

**Fuelight™ FL-2109 Series  
Petroleum Price Displays**

**Installation & Operation Manual**

*DD1398926*

*Rev 4—22 July 2011*

**DAKTRONICS**



Complete the chart with specific information about this display so the details are readily available when calling for service or replacement parts.

<b>Information needed for technicians and/or Customer Service</b>	<b>Fill in the blanks</b>
Location of the display:	
Model number of this display:	
Method of communication:	

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# Section 1: Introduction

This manual explains the installation, maintenance, and troubleshooting of Daktronics Fuelight™ FL-2109 Outdoor LED Petroleum Price Displays and provides details for display maintenance.

## 1.1 Display Overview

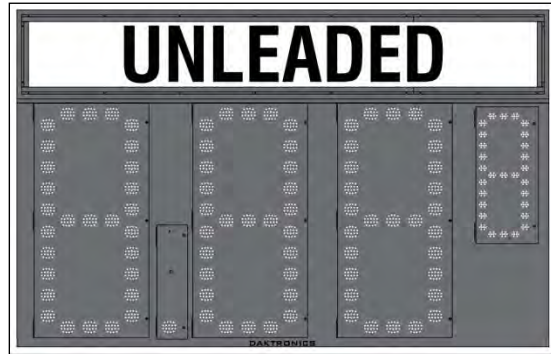
The Fuelight™ model number is described as follows:

FL-2109-HH-C-T#-SF-CC		
<b>FL-2109</b>	=	Outdoor Fuelight™ digit display with backlit panel
<b>HH</b>	=	Digit height in inches
<b>C</b>	=	Color: A=Amber, G=Green, R=Red
<b>T#</b>	=	T=Top Product Panel, #=Caption height in inches
<b>SF</b>	=	Single Face
<b>CC</b>	=	Cash/Credit caption (optional)

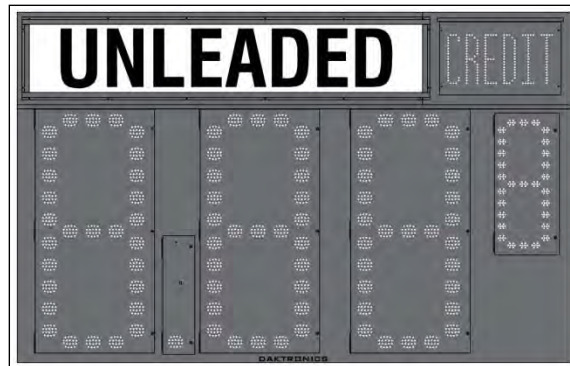
Fuelight™ FL-2109 displays are available in both plain top-captioned cabinets and cash/credit top-captioned cabinets and feature standard petroleum price formatting, employing a variable tenths fraction. **Figure 1** and **Figure 2** provide examples.

FL-2109 series displays are designed for installation as part of an outdoor display system. Digit faceplates are black while backlit panels vary. Displays are mounted independently on a support structure.

All Fuelight™ displays are configured with amber, green, or red LEDs.



**Figure 1:** Top Caption



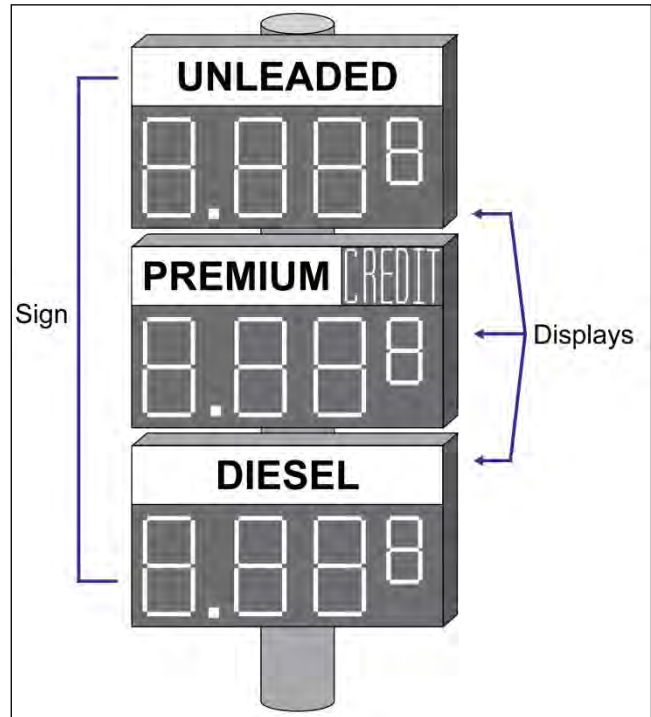
**Figure 2:** Top Caption Cash/Credit

Fuelight™ outdoor LED displays have been designed for use with FLR-100, FLR-500, FLR-1500 and FLD-2000 communication kits.

In this manual, individual “displays” combine to form whole “sign” structures. Refer to **Figure 3** for an example.

## 1.2 Safety Precautions

- Please read and understand installation instructions before installing.
- Do not drop control equipment or allow it to get wet.
- Do not disassemble control equipment or electronic components of the display; this will make the warranty null and void.
- Disconnect display power before servicing power supplies to avoid electrical shock.
- Make certain that the display is properly grounded with an earth-ground electrode at the display.



**Figure 3:** Displays in Sign Structure



## Section 2: Mechanical Installation

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### Important Notes:

- Read and understand these instructions before installing the display.
- Properly ground the display with a ground rod at the display location.
- Disconnect power when servicing or not using the display.
- Do not modify the display structure or attach any panels or coverings.

### 2.1 Support Structure Requirements

The installer must ensure that the mounting structure and hardware can support the display, and that the structure follows all local codes.

Support structure design depends on the mounting methods, display size, and weight. Because every installation site is unique, no single procedure is approved by Daktronics for mounting displays. The information contained in this section is general information only and may not be appropriate for all installations.

Keep in mind the location of mounting clips. Display height and wind loading are also critical factors to be considered. Consult the appropriate **Shop Drawing** for more information.

#### Pre-installation Checklist

Verify the following before proceeding with installation:

- The display is in good condition after shipping and uncrating.
- A straight and square mounting frame is provided for the display.  
**Note:** Height variation in any 4-foot horizontal section may not exceed  $1/4$ ".
- Adequate support is provided for the display so that the structure will not yield at any unsupported points after mounting.
- Clearance of 4" of unobstructed space above the top of the display is allowed to remove the eyebolt.  
**Note:** No clearance is required once the eyebolt is removed.
- Clearance around the entire front of the display is maintained to allow opening the display for maintenance and proper ventilation.
- Be sure that any sprinkler systems near the display are pointed in a direction as to not spray the front of the display.

### 2.2 Ventilation and Temperature Requirements

Fuelight™ Petroleum Price digit displays are front ventilated. The display must NOT be fully enclosed inside a support structure or sign or behind a sign face of plastic, glass, or other material. The front of the display must be exposed to the air to allow for convection cooling.

Fuelight™ Petroleum digit displays are designed to operate in ambient temperatures ranging from -40°F to +120°F. However, the overall sign structure should be designed and ventilated in a way to keep the interior of the sign cabinet at a temperature not to exceed 140°F.

Items to consider when designing a sign package to house LED price displays include:

- Solar gain from the black face of the price displays
- Solar gain from other sign cabinet surfaces
- Heat gain from electronics inside the displays
- Passive or active airflow with adequate intake and exhaust areas

Daktronics is not responsible for high-temperature failure due to inadequate ventilation.

## 2.3 Display Mounting

To maintain the structural integrity of the display cabinet, a 90-degree angle between the cabinet and the lifting method must be maintained.

If damage occurs because of improper lifting procedures, the warranty will be void.

### General Mounting Procedure

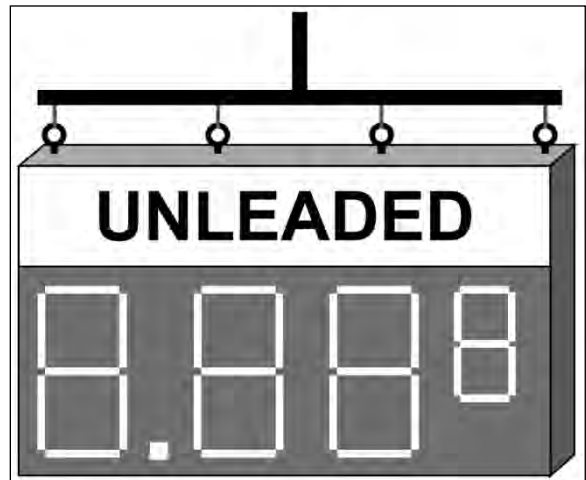
1. Lift the display into position on the support structure using ALL eyebolts. Refer to **Figure 4** for an example.

**Note:** Do not attempt to permanently support the display by the eyebolts.

2. Weld or use 1/2" grade-5 (or stronger) bolts and hardware to secure ALL of the clip angles to the support structure as shown in the appropriate **Shop Drawing**.

**Note:** Clip angles can be substituted with alternative mounting methods as long as ALL of the locations are used.

3. After installation is complete, carefully inspect the display for any holes that may allow water to seep into the display and seal any openings with silicone.



**Figure 4:** Correct Lifting Procedures

If the eyebolts on the top of the display have been removed, plug the holes with bolts and the rubber-sealing washer that was removed with the eyebolt unless an overhead structure protects the area.

## Section 3: Power Installation

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### Important Notes:

- Only a qualified individual should terminate power and signal cable at the display.
- All proposed changes must be approved by Daktronics' engineering staff, or the warranty will be null and void.

Electrical installation consists of the following processes:

- Routing power and ground to the display driver/power enclosure
- Connecting the display ground to a grounding electrode at the display location.

Each **Shop Drawing** shows details on installation and access for electrical connections. Refer to the notes on the appropriated **Shop Drawing** for the electrical requirements for that size of display.

Daktronics Fuelight™ displays' front panels are hinged to allow access to the digits, cabling, and other electronic components.

It is the responsibility of the electrical contractor to ensure that all electrical work meets or exceeds local and national codes. Improper installation could result in serious damage to the equipment and could be hazardous to personnel.

### 3.1 Power Requirements

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

The dedicated 120 V circuit can be shared among all components of the sign structure (including Fuelight™ displays and fluorescent lighting), but not with other external electrical devices (such as air compressors or island lighting). A dedicated circuit is defined as one hot, one neutral and one ground wire. Maximum amperage will vary with the number and type of digit displays connected. All local and national electrical codes must be followed during electrical installation.

**Note:** It is critical that the display circuit be fused at 15 A and that all conductors used must be designed to pass a 15 A current in normal operation. Failure to meet wiring and over-current protection device requirements may violate local and national electrical codes and will void the display warranty.

Conductors of circuits delivering power to a Daktronics display shall be sized in accordance with local and national electrical codes so that the power distribution systems is capable of delivering full load power to the display while maintaining a voltage within 5 percent of the utility nominal voltage.

## 3.2 Grounding

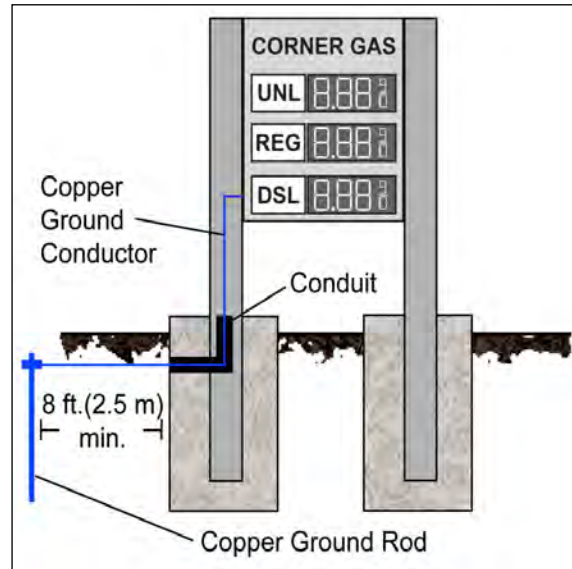
Displays **MUST** be grounded according to the provisions outlined in any applicable local and national electrical codes and according to the specifications in this manual. Daktronics requires a resistance to ground of 10 ohms or less.

The display system must be connected to an earth-ground electrode installed at the display, as shown in **Figure 5**. Proper grounding is necessary for reliable equipment operation and protects the equipment from damaging electrical disturbances and lightning. Refer to **Drawing B-329675** for more information on grounding.

The display must be properly grounded, or the warranty will be void.

Important points about grounding:

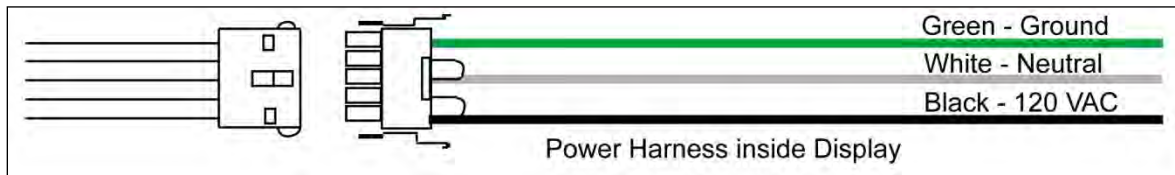
- **Follow local and national codes:** The material of an earth-ground electrode differs from region to region and from conditions present at the site. Consult any local and national electrical codes that may apply.
- **Do NOT use the support structure as an earth-ground electrode:** The support structure is generally embedded in concrete. If embedded in earth, the steel is either primed, or it corrodes, making it a poor ground.
- **Provide one grounding electrode for each sign structure:** The grounding electrode is typically at least one grounding rod for each sign structure. Other grounding electrodes as described in any applicable local and national electrical codes may be used.
- **Confirm that resistance to ground is 10 ohms or less:** This is required by Daktronics for proper display performance. If the resistance to ground is higher than 10 ohms, it will be necessary to install additional grounding electrodes to reduce the resistance. The grounding electrode must be connected to the ground wire inside the display.



**Figure 5:** Correct Grounding

### 3.3 Power Installation

The Daktronics Fuelight™ displays are installed using the provided ground and neutral conductors. For this type of installation, the power circuit must contain an isolated earth-ground conductor. Do not connect neutral to ground at the disconnect or at the display, this would violate electrical codes and void the warranty. Use a disconnect so that all ungrounded conductors can be disconnected.



**Figure 6:** Power Harness

To connect power to the display:

1. Connect power to the power harness (“pigtail”) inside the display, refer to **Figure 6** for an example.  
The power harness has a 5-pin plug at one end and three wires: black, white, and green/yellow. The plug is connected to the mating plug on the transformer and allows for easy disconnection of the power harness.
2. Use wire nuts to connect power wires to the power harness.



# Section 4: Signal Installation

## 4.1 Signal Installation

### LED Driver

In the display, the LED driver performs the task of switching digits on and off. One driver at each display installation is designated as the host driver (the driver with the antenna/signal connection). This driver receives its signal directly from a control unit via the Signal In connector (J12, J13, or J14). J12 is used with the FLR-500 and FLR-1500 control kits. J13 is used with the FLD-2000 control kit on host drivers and for signal to client drivers. J14 is used with the FLR-100 control kit.

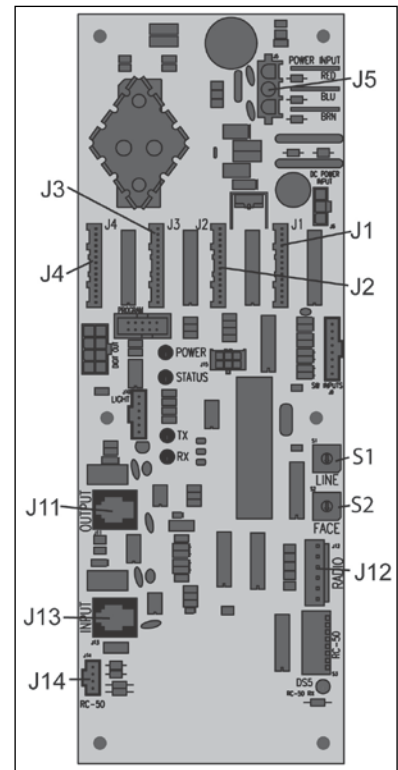
Driver Connectors	
<b>J1</b>	Power Out to Digit 1
<b>J2</b>	Power Out to Digit 2
<b>J3</b>	Power Out to Digit 3
<b>J4</b>	Power Out to Digit 4
<b>J5</b>	AC Power Input
<b>J11</b>	Signal Output (to client driver in next line of the face)
<b>J12</b>	Host Driver Signal Input (for FLR-500 and FLR-1500)
<b>J13</b>	Host Driver Signal Input (for FLD-2000) and Client Driver Signal Input (from driver of another line)
<b>J14</b>	Host Driver Signal Input (for FLR-100)

### Signal Wiring

Signal termination varies depending upon the type of control kit included with the display. Signal from the control transmitter/controller communicates with the host driver. Signal then travels from J11 (output) on the host driver to J13 (input) on the driver of the next face or line.

1. Route cable to J12 (for FLR-500 or FLR-1500), J13 (for FLD-2000) or J14 (for FLR-100) on the host driver within the host display; refer to **Figure 7** for details.
2. Route the RJ14 cable from J11 OUT on the host driver to the next client display, connecting at J13 IN.
3. Follow step 2 for all displays in the network.

Refer to the quick guides provided with the display for more information on signal installation.



**Figure 7:** Driver

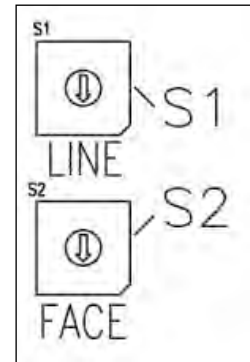
## Driver Rotary Switch Line and Face Settings

The first driver at each display installation is designated as a host driver – the driver with the antenna/signal connection. The host driver sends the line information out to the client drivers.

Every driver must have a unique line and face setting (or “address”) that identifies the face and line of the display.

The line and face numbers are set by turning the rotary switches located on the driver at S1 and S2, refer to **Figure 8** for locations. Set the line number using S1 and the face number using S2.

All displays with the same line number will show the same price. For example, two displays, one with a driver set to Line 1, Face 1 and one with a driver set to Line 1 Face 2, will display the same price. Refer to **Figure 8** for an example.



**Figure 8:** Rotary Switches



## Section 5: Control Options

The FLR-100, FLR-500, FLR-1500, and FLD-2000 (indoor or outdoor) control kits can be used to change petroleum prices displayed on the LED Fuelight™ Petroleum Price displays. The instructions provided in this section discuss the functions the operator uses to control the Petroleum Price display with each control type.

### 5.1 FLR-100 Control Kit

The FLR-100 control kit can control four unique prices on multiple faces using an RC-50 transmitter and has a maximum range of 100 feet. The instructions provided in this section discuss the functions the operator uses to control the displays.

#### Editing the Display

To edit the price on the display, press and hold any button for five seconds. When the display is in Edit mode, the decimal LEDs blink.

On the transmitter, each pair of buttons corresponds to a price line on the display. Each line is numbered to indicate the line it corresponds to.

#### Increasing the Price

To increase the price, press [+] for the corresponding line.

**Note:** Make sure the display is in Edit mode.

#### Decreasing the Price

To decrease the price, press [-] for the corresponding line.

**Note:** Make sure the display is in Edit mode.

#### Rapid Increase/Decrease

To rapidly increase or decrease a price, press and hold the button for the corresponding line.

**Note:** If no button is pressed for more than 10 seconds, the display exits the Edit mode. The prices are saved, and the display returns to its normal state.

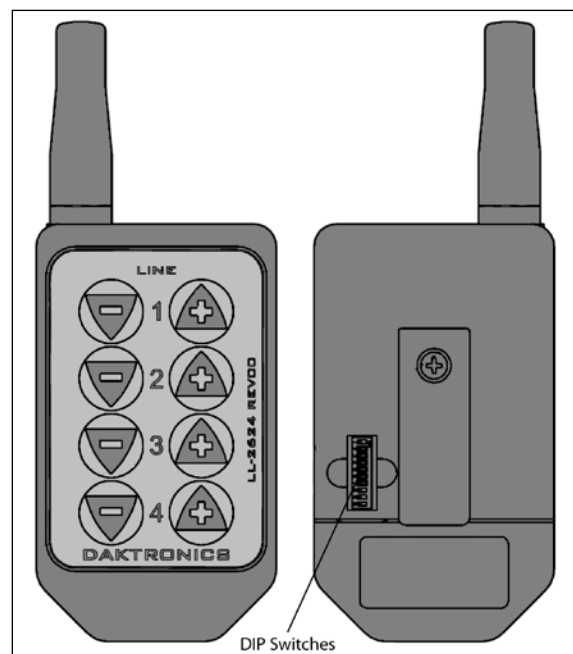


Figure 9: Transmitter

## 5.2 FLR-500 Control Kit

The FLR-500 control kit includes a radio transmitting device, a radio receiving device, and all hardware and instructions.

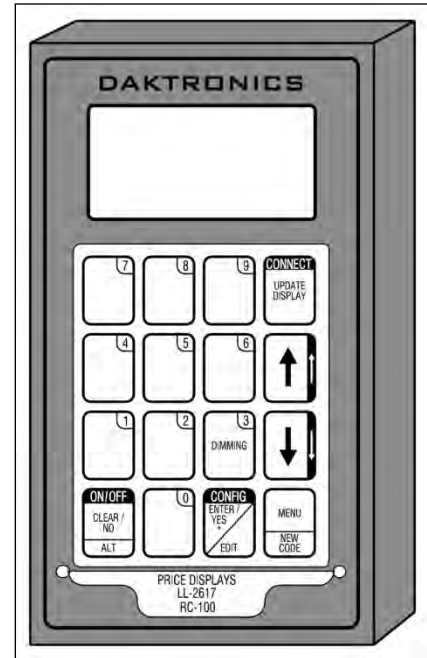
The FLR-500 control kit programs petroleum prices displayed on the LED Fuelight™ Petroleum Price display and has a maximum range of 500 feet.

**Note:** Although multiple wireless hand-held transmitters may be connected to a single wireless base station server, the rate display application allows for only one hand-held device to be connected at a time.

### Transmitter Use

The RC-100 transmitter can be configured to program petroleum price displays. Refer to the control quick guide, which came with the control kit, for information on the correct setup of the FLR-500 Control Kit.

The RC-100 transmitter is charged by a wall pack transformer. Plug the wall pack transformer into a 120 VAC power pack, and connect it to the transmitter. Once charged, the RC-100's operation time will vary depending upon how often it is used.



**Figure 10:** Transmitter

## Petroleum Price Display Startup

To operate the Fuelight™ Petroleum Price displays, the transmitter must first be programmed to the gas price function. Use the <SET FUNCTION>key on startup. Use the following table as a guide to startup procedure.

LCD Screen	Action
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <b>Press Ent to select a new code</b> </div>	Press <ALT>, and then <NEW CODE> to select a new price display function. Press <CLEAR> to resume a new function. Use the <↑↓> arrow keys to select the new price function; then press <ENTER>.
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <b>SELECT FUNCTION GAS PRICE ↓↑</b> </div>	Press the arrow up or down keys <↑↓> until the gas price option is shown. Press the <ENTER> key to accept.

The hand-held transmitter should now be ready for use. The transmitter will “remember” the last function setting, so this step should only need to be done with a new transmitter or one that is configured for different displays.

## Petroleum Price Transmitter Operation

The transmitter LCD display will default to showing the current display settings on power up. The following text will be shown on the LCD.

LCD Screen	Action
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <b>LINE PRICE</b>            1 ↓ \$1.23 9/10         </div> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <b>&lt;EDIT&gt; TO MODIFY</b>            1 ↓ \$1.23 9/10         </div>	<p>The display will toggle between these two screens.</p> <p>Press the up or down arrow keys &lt;↑↓&gt; to scroll through the current setting for any of the lines on the display.</p> <p>Press the &lt;ENTER/EDIT&gt; key to modify any of the line settings.</p>

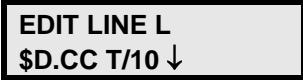
## Modifying Price Line Settings

The petroleum price can be modified either by pressing the <EDIT> key during operation or using the <MENU> key. Refer to the following key to identify the item to be edited.

L = Current line number to be edited

D.CC = Current dollars and cents value to edit

T = Current tenths of cent value to edit

LCD Screen	Action
	<p>Press any of the number keys to edit the price value for this line. Press the down arrow key &lt;↓&gt; to modify the value of the 1/10-cent data for this line (see note below).</p> <p>Press &lt;ENTER&gt; to accept the new value or press &lt;CLEAR&gt; to abort the changes.</p> <p>Note: The flashing asterisk on the LCD shows the current data being edited.</p> <p>Many displays do not have a changeable 1/10-cent digit. Changing the tenths-cent value from 9 on these digits will make the digit appear incorrect.</p>

## Dimming

The dimming level of the display can be adjusted in two ways. A light sensor mounted in the display driver can detect the level of ambient light at the display location and dim the display's LEDs accordingly. This function is known as automatic dimming.

When the manual dimming function is selected, the LEDs remain at the same level of brightness regardless of the level of light detected at the display. To select either of these functions, press <DIMMING>. The current setting is shown on the bottom line of the LCD.

LCD Screen	Action
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <b>DIMMING AUTOMATIC ↓</b> </div>	<p>Press the down arrow key &lt;↓&gt; to toggle through dim settings:</p> <p>Automatic – The display automatically dims based on the light detected at the display</p> <p>Manual – The display dimming level is set manually. Once set, this value remains regardless of the level of light detected at the display.</p> <p>Blank Sign – The display can be blanked out without powering down. Refer to the blank sign section for details.</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <b>SET AUTO DIMMING MAX INTENSITY?</b> </div>	<p>Press the &lt;ENTER/EDIT&gt; key to edit the auto dimming max intensity. This is the maximum intensity that the display will use in full-bright modes (during daylight hours.)</p> <p>Press &lt;CLEAR&gt; to keep the current auto dimming maximum setting</p>
<div style="border: 2px solid black; padding: 5px; text-align: center;"> <b>INTENSITY XX↓↑ ENTER TO SET</b> </div> <p>XX – Current intensity (1-16) Max Intensity - 16</p>	<p>Press the up or down arrow key &lt;↑ ↓&gt; to modify the current intensity of the display (Note: The RC-100 must be communicating with the display)</p> <p>Press &lt;ENTER&gt; to accept this intensity. If manual dimming mode is selected, this will be the new intensity for the display. If the automatic dimming mode is selected, the display will illuminate in full-bright mode, which is the maximum intensity level.</p>

<p><b>DIMMING</b> <b>BLANK SIGN ↓</b></p>	<p>Press <b>&lt;ENTER&gt;</b> to accept this option.</p>
<p><b>BLANK THE SIGN?</b> <b>&lt;ENT&gt; YES</b> <b>&lt;CLR&gt; NO</b></p>	<p>The next LCD dialog will ask whether to blank the sign or not. The LCD toggles between Yes and No. Pressing <b>&lt;CLEAR&gt;</b> resumes normal operation; pressing <b>&lt;ENTER&gt;</b> actually blanks the sign.</p>

### 5.3 FLR-1500 and FLD-2000 (Outdoor/Indoor) Control Kits

The Fuelight™ DM-100 controller, shown in **Figure 11**, is a hand-held controller designed to operate Daktronics LED Fuelight™ displays. It can connect to the display as a part of one of the following two control kits:

1. FLR-1500 control kit: Uses two fixed-mount radios and has a maximum range of 1,500 feet between radios.
2. FLD-2000 control kit: Connects directly to a J box at the base of the display or at an indoor location and has a maximum range of 2,000 feet.

The console's liquid crystal display (LCD) guides the user through the operation of the system.

Refer to the control quick guide, which came in the control kit, for information on connection procedures and petroleum price controller startup.



**Figure 11:** DM-100 Controller

#### **FLR-1500 Connection**

The Fuelight™ FLR-1500 control kit is designed to operate Daktronics LED Fuelight™ displays. Connection to the display uses two fixed-mount radios.

## FLD-2000 Connection to the Display (Outdoor and Indoor)

The Fuelight™ displays may be controlled from a location inside a building or from the base of the displays. The following subsections provide more detail on both installation types.

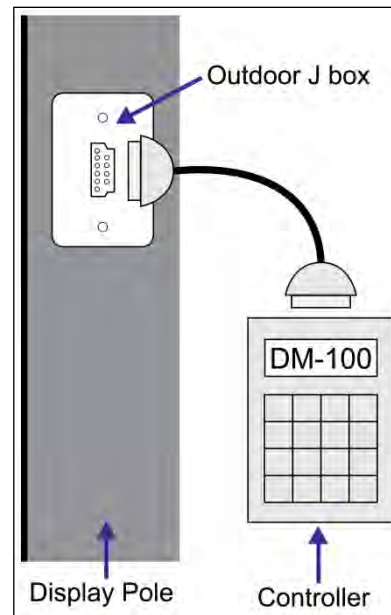
### Outdoor Installation

This control option permits operation of the sign from the base of the display, refer to **Figure 12** for an example. The DM-100 controller is connected to an outdoor junction box (J box) mounted on the display pole, which routes the signal to the sign through a 2-pair cable (in conduit, where required).

This control option does not require the controller to be connected to a power outlet. In this configuration, the DM-100 controller uses the sign as a power source.

To operate the display using this setup:

- Connect the 9-pin to 9-pin cable from the DM-100 controller to the J box mounted on the display pole.



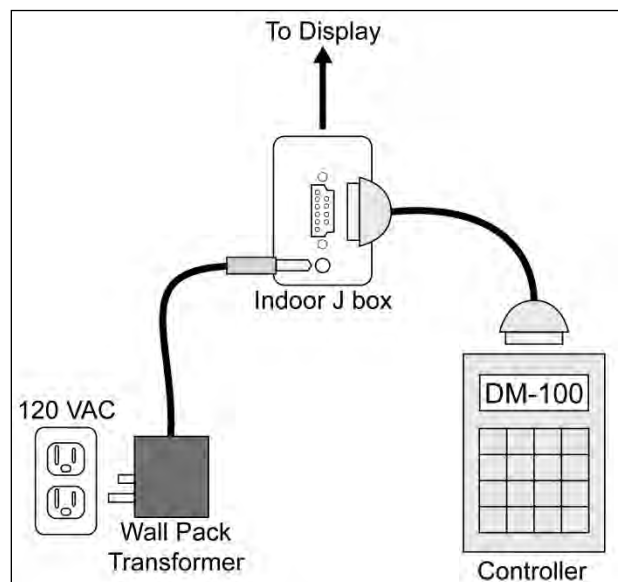
**Figure 12:** FLD-2000 Outdoor Connection

### Indoor Installation

This control option permits operation of the sign from an indoor control location; refer to **Figure 13** for an example. The hand-held controller is connected to an indoor J box, which routes the signal to the display through a 2-pair cable (in conduit, where required).

To operate the display using this setup:

1. Connect the 9-pin to 9-pin cable from the DM-100 controller to the 9-pin J box.
2. Plug the controller's wall pack transformer in to a 120 VAC outlet.



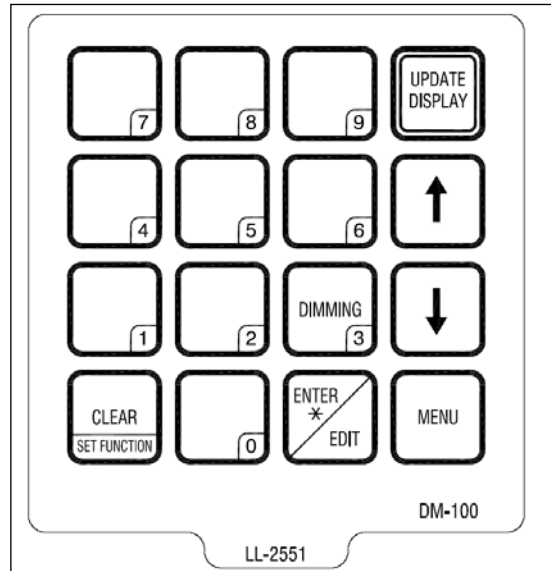
**Figure 13:** FLD-2000 Indoor Connection

## DM-100 Insert and Code

The DM-100 uses a keypad insert to program price information for Daktronics LED Fuelight™ Displays. The DM-100 insert illustrated in **Figure 14** is used to control the displays.

If an insert is lost or damaged, make a copy of the insert from **Drawing A-167856** located in **Appendix A**. Cut this to size and slide it into the DM-100 pocket. Use this as a reference until a replacement is received.

To start the controller and use the insert to program information into the display driver, follow the instructions in control quick guide, which came with the control kit.



**Figure 14:** DM-100 Insert

## Petroleum Price Display Startup

To operate the petroleum price displays, the DM-100 must first be programmed to the gas price function. Use the **<SET FUNCTION>** key on startup. Use the following table as a guide to startup procedures.

LCD Screen	Action
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>CURRENT FUNCTION GAS PRICE</b> </div>	<p>For indoor installation only: Plug the wall pack transformer into a 120 VAC power outlet, and connect it to the DM-100.</p> <p>This display appears briefly.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>CHANGE FUNCTION? PRESS SET FUNCT</b> </div>	<p>This message appears next on the screen.</p> <p>If "GAS PRICE" was shown on the bottom line of the LCD during startup, do nothing. The controller will automatically default to previous Gas Price settings.</p> <p>If a function other than "GAS PRICE" was shown on the bottom line of the LCD during startup, press the <b>&lt;SET FUNCTION&gt;</b> key while the second LCD prompt is displayed.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>SELECT FUNCTION GAS PRICE ↓↑</b> </div>	<p>Press the arrow up or down keys <b>&lt;↑↓&gt;</b> until the gas price option is shown. Press the <b>&lt;ENTER&gt;</b> key to accept</p>

The DM-100 controller should now be ready for use. The controller will "remember" the last function setting, so this step should only need to be done with a new controller or one that is configured for different displays.



## DM-100 Controller Operation

The Petroleum Price Controller LCD display will default to showing the current display settings on power up. The following text will be shown on the LCD.

LCD Screen	Action
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <b>LINE PRICE</b>            1 ↓ \$1.23 9/10         </div> <div style="border: 1px solid black; padding: 5px;"> <b>&lt;EDIT&gt; TO MODIFY</b>            1 ↓ \$1.23 9/10         </div>	<p>The display will toggle between these two screens.</p> <p>Press the up or down arrow keys &lt;↑↓&gt; to scroll through the current setting for any of the lines on the display.</p> <p>Press the &lt;ENTER/EDIT&gt; key to modify any of the line settings.</p>

To modify Price Line Settings:

1. Press either the <EDIT> key during operation or the <MENU> key. (Refer to the following Menu Items chart.)
2. The following keys identify editable items:
  - L = Current line number to be edited
  - D.CC = Current dollars and cents value to edit
  - T = Current tenths of cent value to edit

LCD Screen	Action
<div style="border: 1px solid black; padding: 5px;"> <b>EDIT LINE L</b>            \$D.CC T/10 ↓         </div>	<p>Press any of the number keys to edit the price value for this line. Press the down arrow key &lt;↓&gt; to modify the value of the 1/10-cent data for this line (read Note following).</p> <p>Press &lt;ENTER&gt; to accept the new value or press &lt;CLEAR&gt; to abort the changes.</p> <p>Note: The flashing asterisk on the LCD shows the current data being edited.</p> <p>Many displays do not have a changeable 1/10-cent digit. Changing the tenths-cent value from 9 on these digits will make the digit appear incorrect.</p>

To access **Menu Items**:

1. Press the <MENU> key.
2. Press the number of the desired menu item.
  - Use Menu Items 1-5 to edit the price on each line of the display. Lines are typically numbered top to bottom with 1 being the top of the display.
  - Use Menu Item 6 to run an LED test.
  - Use Menu Item 7 allows the user access to change the display options.
  - Menu Item 8 will not be necessary for displays operating without a modem.
  - Menu Item 9 can be used with a bi-directional display setup to get display status back from the driver. The controller will cycle through various LCD message screens, illustrated in the following table, that show display status. Press <CLEAR> at any time to exit the Display Status submenu.
  - Menu Item 10 can be used to set the display time. Refer to the following table to set the time and date. If the time and date are already correct, enter through and press <ENTER> to send the date and time to the display.

Menu Items	
Key	Setting
1	Price Line 1
2	Price Line 2
3	Price Line 3
4	Price Line 4
5	Price Line 5
6	LED Test?
7	Display Option
8	Modem Settings
9	Display Status
10	Set Time 12HR

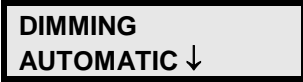
LCD Screen	Action
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <b>Display status Get status?</b> </div> <div style="border: 1px solid black; padding: 5px;"> <b>Driver Firmware version x.x</b> </div>	<p>Press &lt;ENTER&gt; to get the status of the display that is connected to the DM-100.</p> <p>The LCD will scroll through the status sent back from the display. Following is a list of responses:</p> <p>Firmware Version This is the firmware version programmed on the host MASC driver in the display.</p>

To adjust the **Dimming Level**:


1. Press <DIMMING> on the keypad. The current setting is shown on the bottom line of the LCD.

**Note:** The dimming level of the display can be adjusted in two ways. A light sensor, located on each driver, can detect the level of ambient light at the display location and dims the sign's LEDs accordingly. This function is known as Automatic Dimming. When the Manual Dimming function is selected, the LEDs remain at the same level of brightness regardless of the level of light detected at the display.


2. Refer to the following tables to set the dimming level:

LCD Screen	Action
	<p>Press the down arrow key &lt;↓&gt; to toggle through dim settings:</p> <p>Automatic – The display automatically dims based on the light detected at the display</p> <p>Manual – The display dimming level is set manually. Once set, this value remains regardless of the level of light detected at the display.</p>

If AUTOMATIC dimming is selected, the following LCD prompt will appear:

LCD Screen	Action
	<p>Press the &lt;ENTER/EDIT&gt; key to edit the auto dimming max intensity. This is the maximum intensity that the display will use in full-bright modes (during daylight hours).</p> <p>Press &lt;CLEAR&gt; to keep the current auto dimming maximum setting.</p>

The following LCD prompt is shown for both MANUAL and AUTOMATIC dimming selections:

LCD Screen	Action
 <p>XX – Current intensity (1-16) Max Intensity - 16</p>	<p>Press the up or down arrow key &lt;↑ ↓&gt; to modify the current intensity of the display (Note: The DM-100 must be connected to the display)</p> <p>Press &lt;ENTER&gt; to accept this intensity. If the manual-dimming mode is selected, this will be the new intensity for the display. If the automatic dimming mode is selected, the display will illuminate in full-bright mode, which is the maximum intensity level.</p>

To Update the Display:

1. After connecting to the display with the DM-100 controller, press <UPDATE DISPLAY> to display the new sequence on the display.
2. This button will also allow for a preview of the new sequence on the LCD.



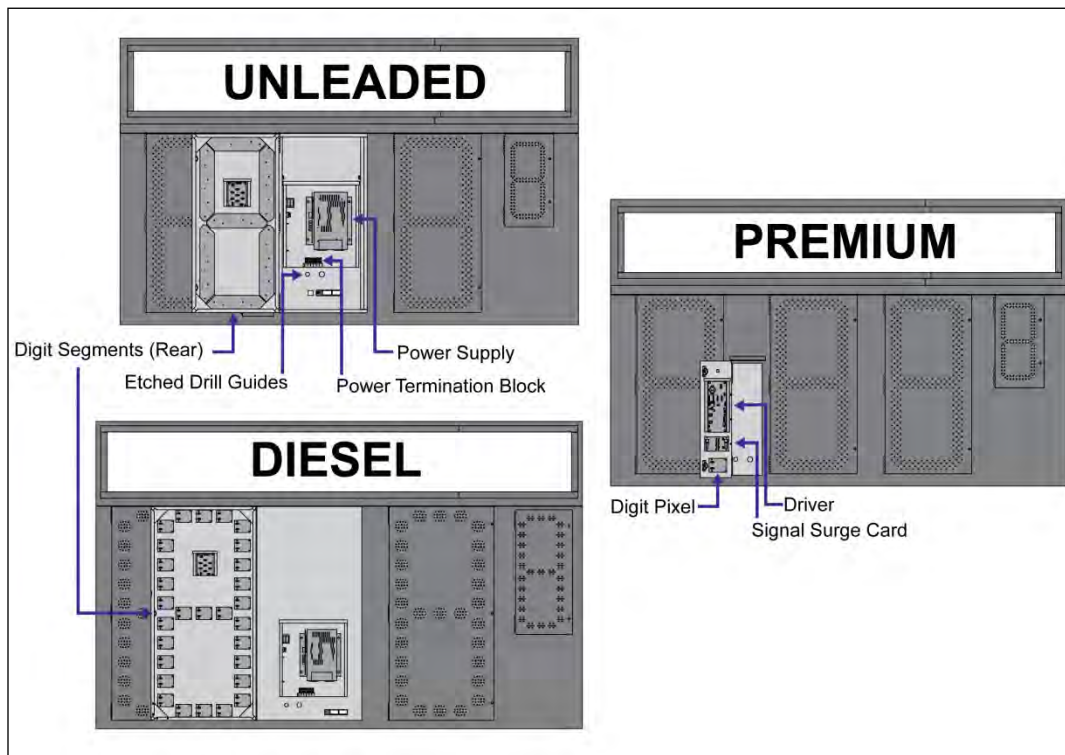
## Section 6: Maintenance and Troubleshooting

### Important Notes:

- Disconnect power before any repair or maintenance is done on the display.
- Qualified service personnel must make any access to internal display electronics.
- Disconnect power when the display is not in use.

### 6.1 Component Location and Access

All internal electronic components and digits can be reached by opening the hinged access doors on the front of the display. **Figure 15** demonstrates the internal display component layouts. Component placement varies slightly with each Fuelight™ model.



**Figure 15:** Typical Front View with Face Panel Open

#### Visual Structural Inspection

At least once a year, check the display to ensure the structure and components are in good condition. Inspect the paint and cabinet for corrosion. Make sure fasteners are tight. Tighten or replace as required.

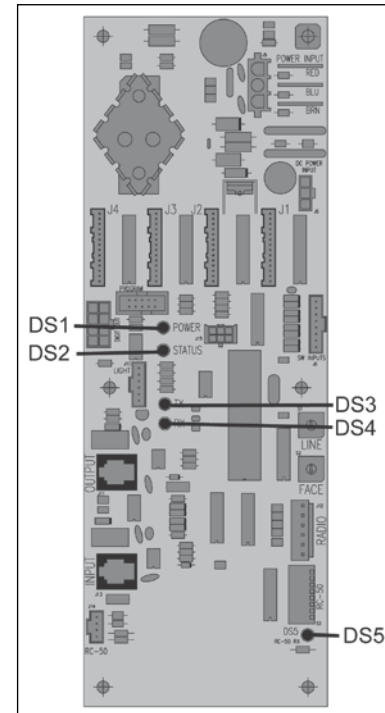
**Note:** Disconnect power before servicing the display. Also disconnect power when the display is not in use. Prolonged power-on may shorten the life of some electronic components.

## 6.2 Display Diagnostics

### Driver Diagnostic LEDs

The driver has five LEDs that indicate whether it is functioning properly. Refer to **Figure 16** for their locations. These LEDs can help pinpoint problems with the driver set-up or operation.

LED Name	Function	Label	Indication
DS1	Power	POWER	On constantly when operating correctly.
DS2	Status	STATUS	Blinking when driver is operating correctly. On when microcontroller is not working. Off when microcontroller is not working.
DS3	Transmit	TX	Flickers when transmitting data.
DS4	Receive	RX	Flickers when receiving data.
DS5	RC-50 Receive	RC-50 RX	Flickers when receiving data from the RC-50 transmitter (FLR-100 control kit). Off when not receiving data.



**Figure 16:** Driver Diagnostic LEDs

### Power-up Self Test

A useful troubleshooting tool is the power on self-test performed by the host driver every time the display powers up. The display should show the information listed in the left column. Sign (X) and Line (Y) numbers refer to the rotary switch settings for the specific display.

Information Shown on Display	Meaning of Information
rNN	Revision Number of the Software
XLY	X = Sign #, L is Constant, Y = Line #
123 9/10	Digit Layout, if connected properly

## 6.3 Troubleshooting

This chart lists some symptoms that may be encountered with the displays. For each symptom, possible causes 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.

Symptom/Condition	Possible Cause	Possible Solution
No display in the face/sign will light.	Power incorrectly installed.	Check the power LED on the host driver. If not lit, connect power as described in <b>Section 3</b> .
Multiple-line sign with all lines showing the same prices, or data appears on the wrong line.	Line and face numbers not set correctly.	Set a different line number for each display on each face (refer to <b>Section 4.1</b> ).
Garbled display.	Driver malfunction.	Check driver to make sure signal cables are routed to the correct digits. Cycle power to the display. Replace the driver.
	Digit malfunction.	Digit the control.
Digit will not light.	Cable to the digit broken or disconnected.	Check cable by switching it to a different driver output. Replace the cable.
	Poor contact at driver connection.	Clean the contacts.
	Driver malfunction.	Replace the driver.
Segment or several LEDs will not light.	Poor contact at driver connection.	Clean the contact or replace the harness.
	Broken or disconnected cable between driver and digit.	Replace the cable.
	Broken LEDs.	Replace the segment or digit.
Display shows "E4."	No Message Error: This code is shown when a price has not been set on the display.	Use the control method to set the price on the display.





## Section 7: Replacement Parts

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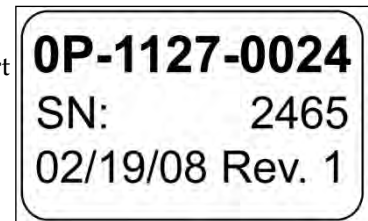
### Important Notes:

- Disconnect power before any repair or maintenance is done on the display.
- Only qualified service personnel should make any access to internal display electronics.
- Disconnect power when the display is not in use.

### 7.1 About Replacement Parts

Most components within the display carry a label that lists the part number. A typical label is shown in **Figure 17** with the part number in bold. Use the part number on the label to easily order replacement parts from Customer Service.

Refer to **Section 8** for instructions on obtaining parts from Daktronics.



*Figure 17: Typical Part Label*



# Section 8: Daktronics Exchange and Repair & Return Programs

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## 8.1 Exchange Program

The Daktronics Exchange Program is a quick, economical service for replacing key components in need of repair. If a component fails, Daktronics sends a replacement part to the customer who, in turn, returns the failed component to Daktronics. This not only saves money but also decreases equipment downtime. Customers who follow the program guidelines explained below will receive this service.

### Before Contacting Daktronics

Fill in these numbers before calling Customer Service:

Display Serial Number: \_\_\_\_\_

Display Model Number: \_\_\_\_\_

Date Installed: \_\_\_\_\_

Location of Sign: \_\_\_\_\_

Daktronics Customer ID Number: \_\_\_\_\_

To participate in the Exchange Program, follow these steps.

1. **Call Daktronics Customer Service: 888-DAK-SIGN (888-325-7446)** to order the exchange part.
2. **When the new exchange part is received, mail the old part to Daktronics.**

If the replacement part fixes the problem, send in the failed part within 3 weeks of the ship date.

  - a. Package the old part in the same shipping materials in which the replacement part arrived.
  - b. Fill out and attach the enclosed UPS shipping document.
  - c. Ship the part to Daktronics.

3. **A charge will be made for the replacement part immediately, unless a qualifying service agreement is in place.**

In most circumstances, the replacement part will be invoiced at the time it is shipped. If the failed part or replacement part is not returned to Daktronics within 3 weeks of the ship date, it is assumed that the customer is purchasing the replacement part and will be invoiced for the value of the new sale part.

If the part or parts are returned within 2 weeks of the second invoice date, Daktronics will credit the customer for the amount of the second invoice. If after 2 weeks Daktronics has still not received the parts back, the customer must pay the second invoice and will not be credited for the return of the failed part.

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

## 8.2 Repair & Return Program

For items not subject to exchange, Daktronics offers a Repair & Return Program. To send a part for repair, follow these steps:

1. **Call or fax Daktronics Customer Service:**  
Phone: 888-DAK-SIGN (888-325-7446) Fax: 605-697-4000
2. **Receive a Return Materials Authorization (RMA) number before shipping.**  
This expedites repair of the part.
3. **Package and pad the item carefully to prevent damage during shipment.**  
Electronic components, such as printed circuit boards, should be placed in an antistatic bag before boxing. Daktronics does not recommend using packing peanuts when shipping.
4. **Enclose:**
  - Your name
  - Address
  - Phone number
  - The RMA number
  - A clear description of symptoms

### Shipping Address

Daktronics Inc.  
Customer Service Receiving  
PO Box 5128  
201 Daktronics Drive  
Brookings, SD 57006  
Attn: RMA#\_\_\_\_\_

# Glossary

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**Cabinet:** The metal body of a display.

**Client Driver:** All drivers not designated as the host driver. The host receiver sends the line information out to the clients. Each client should use specific line and face numbers (“address”).

**Digit Circuit Board:** The circuit board on which the LEDs for the entire digit are mounted.

**Digit Panel:** Metal panel on which the digit circuit boards or digit segments are mounted. The digit panel must be opened to access the display’s internal components.

**Digit Segment:** A group of LEDs in a digit that function as a single circuit. On 24” and larger digits, each segment is an individual circuit board.

**DM-100 Controller:** A component used to transmit price data to displays operating with FLR-1500 and FLD-2000 Control Kits.

**Driver:** The circuit in a display that receives signal from the controller in order to operate the digits, causing the correct numbers to be shown.

**Host Driver:** The driver that receives signal from the controller, and transmits it to the other drivers in the sign. On radio-controlled displays, the host driver is connected to the radio receiver. On direct-wired displays, the host driver is wired to the control J box.

**Light Emitting Diode (LED):** A low energy, high intensity lighting unit used in Fuelight™ displays.

**RC-50 Transmitter:** A component used to transmit price data to displays operating with FLR-100 Control Kits.

**RC-100 Transmitter:** A component used to transmit price data to displays operating with FLR-500 Control Kits.

**Signal Surge Suppression Card:** An electrical device used to protect equipment from high-voltage surges in the signal line.

**Transformer:** A device that takes in 120 VAC and steps in down to 20 VAC for use by the driver.



# Appendix A: Reference Drawings

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This manual refers to drawings by listing the last set of digits and the letter preceding them. **Figure 18** illustrates a Daktronics drawing label, located in the lower-right corner of a drawing. In the example, the drawing number would be referred to as **Drawing A-397727**.

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DAKTRONICS, INC. BROOKINGS, SD 57006			
BKOL: FUELIGHT DISPLAYS			
TITLE: SHOP DRAWING, FL-2000-12-NA-DI			
DES. BY: AVB		DRAWN BY: A VANBEMMEL DATE: 29 APR 08	
REVISION	APPROVED BY:	1478-R08A-397727	
00	SCALE: 1=15	Drawing Number	

**Figure 18:** Drawing Label

Insert; LL-2551 DM-100 Price/T&T Display..... **Drawing A-167856**  
Riser Diagram, DM-100 Wired Control..... **Drawing A-267491**

Grounding Detail, Gas Price Displays ..... **Drawing B-329675**

To obtain copies of shop drawings or other reference drawings specific to your display, contact Daktronics Customer Service.

Phone: 888-DAK-SIGN (888-325-7446)





## **Appendix B: Daktronics Warranty and Limitation of Liability**

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