Auto Racing Display
Model CH-1618H
Installation & Maintenance Manual

ED 7010

DAKTRONICS, INC.
Setting New Standards Worldwide
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Section 1: Introduction

1.1 How To Use This Manual

This manual explains the installation and maintenance of the Daktronics CH-1618H auto
racing display system. 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
display without the 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 lower-right corner of the drawing. This manual refers to drawings by listing the
last set of digits and the letter preceding them. In the example below, the drawing would be
referred to as Drawing A-69945. Referenced drawings are inserted at the end of the first
section which references them.

1.2 Display Overview

Reference Drawing: Display, CH-1618H ................................. Drawing A-55425

Drawing A-55425 shows a Daktronics CH-1618H display. The CH-1618H display along
with use of the Daktronics CHTS-300 timing console will display the car positions on the
display.
OVERALL DIMENSIONS: 144" x 87" x 6"

WEIGHT: 400 LBS

POWER REQUIREMENTS: 120/240 VAC, 40 AMPS PER LINE

MAXIMUM POWER DEMAND: 9600 WATTS

DIGITS ARE 18" HIGH, 4 x 7 MATRICES, WITH 30W FROSTED MEDIUM BASE LAMPS.
Section 2: Installation

2.1 General System

Reference Drawings: Pwr/Sig Entrance, 1 Driver Display ................. Drawing A-46755
Color Code, 25-Pin J-Box .................................... Drawing A-47207
System Layout, CH-1618H ................................. Drawing A-55430
Installation Specifications, CH-1618H................... Drawing A-55436
Display Mounting, CH-1618H............................... Drawing A-55466
Component Locations, CH-1618H ......................... Drawing A-55469

Refer to Drawing A-55430 for a general system layout.

The general procedure for installing the CH-1618H display is as follows:

1. Select beam and footing recommendations from the table below.
2. Dig the footing holes and install beams and footings.
3. Route power and signal cables to the display and the control locations.
4. Mount the displays to the beams as described in Section 2.3 and Drawings A-55436 and A-55466.
5. Route power and signal wires into the displays as described in Section 2.4 and Drawings A-46755, A-47207, and A-55469.

2.2 Beam and Footing Selection

Reference Drawing: Installation Specifications ...................... Drawing A-55436

The table below contains recommendations for W-shape beams and footings to support the display as shown in Drawing A-55436. The first column is wind velocity in miles per hour. The distance in the second column is from the ground to the bottom of the display. The choice from these columns depends upon the display location.

The beams listed below are beams which provide maximum wind load strength for the weight and the cost of the beams.

<table>
<thead>
<tr>
<th>Wind Speed</th>
<th>Height (ft)</th>
<th>Beam Section</th>
<th>Footing Depth x Dia.</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 mph</td>
<td>10</td>
<td>W8 x 15</td>
<td>4 ¾ ft x 3 ft</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>W6 x 20</td>
<td>5 ½ ft x 3 ft</td>
</tr>
<tr>
<td>80 mph</td>
<td>10</td>
<td>W8 x 15</td>
<td>5 ½ ft x 3 ft</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>W8 x 20</td>
<td>6 ¼ ft x 3 ft</td>
</tr>
<tr>
<td>90 mph</td>
<td>10</td>
<td>W8 x 17</td>
<td>6 ¼ ft x 3 ft</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>W8 x 24</td>
<td>7 ft x 3 ft</td>
</tr>
</tbody>
</table>

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.

The footing recommendations are based on the allowable soil bearing pressure of 3000 psf vertically and 300 psf/ft of depth horizontally. However, these recommendations are...
suggestions only and soil bearing pressure at the site must be determined by a sample test prior to specifying actual footings. 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. Daktronics recommends that W-sections of grade 35 steel be used for beams, and that 28-day (strength 3000 psi) concrete be used for footings.

A note about beam nomenclature: For a typical beam, W6 x 12 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 a standard in the steel industry. Widths are from 6.00 to 8.00 inches in the chart above.

2.3 Display Mounting

Reference Drawings: Installation Specifications, CH-1618H ............ Drawing A-55436
Display Mounting, CH-1618H .................. Drawing A-55466

Drawings A-55436 and A-55466 show the typical mounting for the display.

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

A mounting kit consisting of mounting angles and 1/2" hardware are provided to mount the display.

1. Position the display against the mounting beams and secure the bottom of the display to both beams as shown.
2. Secure the top of the display. Once mounting angles are attached, the display may be slid up or down to the desired height.
3. Once positioned as desired, tighten all bolts.

2.4 Electrical Installation

2.4.1 Control Signal Cable

Reference Drawings: Pwr/Sig Entrance, 1 Driver Display .......... Drawing A-46755
Color Code, 25-Pin J-Box .................. Drawing A-47207
Component Locations, CH-1618H .......... Drawing A-55469

For the display, two conductors of 24 AWG are needed. For distances up to 600 ft. or 22 AWG, up to 1000 ft. are required. Daktronics has 24 AWG direct burial cable, Daktronics part no. W-1105 with 6 conductors, and 22 AWG cable that must be pulled through the conduit before burial, Daktronics part no. W-1077 with 2 conductors.

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-47207.

At the display, open the bottom hinged panel covering the lamp driver enclosure as shown in Drawing A-55469. Remove the cover from the entrance enclosure. Refer to Drawing A-46755 for an illustration of the components inside the entrance enclosure. Connect the signal wires to TB31 as indicated in the table below.
### Control End

<table>
<thead>
<tr>
<th>J-box Terminal No.</th>
<th>Wire Color</th>
<th>Output No.</th>
<th>Display End</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>Red/Wht</td>
<td>1*</td>
<td>TB31 Terminal No.</td>
</tr>
<tr>
<td>15</td>
<td>Grn/Wht</td>
<td>2 (-)</td>
<td></td>
</tr>
</tbody>
</table>

*Auxiliary display(s) require(s) a different output no.(s). Consult your CHTS-300 console manual.

#### 2.4.2 Power Wiring

**Reference Drawings:** Pwr/Sig Entrance, 1 Driver Display... **Drawing A-46755**

The CH-1618H display requires a 120/240 VAC, 40 amp circuit per line. When equipped with 30W lamps, the maximum current draw is 80 amps.

Route power wires to the display and connect to TB41 in the power and signal entrance enclosure as shown in **Drawing A-46755**.

Connect the ground wire to E41 and to a ground rod near the display according to local codes.
1.) STRIP WIRE ENDS 1/4".
2.) INSERT WIRE INTO CONNECTOR.
3.) SQUEEZE CONNECTOR SECURELY Onto WIRE END WITH PLIERS OR CRIMPING TOOL.

<table>
<thead>
<tr>
<th>PIN NO.</th>
<th>WIRE COLOR</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BLACK</td>
<td>PHOTO 1–N</td>
</tr>
<tr>
<td>2</td>
<td>WHITE</td>
<td>PWR 1–P</td>
</tr>
<tr>
<td>3</td>
<td>RED</td>
<td>GND 1–N</td>
</tr>
<tr>
<td>4</td>
<td>GREEN</td>
<td>PHOTO 2–N</td>
</tr>
<tr>
<td>5</td>
<td>ORANGE</td>
<td>PWR 2–P</td>
</tr>
<tr>
<td>6</td>
<td>BLUE</td>
<td>GND 2–N</td>
</tr>
<tr>
<td>7</td>
<td>WHITE/BLACK</td>
<td>PHOTO 3–N</td>
</tr>
<tr>
<td>8</td>
<td>RED/BLACK</td>
<td>PWR 3–P</td>
</tr>
<tr>
<td>9</td>
<td>GREEN/BLACK</td>
<td>GND 3–N</td>
</tr>
<tr>
<td>10</td>
<td>ORANGE/BLACK</td>
<td>PHOTO 4–N</td>
</tr>
<tr>
<td>11</td>
<td>BLUE/BLACK</td>
<td>PWR 4–P</td>
</tr>
<tr>
<td>12</td>
<td>BLACK/WHITE</td>
<td>GND 4–N</td>
</tr>
<tr>
<td>13</td>
<td>RED/WHITE</td>
<td>1 SIG–P</td>
</tr>
<tr>
<td>15</td>
<td>GREEN/WHITE</td>
<td>1 SIG–N</td>
</tr>
<tr>
<td>16</td>
<td>BLUE/WHITE</td>
<td>2 SIG–P</td>
</tr>
<tr>
<td>17</td>
<td>BLACK/RED</td>
<td>2 SIG–N</td>
</tr>
<tr>
<td>18</td>
<td>WHITE/RED</td>
<td>3 SIG–P</td>
</tr>
<tr>
<td>19</td>
<td>ORANGE/RED</td>
<td>3 SIG–N</td>
</tr>
<tr>
<td>22</td>
<td>BLUE/RED</td>
<td>4 SIG–P</td>
</tr>
<tr>
<td>23</td>
<td>RED/GREEN</td>
<td>4 SIG–N</td>
</tr>
<tr>
<td>13</td>
<td>ORANGE/GREEN</td>
<td>NOT USED</td>
</tr>
<tr>
<td>20</td>
<td>BLK/WHT/RED</td>
<td>NOT USED</td>
</tr>
<tr>
<td>21</td>
<td>WHT/BLK/RED</td>
<td>NOT USED</td>
</tr>
<tr>
<td>24</td>
<td>RED/BLK/WHT</td>
<td>12 VAC</td>
</tr>
<tr>
<td>25</td>
<td>GRN/BLK/WHT</td>
<td>12 VAC</td>
</tr>
</tbody>
</table>

PHOTOCCELL POWER INPUTS

SCOREBOARD SIGNAL OUTPUTS

THESE PINS TYPICALLY NOT USED BY CHTS TIMER
DISPLAY

PWR & SIG. ENTRANCE

LOOKABLE DISCONNECT SWITCH, (BY OTHERS)

EARTH GND

120/240 VAC, 40 AMPS PER LINE

DISPLAY LOCATION

CONTROL SIGNAL CABLE,
1 PAIR, 24 AWG OR 22 AWG
24 AWG, UP TO 600 FT.
22 AWG, UP TO 1000 FT.
IN CONDUIT BY OTHERS OR DIRECT BURIAL.

SIGNAL J-BOX

SIGNAL CABLE

120 VAC

CHTS-300 TIMING CONSOLE

CONTROL LOCATION
MOUNTING PROCEDURE:

1.) Locate where center of the beams will be on back of the display.

2.) Drill 9/16" holes in the mounting channels on the back of the display at a distance of ± 3.50" or 4.50" from center of each beam.

3.) Lift display in place.

4.) Attach mounting angles and 1/2" hardware as shown above.

5.) Display can be slid up or down to height required.

6.) Tighten all mounting hardware securely.
A1 IS THE ENCLOSED LAMP DRIVER, COVER REMOVED TO SHOW LAMP DRIVER.

POWER & SIGNAL ENTRANCE

KNOCKOUTS FOR POWER & SIGNAL CONDUIT

REMOVE THESE (4) SCREWS TO REMOVE SCREEN FOR LAMP ACCESS

NOTE: TWO HINGED ACCESS DOORS REMOVED TO SHOW LAMP DRIVER AND POWER & SIGNAL ENTRANCE.

= LAMP DRIVER CONNECTOR NO. WIRED TO THAT DIGIT.
Section 3: 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.

3.1 Lamp Replacement

Reference Drawing: Digit Service .................................. [Drawing A-27674]

The primary service required by the CH-1618H display is to replace burned-out lamps. Refer to Drawing A-27674 for an illustration of how to access the digit lamps for replacement. Standard replacement lamps for the digits are 130V, 30W frosted medium base and may be obtained at your local store or directly from Daktronics, part number DS-1182.

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, 16 Col. w/ Fan........... [Drawing A-37070]
Component Locations, CH-1618H ............ [Drawing A-55469]

In the display, the task of switching lamps on and off is performed by the lamp driver. Drawing A-55469 in Section 2 shows the location of the lamp driver in the display. Drawing A-37070 is an illustration of the lamp driver and the fuses located in it.

The lamp driver has 21 connectors, providing power and signal inputs and outputs to the digits. The functions of these connectors are as follows:

<table>
<thead>
<tr>
<th>Connector Number</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-16</td>
<td>Outputs to digits</td>
</tr>
<tr>
<td>17</td>
<td>Signal Input</td>
</tr>
<tr>
<td>18</td>
<td>Power input for outputs 1-8 (120 V)</td>
</tr>
<tr>
<td>19</td>
<td>Power input for driver logic and fan (120V)</td>
</tr>
<tr>
<td>20</td>
<td>Power input for outputs 9-16 (120V)</td>
</tr>
<tr>
<td>24</td>
<td>Dim option selector</td>
</tr>
</tbody>
</table>

In Drawing A-55469, 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** illustrates these segments and shows which connector pin and wire color is wired to each segment.

### 3.4 Schematic

**Reference Drawings:**

- Schematic, 1 Driver Display ........................ [Drawing A-46754]
- Pwr/Sig Entrance, 1 Driver Display ................ [Drawing A-46755]
- Component Locations, CH-1618H .................... [Drawing A-55469]

The schematic diagram in **Drawing A-46754** shows the power and signal inputs into the display and to the lamp driver. The component numbers correspond to those shown in **Drawings A-46755 and A-55469**.

### 3.5 Troubleshooting

This section lists some symptoms that may be encountered with the display. For these symptoms, possible cause and corrective actions are indicated. This list does not include every possible problem, but does represent some of the more common situations that may occur.

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

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 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

<table>
<thead>
<tr>
<th>Part Name or Description</th>
<th>Type</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamp Driver</td>
<td></td>
<td>0A-1033-0122</td>
</tr>
<tr>
<td>J-Box, CHTS-300 Timer</td>
<td></td>
<td>0A-1067-0056</td>
</tr>
<tr>
<td>Fuse, Main Power, 20A</td>
<td>FNW-20</td>
<td>F-1016</td>
</tr>
<tr>
<td>Fuse, Lamp Driver, 10A</td>
<td>AGC-10</td>
<td>F-1006</td>
</tr>
<tr>
<td>Fuse, Driver Logic, 1/2A</td>
<td>AGC-1/2</td>
<td>F-1000</td>
</tr>
<tr>
<td>Digit Lampbank, 18” 4x7</td>
<td></td>
<td>0A-1027-0068</td>
</tr>
<tr>
<td>Digit Screen, 18” 4x7</td>
<td></td>
<td>0S-1064-0001</td>
</tr>
<tr>
<td>Socket, Med. Base</td>
<td>X-1046</td>
<td></td>
</tr>
<tr>
<td>Lamp, 30W Frosted</td>
<td>DS-1182</td>
<td></td>
</tr>
</tbody>
</table>

### 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 fails, Daktronics will send the customer a replacement. The customer, in turn, sends the failed component to Daktronics. This not only saves money but 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. **Driver Packaging Instructions:** 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). The shipping box (Daktronics part number PK-1006) should be used along with the foam.

3. **Where to Send:** 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 use 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 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
DIGIT SERVICE DETAIL
BEFORE JANUARY 1998

LAMP

SHADESCREEN

SCREW

USE 1/4" SOCKET OR SCREWDRIVER TO REMOVE.

RIVET (OR SCREW)

DISPLAY

LAMPBANK

DIGIT SERVICE DETAIL
AFTER JANUARY 1998

LAMP

SHADESCREEN

SCREW

USE 5/16" SOCKET OR SCREWDRIVER TO REMOVE.

DISPLAY

LAMPBANK

DAKTRONICS, INC. BROOKINGS, SD 57006

PROJECT: OUTDOOR SCOREBOARDS
TITLE: DIGIT SERVICE
DES. BY: DAKTRONICS, INC.
DRAWN BY: TERRY P.
DATE: 31 JULY 86
REVISION APPR. IN:
SCALE: 1=15

1064-E10A-27674
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

PROJ: MULTIPLEX CONTROLLERS
TITLE: LAMP DRIVER, 16 COL., W/FAN
DES. BY: JH
DRAWN BY: JH
DATE: 20 FEB 89

REV. DATE DESCRIPTION
1 5 MAR 91 CHANGED FROM "B" TO "A" SIZE ENG.

AVB AVB

SCALE: 1=5

1033-R04A-37070
4 x 7 LAMP MATRIX DIGIT

CONNECTOR PIN NUMBER WIRED TO THAT SEGMENT

COLOR CODE

<table>
<thead>
<tr>
<th>PIN NO.</th>
<th>WIRE COLOR</th>
<th>DRIVER SEGMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ORANGE</td>
<td>C</td>
</tr>
<tr>
<td>2</td>
<td>RED</td>
<td>B</td>
</tr>
<tr>
<td>3</td>
<td>BROWN</td>
<td>A</td>
</tr>
<tr>
<td>4</td>
<td>BLUE</td>
<td>F</td>
</tr>
<tr>
<td>5</td>
<td>GRN OR PNK</td>
<td>E</td>
</tr>
<tr>
<td>6</td>
<td>YEL OR TAN</td>
<td>D</td>
</tr>
<tr>
<td>7</td>
<td>BLACK</td>
<td>COMMON</td>
</tr>
<tr>
<td>8</td>
<td>GRAY</td>
<td>H</td>
</tr>
<tr>
<td>9</td>
<td>VIOLET</td>
<td>G</td>
</tr>
</tbody>
</table>