

Auto Racing Display Model CH-424

Installation & Service Manual

ED-5888

ED#5888 Project#1081 Rev.5 - 09 September 1999

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DAKTRONICS, INC.

Setting New Standards Worldwide

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Section 1: Introduction

1.1 How To Use This Manual

This manual is designed to explain installation and maintenance of the Daktronics CH-424 display. Details for display maintenance are also given. Setup of other control equipment or operation of the CHTS-300 timing console are not covered in this manual. 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.

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 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 scoreboard without the express written consent of Daktronics, Inc.

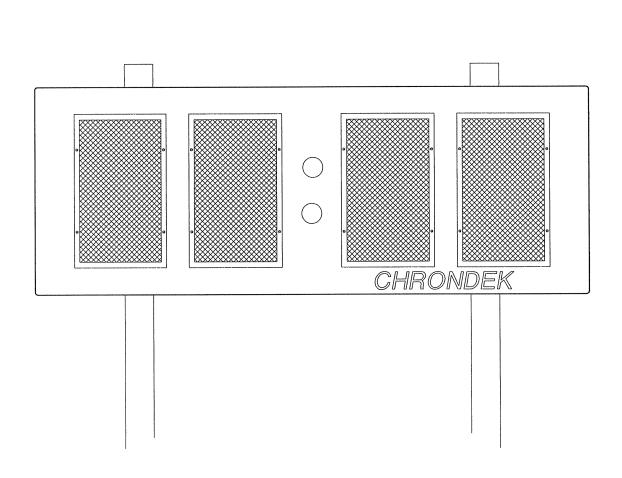
The box below illustrates Daktronics drawing numbering system. The drawing number "7087-P08A-69945" is how Daktronics identifies individual drawings. This number is located in the bottom right corner of the drawing. The manual refers to drawings by the last set of digits and the letter preceding them. In the example, the drawing would be referred to as **Drawing A-69945**. All reference drawings are inserted at the *end of the first section which references them*.

| | DAKTRONICS, INC | BROOKINGS, SD 57006 |
|----------|-----------------|---------------------|
| PROJ: | | |
| TITLE: | | |
| DES. BY: | DRAW | IBY: DATE: |
| | APPR.BY: | 7087-P08A-69945 |
| | SCALE: | 7007-P00A-09940 |

1.2 Display Overview

Reference Drawing: Display, CH-424 Drawing A-46375

Drawing A-46375 shows a Daktronics CH-424 display. The CH-424 display uses the Daktronics CHTS-300 timing console to display the lap number and lap time alternating on the same display.



OVERALL DIMENSIONS: 36" H x 96" x 11" D

DESCRIPTION

WEIGHT: 125 LBS.

REV.

DATE

POWER REQUIREMENTS: 120 VAC, 20 AMPS PER LINE, WITH 25W FROSTED LAMPS 120 VAC, 25 AMPS PER LINE, WITH 30W FROSTED, 30R20 REFLECTOR LAMPS

MAXIMUM POWER DEMAND: 2050 WATTS WITH 25W FROSTED LAMPS 2460 WATTS WITH 30W FROSTED, 30R20 REFLECTOR LAMPS

DIGITS ARE 24" HIGH, 4 x 7 MATRICES, WITH 25W FROSTED MED. BASE LAMPS OR 30W FROSTED, TYPE 30R20 REFLECTOR LAMPS.

| | | | DAKTRONICS, | INC. | BROOKINGS, | SD | 57006 | | |
|----|-------|-------------------------|---------------|---------|------------|----|----------|-----|-----------|
| | | PROJ: CHRONDEK DISPLAYS | | | | | | | |
| | | TITLE: DISPLAY, CH-424 | | | | | | | |
| | | DES. BY: CF DRAW | | DRAWN E | ey: CF | | DATE: 28 | FEB | 91 |
| | | REVISION | APPR. BY: AVB | | 1081-R | 20 | 1 - 1 C | 77 | _ |
| BY | APPR. | | SCALE: 1=15 | | 100 FR | JO | A-40 | 5/ | \supset |

Section 2: Installation

2.1 General System

The general procedure for installing the CH-424 display is as follows:

- Select beam and footing recommendations from the following table.
- Dig the footing holes and install the beams and footings.
- Route power and signal cables to the display and control locations.
- Mount the displays to the beams as described in Drawings A-46392, A-47224 and in Section 2.3.
- Route power and signal wires into the display as described in **Drawings A-46399**, **A-46410**, **A-115753**, and in **Section 2.4**.

Beam And Footing Selection Table

| | | | -SEC ISPLA | | | SECT SPLA | | THRE D | E-SEC ISPLA | |
|----------------------------------|--|--|------------------------------|----------------------------------|---|---|------------------------------------|--|--------------------------------|------------------------------------|
| DIST FROM | WIND VELO- | BEAM SECT | FOO ⁻ | TINGS | BEAM SECT | FO | OTINGS | BEAM SECT | FO | OTINGS |
| GRND (FT) | CITY (MPH) | REQ. @ 2 | DIA | DEPTH | REQ. @ 2 | DIA | DEPT H | REQ. @ 2 | DIA | DEPTH |
| 10 12 14 16 18 20 | 70 70 70 70 70 70 | W6x9 W6x9 W6x9 W6x9 W6x9 W6x9 | 2 2 2 2 2 2 | 3.5 3.5 4 4 4 4 | W6x9 W6x9 W6x12 W6x12 W6x16 W6x16 | 2 2 2 3 3 3 | 4 4.5 4.5 4 4 4.5 | W6x16 W6x16 W6x16 W6x18 W6x18 W6x18 | 2 2 2.5 2.5 3 3 | 4.5 5 5 5.5 5.5 5.5 |
| 10 12 14 16 18 20 | 80 80 80 80 80 80 | W6x9 W6x9 W6x9 W6x9 W6x12 W6x12 | 2 2 2 2 2 2 | 4 4 4.5 4.5 4.5 5 | W6x16 W6x16 W6x16 W6x18 W6x18 W6x18 | 2 2 2.5 2.5 2.5 2.5 2.5 | 10 4.5 4.5 5 5 | W8x18 W8x18 W8x18 W8x24 W8x24 W8x24 | 3 3 3 3 3 | 4.5 4.5 5 5.5 5.5 6 |
| 10 12 14 16 18 20 | 100 100 100 100 100 100 | W6x9 W6x9 W6x12 W6x12 W6x16 W6x16 | 2 2 2 2 2 2.5 | 4 4 4.5 5 5 4.5 | W8x18 W8x24 W8x24 W8x24 W8x24 W10x22 | 2.5 2.5 3 3 3 | 5.5 5.5 5.5 5.5 6 6 | W8x24 W8x28 W8x28 W8x28 W10x30 W10x30 | 3 3 3 4 4 | 6 6.5 6.5 7 7 7 |

All footing dimensions are in feet.

These footing recommendations are based on an allowable soil bearing pressure of 3000 psf vertically and 300 psf/ft of depth horizontally. However, these recommendations are suggestions only and each installation should be treated individually. You must be sure that the installation complies with local codes and is suitable for the particular soil and wind conditions. **Daktronics assumes no responsibility for structures installed by others.**

A note about nomenclature: For a typical beam, W6x12 for example, "W" stands for "Wide-Flange Beam". The first number (6) is the approximate front to rear dimension of the beam in inches. The second number (12) is the weight per foot in pounds. This numbering is standard in the steel industry. Widths vary from 4 to $6 \frac{1}{2}$ inches in chart above.

2.2 Beam And Footing Selection

The table above contains recommendations for beams and footings to support the display. The distance in the left column is from the ground to the bottom of the display. The second column is wind velocity in miles per hour. The choices from these columns depend upon the display location.

The beams listed are W-shape (wide flange) beams which provide maximum wind load strength for the weight and cost of the beams. The two and three section columns are provided if ad panel(s) or additional display(s) are to be added to the display.

The calculations for footing diameters and depths are based on the assumption that footings are in undisturbed soils, *not fill soils*. Lateral bearing capacity of 300 psf per foot of depth in natural grade was used to derive these figures.

These footing recommendations are based on an allowable soil bearing pressure of 3000 psf vertically and 300 psf/ft of depth horizontally. However, these recommendations are suggestions only and each installation should be treated individually. Be sure that the installation complies with local codes and is suitable for your particular soil and wind conditions. Daktronics assumes no responsibility for structures installed by others. Daktronics recommends that W-sections of grade 36 steel be used for beams, and that 28-day (strength 3000 psi) concrete be used for footings.

2.3 Display Mounting

Reference Drawings: Display MTG, Oval or Road Track Drawing A-46392
Installation Specifications Drawing A-47244

Drawings A-46392 and A-47244 show the typical mounting procedures for the display.

Note: The bolts that secure the display do not go through the beams, but run along both sides of the beam, clamping the display to the beams.

Mounting brackets, angles and ½" hardware are provided to mount the display.

Secure the bottom of the display as shown in Step 1 on **Drawing A-46392**. Next, secure the top of the display with the mounting brackets, angles and $\frac{1}{2}$ " hardware. Tighten all nuts securely.

2.4.1 Control Signal Cable

Reference Drawings: Component Locations Drawing A-46399

Entrance Components Drawing A-46410 CHTS-300 25-Pin J-Box Pinout . . . Drawing A-115753

The following signal cables are required.

| Distance | Cable |
|-----------------|---------------------|
| Up to 600 feet | 22 AWG, 2 conductor |
| Up to 1000 feet | 18 AWG, 2 conductor |

Daktronics recommends the following signal cables.

| Daktronics Part Number | Cable Type | Material Specification |
|---------------------------|-------------------------------|------------------------|
| W-1077 | 22 AWG, 2 conductor | Belden 8451 |
| W-1117 | 18, AWG 2 conductor | Belden 8760 |
| W-1314 | 22 AWG, 2 pair, Direct Barial | Graybar BWF-02P22-GR |

At the control location, mount the signal J-box to a convenient location. Route the cables and connect to the wires leading from the connector in the cover according to the table below and **Drawing A-115753**.

At the display, open the hinged digit covering the entrance enclosure as shown in **Drawing A-46399.** Remove the cover from the entrance enclosure. Refer to **Drawing A-46410** for details of the components inside the enclosure. Connect the signal wires to TB31 as indicated in the table below.

Signal Connections

| Control E | Display End | |
|--------------|-------------|--------------|
| J-box | Output | TB31 |
| Terminal no. | No. | Terminal no. |
| 18 | | 1 (+) |
| 19 | 3* | 2 (-) |

^{*}Auxiliary display(s) require(s) a different output number(s). Consult your CHTS-300 console manual.

2.4.2 Power Wiring

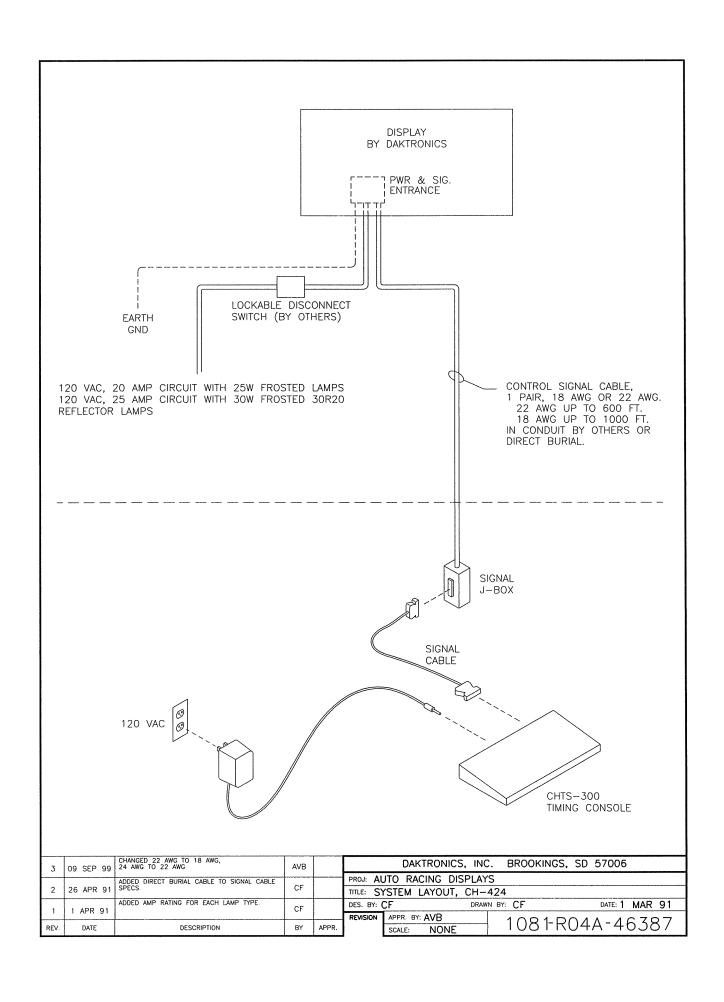
Reference Drawings: Entrance Components Drawing A-46410

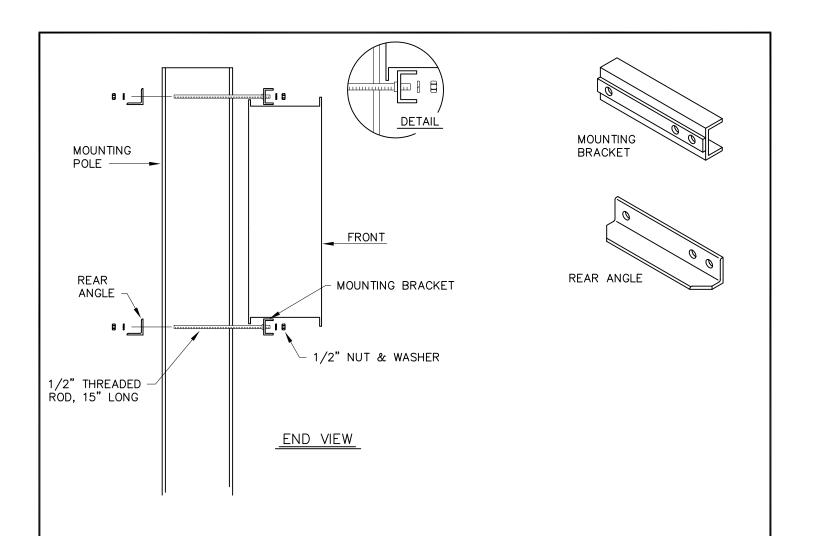
The CH-424 display requires a 120 VAC, 20 amp circuit, when equipped with 25W

lamps, with a maximum current draw of 17 amps. When equipped with 30W or 30R20 reflector lamps, the display requires a 120VAC, 25 amp circuit, with a maximum current draw of 20.5 amps.

Route power wires into the display and connect to TB41 in the entrance enclosure, as shown in **Drawing A-46410**.

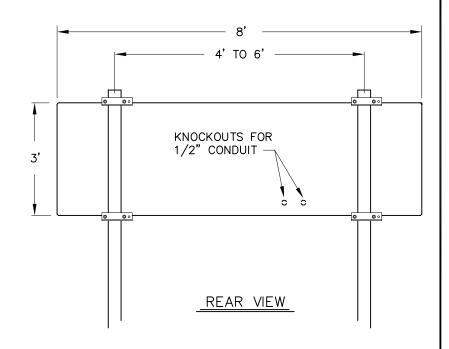
Connect the ground wire to E41 and to a ground rod near the display, according to local codes.





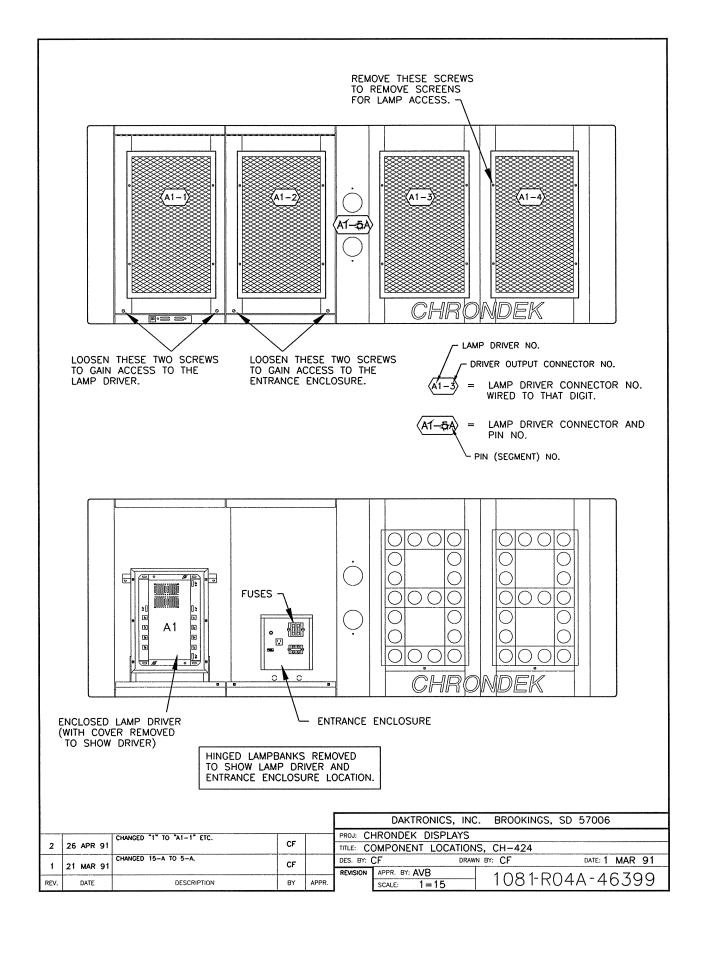
MOUNTING PROCEDURE

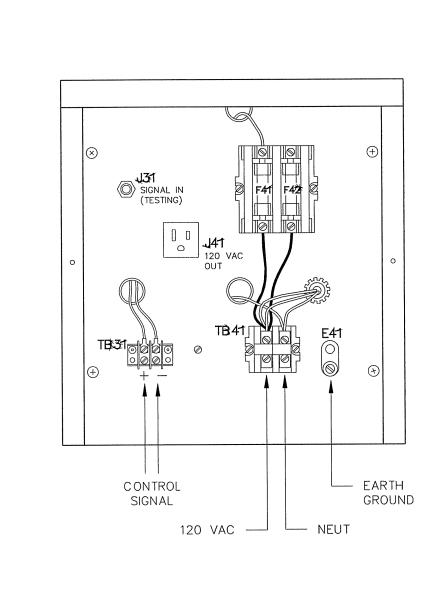
- POSITION DISPLAY AGAINST MOUNTING POLES AND POSITION MOUNTING BRACKETS AT THE BOTTOM OF THE DISPLAY AND SECURE INTO PLACE WITH 1/2" HARDWARE.
- 2. POSITION MOUNTING BRACKETS AT THE TOP OF THE DISPLAY AND SECURE INTO PLACE WITH 1/2" HARDWARE.
- 3. TIGHTEN ALL NUTS.



| | | DAKTRONICS, INC | C. BROOKINGS, SD 57 | 7006 |
|----|------------|-------------------|---------------------|----------------|
| | PROJ: C | HRONDEK DISPLAYS | | |
| | TITLE: DI | SPLAY MTG, OVAL C | R ROAD TRACK | |
| | DES. BY: (| CF DRAW | N BY: CF D | DATE: 1 MAR 91 |
| | REVISION | APPR. BY: AVB | 1081-R10A | - 16300 |
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DAKTRONICS, INC. BROOKINGS, SD 57006

PROJ: CHRONDEK DISPLAYS

TITLE: ENTRANCE COMPONENTS, CH-424

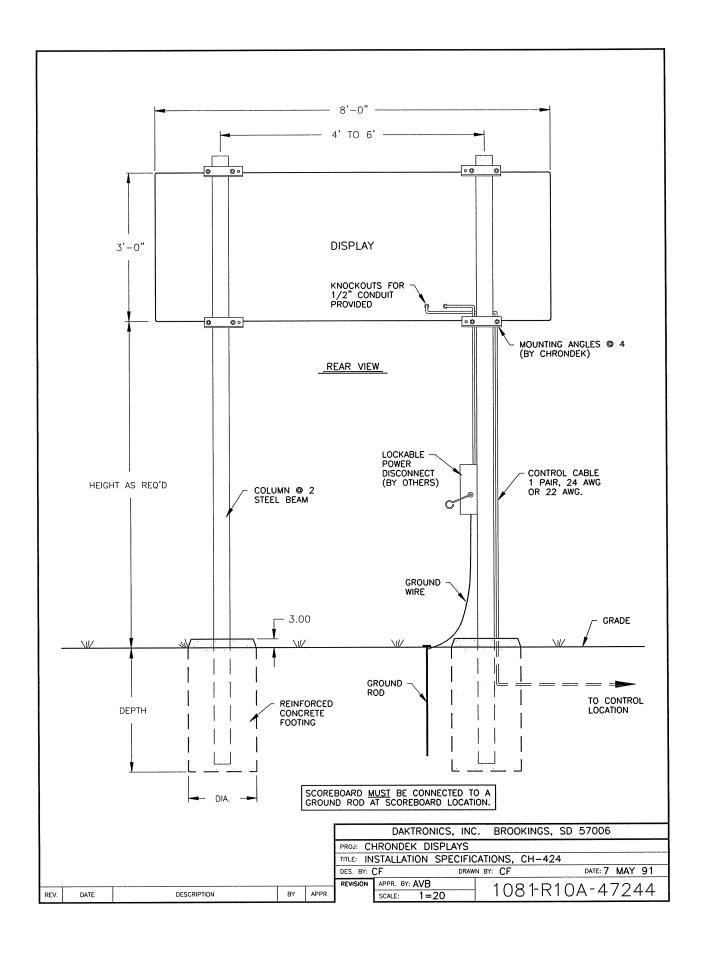
DES. BY: CF DATE: 4 MAR 91

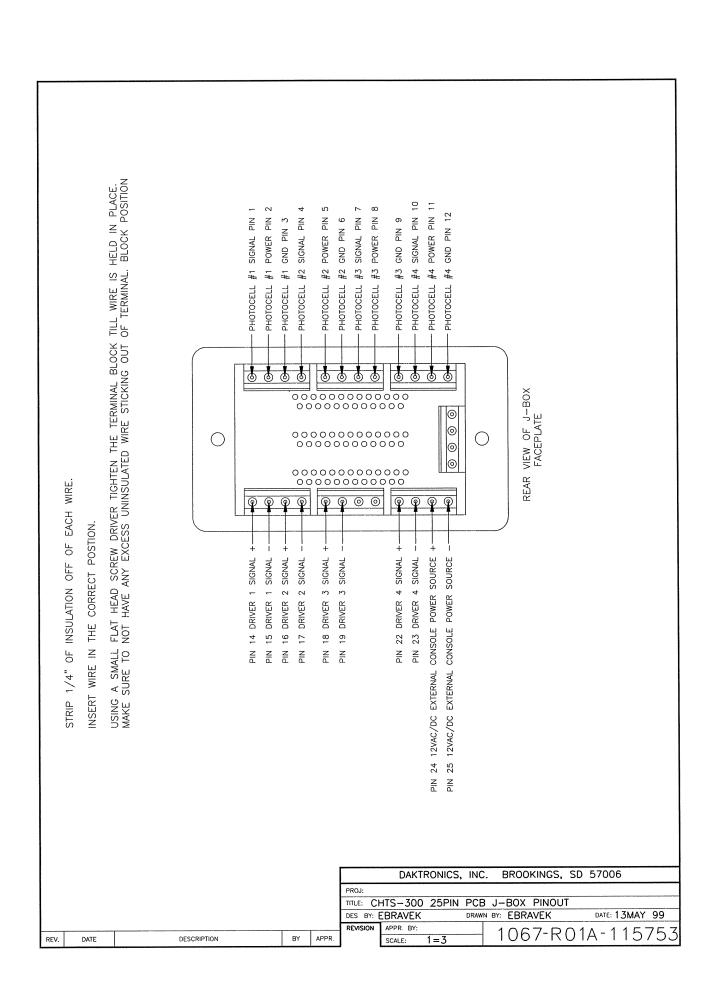
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SCALE: 1=8

1081-R04A-46410

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Section 3: Maintenance & Troubleshooting



IMPORTANT NOTES:

1.

Disconnect power before any repair or maintenance work is done on the CH-424 display!

2.

Any access to internal display electronics must be made by qualified service personnel.

3.

Disconnect power when the CH-424 display is not in use.

3.1 Lamp Replacement

Reference Drawing: Digit Service Drawing A-27674

The primary service required by the CH-424 display is to replace burned-out lamps. Refer to **Drawing A-27674** for details about lamp changing. Replacement lamps are 120V, 25W frosted, medium base, available at your local store or directly from Daktronics, part number DS-1029. Some displays may be equipped with 120V, 30W reflector type 30R20 lamps, Daktronics part number DS-1126.

Do not use lamps larger than those originally installed in the display. Using higher powered lamps will likely cause fuse failures in the display and could exceed the current levels that the display's circuits can safely handle.

3.2 Lamp Driver

| Reference Drawings: Lamp Driver, 8 Col., W/Fan | Drawing A-37074 |
|--|-----------------|
| Component Locations | Drawing A-46399 |

In the display, the task of switching lamps on and off is performed by the lamp driver. **Drawing** A-46399 in Section 2 shows the location of the lamp driver in the display. **Drawing** A-37074 shows the lamp driver and the fuses located in it.

The lamp driver has 13 connectors, providing power and signal inputs and outputs to digits. The functions of these connectors are as follows:

| Connector no. | Function |
|---------------|---|
| 1 -8 | Outputs to digits |
| 17 | Signal Input |
| 18 | Power input for outputs 1-8 (120V) |
| 19 | Power input for driver logic and fan (120V) |
| 23 | Power input for fan |
| 24 | Dim Option Selector |
| 25 | Addressing |

In **Drawing A-46399**, the numbers on the digits refer to the lamp driver output connector wired to each digit.

3.3 Digit Segmentation

Reference Drawing: Segments, 4x7 Lamp Matrix Digit Drawing A-37685

In a digit certain lamps always go on and off together. These groupings of lamps are known as "segments". Each digit has eight segments, referred to by letters A through H. **Drawing A-37685** shows these segments and which connector pin and wire color is wired to each segment.

3.4 Schematic

| Reference Drawings: | Schematic, Power & Signal | Drawing A-29586 |
|---------------------|---------------------------|-----------------|
| | Component Locations | Drawing A-46399 |
| | Entrance Components | Drawing A-46410 |

Drawing A-29586 shows the power and signal inputs into the display and into the lamp driver. The component numbers correspond to those shown in **Drawings A-46399** and **A-46410** from **Section 2**.

3.5 Troubleshooting

This section contains some symptoms that may be encountered with the display. Possible causes and corrective actions are given. The list is not inclusive of every possible problem, but does represent some of the more common situations that may occur.

| Observed Problem | Possible Cause |
|------------------------------|--|
| One lamp won't light | Burned-out lamp |
| | Broken wire behind digit |
| Digit segment won't light | Broken Wire |
| | Poor contact at driver connector |
| | Internal driver malfunction |
| Entire digit won't light | Broken Wire (black) |
| | Poor contact at connector, pin 7 |
| | Fuse blown in driver |
| Half the display won't light | Service breaker tripped |
| | Main fuse blown |
| | Poor contact at main power |
| | connection |
| | P18 disconnected |
| Entire display won't light | Power disruption |
| | Poor signal connection |
| | Driver logic fuse blown |
| | Control not connected to display |
| | P20 disconnected |
| Segment stays lit | Broken wire behind digit |
| | Internal driver malfunction |
| Garbled display | Control malfunction |
| | Internal driver malfunction |

If a problem is observed in one digit, the cause may be isolated by swapping plugs on the driver (connect the plug from the digit into a different jack). If the same digit shows the same problem, the cause may be in the digit or the wiring. If the problem moves to another digit, then the cause is probably an internal driver problem.

Use a volt meter at the driver inputs to determine if power is being supplied to the driver. An ohmmeter can be helpful in finding broken wires and bad connections. Internal electronic problems must be corrected by Daktronics or an authorized service center.

3.6 Replacement Parts

| Part Name or Description | Туре | Daktronics Part No. |
|-----------------------------------|---------|---------------------|
| Lamp Driver | | 0A-1033-0107 |
| J-Box, CHTS-300 Timer | | 0A-1067-0056 |
| Fuse, main power, 20A | FNW-20 | F-1016 |
| Fuse, Lamp Driver, 10A | AGC-10 | F-1006 |
| Fuse, Driver Logic, 1/2A | AGC-1/2 | F-1000 |
| Digit Lampbank, 24" 4x7 | | 0A-1064-0002 |
| Digit Screen, 24" 4x7 | | 0S-1064-0002 |
| Socket, Med. Base | | X-1046 |
| Lamp, 25W Frosted | | DS-1029 |
| Lamp, 30W Frosted, Reflector Type | 30R20 | DS-1126 |

3.7 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 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 packaging is available from Daktronics, part number PK-1135 for customer 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

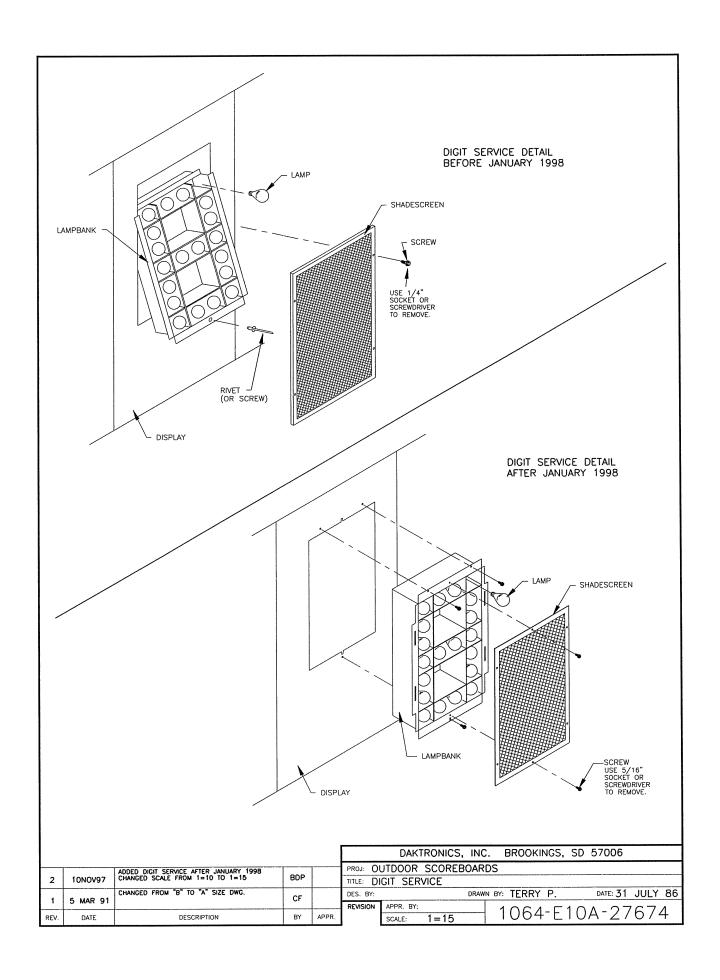
PO Box 5128 331 32nd Avenue Brookings, SD 57006

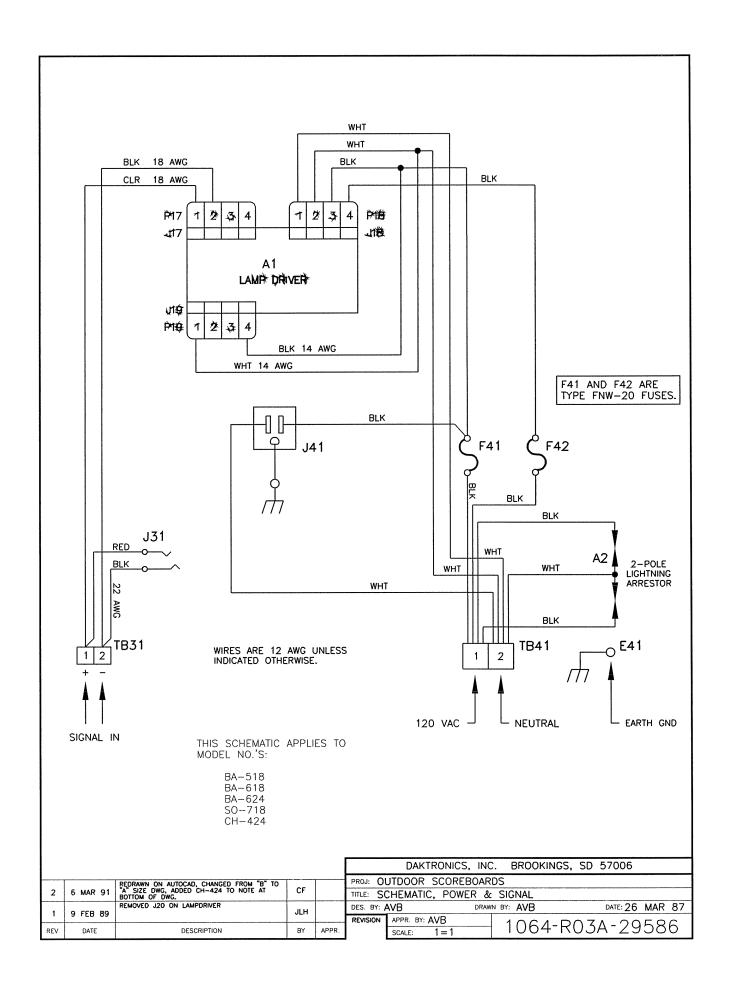
Phone: Toll Free: 1-800-843-9879

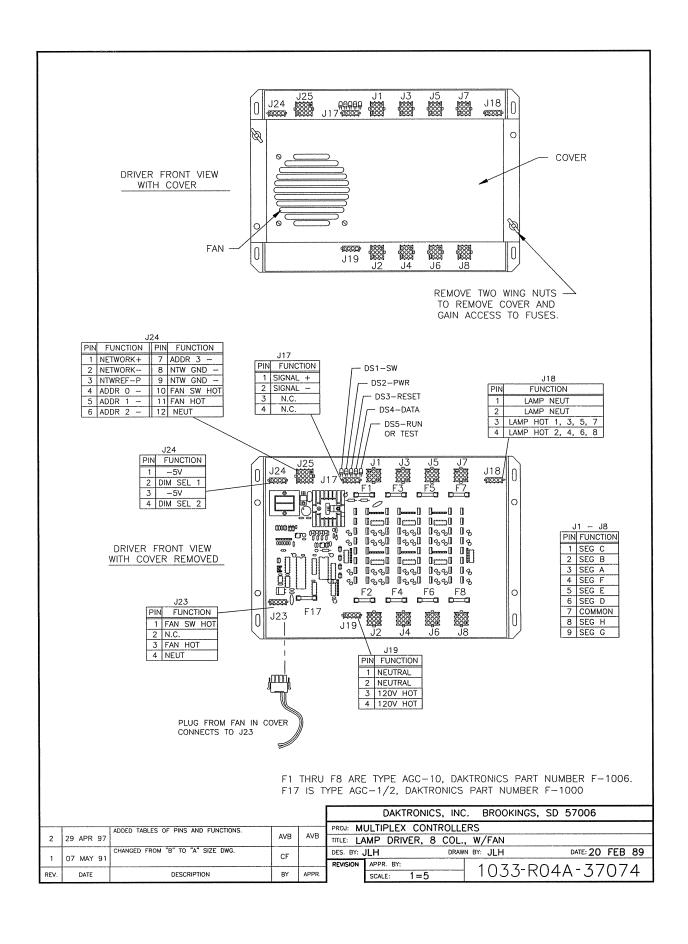
or 1-605-697-4400

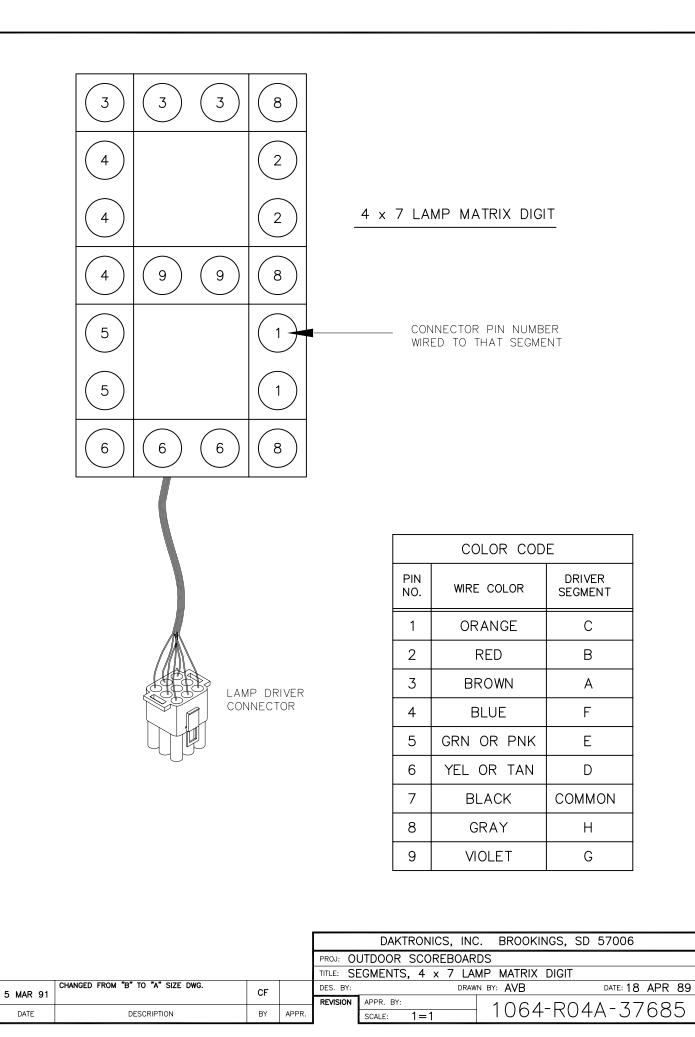
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