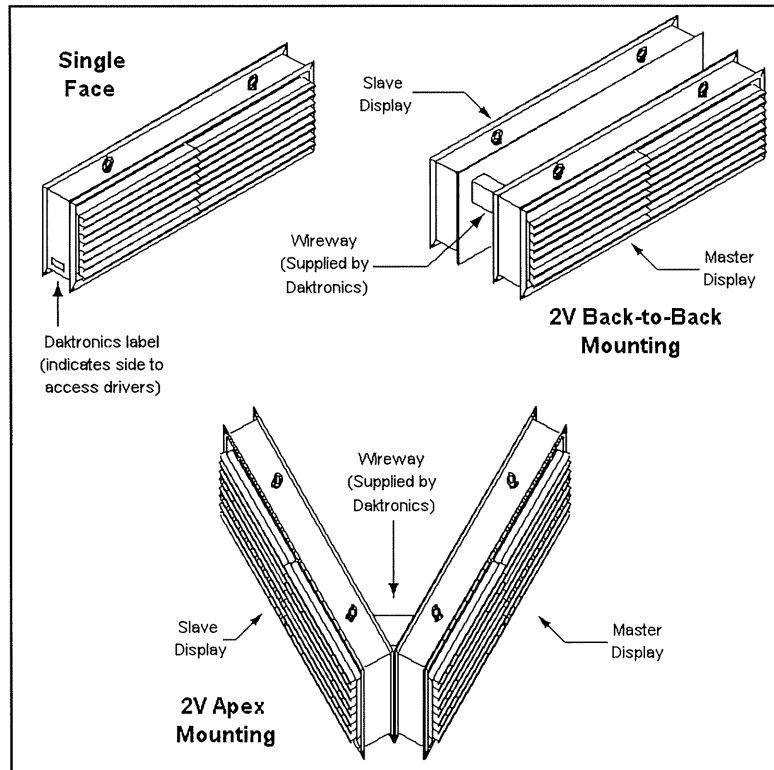
Two configurations of displays are offered: single face displays and 2V displays. **Figure 1** gives illustrations of these two display types. Refer to the features and specifications sheets (**Section 1**) for estimated display weights and display dimensions.

### 2.1.1 Single Face Display

This display is single-sided stand alone unit. It does not have the ability to drive a slave display.

### 2.1.2 2V Display

A 2V display consists of two single face units, one master and one slave. The two sides of this display may be mounted at any angle between 0 and 90 degrees. When mounted back to back, the maximum distance between displays cannot exceed 24." An interconnect harness used to power the slave unit is coiled up inside the master unit. For exceptions to these specifications, consult your Daktronics sales representative.



**Figure 1:** Display Configurations

## 2.2 Display Mounting

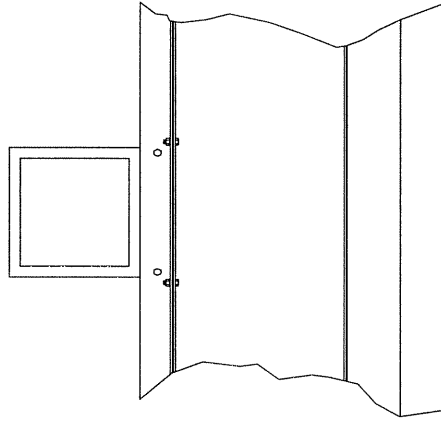
**Reference Drawings:** Display Mounting, Using Horizontal Angle . . . **Drawing A-72324**  
Display Mounting, Using U-Clamp . . . . . **Drawing A-72325**  
Display Mounting, Vertical Angle . . . . . **Drawing A-72326**

**Drawings A-72324, A-72325, and A-72326** show suggested methods of mounting displays to columns. There is a 1.65" flange on the cabinet as shown that can be used for mounting. *The 1*

*½" angle provided by Daktronics for use on the inside flange of the cabinet extrusion must be used. This mounting angle(s) is stored in the master display behind the left most lampbank for shipment. This support angle or channel is an absolute must to keep the display from sliding down the column. All displays come with diagonal braces attached to the rear of the display. If necessary, reposition these diagonal braces, but do not remove and discard diagonal braces. Failure to follow these guidelines will void the warranty.*

**Note:** It is the responsibility of the installer to insure the installation will adequately meet local standards. The mounting hardware and method is also the responsibility of the installer. Holes can be punched or drilled in the cabinet near the column to run power and signal wires into the display. *Support columns cannot be located within 12" of the end of the display to ensure adequate room for sheet metal polonium and interconnect harness.*

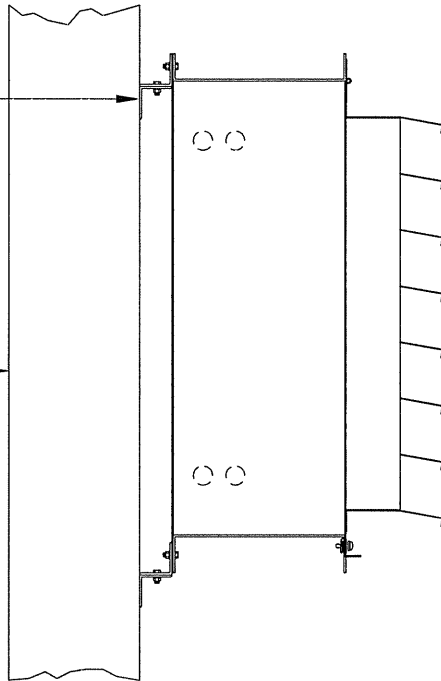
TOP VIEW



ANGLES AND BOLTS  
(BY OTHERS)

COLUMN  
(BY OTHERS)

SIDE VIEW



DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ:

TITLE: DISPLAY MOUNTING, USING HORIZONTAL ANGLE

DES. BY:

DRAWN BY: NJA

DATE: 28 JUN 95

REVISION

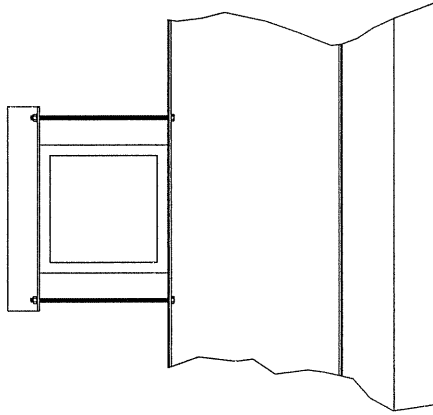
APPR. BY:

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1114-R07A-72324

REV.	DATE	DESCRIPTION	BY	APPR.

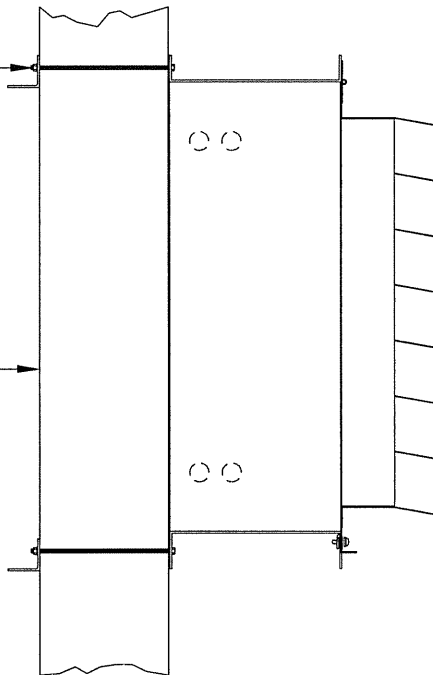
TOP VIEW



ANGLES AND BOLTS  
(BY OTHERS)

COLUMN  
(BY OTHERS)

SIDE VIEW



DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ:

TITLE: DISPLAY MOUNTING, USING U-CLAMP

DES. BY:

DRAWN BY: NJA

DATE: 28 JUN 95

REVISION

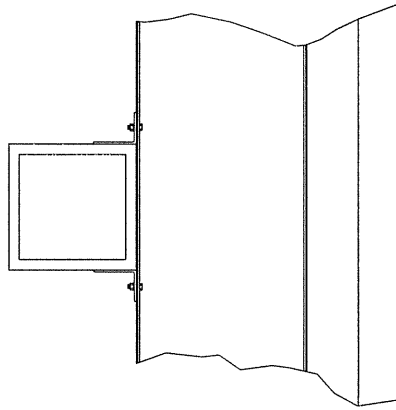
APPR. BY:

SCALE: 1=8

1114-R07A-72325

REV	DATE	DESCRIPTION	BY	APPR.

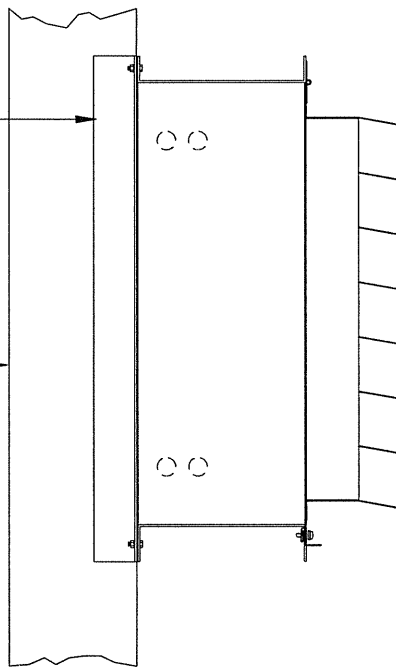
TOP VIEW



WELD OR BOLT ANGLE  
TO COLUMN  
(BY OTHERS)

COLUMN  
(BY OTHERS)

SIDE VIEW



DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ:

TITLE: DISPLAY MOUNTING, VERTICAL ANGLE

DES. BY:

DRAWN BY: NJA

DATE: 28 JUN 95

REVISION

APPR. BY:

SCALE: 1=8

1114-R07A-72326

REV.	DATE	DESCRIPTION	BY	APPR.





# Section 3: Electrical Installation

**Reference Drawings:** System Schematic - Single Face Display . . . . . **Drawing B-44569**  
System Schematic - 2V Display . . . . . **Drawing B-44570**

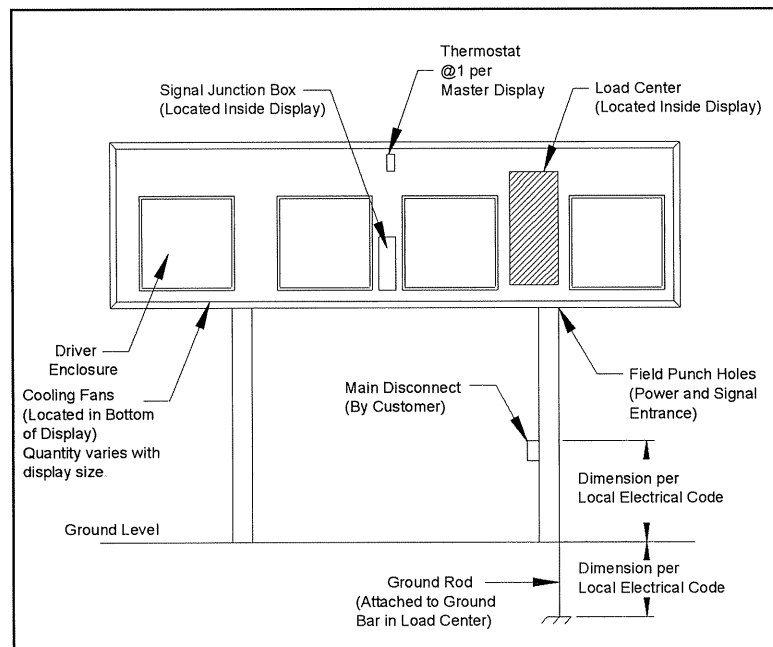
Refer to **Figure 2** for a typical layout of the electrical components within a 16 x 64 matrix display. Electrical component locations may vary with display size.

Refer to **Drawings B-44569** and **B-44570** for the typical system schematics for single face and 2V displays.

## 3.1 Prop Rods

Prop rods are stored in the master display behind the left most lampbank for shipment. The prop rods secure the socket panels open for front access to display electronics. Secure the end of the prop rod with the cotter pin into the pre-drilled holes in the bottom angle of the display. Secure the rod “T” shaped end to the bracket on the rear of the socket panel.

Prop rods are for safety use. Any deviation from their recommended use may cause serious bodily injury or damage to the display.



**Figure 2:** Component Locations (Shown for a 16x64 Matrix Display)

## 3.2 Grounding

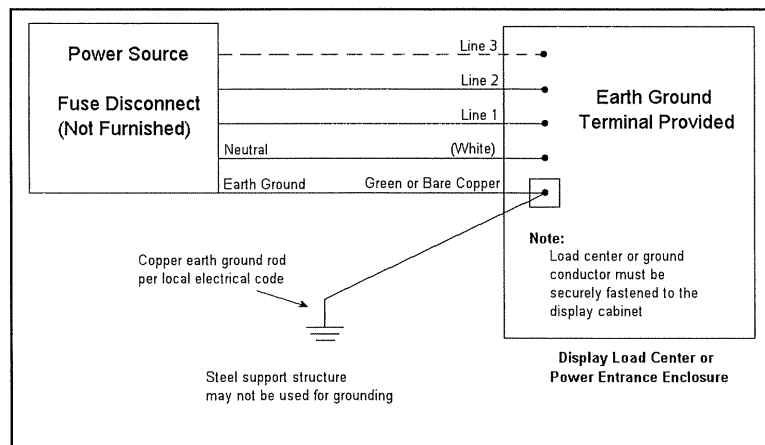
Proper grounding is necessary for reliable equipment operation. It also serves to provide some protection to the equipment from damaging electrical disturbances and lighting. If the grounding methods outlined below are not adhered to, the warranty will be void.

The steel support structure for the display cannot be used as grounding. The support is generally imbedded in concrete, and if in earth, the steel is either primed or it corrodes, making it a poor ground.

The two options for power installations, new power installations and existing power installations, differ slightly. Detailed explanations are given in the following.

### New Power Installation

The display has built-in surge protection. However, for this to be effective, the display must be properly earth grounded. **Figure 3** illustrates the proper power and grounding installation, showing an earth ground conductor from the power source. This method should be used whenever a new installation needs to be done for a display.



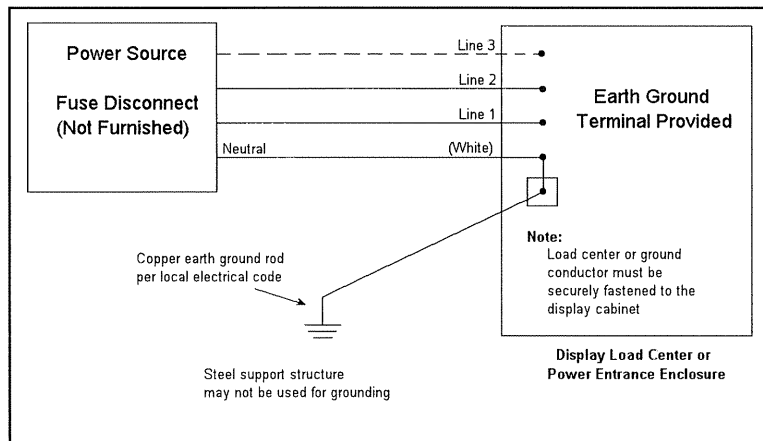
**Figure 3:** New Power Installation (120/308 3-Phase Installations)

Please note that this installation shows an earth ground conductor from the first point of disconnect or power source to the display location. The earth ground conductor must then be tied securely to the display cabinet via the load center, or in some cases directly to the cabinet. Another conductor is then run from this termination to a copper earth ground rod making certain that the termination to the ground rod is secure. This termination should be made with a brass or copper connection. The earth ground rod should be the diameter and length appropriate for the local electrical code. The earth ground conductor should be of the same size as the line and neutral conductors or no less than one size under these conductors.

### Existing Power Installation

In many cases, displays will be installed where it is advantageous to use an existing power installation. These existing power installations may not have an earth ground conductor. If this is the situation, the earth grounding should be done as outlined in **Figure 4**.

If new power is being pulled to the display, the new power installation method (**Figure 3**) using an earth ground conductor from the source is recommended. The existing power installation method used in **Figure 4** is not as effective in protecting equipment as the method in **Figure 3**. In **Figure 4**, the neutral conductor must be tied to the ground terminal provided in the load center in the power entrance enclosure. A conductor size equal to the neutral needs to be run from the terminal to an earth ground rod in accordance with local codes.



**Figure 4:** Existing Power Installation (120/208 3-Phase Installation)

## 3.3 Driver/Module Numbering Convention

The list and table below show the driver number convention. Power and signal wires, signal junction terminal blocks and load center breaker assignments will be labeled with the number of the driver to which they are connected, preceded by the identifier prefix “A” (where “A”

designates a module driver). On one line displays, each driver controls a 7x16 array of lamps. On two line displays, each driver controls an 8x16 array of lamps.

### 16x96 Matrix Display - Front View

A101	A102	A103	A104	A105	A106
A201	A202	A203	A204	A205	A206

- Labeling reference begins with the upper left driver/module and increments to the right and down from that point, independent of display size (module drivers are designated by the prefix "A"). A101 represents the upper left display driver.
- The *hundreds digit* indicates the "line" number of the display. A101 through A106 together make up the first display line, and A201 through A206 make up the second display line.

**Example:** A 16x64 matrix display will include drivers A101 through A104 and drivers A201 through A204.

## 3.4 Electrical Service Requirements

**Reference Drawing:** Surge Suppressor Connections . . . . . **Drawing A-74902**

The load center is provided internally for display power distribution to the driver circuits. Refer to the tables below for electrical service requirements. **Note:** All electrical service requirements listed in these tables are calculated based on the maximum wattage lamp offered for each display size. The installer is to supply an external mounted fused main disconnect(s) and wire to the load center. The installer must field punch a hole or holes in the cabinet at the appropriate location for power cable entrance to load center.

The load center is provided in the master display cabinet. Single load centers are always located to the left of the right-most lamp driver enclosure assembly. When a second load center is provided, it will be found to the left of the first load center (between two lamp driver enclosure assemblies). When a second load center is provided, two externally mounted fused main disconnects are required. Refer to the tables below for the number of disconnects required for your particular application.

**Note:** Surge Suppressors are installed in the load center(s) but are not hooked up. They *must* be connected when the main power is hooked up to the load center. Refer to **Drawing A-74902** for the proper connections.

Single Face Displays					
Display Size	Number of Drivers	18" Character 15/30 Watt Lamp		21" & 24" Character 30/33 Watt Lamp	
		Total Amps, 120/208 3 Ø	Number of Breaker Boxes/Disconnects	Total Amps, 120/208 3 Ø	Number of Breaker Boxes/Disconnects
732	2	28	1	32	1
748	3	28	1	32	1
764	4	42	1	48	1
780	5	56	1	64	1
796	6	56	1	64	1
7112	7	70	1	n/a	n/a

1648	6	64	1	71	1
1664	8	96	1	106	1
1680	10	112	1	124	1
1696	12	128	1	141	1
16112	14	160	1	n/a	n/a

2V Displays					
Display Size	Number of Drivers	18" Character 15/30 Watt Lamp		21" & 24" Character 30/33 Watt Lamp	
		Total Amps, 120/208 3 Ø	Number of Breaker Boxes/Disconnects	Total Amps, 120/208 3 Ø	Number of Breaker Boxes/Disconnects
732	2	56	1	62	1
748	3	56	1	62	1
764	4	84	1	93	1
780	5	112	1	124	1
796	6	56 56	2	62 62	2
7112	7	84 84	2	n/a	n/a
1648	6	128	1	144	1
1664	8	192	1	216	1
1680	10	224	1	144 144	2
1696	12	128 128	2	144 144	2
16112	14	160 160	2	n/a	n/a

For information regarding display power demands on the lamps, refer to the following tables.

Single Face Displays						
Display Size	15 Watt Lamp		30 Watt Lamp		33 Watt Lamp	
	Average Watt	Maximum Watts	Average Watt	Maximum Watts	Average Watts	Maximum Watts
732	1,344	3,360	2,688	6,720	2,957	7,392
748	2,016	5,040	4,032	10,080	4,435	11,088
764	2,688	6,720	5,376	13,440	5,914	14,784
780	3,360	8,400	6,720	16,800	7,392	18,480
796	4,032	10,080	8,064	20,160	8,870	22,176
7112	4,704	11,760	9,408	23,520	10,349	25,872
1648	4,608	11,520	9,216	23,040	10,138	25,344
1664	6,144	15,360	12,288	30,720	13,517	33,792
1680	7,680	19,200	15,360	38,400	16,896	42,240
1696	9,216	23,040	18,432	46,080	20,275	50,688
16112	10,752	26,880	21,504	53,760	23,654	59,136

2V Displays						
Display Size	15 Watt Lamp		30 Watt Lamp		33 Watt Lamp	
	Average Watt	Maximum Watts	Average Watt	Maximum Watts	Average Watts	Maximum Watts
732	2,688	6,720	5,376	13,440	5,914	14,784
748	4,032	10,080	8,064	20,160	8,870	22,176
764	5,376	13,440	10,752	26,880	11,827	29,586
780	6,720	16,800	13,440	33,600	14,784	36,960
796	8,064	20,160	16,128	40,320	17,741	44,352
7112	9,408	23,520	18,816	47,040	20,698	51,744

1648	9,216	23,040	18,432	46,080	20,275	50,688
1664	12,288	30,720	24,576	61,440	27,034	67,584
1680	15,360	38,400	30,720	76,800	33,792	84,480
1696	18,432	46,080	36,864	92,160	40,550	101,376
16112	21,504	53,760	43,008	107,520	47,309	118,272

### 3.5 Load Center Assignments

**Reference Drawing:** Lamp Driver, 16 col., w/ Fan . . . . . **Drawing A-37070**

Electrical distribution from the load center to the drivers is shown in **Drawing A-37070**. **Note:** Each driver is fed by two or four breakers, depending on whether it is a single face or a 2V display. All power wires are labeled with a number in the format **A** (as illustrated in the following set of tables) where **A** indicates the driver/module number.

This table is for a 16x64 single face display. It has a 125 amp load center and uses 16 of 20 positions. Note that two breakers feed each driver.

Breaker	Wire	Driver	Wire	Breaker
1	A101 (Black)	A101	A101 (Red)	2
3	A102 (Black)	A102	A102 (Red)	4
5	A103 (Black)	A103	A103 (Red)	6
7	A104 (Black)	A104	A104 (Red)	8
9	A201 (Black)	A201	A201 (Red)	10
11	A202 (Black)	A202	A202 (Red)	12
13	A203 (Black)	A203	A203 (Red)	14
15	A204 (Black)	A204	A204 (Red)	16
19	Not Used		Not Used	20

This example is for a 16x64 2V display. It has a 225 amp load center and uses 32 of 42 positions. Note that four breakers feed each driver.

Breaker	Wire	Driver	Wire	Breaker
1	A101 (Black)	A101	A101 (Blue)	2
3	A101 (Red)		A101 (Orange)	4
5	A102 (Black)	A102	A102 (Blue)	6
7	A102 (Red)		A102 (Orange)	8
9	A103 (Black)	A103	A103 (Blue)	10
11	A103 (Red)		A103 (Orange)	12
13	A104 (Black)	A104	A104 (Blue)	14
15	A104 (Red)		A104 (Orange)	16
17	A201 (Black)	A201	A201 (Blue)	18
19	A201 (Red)		A201 (Orange)	20
21	A202 (Black)	A202	A202 (Blue)	22
23	A202 (Red)		A202 (Orange)	24
25	A203 (Black)	A203	A203 (Blue)	26
27	A203 (Red)		A203 (Orange)	28
29	A204 (Black)	A204	A204 (Blue)	30
31	A204 (Red)		A204 (Orange)	32

41	Not Used	Not Used	42
----	----------	----------	----

1. A list similar to one of the above is located inside the load center door.
2. The square D 20 amp QA breaker is UL listed for 1 or 2 #12 AWG wire(s).
3. Breakers above the dark solid line within the tables are for line one (upper 8 rows of lamps) of the display. Breakers below the solid line are for line two (lower 8 rows of lamps) of the display.

### **3.6 Control Cable**

---

Daktronics has identified four general categories for control cable. Refer to the controller installation and maintenance manual for more detailed discussions and recommended selections for control cable. Unshielded cable is most commonly used for installation in conduit. The table in **Section 3.6.5** lists the requirements for these cable types and their recommended conduit sizes.

#### **3.6.1 Unshielded Cable**

---

Unshielded 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.
- In plastic conduit away from interference signals.
- Inside buildings, if cable is not in conduit, keep away from interference signals.

With interference signals such as power conductors, intercom, etc., a two foot separation should be maintained.

#### **3.6.2 Shielded Cable**

---

Shielded cable consists of a paired, overall shielded cable with stranded wire. This cable may be subjected to interference signals and need not have a dedicated metallic conduit. The cable can be subjected to some flexing after installation. Cable is not for direct burial. Do not run this in conduit with power conductors.

#### **3.6.3 Direct Burial Cable**

---

Direct burial cable consists of a paired, overall shielded, solid wire, direct burial cable. It is intended that this cable type be used underground without conduit.

#### **3.6.4 High Voltage Insulation Cable**

---

High voltage insulation cable consists of individually shielded pairs of stranded wires. The insulation rating is 600V and 60 degrees Celsius. Cable routing may be with power conductors. This category is discouraged when other routing is possible. The National Electrical Code has specific requirements concerning the voltage rating of cables with power conductors. All applicable electrical and building codes must be followed.

### 3.6.5 Signal Conduit Sizing

---

The table below contains recommended conduit sizes for the signal wiring between the controller junction box and the display junction box. These recommendations are based on conduit runs not more than 100 feet of straight line conduit. Conduit runs of more than 100 feet should have pull boxes at 100 foot intervals. If signal cables other than those recommended by Daktronics are used, conduit sizes may have to be adjusted accordingly. A 90 degree bend is the equivalent of 30 feet of straight conduit.

Display Size	Required # Pair With Spare	Unshielded			Shielded		
		W1077	W1152	Conduit Size	W1077	W1153	Conduit Size
732	3	3	0	3/4	3	0	3/4
748	4	4	0	3/4	4	0	3/4
764	5	0	1	3/4	0	1	3/4
780	6	0	1	3/4	0	1	3/4
796	7	0	1	3/4	0	1	3/4
7112	8	0	1	3/4	0	1	3/4
1648	7	0	1	3/4	0	1	3/4
1664	9	0	1	3/4	0	1	3/4
1680	12	0	1	3/4	1	1	3/4
1696	14	2	1	3/4	3	1	3/4
16112	16	4	1	3/4	5	1	1

- Daktronics PN W1077 = Belden PN 8451 with an outside diameter of 0.135 inches. 1 pair, 22 AWG. W1077 is a shielded cable; however, it is cost effective for unshielded applications as well.
- Daktronics PN W1152 = International Wire Company PN IWC-1222BA with an outside diameter of 0.38 inches. 12 pair, 22AWG.
- Daktronics PN W1153 = Alpha PN 5489/11 with an outside diameter of 0.42 inches. 11 pair, 22 AWG.
- Cable requirement specified includes adequate spares.

### 3.6.6 Signal Cable Termination at Display

---

Refer to **Figure 2 (Section 3.1)**. The signal junction box is located within the master display, toward the center of the cabinet. The installer must field punch a hole in the cabinet at the appropriate location for the signal cable entrance to the junction box.

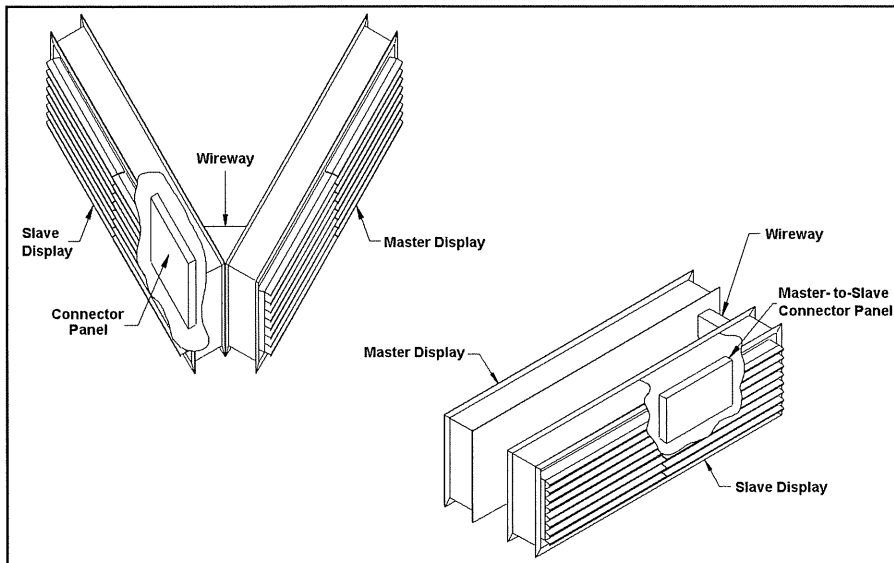
### 3.6.7 Signal Junction Box Terminations

---

**Reference Drawing:** Assy, Signal, 7 High Display . . . . . **Drawing A-42461**

**Drawing A-42461** shows examples of a one and a two line display signal junction box. The signal wires for the drivers in the first line of the display are connected to TB31. The signal wires for the second line are connected to TB32. Each signal pair location is labeled with the driver number it corresponds to. Connect the signal wire to the junction box in correspondence to their connection orientation at the controller (refer to appropriate controller manual). Be sure to note the + and - signal orientation.

### 3.7 Master/Slave Connection



**Figure 5:** Connector Panel Location

The slave unit is electrically connected to the master unit by means of an interconnect harness provided in the master unit.

**Figure 5** shows two ways to mount the master and the slave units. The interconnect harness is designed to run from the left end of the master display to the right end of the slave display. The display angle may be from 0 to 90 degrees.

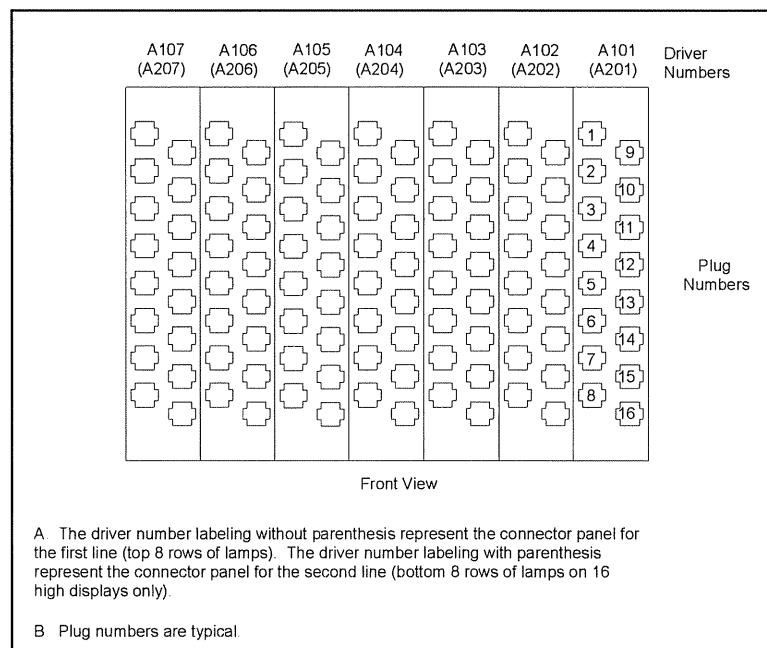
When mounted back to back, the maximum distance between displays cannot exceed 24." This is all that the electrical harness will allow.

The interconnect harness plugs into the slave unit at a connector panel. The master-to-slave connector panel is located in the slave unit, behind the right most lampbank, as shown in **Figure 5**. To access the connector panel, remove the two screws securing the socket panel, and swing the panel up. Secure socket panel with a prop rod(s).

**Figure 6** shows the connector panel numbering system. The 2V interconnect harnesses will have the plugs marked with the appropriate connector panel jack number and lamp driver number (1 through 7).

A sheet metal wireway is provided with the display to protect the interconnect harness. The wireway is stored in the slave display behind the left most lampbank for shipment. The installer must install

this sheet wireway to insure adequate protection of the electrical wiring between the sides of the display. This is a shroud only. It is not designed to provide any structural support.



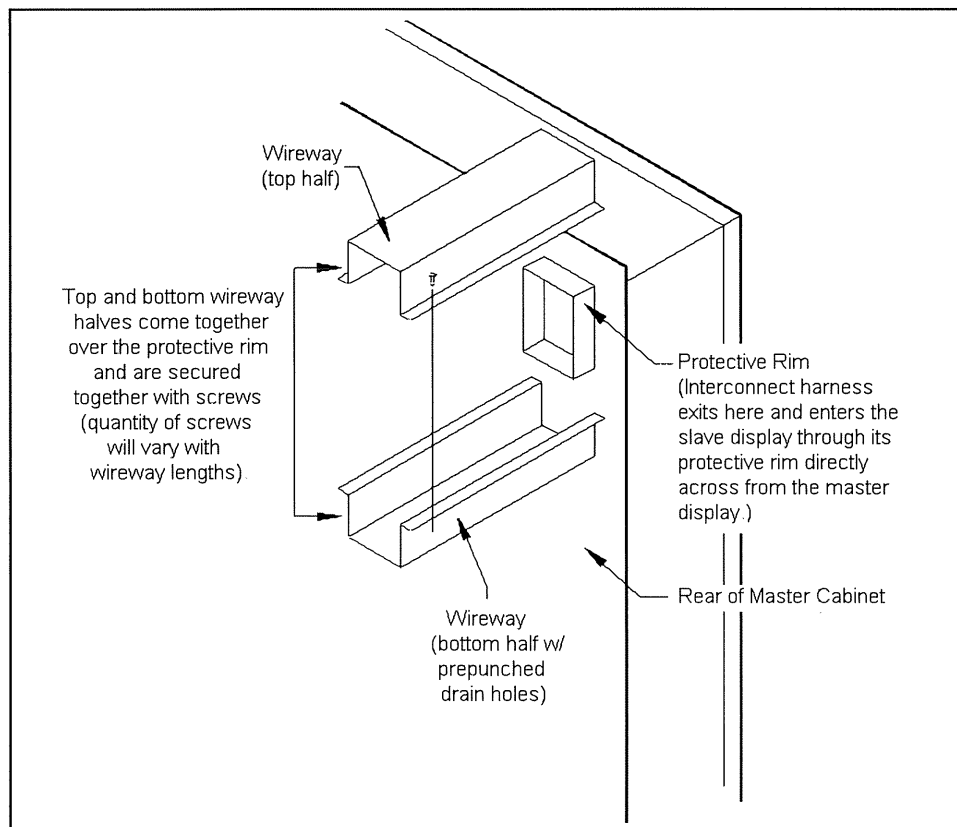
**Figure 6:** Connector Panel Layout



The wireway top and bottom halves come ready to install a 24" long. Refer to **Figure 7** for an illustration of the wireway top and bottom halves, and the protective rim on the master cabinet. The installer is responsible for cutting the wireway to the required length. This can be done using a pair of sheet metal snips.

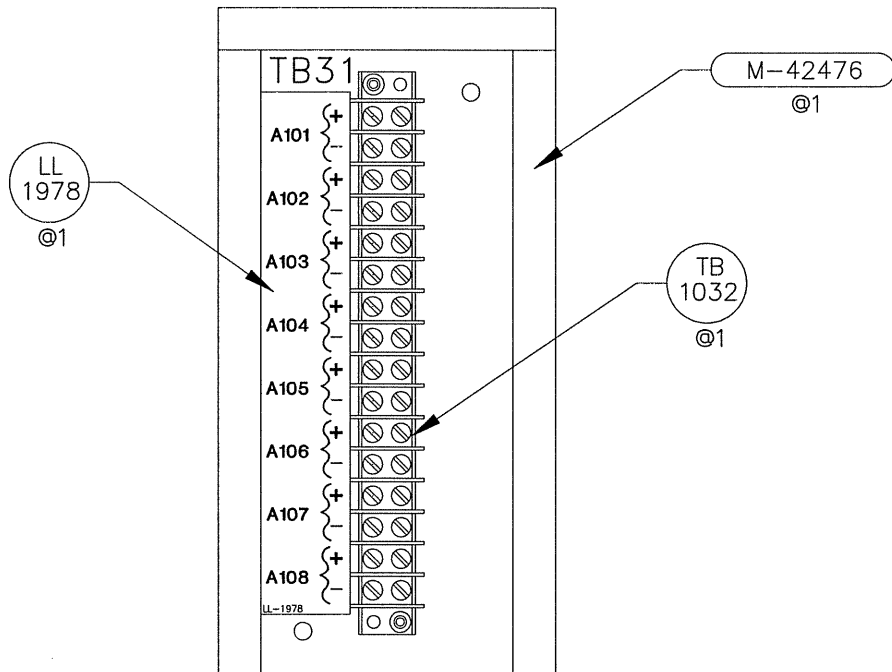
The procedure for attaching the master and slave display is as follows:

1. Attach the master and slave units to the support structure.
2. Remove the protective rim from the precut hole in the rear of each display and reinstall with flanges protruding out of the rear of the display.
3. Route the interconnect harness through the master unit and into the slave unit. Snap the plugs into the appropriate jack of the connector panel in the slave unit. Start with the lowest numbered section and work from the bottom of the panel to the top. Start with jack number 8 and complete by columns (i.e., start with jack number 8 in panel section number A101 (A201). Connect plugs from 8 to 1, then move from 16 to 9. Continue on to panel section A102 (A202), etc., following the same sequence until all connections are made).
4. Determine the length of wireway required and cut it to this length.
5. Install the bottom half (with drain holes) and the top half of the wireway over the protective rim.
6. Attach the top and bottom halves together along the *outer flanges only*, using the screws provided.

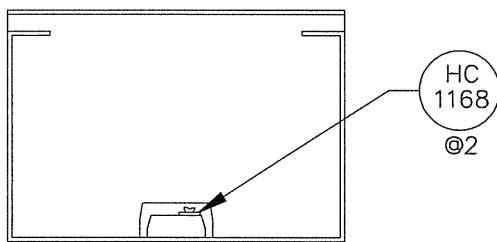


**Figure 7:** Double-Sided (2V) Wireway Installation





FRONT VIEW

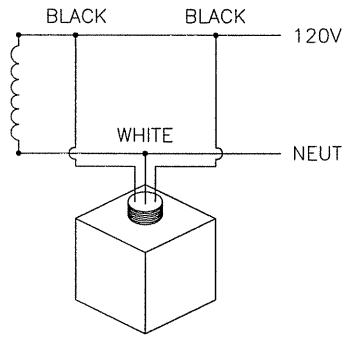


BOTTOM VIEW

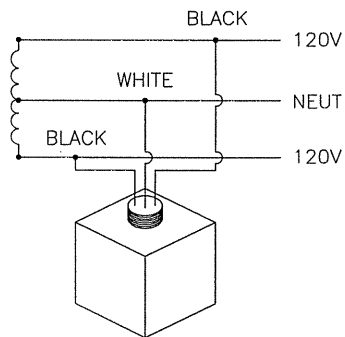
NOTE:  
ORIENTATION OF  
RIVET AND  
PLACEMENT OF  
FLAT WASHER !!

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TITLE: ASSY, SIGNAL, 7 HIGH DISPLAY			
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REVISION	APPR. BY:	1082-E10A-42461	
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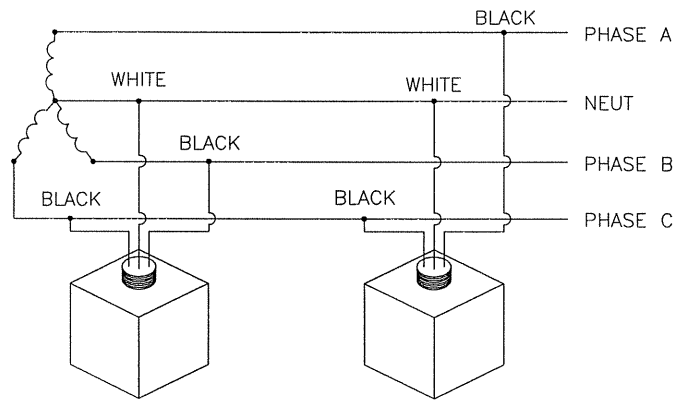
REV.	DATE	DESCRIPTION	BY	APPR.



TWO--WIRE SERVICE UP TO 175VAC



SINGLE--PHASE THREE--WIRE 120/240VAC



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

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DAKTRONICS, INC. BROOKINGS, SD 57006

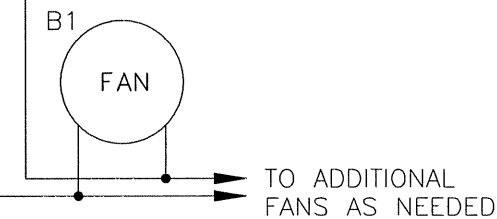
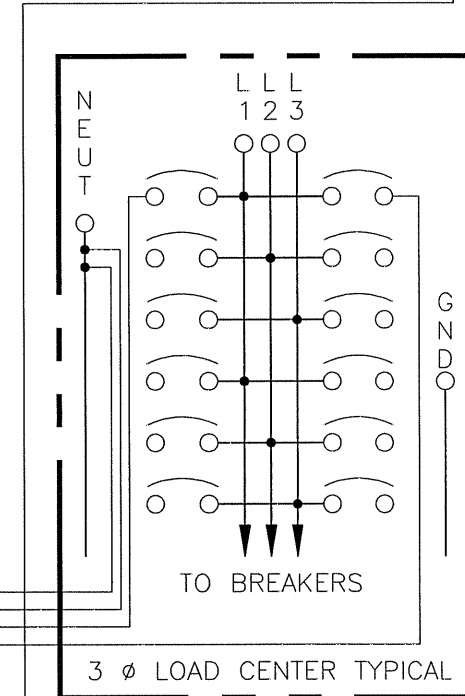
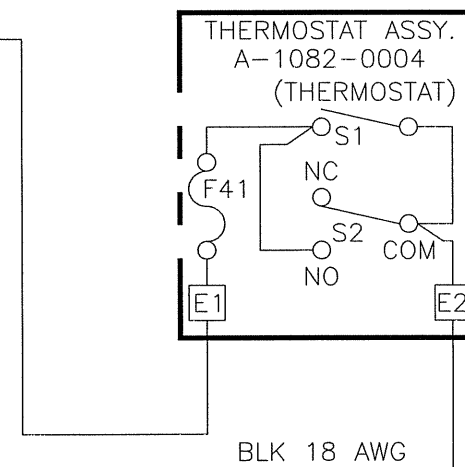
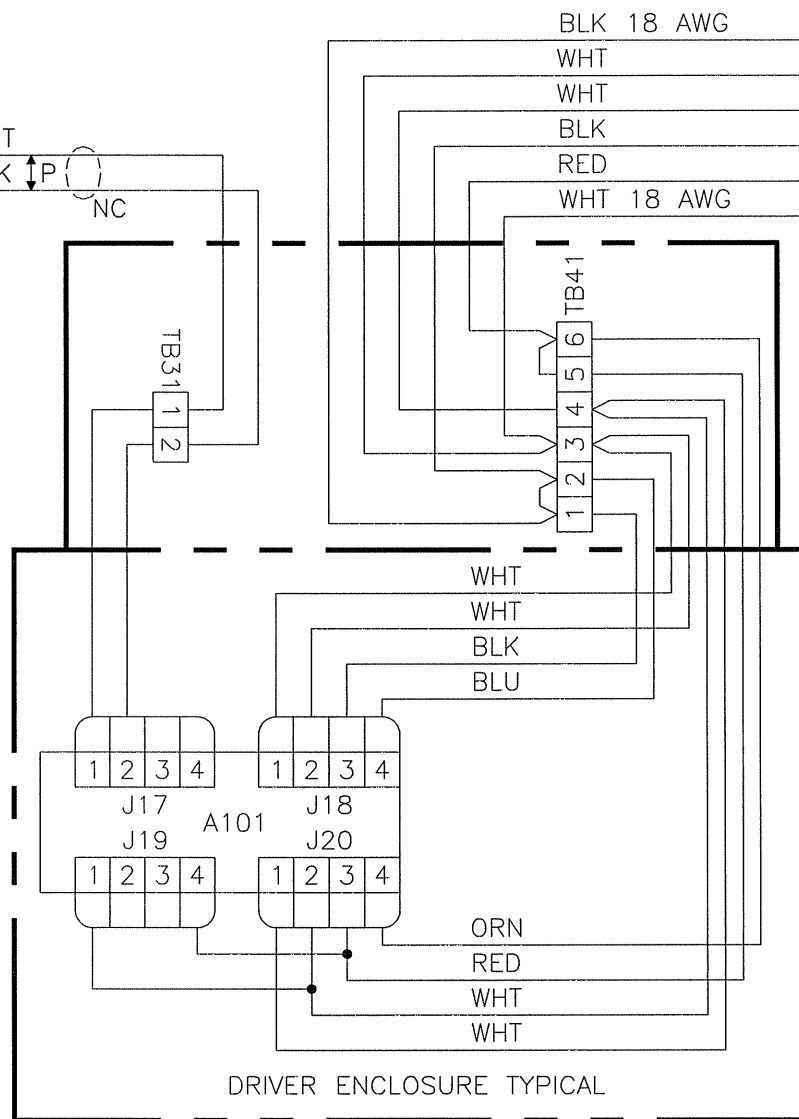
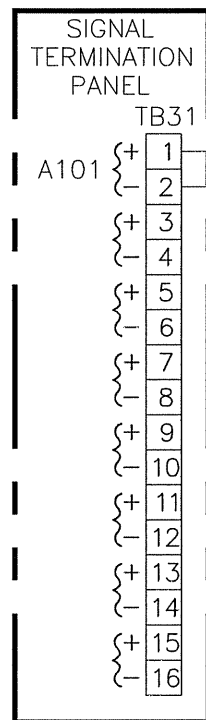
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DES. BY: DRAWN BY: DOK DATE: 09-13-95

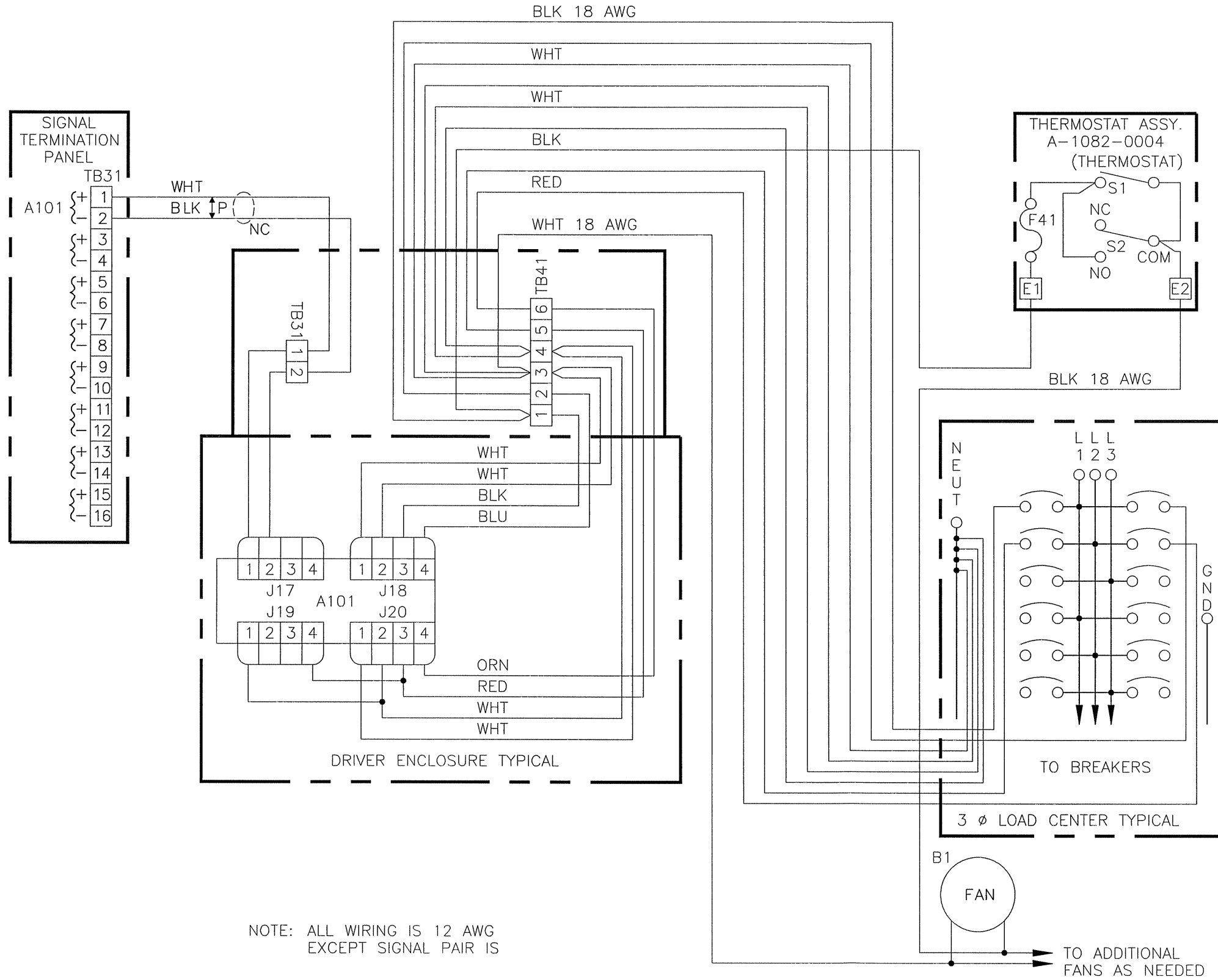
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REVISION	APPR. BY:	7000-P08A-74902
	SCALE: 1=20	



NOTE: ALL WIRING IS 12 AWG EXCEPT SIGNAL PAIR IS

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100 SERIES MESSAGE CENTERS				
SCHEMATIC, 100 SERIES 7 HIGH, SF				
DRAWING NUMBER: 1082-R03B-44569		SCALE: 1=1		
DESIGNED: TWOODARD		DRAWN: TWOODARD		
DATE: 03SEPT90		DATE: 03SEPT90		
CHECKED:		APPROVED:		
DATE:		DATE:		

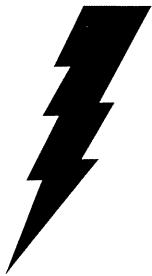


NOTE: ALL WIRING IS 12 AWG EXCEPT SIGNAL PAIR IS

REV.	DATE	DESCRIPTION	MADE	APPR.
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100 SERIES MESSAGE CENTERS				
SCHEMATIC, 100 SERIES 7 HIGH, DF				
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DESIGNED: TWOODARD		DRAWN: TWOODARD		
DATE: 03SEPT90		DATE: 03SEPT90		
CHECKED:		APPROVED:		
DATE:		DATE:		

# Section 4: Maintenance & Troubleshooting

---



## IMPORTANT NOTES:

1. **Disconnect power before any repair or maintenance work is done on the display!**
2. **Any access to internal display electronics must be made by qualified service personnel.**
3. **Disconnect power when the display is not in use.**

### 4.1 Lamp Testing and Replacement

---

1. Refer to the controller operator's manual for the lamp test procedure to determine which lamps need replacing.
2. Power to lamps must be off when replacing lamps to avoid damaging the driver.
3. Replace defective lamps only with Daktronics approved lamps of the same wattage.

*Note: Light dividers may be removed for easier lamp access. Remove the screws at the top and bottom of the light divider and lift off.*

### 4.2 Socket Replacement

---

1. Remove the two or three 1/4 turn fasteners securing the socket panel and swing the panel up. **Note:** On all 16 high models, there will be two socket panels.
2. Secure the socket panel(s) with the prop rod(s).
3. Remove silicone from the socket.
4. Remove wires to the bad socket.
5. Snap the socket out of the panel by pressing together the ends of the silver spring strip and pressing toward the front of the panel.
6. Remove the lamp in the bad socket.
7. Snap the new socket into place.
8. Replace the lamp, rewire, reapply silicone and secure the socket panel.

### 4.3 Lamp Driver

---

**Reference Drawings:** Color Code, 9-Pin Connectors . . . . . **Drawing A-12760**  
Lamp Driver, 16 col., w/ Fan . . . . . **Drawing A-37070**

The lamps of the incandescent displays are switched by a unit called a lamp driver. This unit receives display information from the controller on a pair of wires and converts it to the drive signals, which switch the lamps. Refer to **Drawing A-12760** for the layout of this unit.

**Drawing A-37070** in **Section 3** shows the wiring to the lamp driver.

Refer to **Section 4.7** if a malfunction of the display occurs. If replacement of a lamp driver is then required, proceed as indicated in the following steps:

1. Remove the two or three 1/4 turn fasteners securing the bottom of the socket panel, and swing the panel up. **Note:** On 16 high models, there will be two socket panels.

2. Secure the socket panel(s) with the prop rod(s).
3. Remove the screws fastening the cover on the driver enclosure and lift off the cover.
4. Unplug wiring connections (J-1 through J-20). Refer to **Drawing A-12760**.
5. Remove the two wing nuts in the top corners of the enclosure and remove the driver.
6. Reverse **Steps 1** through **6** to install the new driver.

#### 4.4 Fuse Replacement

---

**Reference Drawings:** Lamp Driver, 16 col., w/Fan . . . . . **Drawing A-37070**

Refer to **Drawing A-37070** in **Section 3** for a visual illustration of the lamp driver and its fuses. To replace a blown fuse, follow these steps:

1. Gain access to the driver as stated in **Section 4.3, Steps 1-3**.
2. Remove the two driver cover wing nuts and lift off the cover to gain access to the fuses.
3. Replace the blown fuses.

#### 4.5 Display Cooling System

---

The display cooling system consists of a fan control thermostat assembly and cooling fan(s). The thermostat assembly is located at the top and the center of the master display cabinet. It is stud-mounted to the display back sheet. Refer to **Figure 2 (Section 3.1)** for a typical thermostat location. The first breaker to driver A101 at the load center provides power to the fans and thermostat.

The thermostat assembly consists of a fuse (MDL-2 ½ amp, 125 volt), temperature sensor, momentary switch and an enclosure. The temperature sensor activates the display cooling fans to turn on at 140 degrees Fahrenheit and to turn off at 110 degrees Fahrenheit. The momentary switch is used to check fan operation. Check fans periodically to ensure they are running smoothly.

The stainless steel ball bearing fans provide cooling to the interior of the master cabinet only and are thermostatically controlled. The fan air inlets are located in the bottom of the cabinet. The fans pressurize the cabinet and force warm air from inside the cabinet out four small holes near each lamp. *Airflow cannot be restricted to the bottom of the display cabinet.* If the display frame is “skinned” over, adequate ventilation ports must be provided throughout the skin. Holes in the skin must be equal to the size and quantity of the holes provided in the Daktronics cabinet. Holes must be located in the bottom of the display cabinet.

A faulty thermostat or cooling fan must be repaired or replaced as soon as possible to extend the life of the display’s electrical components. If a cooling fan or fans in the bottom of the display should fail, use the following guidelines to locate and correct the malfunction.

1. Make sure the breakers to driver A101 (refer to the following table for A101 location) are in the ON position and are not blown.
2. Remove the two screws securing the appropriate socket panel(s), and swing panel(s) up. Secure panel(s) with prop rod(s).
3. Push the momentary switch on the thermostat assembly to see if fans are activated. If one or more fans operate while others do not, replace the fans that do not work.



4. If the momentary switch fails to activate any of the fans, remove the cover from the thermostat assembly and check for a blown fuse. Replace fuse if necessary (MDL-2 ½ amp, 125 volt).
5. If the momentary switch activates all the fans, test the thermostat by using a soldering iron to heat up the thermostat (heat the metal behind the ½" hole punched in the cover). If the fans do not activate by heating up the thermostat, the thermostat assembly should be replaced.

If problems with the display cooling system persist, contact a Daktronics customer service representative. The following table lists the number of fans required for each display size.

Display Size	18" Character Number Of Fans	21" Character Number Of Fans	24" Character Number of Fans
732	1	1	1
748	1	1	2
764	2	2	2
780	2	2	3
796	2	3	--
7112	3	--	--
1648	--	2	3
1664	2	3	4
1680	2	4	5
1696	3	5	--
16112	3	--	--

#### 4.6 Structural Inspection

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

#### 4.7 Troubleshooting

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This section contains some symptoms that may be encountered with the 100 Series display. Possible remedies are provided. This list does not include every possible problem, but does represent some of the more common situations that may occur.

Problem	Possible Solutions
Single lamps do not light.	<ul style="list-style-type: none"> <li>• Inspect lamps, sockets and wires.</li> <li>• Switch the plugs on the driver. If the problem moves, the driver is defective and needs to be replaced.</li> </ul>
Lamps stay lit on both faces.	<ul style="list-style-type: none"> <li>• Switch the plugs on the driver. If the problem moves, the driver is defective and needs to be replaced.</li> </ul>

Columns do not light correctly.	<ul style="list-style-type: none"> <li>• Check the common (black) wire to the column.</li> <li>• Check the breaker in the load center.</li> <li>• Check the fuse for that column in the driver.</li> <li>• Check the power connection to the driver.</li> <li>• Check the main breaker, disconnect, power source and power terminal in the display.</li> </ul>
Columns turn on out of sequence.	<ul style="list-style-type: none"> <li>• Check the plugs at the driver board.</li> </ul>
Display intensity cannot be controlled manually.	<ul style="list-style-type: none"> <li>• Check the wiring to the circuit card in the temperature sensor housing.</li> <li>• Check the photocell for obstruction.</li> </ul>

#### 4.8 Replacement Parts List

Parts Description	Part Number
Driver, 16 col., w/ Fan	0A-1033-0100
Fan: 240 CFM, 115 VAC, 32W, 60 HZ, 6" Dia.	B-1007
Fan Finger Guard	HS-1130
Fuse; AGC-1/2, 1/2A, 250V	F-1000
Fuse; AGC-10, 10A, 32V, Glass	F-1006
Fuse; Thermostat Assembly, MDL-2 1/2A, 125V	F-1002
Lamp; 33 Watt, 33A19 (clear)	DS-1075
Lamp; 30 Watt, 30A15 (clear)	DS-1076
Lamp; 30 Watt 30R20, 2000 Hrs.	DS-1094
Lamp; 30 Watt, 30R20, 6000 Hrs.	DS-1126
Lamp; 15 Watt, 15S14 (clear)	DS-1248
Socket; Med Base Lamp	X-1046
Thermostat Assembly	0A-1082-0004

#### 4.9 Unit Exchange/Replacement Procedure

Daktronics unique exchange program offers our clients the quickest, most economical way of receiving product repairs. If a component has failed, Daktronics will send the customer a replacement. The customer, in turn, sends the failed components to Daktronics. This not only saves money, but also decreases the time that the display is inoperable. Daktronics offers repair and return on a timely basis. In urgent situations, every attempt is made to ship by the fastest transit method available.

- 1. Packaging for Return:** Package and pad the item well to prevent damage during shipment. Electronic components such as printed circuit boards should either be installed in an enclosure or placed in an anti-static bag before boxing.

Please enclose your name and address along with a list of all the symptoms. Please be as specific as possible.

- 2. Lampbank and Driver Packaging Instructions:** Lampbanks and drivers should be placed in a static-free enclosure for return shipping. An anti-static convoluted foam packing is available from Daktronics, part number PK-1135 for your use if needed. The shipping box (Daktronics part number PK-1006) should be used in conjunction with the foam.

- 3. Where to Send:** To return parts for service, contact your local representative prior to shipment to acquire a Return Material Authorization Number (RMA#). This will speed up the repair of your unit.

When returning defective items under the exchange program, please utilize the UPS Blue Return Tags found in the package containing the exchange unit sent from Daktronics. This will speed up the transaction and help avoid any confusion when the part is returned to Daktronics. **The defective item must be returned within 15 days of receiving a replacement part.** Using the UPS Blue Return tag immediately will eliminate the possibility of late charges being assessed against your account.

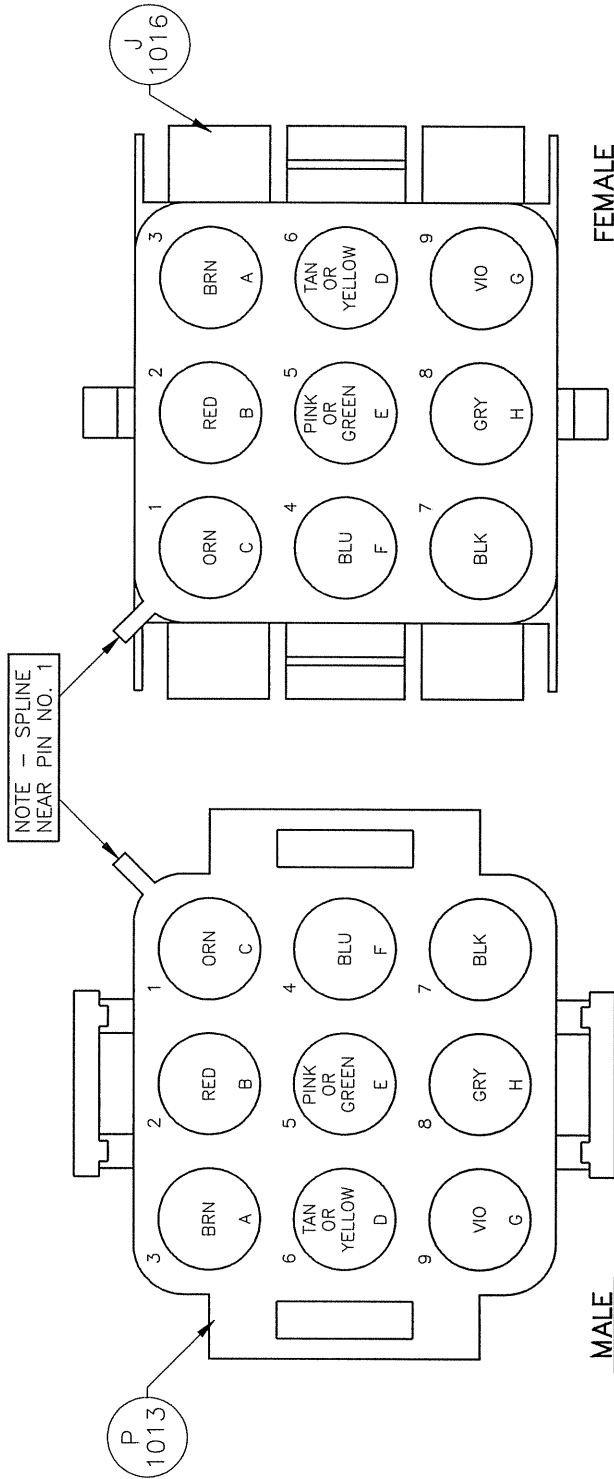
**Mail:** Daktronics, Inc., Customer Service  
PO Box 5128  
331 32nd Avenue  
Brookings, SD 57006

**Phone:** Toll Free: 1-800-843-9879  
or 1-605-697-4400

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

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





**REAR VIEWS**

**NOTES:**

- ON SOME APPLICATIONS, WHITE WIRE MAY BE SUBSTITUTED FOR ANY COLOR EXCEPT BLACK.
- GRAY WIRE (PIN NO. 8) IS OMITTED ON 8 WIRE LACED HARNESS.

PIN NO.	COLOR	SEGMENT
1	ORANGE	C
2	RED	B
3	BROWN	A
4	BLUE	F
5	PINK or GREEN	E
6	TAN or YELLOW	D
7	BLACK	COMMON
8	GRAY	H
9	VIOLET	G

REV	DATE	DESCRIPTION	BY	APPR.
3	4 APR 94	REDRAWN ON AUTO CAD AND A-SIZE-V DRAWING.	C FICK	
2	25 AUG 87	ADDED PINK & TAN TO COLOR CODE.	TOM O	
1	5 MAY 82	ADDED FEMALE AND SEGMENT NO.	?	

DAKTRONICS, INC. BROOKINGS, SD 57006

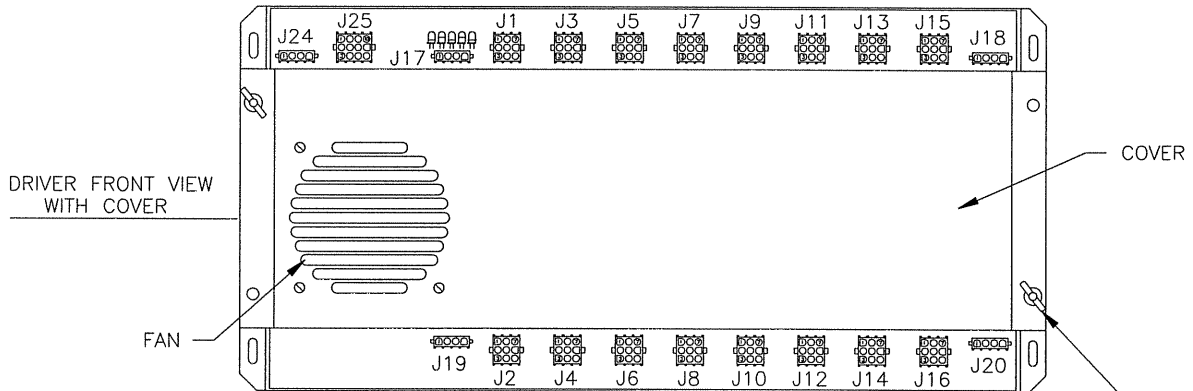
PROJ: SCOREBOARDS

TITLE: COLOR CODE, 9-PIN CONNECTORS

DES. BY: DRAWN BY: TOM OPPOLD DATE: 20 JULY 87

REVISION APPR. BY: SCALE: NONE

1009-R04A-12760



REMOVE TWO WING NUTS TO REMOVE COVER AND GAIN ACCESS TO FUSES.

J24

PIN	FUNCTION	PIN	FUNCTION
1	NETWORK+	7	ADDR 3 -
2	NETWORK-	8	NTW GND -
3	NTWREF-P	9	NTW GND -
4	ADDR 0 -	10	FAN SW HOT
5	ADDR 1 -	11	FAN HOT
6	ADDR 2 -	12	NEUT

J17

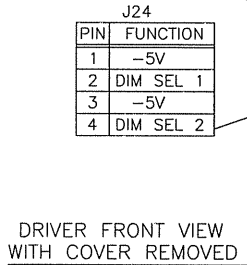
PIN	FUNCTION
1	SIGNAL +
2	SIGNAL -
3	N.C.
4	N.C.

J1 - J16

PIN	FUNCTION
1	SEG C
2	SEG B
3	SEG A
4	SEG F
5	SEG E
6	SEG D
7	COMMON
8	SEG H
9	SEG G

J18

PIN	FUNCTION
1	LAMP NEUT
2	LAMP NEUT
3	LAMP HOT 1, 3, 5, 7
4	LAMP HOT 2, 4, 6, 8



J24

PIN	FUNCTION
1	-5V
2	DIM SEL 1
3	-5V
4	DIM SEL 2

J23

PIN	FUNCTION
1	FAN SW HOT
2	N.C.
3	FAN HOT
4	NEUT

J19

PIN	FUNCTION
1	NEUTRAL
2	NEUTRAL
3	120V HOT
4	120V HOT

J20

PIN	FUNCTION
1	LAMP NEUT
2	LAMP NEUT
3	LAMP HOT 9,11,13,15
4	LAMP HOT 10,12,14,16

PLUG FROM FAN IN COVER CONNECTS TO J23

F1 THRU F16 ARE TYPE AGC-10, DAKTRONICS PART NUMBER F-1006. F17 IS TYPE AGC-1/2, DAKTRONICS PART NUMBER F-1000

DAKTRONICS, INC. BROOKINGS, SD 57006				
2	29 APR 97	ADDED TABLES OF PINS AND FUNCTIONS.	AVB	AVB
1	5 MAR 91	CHANGED FROM "B" TO "A" SIZE DWG.	CF	
REV.	DATE	DESCRIPTION	BY	APPR.
		PROJ: MULTIPLEX CONTROLLERS		
		TITLE: LAMP DRIVER, 16 COL., W/FAN		
		DES. BY: JLH	DRAWN BY: JLH	DATE: 20 FEB 89
		REVISION	APPR BY:	
		SCALE: 1=5	1033-R04A-37070	