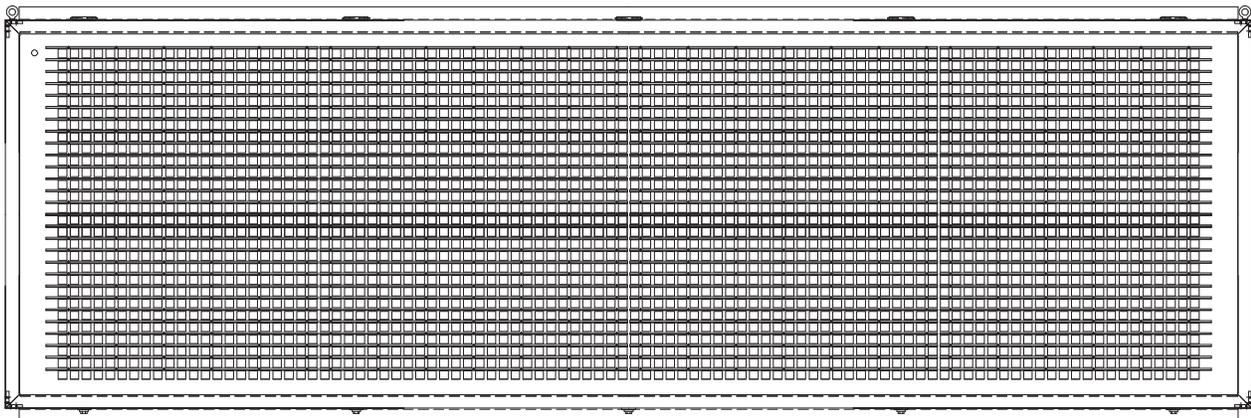


# 28x96 Front Access Full Matrix LED Sign

## Maintenance Manual

1.07-inch, 1.35-inch, and 1.75-inch Pitch Signs with 1 Controller

P1507/P1514



**Manual part number: 1507610401 rev. A**

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# Introduction

## Purpose

This manual is intended as a guide for maintenance and repairs considered field serviceable.

This field service manual supplies technical information for service and technical personnel so that they can maintain the equipment at the assembly but not the component level.

## Revision history

Revision	Date	Notes
1507610401 rev. A	December 10, 2007	Initial release.

## Related documentation

Technical documentation can be found at Adaptive's Web site (<http://www.adaptivedisplays.com>).

Part #	Manual title	Description
1507650204	Wiring Diagram	Sign wiring diagram for the 1.07-inch pitch sign with one controller.
1507650206	Wiring Diagram	Sign wiring diagram for the 1.35-inch pitch sign with one controller.
1507650205	Wiring Diagram	Sign wiring diagram for the 1.75-inch pitch sign with one controller.
TechMemo #00-0005	Preventing Electrostatic Discharge (ESD) Damage	Describes the precautions to take to protect electronic components from ESD damage.

## Safety information

### Equipment symbols



Chassis ground

### Warnings and cautions

Warnings and cautions are posted in appropriate locations throughout this manual.

## Battery backup

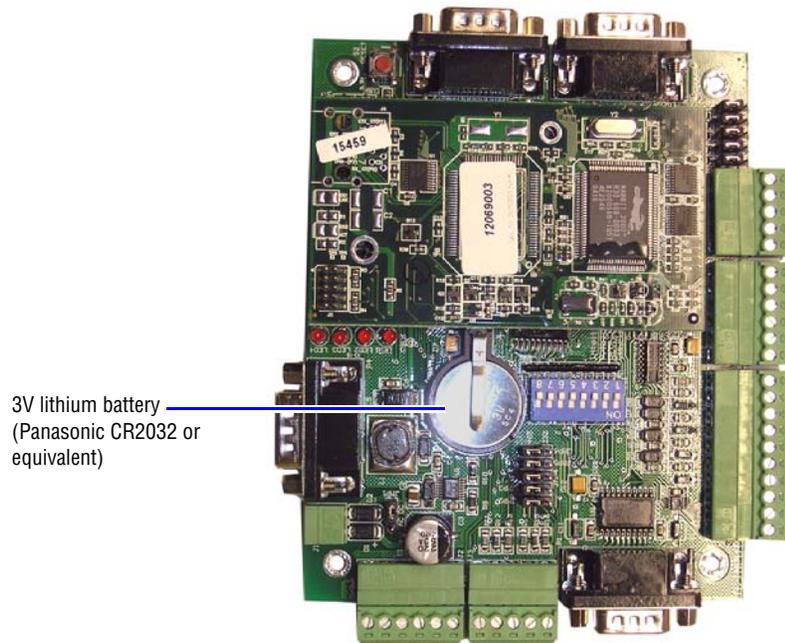
In the event of power loss, a lithium battery provides power to the sign's controller board.

**Note:** The backup battery provides only enough power to back up the sign controller's memory, not the sign's LED displays.

### 3V lithium backup battery

**WARNING!** Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

One 3V lithium battery is located on the sign's controller board.



**Figure 1.** Location of the 3V lithium battery on the sign's controller

---

# System overview

This section contains the LED Variable Message Sign (VMS) systems description and a general explanation of how each system operates.

## Introduction

The Adaptive LED family of Variable Message Signs is considered to be one of the highest visibility sign systems available. Utilizing the latest generation of light emitting diode (LED) technology has allowed us to construct a high-reliability, variable message sign display system.

The LED Variable Message Signs discussed in this manual consist of front access types with a 28 x 96 display board at 1.07-inch, 1.35-inch, and 1.75-inch pitch. The signs are designed for use as outdoor highway information signs. The signs utilize a corrosion-resistant front access housing with enclosed control circuitry within. The only connections necessary are AC power and Communications Input/Output between the sign housings and the ground cabinets.

## General system

The entire sign system can be broken down into four basic subsystems:

- VMS control system
- LED brightness control system
- Environmental control
- Electrical system

In the following sections, we explain each of the above-mentioned systems in general terms for ease of understanding. Referring to the drawings throughout this manual should help you to gain a general understanding of the LED Variable Message Sign system.

## What is an LED?

LED-based signs are one of the most versatile and visible display systems available. We use a cluster of four LEDs to form a single pixel. The pixels are arranged in various matrices to form alphanumeric characters. These characters are then linked together to form an LED display line. The display line format used in the signs discussed in this manual is full matrix, which allows for the display of any alphanumeric character, including punctuation marks, as well as simple graphics characters.

## VMS control system

The VMS control system utilized in the Variable Message Sign consists of the following components:

- IDI 1321 controller
- LED display board/driver board

## General operation

The controller interfaces with the “Host” computer system and communicates with the Host through a CAT5 Ethernet cable or an RS232 Input/Output (I/O) port. Using this network connection or I/O port, the host issues commands to and requests status information from the LED VMS equipment. The controller monitors and controls the entire LED VMS system. Communication by the controller to and from the host and the VMS is accomplished using industry standard 10/100 Ethernet or RS232 communications circuitry and NTCIP protocol.

## LED brightness control system

The VMS is equipped with a brightness control system for the LEDs. The brightness control system ensures that the display is readable in all lighting conditions.

The main components of the brightness control system are the following:

- Photocell assembly
- Photocells (3: 1 upper, 1 front of sign, and 1 back of sign)
- IDI 1321 Controller

### General operation

The photocells are enclosed in the cabinet to protect them from the environment. The photocells continuously monitor the ambient light conditions and send the information directly to the controller. The controller assembly determines exactly how much ambient light is present through the light-sensing photocells and sends the proper command to the display module for it to adjust duty cycle of the LED current drive, thus dimming or brightening the LED modules according to the ambient light. (If the on time of the duty cycle is 50%, then the brightness will be at 50%; if the on time of the duty cycle is 75%, then the brightness will be at 75%, etc.)

## Environmental control system — sign housing

The environmental control system in the sign housing is responsible for maintaining a working environment for the sign display components and communication electronics in the sign display systems. The environmental control system consists of the following components:

- Photo/temperature sensor
- Fans
- Fan filters
- Fan relay
- Humidity sensor
- Fan monitor board
- Heater strip
- Heater relay

### General operation

The fans are responsible for exchanging air in the sign for temperature control and ventilation through the sign. The fans are automatically turned OFF or ON based on the readings from temperature sensors and sign controller settings. The fan monitor board is used to determine if the fans are operating within specifications and communicates the fan status to the controller. The humidity sensor, heater strip, fans, and temperature sensors are all used to determine if there is an environmental condition that could cause the front plex to fog. Based on an algorithm, if the situation dictates it is needed, the heater strip will be enabled and the fans will blow hot air across the front face. The fans automatically turn on when the temperature exceeds 120°F (50°C) and automatically turn off when the temperature goes below 113°F (45°C).

## Electrical system

The electrical supply system is responsible for supplying the necessary power to operate the LED sign system. The sign housing AC and DC electrical system consists of the following components:

- Load center
- GFCI service outlet
- DC power supply

## **Electrical distribution (AC)**

The AC input to the sign systems consists of 120VAC single-phase service wired to the load center located in the sign. AC is also wired to the DC power supplies. The signs discussed in this manual require 15A service for the 1.07-inch and 1.35-inch pitch signs and 20A service for the 1.75-inch pitch sign.

## **Electrical distribution (DC)**

Attached to the back panels in the sign housing are the power supply boxes that contain two 12VDC switching power supplies. The electronic power supplies convert the 120VAC to the required DC voltage to power all of the electronics in the sign. DC power to the electronics is redundant and has a primary and secondary source of DC power. Therefore, failure of a power supply will not impact sign performance. The controller monitors the status of the power supplies.

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# Equipment description

## General description

- Serviceability: Front access.
- Dimensions: Refer to the sign wiring diagram that came with the sign.
- Weight (approximate): 1.07-inch pitch – 500 lbs, 1.35-inch pitch – 525 lbs, 1.75-inch pitch – 615 lbs.
- Electrical: 120VAC, 50/60Hz, 15A for the 1.07-inch and 1.35-inch pitch signs and 20A for the 1.75-inch pitch sign. Typical current draw is approximately 5-8A.
- Display: Full matrix 28 x 96 pixels.

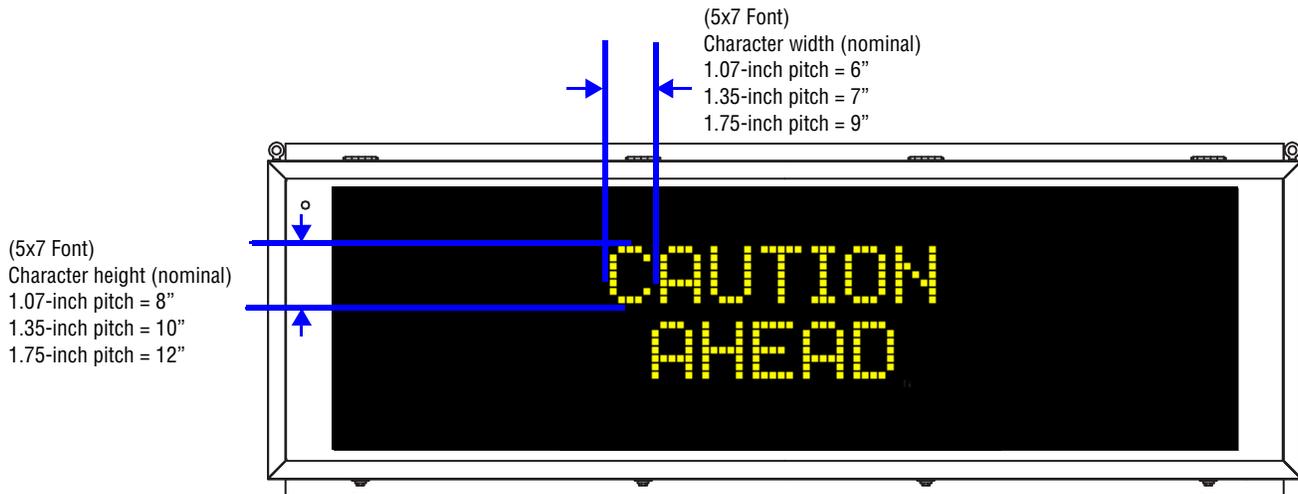


Figure 2. 5x7 font dimensions

- Pitch (distance between each LED pixel): 1.07-inch, 1.35-inch, and 1.75-inch pitch.

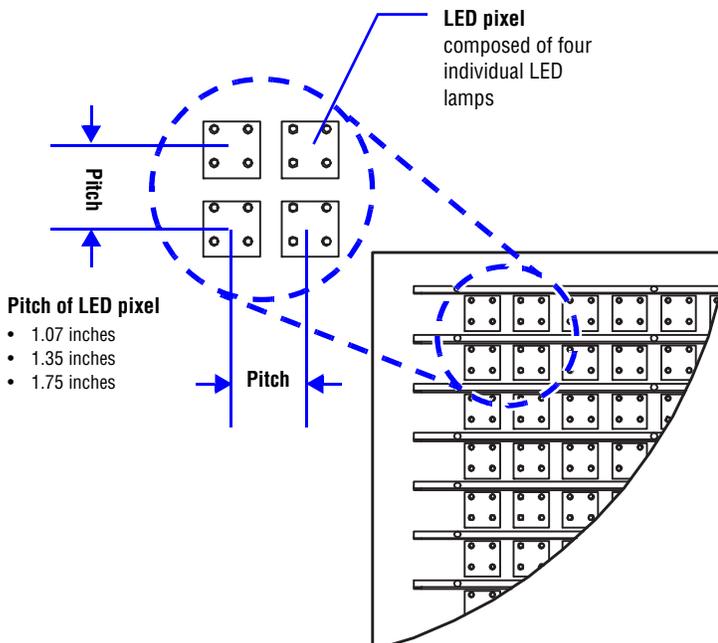
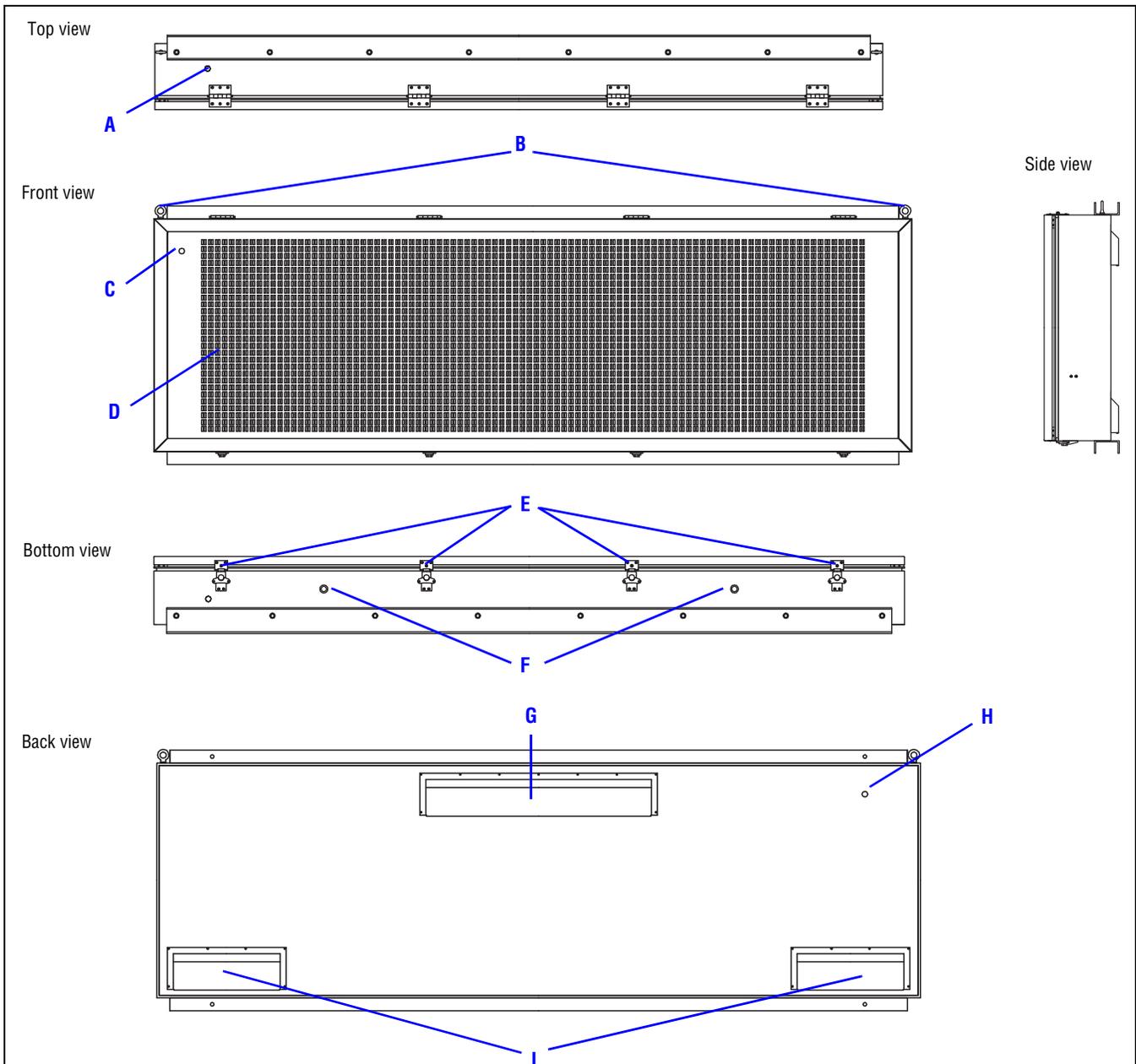


Figure 3. LED pitch

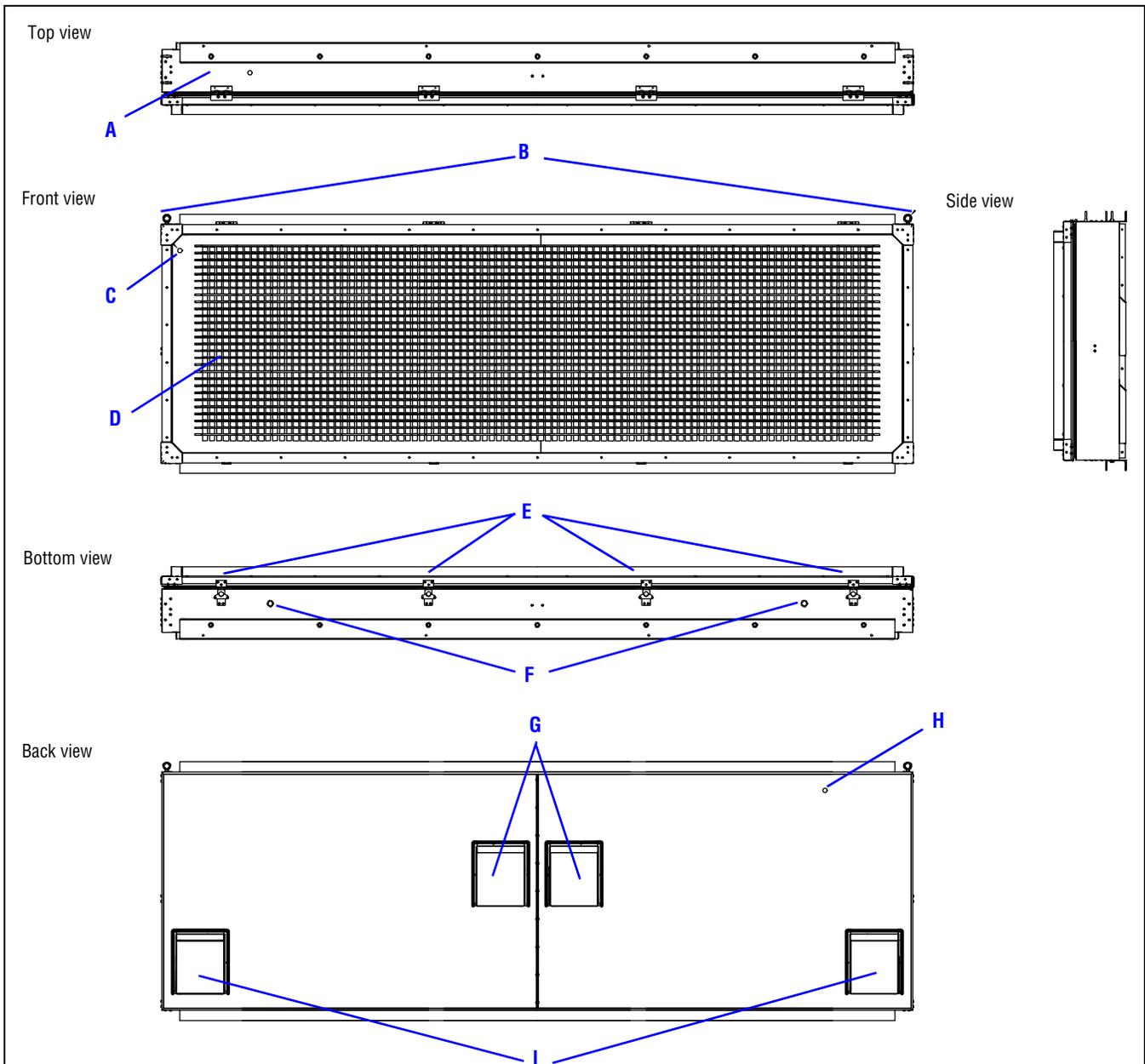
## External views — 1.07-inch pitch sign



**Figure 4.** Exterior top, front, bottom, back, and side views of a 1.07-inch sign

Item	Name	Description
<b>A</b>	UPPER PHOTO CELL	Used for controlling LED brightness.
<b>B</b>	LIFTING EYEBOLTS	Used to lift sign. These should NOT be used to mount the sign.
<b>C</b>	FRONT PHOTO CELL	Used for controlling LED brightness.
<b>D</b>	LEDS	Used to display messages.
<b>E</b>	FRONT FACE FRAME LATCH	Used to fasten sign front face frame.
<b>F</b>	DRAIN HOLE	Allows water that may accumulate inside the sign to escape.
<b>G</b>	EXHAUST VENT OUTLET (WITH HOOD)	Permits hot air from inside sign to exit.
<b>H</b>	BACK PHOTO CELL	Used for controlling LED brightness.
<b>I</b>	INTAKE AIR VENT	Allows cool air inside sign.

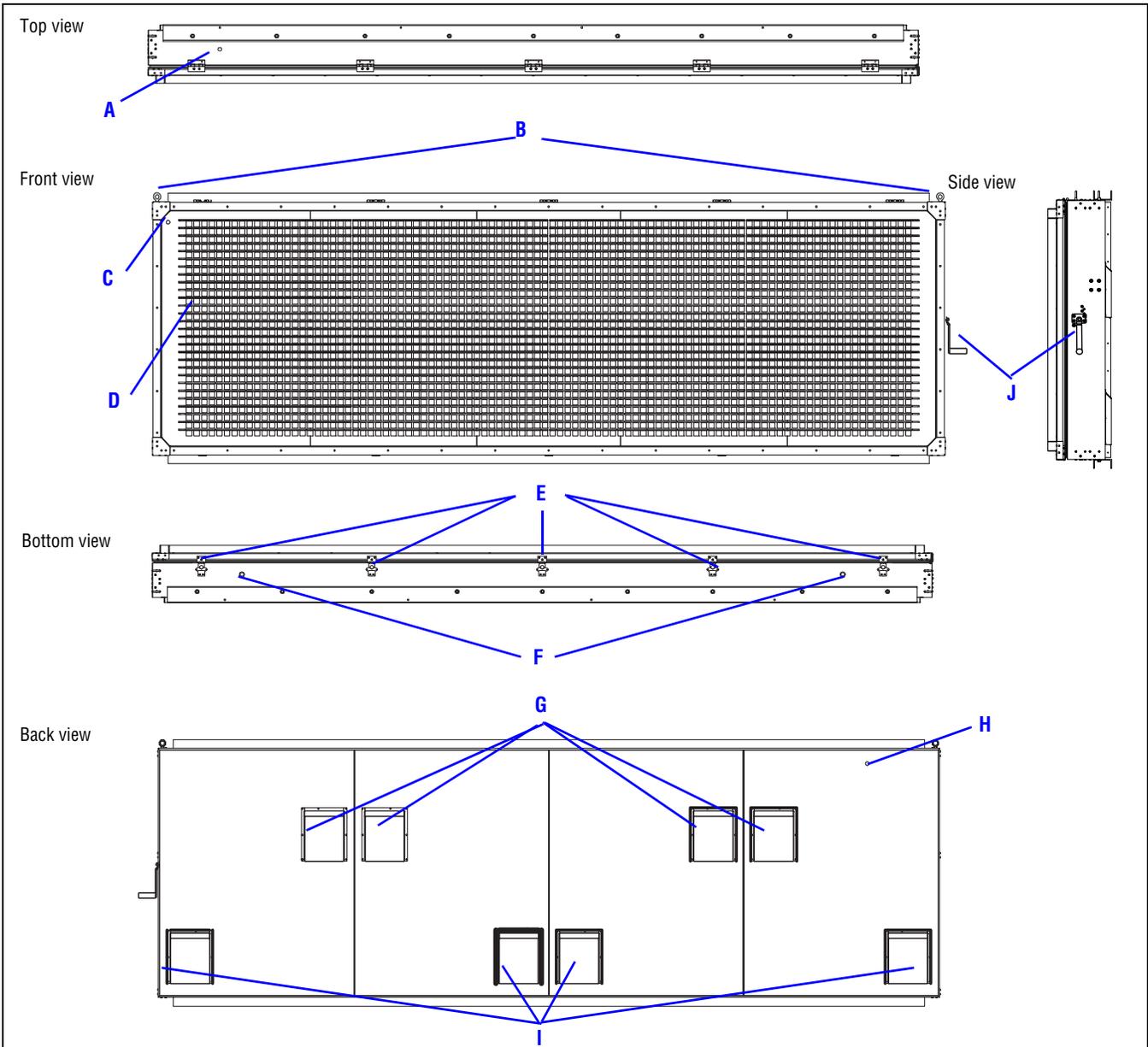
## External views — 1.35-inch pitch sign



**Figure 5.** Exterior top, front, bottom, back, and side views of a 1.35-inch sign

Item	Name	Description
A	UPPER PHOTO CELL	Used for controlling LED brightness.
B	LIFTING EYEBOLTS	Used to lift sign. These should NOT be used to mount the sign.
C	FRONT PHOTO CELL	Used for controlling LED brightness.
D	LEDS	Used to display messages.
E	FRONT FACE FRAME LATCH	Used to fasten sign front face frame.
F	DRAIN HOLE	Allows water that may accumulate inside the sign to escape.
G	EXHAUST VENT OUTLET (WITH HOOD)	Permits hot air from inside sign to exit.
H	BACK PHOTO CELL	Used for controlling LED brightness.
I	INTAKE AIR VENT	Allows cool air inside sign.

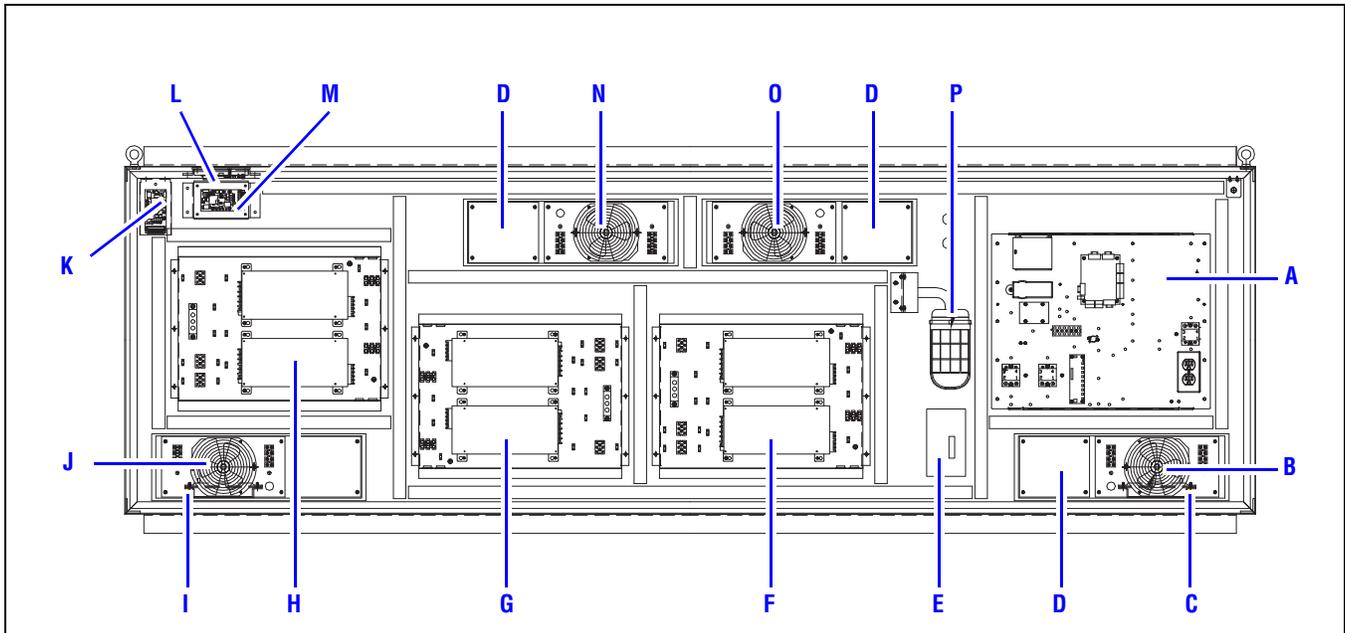
## External views — 1.75-inch pitch sign



**Figure 6.** Exterior top, front, bottom, back, and side views of a 1.75-inch sign

Item	Name	Description
A	UPPER PHOTO CELL	Used for controlling LED brightness.
B	LIFTING EYEBOLTS	Used to lift sign. These should NOT be used to mount the sign.
C	FRONT PHOTO CELL	Used for controlling LED brightness.
D	LEDS	Used to display messages.
E	FRONT FACE FRAME LATCH	Used to fasten sign front face frame.
F	DRAIN HOLE	Allows water that may accumulate inside the sign to escape.
G	EXHAUST VENT OUTLET (WITH HOOD)	Permits hot air from inside sign to exit.
H	BACK PHOTO CELL	Used for controlling LED brightness.
I	INTAKE AIR VENT	Allows cool air inside sign.
J	HANDLE	Winch handle used to assist with opening and closing the sign. See “Opening and closing a sign” on page 28.

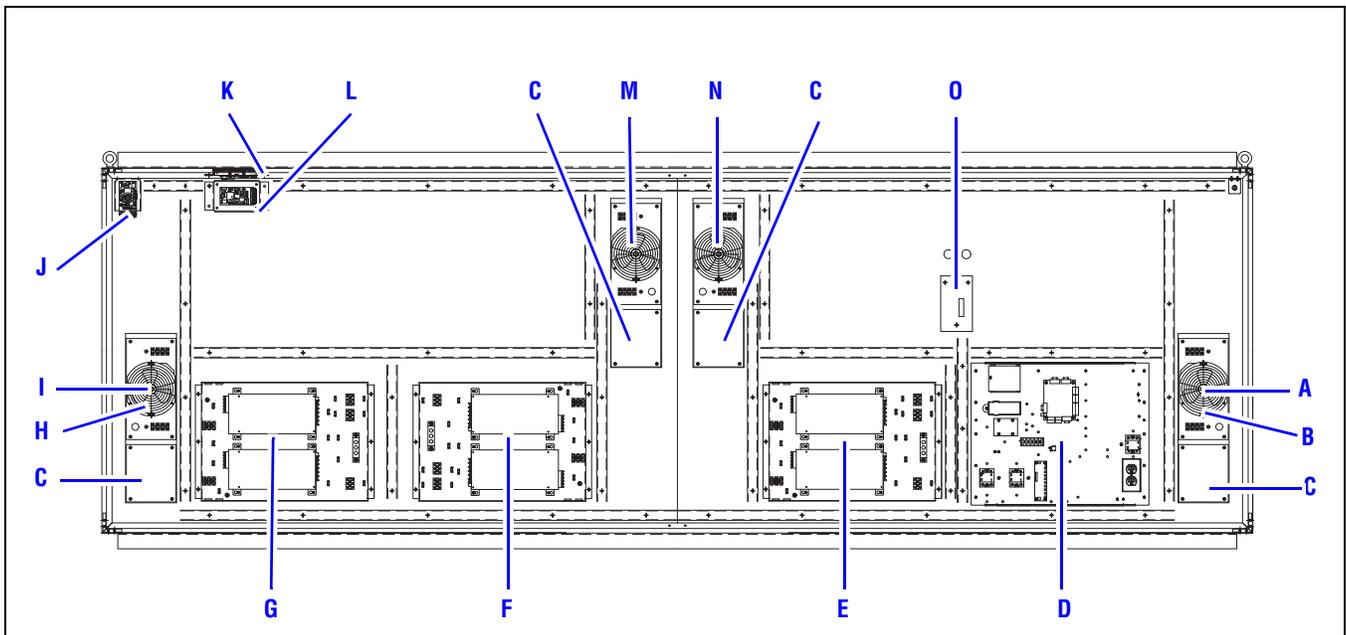
## Internal view — 1.07-inch pitch sign



**Figure 7.** Internal components of a 1.07-inch sign

Item	Name	Description
A	CONTROLLER PLATE	Mounting sub plate for controller, outlet, fan monitoring board, and fan/heater control relays.
B	INTAKE FAN (FAN #4)	Draws in air from outside.
C	HEATER #2	Used to control humidity inside sign.
D	AIR FILTER COVER	When removed provides access to fan air filters.
E	LOAD CENTER	Principal AC power for sign. 120VAC 15A service required.
F	POWER PANEL #3	Convert AC power from load center to DC power.
G	POWER PANEL #2	
H	POWER PANEL #1	
I	HEATER #1	Used to control humidity inside sign.
J	INTAKE FAN (FAN #1)	Draws in air from outside.
K	LIGHT SENSOR #0 — FRONT	The address number of a light sensor is set via SW1 and is the same as the light sensor number. To replace light sensor board, remove the four nuts attached to the mounting plate.
L	LIGHT SENSOR #1 — TOP	
M	LIGHT SENSOR #2 — BACK	
N	EXHAUST VENT (FAN #2)	Vents hot air inside the sign to the outside.
O	EXHAUST VENT (FAN #3)	
P	LIGHT	Automatically turns on when door is opened.

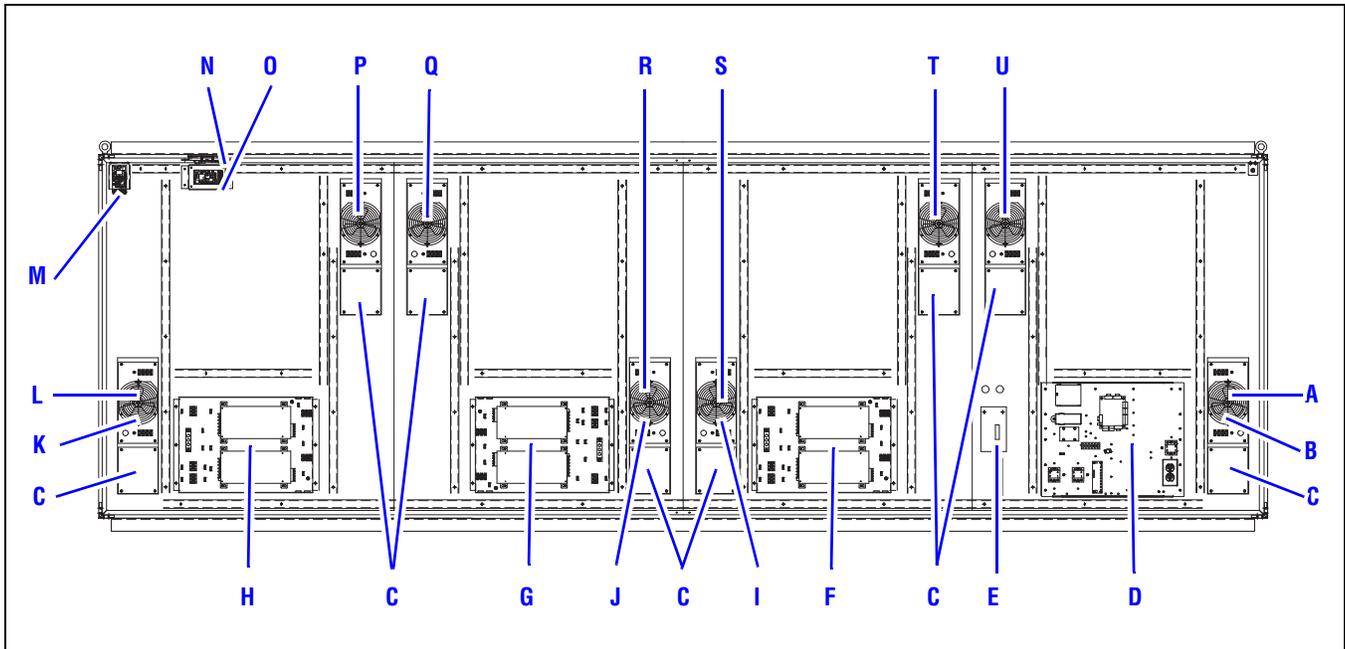
## Internal view — 1.35-inch pitch sign



**Figure 8.** Internal components of a 1.35-inch sign

Item	Name	Description
A	INTAKE FAN (FAN #4)	Draws in air from outside.
B	HEATER #2	Used to control humidity inside sign.
C	AIR FILTER COVER	When removed provides access to fan air filters.
D	CONTROLLER PLATE	Mounting sub plate for controller, outlet, fan monitoring board, and fan/heater control relays.
E	POWER PANEL #3	Convert AC power from load center to DC power.
F	POWER PANEL #2	
G	POWER PANEL #1	
H	HEATER #1	Used to control humidity inside sign.
I	INTAKE FAN (FAN #1)	Draws in air from outside.
J	LIGHT SENSOR #0 — FRONT	The address number of a light sensor is set via SW1 and is the same as the light sensor number. To replace light sensor board, remove the four nuts attached to the mounting plate.
K	LIGHT SENSOR #1 — TOP	
L	LIGHT SENSOR #2 — BACK	
M	EXHAUST VENT (FAN #2)	Vents hot air inside the sign to the outside.
N	EXHAUST VENT (FAN #3)	
O	LOAD CENTER	Principal AC power for sign. 120VAC 15A service required.

## Internal view — 1.75-inch pitch sign



**Figure 9.** Internal components of a 1.35-inch sign

Item	Name	Description
A	INTAKE FAN (FAN #8)	Draws in air from outside.
B	HEATER #4	Used to control humidity inside sign.
C	AIR FILTER COVER	When removed provides access to fan air filters.
D	CONTROLLER PLATE	Mounting sub plate for controller, outlet, fan monitoring board, and fan/heater control relays.
E	LOAD CENTER	Principal AC power for sign. 120VAC 20A service required.
F	POWER PANEL #3	Convert AC power from load center to DC power.
G	POWER PANEL #2	
H	POWER PANEL #1	
I	HEATER #3	Used to control humidity inside sign.
J	HEATER #2	
K	HEATER #1	
L	INTAKE FAN (FAN #1)	Draws in air from outside.
M	LIGHT SENSOR #0	The address number of a light sensor is set via SW1 and is the same as the light sensor number. To replace light sensor board, remove the four nuts attached to the mounting plate.
N	LIGHT SENSOR #1	
O	LIGHT SENSOR #2	
P	EXHAUST VENT (FAN #2)	Vents hot air inside the sign to the outside.
Q	EXHAUST VENT (FAN #3)	
R	INTAKE FAN (FAN #4)	Draws in air from outside.
S	INTAKE FAN (FAN #5)	
T	EXHAUST VENT (FAN #6)	Vents hot air inside the sign to the outside.
U	EXHAUST VENT (FAN #7)	

## Controller plate

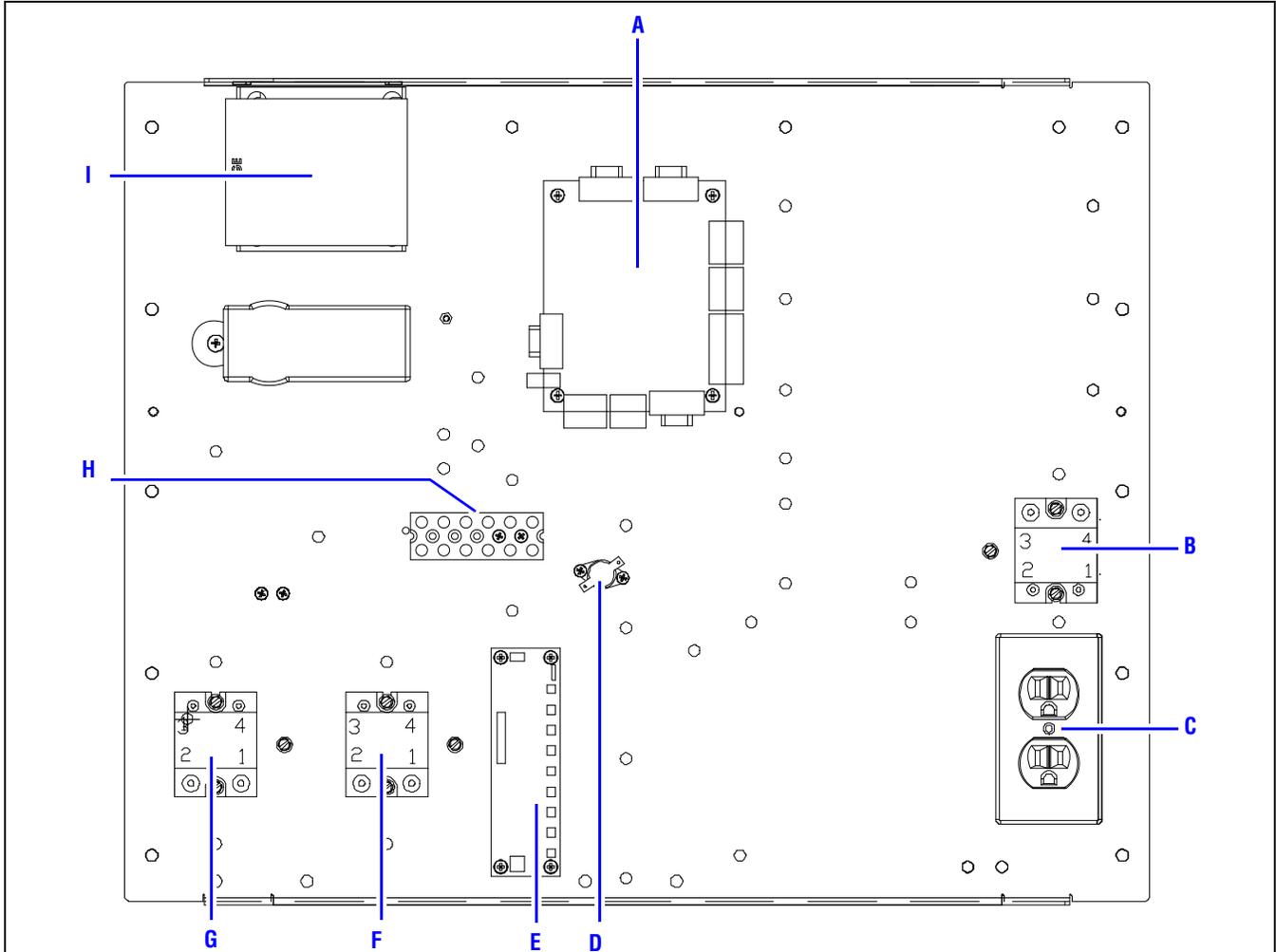


Figure 10. Controller plate components

Item	Name	Part #	Description
A	CONTROLLER	15029101	Controls display and communicates status information to central communications.
B	RELAY #3	48000005	Only used on 1.07-inch pitch signs to turn the light on when the door switch is open.
C	120V OUTLET	64000024	Service outlet (GFCI).
D	FAN THERMOSTAT	30670752	Normally open. Closes when temperature >120°F and fans are activated.
E	FAN MONITORING BOARD	1509110301	Monitors fan speed. Sends alert via NTCIP if fan speed falls below a specified RPM.
F	RELAY #1	48000004	Fan relay. This relay is used to control AC power being applied to the fans.
G	RELAY #2	48000009	Heat strip relay. The relay is used to control AC power being applied to the heaters.
H	TERMINAL BLOCK	43201045	Distributes DC power and signal to control sub assembly.
I	HUMIDITY SENSOR	30676015	Measures internal relative humidity within 2% accuracy.

## Sign controller

Example of a sign controller, the Ethernet port is not shown.

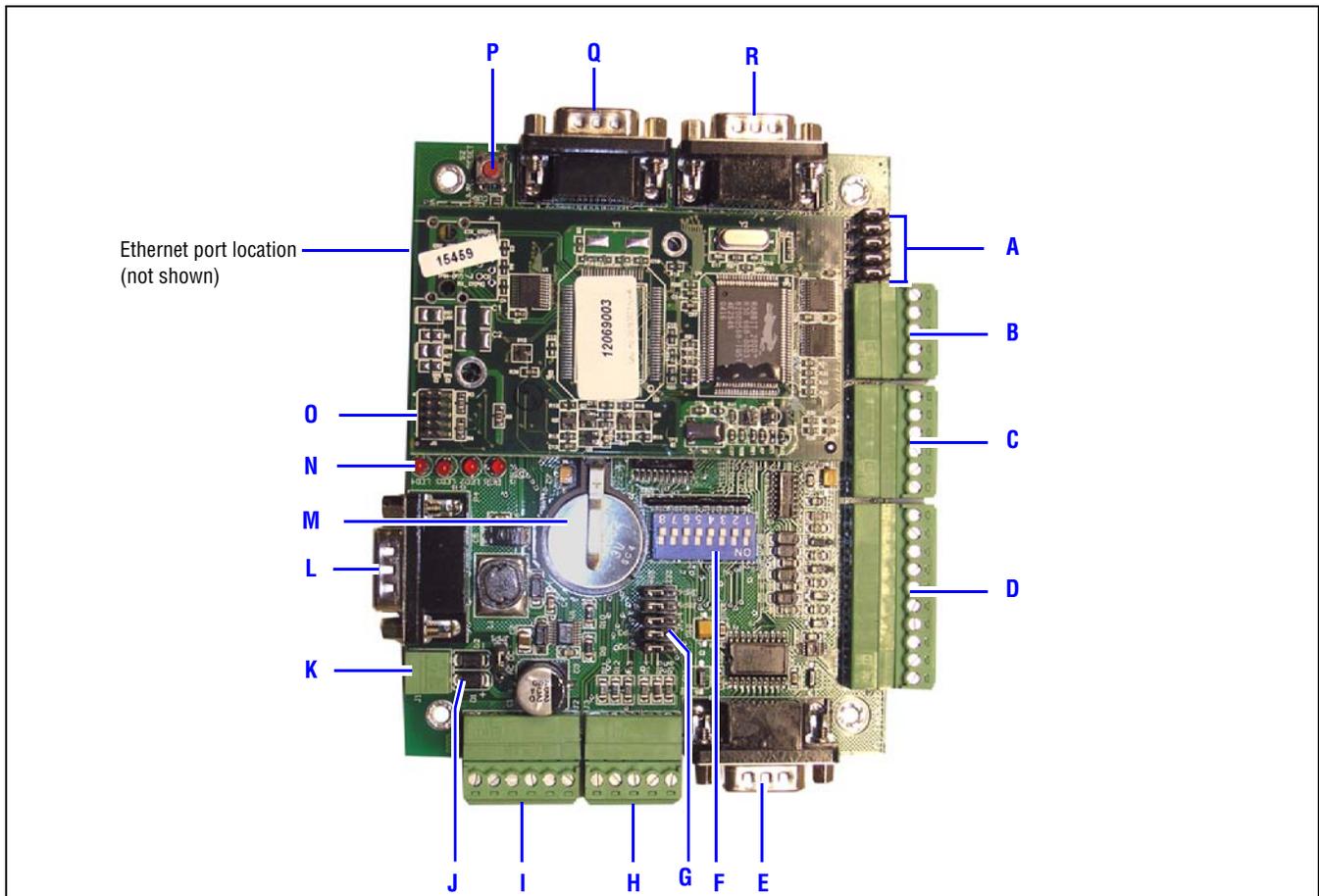


Figure 11. Sign controller components

Item	PCB label	Name	Description
A	JP7 TO JP11		Configures controller for RS422 on J6 for display modules (115.2 kbaud).
B	J6	RS485 PORT 1	Connects to LED displays.
C	J5 A/INPUT	ANALOG INPUTS	Connects to humidity sensor.
D	J4 D/INPUT	DIGITAL INPUTS	Connects to power supply fail signals, door status, and fan monitor board.
E	P1	RS232 PORT	RS232 COMM PORT 0 — Not used. J3 is used.
F	S1	DIP SWITCH	Serial addressing and sign configuration.
G	JMP2 TO JMP6		Configures controller for RS422 on J3 for light sensors (38.4 kbaud).
H	J3	RS485 PORT	Connects to light sensors.
I	J2	DIGITAL OUTPUTS	Connects to Relays #1 and #2.
J	JMP1		Configures controller for DC power.
K	J1	POWER CONNECTOR	Connects to 12VDC power.
L	P4	RS232 PORT	RS232 COMM PORT 3 — used to interface laptop computer to the controller.
M	BAT1	BATTERY BACKUP	3V lithium battery (Panasonic CR2032 or equivalent).

<b>N</b>	LED1 TO LED4	DIAGNOSTIC LEDES	<ul style="list-style-type: none"> <li>• LED1: Controller heartbeat.</li> <li>• LED2: Communications from P4 (laptop computer), P3 (central), or Ethernet communications.</li> <li>• LED3: Communications to and from light sensors.</li> <li>• LED4: Communications to and from LED display boards.</li> </ul>
<b>O</b>	J5	PROGRAMMING PORT	
<b>P</b>	S2 RESET	CONTROLLER RESET SWITCH	Used to reset the controller for a soft start.
<b>Q</b>	P3	RS232 PORT	RS232 COMM PORT 2 — used for central communications.
<b>R</b>	P2	RS232 PORT	RS232 COMM PORT 1 — not used because J6 is used.

## Sign power panels

There are three power panels in each sign. Each panel contains two 12VDC output power supplies.

**Note:** Both power supplies may not turn on at the same time if there is not enough display load.

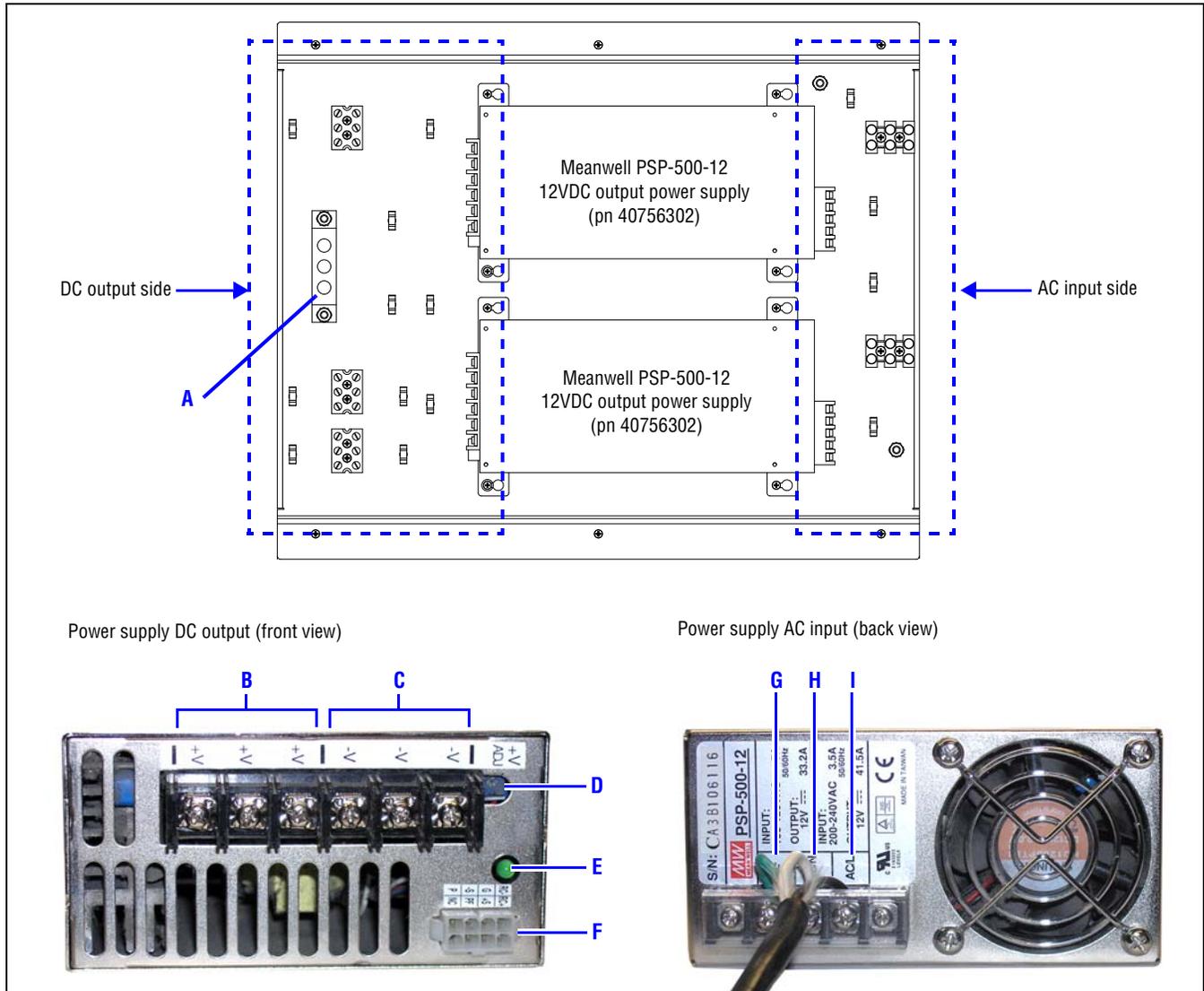


Figure 12. Power panel components

Item	Power supply label	Name	Description
A		Diode module	Part number 30300003LFSP or 30300002SP. See "Diode module replacement" on page 37.
B	V+	12VDC +	DC output.
C	V-	12VDC -	
D		DC output voltage adjust	Adjustment range. Output should be set to 12VDC $\pm$ 0.1V.
E		Input power indicator	Green = AC voltage supplied to power supply.
F		Signal connector	Used for remote control, remote sense, and power good signal.
G		AC in ground	AC input (90-264VAC, 47-63Hz).
H	AC/N	AC in neutral	
I	AC/L	AC in neutral	

## LED driver board

Each board is 8 x 14 pixels, and each pixel is composed of 4 LED lamps. See the wiring diagrams that accompanied the sign for part number information.

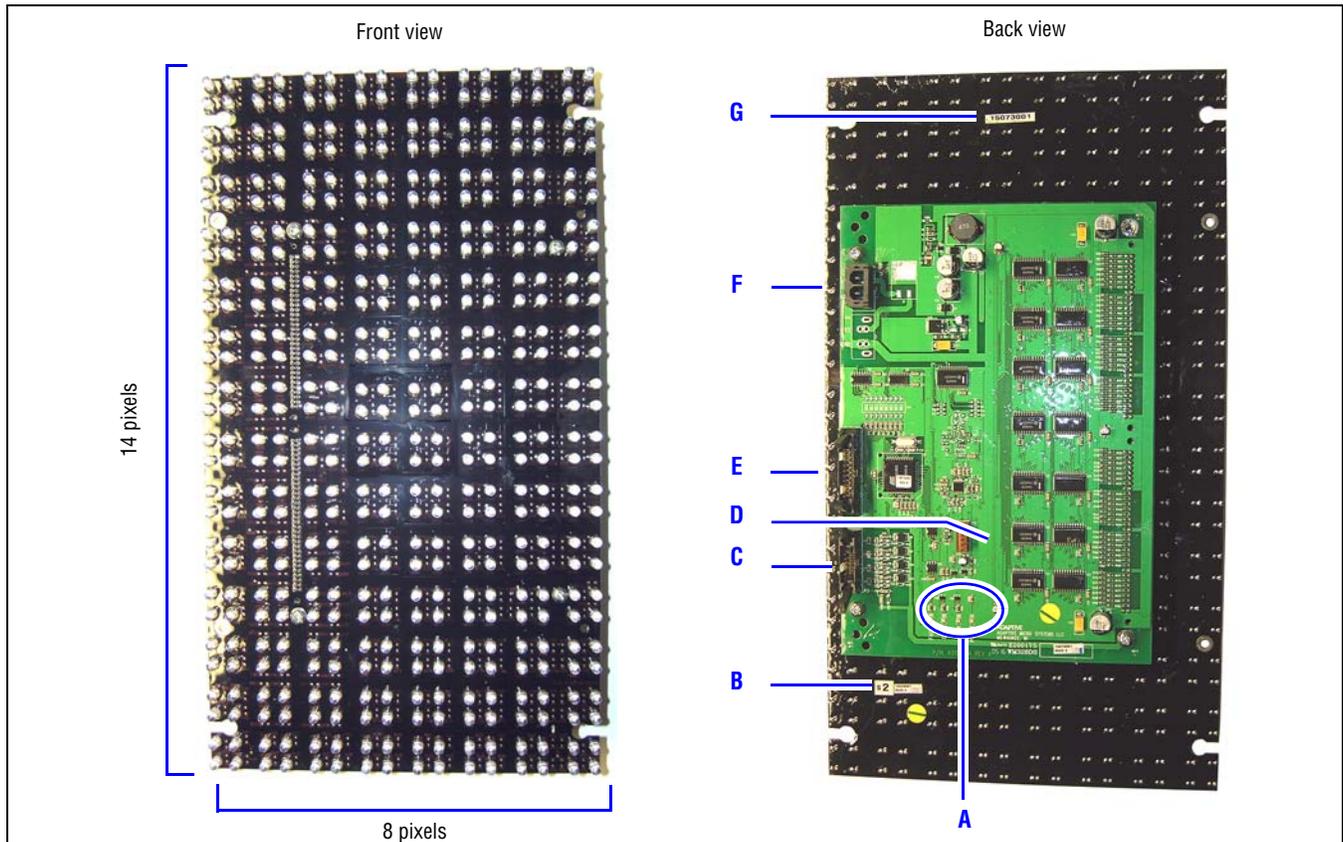
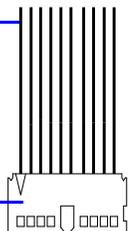


Figure 13. LED driver board views and components

Item	PCB label	Name	Description
A	LD1	POWER	On = 12V supplied to LED driver board.
	LD2	FAULT	On = one or more bad LED lamps on the LED driver board (if in normal operating mode).
	LD3	COMM	<ul style="list-style-type: none"> <li>On = There is NO communication from sign controller.</li> <li>Off = There is communication from the sign controller.</li> </ul>
	LD4	RUN	Flashing = LED driver board processor operating.
B		BIN LABEL	Information on the intensity and wavelength of the LED lamps.
C	P3		Connects to the controller via a ribbon cable.
D	P5		Programming port for the LED driver board processor.
E	P2	LED DRIVER BOARD ADDRESS	<p>This address is set using an address plug (pn 1509100701).</p> <p><b>Jumper wires</b> —————</p> <p>Refer to the appropriate wiring diagram for your sign model. These are preset from the factory with the correct settings.</p> <p>Plugs into P2 —————</p> 
F	P1	+V1	DC power from power supplies.
G		PART NUMBER LABEL	The module's part number is located at the top center of the board.

---

# Maintenance

## Physical Inspection

A physical inspection of the sign's exterior and interior should be performed every 6 months.

### Exterior inspection

- Check for any physical damage to the exterior of the sign.
- Check for loose nuts, bolts, hinges, doors, and so on.
- Check the exterior electronics for foreign debris and general cleanliness.
- Check the exterior of the sign for general cleanliness.
- Check the LEDs of the sign for general cleanliness and visibility.

### Interior inspection

- Check for any physical damage to the interior of the sign.
- Check for loose nuts, bolts, hinges, doors, and so on.
- Check the interior electronics for foreign debris and general cleanliness.
- Check the interior of the sign for general cleanliness.
- Make sure the sign's drain holes are not plugged.

## Front lens cleaning

**Notice:** Do not clean the lens with a pressure washer. Damage to the sign resulting from the use of a pressure washer is not covered by the manufacturer's warranty.

### Required materials

- Cleaning brush with very long and soft bristles.
- Mild, nonabrasive liquid detergent (liquid glass cleaner).  
**Note:** Do not use solvents. Use of solvents will damage the lens UV stabilizer.
- Soft cloth or soft paper towels.

### Cleaning procedure

1. Mix the detergent with water in a large bucket. The solution may be put in a spray bottle for spot cleaning.
2. Saturate the cleaning brush with the cleaning solution in the bucket or with the spray bottle.
3. Clean the sign's lens and louvers in a horizontal motion, starting from the top and progressing toward the bottom.

## Air filter cleaning

The exhaust vent and fan air filters should be checked every six months.

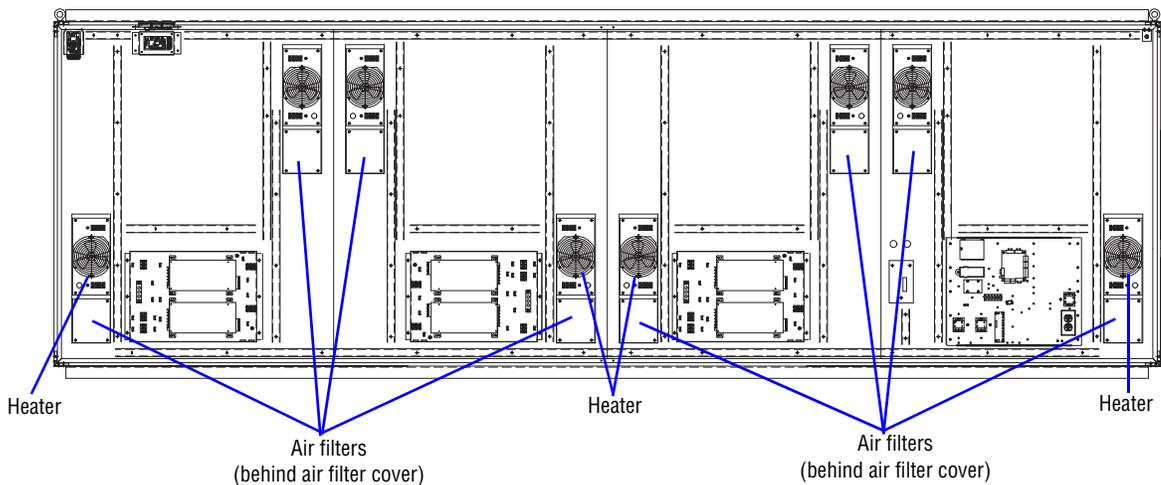
**WARNING! Hazardous voltage. Contact with high voltage may cause serious injury or death. Always disconnect power to unit prior to servicing.**

⇒ **To clean an air filter:**

1. Open the sign; see “Opening and closing a sign” on page 28.
2. Remove the air filter cover.

**WARNING! Do not touch the heater. The surface is hot and may result in injury.**

**Note:** The heater is located below the intake fan filter.



**Figure 14.** Air filter locations in the 1.75-inch pitch sign. The 1.07-inch and 1.35-inch pitch signs have 4 fans, see “Internal view — 1.07-inch pitch sign” on page 17 or “Internal view — 1.35-inch pitch sign” on page 18 for locations

3. If an air filter needs cleaning, wash it using warm water and dish cleaning liquid. Rinse the air filter in clean water and dry it with a clean cloth.
4. Return the clean air filter to the sign.
5. Reattach the air filter cover.
6. Close the sign.

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# Part replacement

## List of field-replaceable parts

Part name	page
Controller	page 32
Power supply	page 35
Diode module	page 37
Relay #1, #2, #3	page 39
LED driver board	page 41
Fan	page 42
Heater	page 44

## Controlling electrostatic discharge (ESD)

**Notice:** This equipment contains components that may be damaged by “static electricity”, or electrostatic discharge. To prevent this from happening, be sure to follow the guidelines in Adaptive Tech Memo 00-0005, “*Guidelines for Controlling Electrostatic Discharge Damage*”, available at Adaptive’s web site at <http://www.adaptivedisplays.com>.

## Opening and closing a sign

Separate instructions are provided for opening and closing the 1.75-inch pitch sign. This sign must be opened differently because it is larger and uses a handle.

**WARNING! Hazardous voltage. Contact with high voltage may cause serious injury or death. Always disconnect power to unit prior to servicing.**

### ⇒ To open a 1.07-inch or 1.35-inch pitch sign

1. Remove power from the sign.
2. Unhook the four latches securing the front face frame.

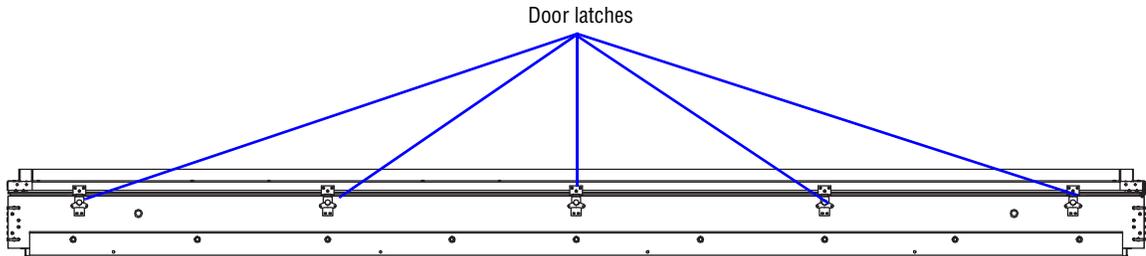


Figure 15. Door latch locations on 1.07-inch and 1.35-inch pitch signs

3. Lift the front face frame up until the frame's prop rods lock in place.

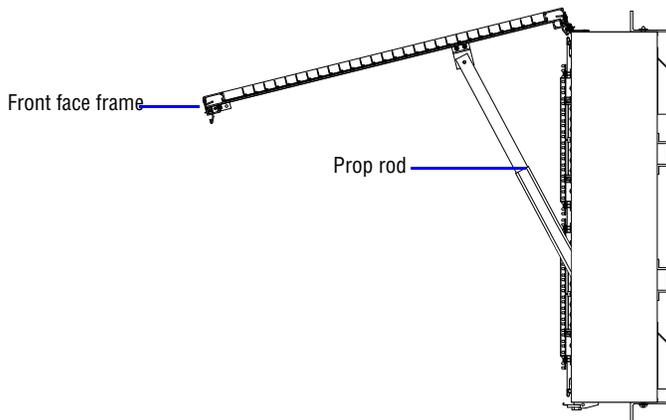


Figure 16. Front face frame and prop rod

4. Lift the LED panels up and fasten each to the underside of the front face frame using the quick-release pin.

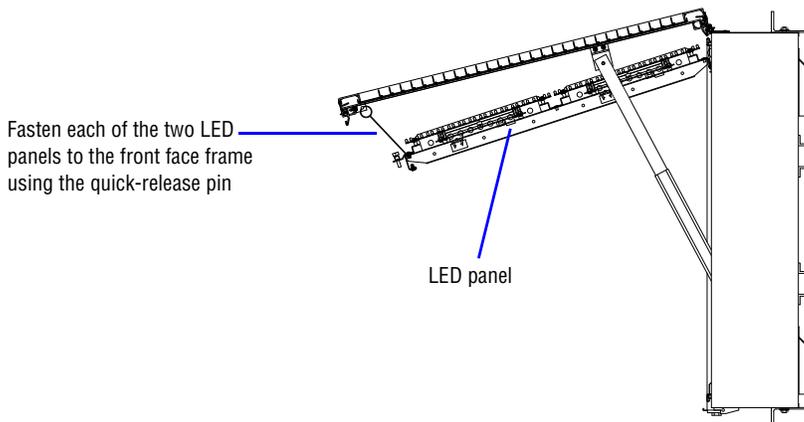
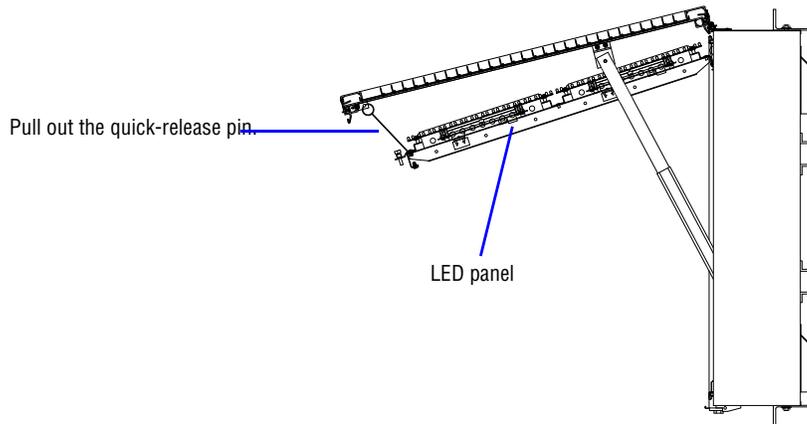


Figure 17. Fastening LED panels

⇒ **To close a 1.07-inch or 1.35-inch pitch sign**

1. Pull out the quick release pin to unfasten the LED panels from the underside of the front face frame and lower the panels.



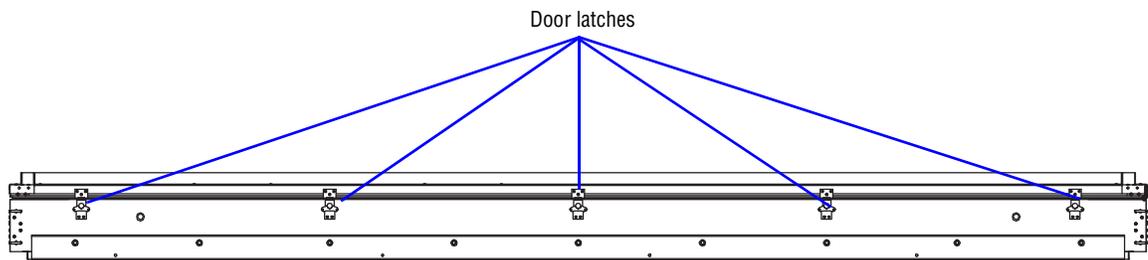
**Figure 18.** Removing quick release pin and unfastening LED panels

2. Gently push the front face frame up to release the prop rod and then lower the it down until the door is closed.
3. Push the door closed until it latches on the bottom of the front of the sign.

⇒ **To open a 1.75-inch pitch sign**

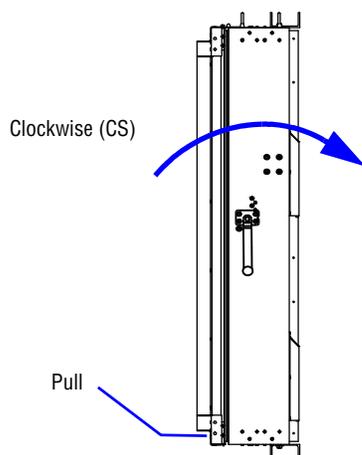
There is a label on the sign with instructions for opening the sign.

1. Remove power from the sign.
2. Unhook the latches securing the front face frame.



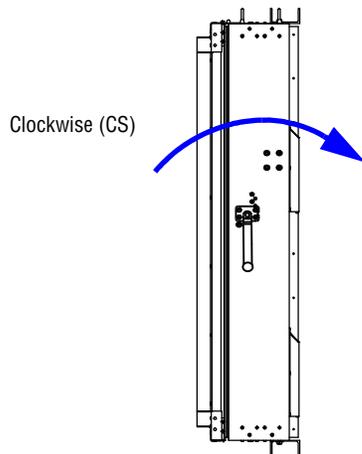
**Figure 19.** Door latch locations on the 1.75-inch pitch sign

3. Pull the front of the door to loosen the seal. If this is not done, the door will not open.



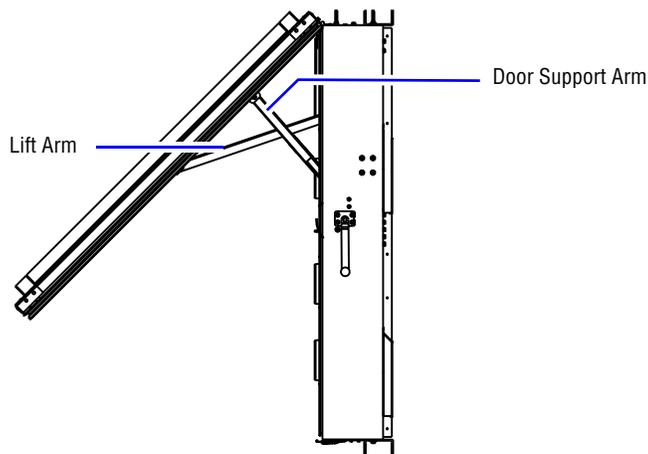
**Figure 20.** Loosening the seal

4. On the right side of the sign, turn the handle clockwise approximately 40 times until the door lift arms have fully extended. Stop turning the winch as soon as you feel resistance.



**Figure 21.**Turning the winch handle

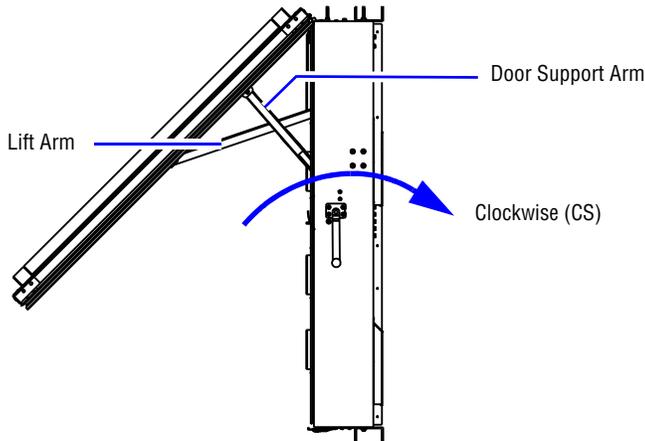
5. Turn handle in a counter-clockwise direction until door support arms are engaged.



**Figure 22.**Lift arms and door support arms on the 1.75-inch pitch sign

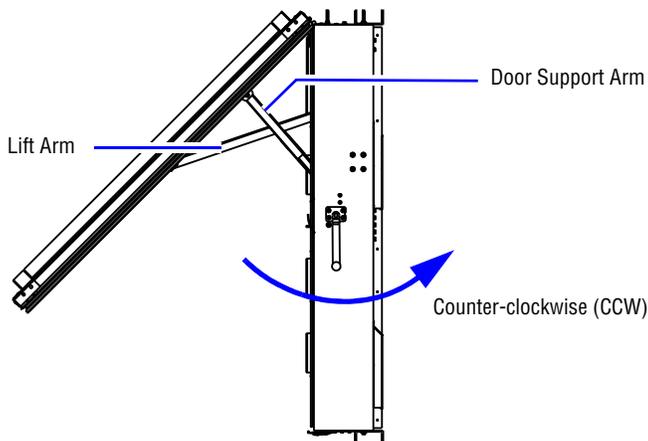
## ⇒ To close a 1.75-inch pitch sign

1. Disengage the support arms by turning the winch handle clockwise until the door opens and the lift arms bottom out.



**Figure 23.**Disengaging the door's support arms

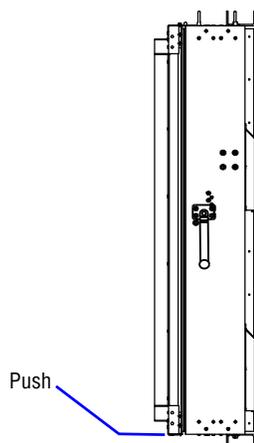
2. Turn the handle in the opposite direction (counter-clockwise) and lower the door slightly. Make sure the lift arms are moving and cables are not slack.



**Figure 24.**Cranking the door closed

**Note:** If either door support arm does not release when lowering the door, turn the handle clockwise to re-lift the door to disengage both door support arms.

3. Turn the handle counter-clockwise approximately 40 times until the door is closed.
4. Push the door closed until it latches on the bottom of the front of the sign and rehook the four latches securing the front face frame.



**Figure 25.**Push the door completely closed

## Sign controller board replacement

**WARNING!** Hazardous voltage. Contact with high voltage may cause serious injury or death. Always disconnect power to unit prior to servicing.

### ⇒ To replace the controller board

1. Open the sign. See “Opening and closing a sign” on page 28.
2. Turn the sign breaker to the OFF position.
3. Locate the controller board to be replaced.
4. Set the DIP switches and jumpers on the replacement board to match the DIP switches and jumpers on the board being replaced.

#### Controller DIP switches

For information about setting the serial address using the dip switches, see the table in Figure 28 on page 34.

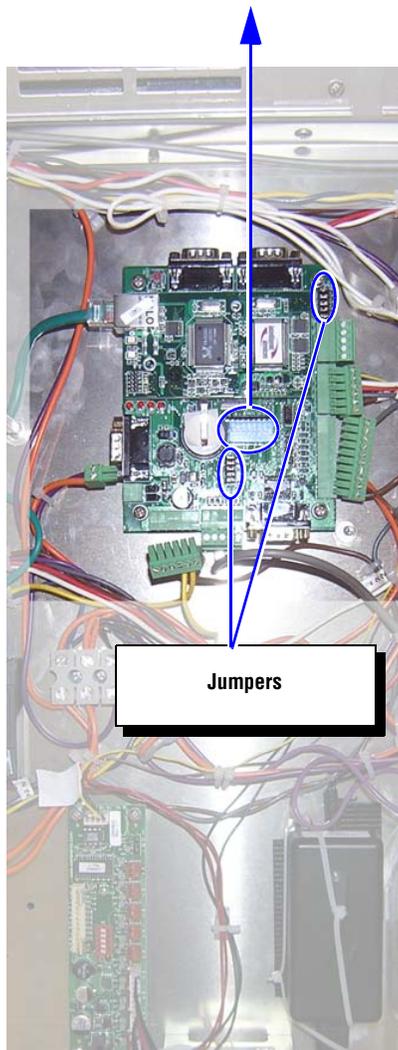
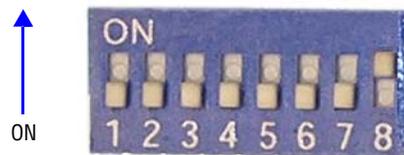
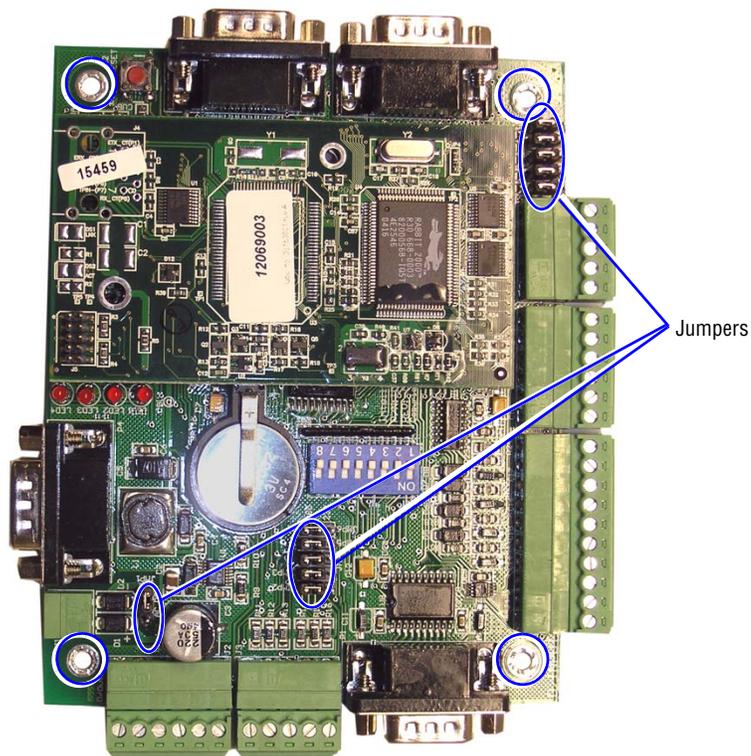


Figure 26. Controller jumper locations and dip switch settings

5. Disconnect all cables from the controller board to be replaced.
6. Remove the four screws (circled) securing the controller board to the sign.



Example controller shown, Ethernet port is not shown.

**Figure 27.** Controller board screws and jumpers

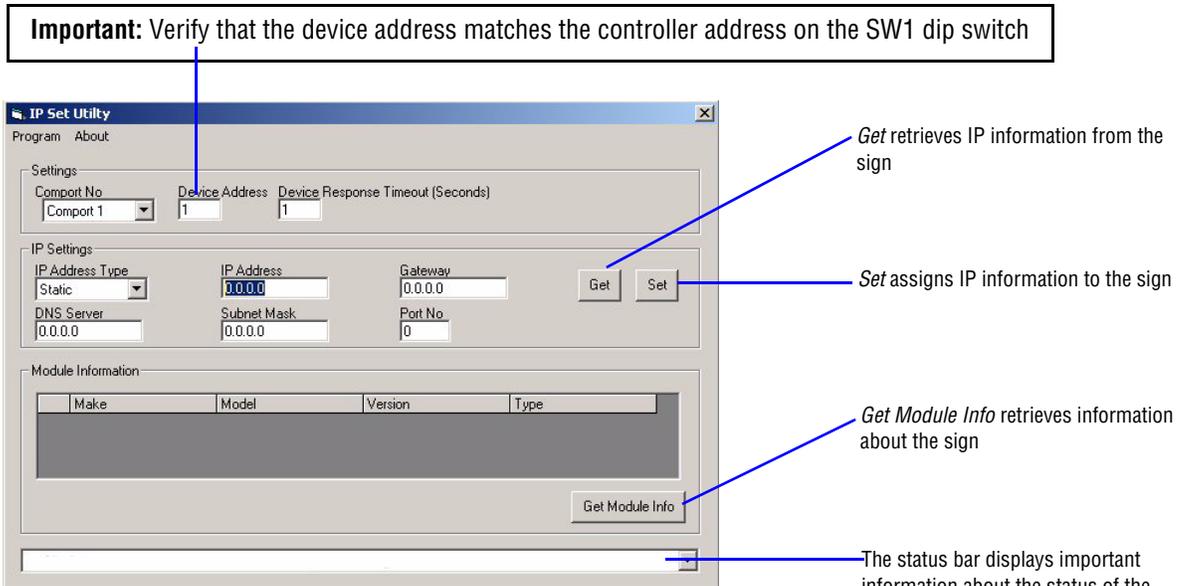
7. Fasten the new controller board to the sign.
8. Verify that the DIP switches and jumpers match the settings on the failed controller board.
9. Reconnect all cables to the new controller board.
10. Close the sign and apply power. See “Opening and closing a sign” on page 28.
11. Follow the steps in “Set the IP address for new controller board” on page 34.

⇒ **Set the IP address for new controller board**

To assign an IP address, the IP Set Utility program must be installed on the computer that will be communicating to the sign. Contact Adaptive Technical Services at (800) 558-7022 or (414) 357-2020 if you do not have this program.

1. Using a null modem cable, connect a laptop computer to the controller board at P3 (next to the Reset button). See “Sign controller” on page 21 for P3 location.
2. Open IP Set Utility program — select **Start > Programs > IPSetUtility > IP Set Utility**.
3. Enter the appropriate information in the *IP Set Utility* window (see following illustration).

**Note:** If the controller is operational (LED 1 is normally flashing), use *Get* to see if the sign’s IP address can be retrieved.



DIP switch positions and decimal values.

DIP switch positions	Equivalent decimal values
1	1
2	2
3	4
4	8
5	16
6	32
7	64
8	128

Example: if SW1 has position 1 and position 4 on, then it is set to address 9.

**Figure 28.**Settings in the IP Set Utility

4. Click **Set** to set the IP address (each sign must have a unique IP address).
5. After the IP address is set, detach the computer from the controller board.
6. Close the sign and apply power.

## Power supply replacement

**WARNING!** Hazardous voltage. Contact with high voltage may cause serious injury or death. Always disconnect power to unit prior to servicing.

### ⇒ To replace a power supply

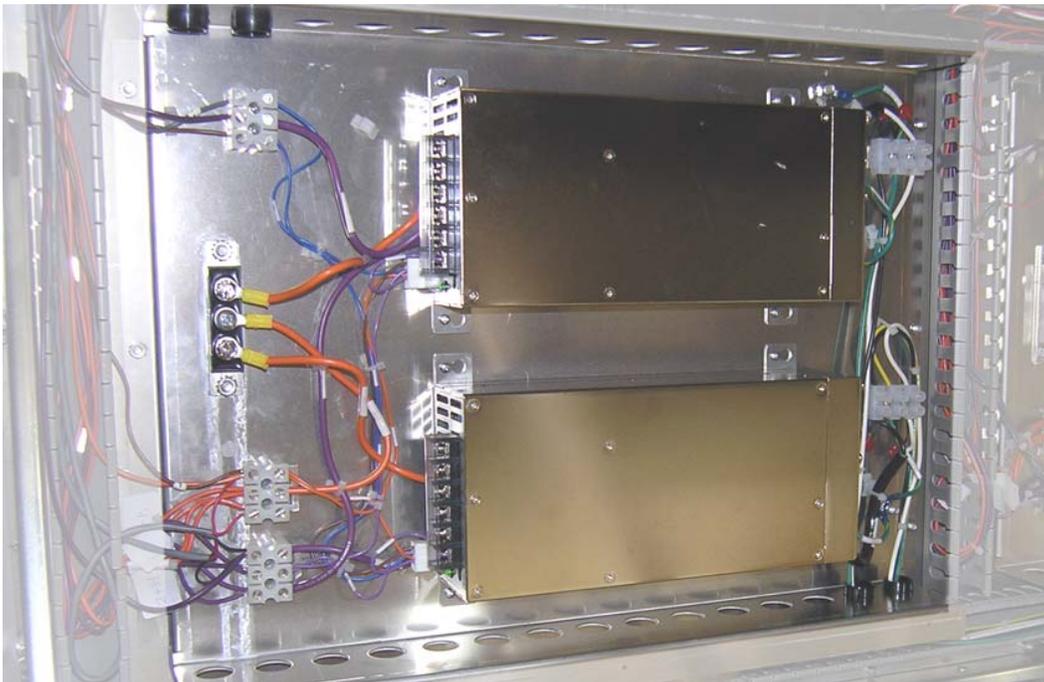
1. Open the sign. See “Opening and closing a sign” on page 28.
2. Turn the sign breaker to the OFF position.
3. Remove the power panel cover by loosening the six screws and sliding the cover off.
4. Remove all wires from the power supply to be replaced.

#### **DC connections:**

- V+ (orange-colored wire)
- V- (violet-colored wire)
- Signal harness

#### **AC connections:**

- Hot (black wire)
- Neutral (white wire)
- Ground (green wire)



**Figure 29.**Power supply wiring

**Note:** Power panel view may be reversed 180 degrees from the position above.

5. Loosen the four screws (circled) and remove power supply from the sign.



**Figure 30.**Screw locations on the power supply

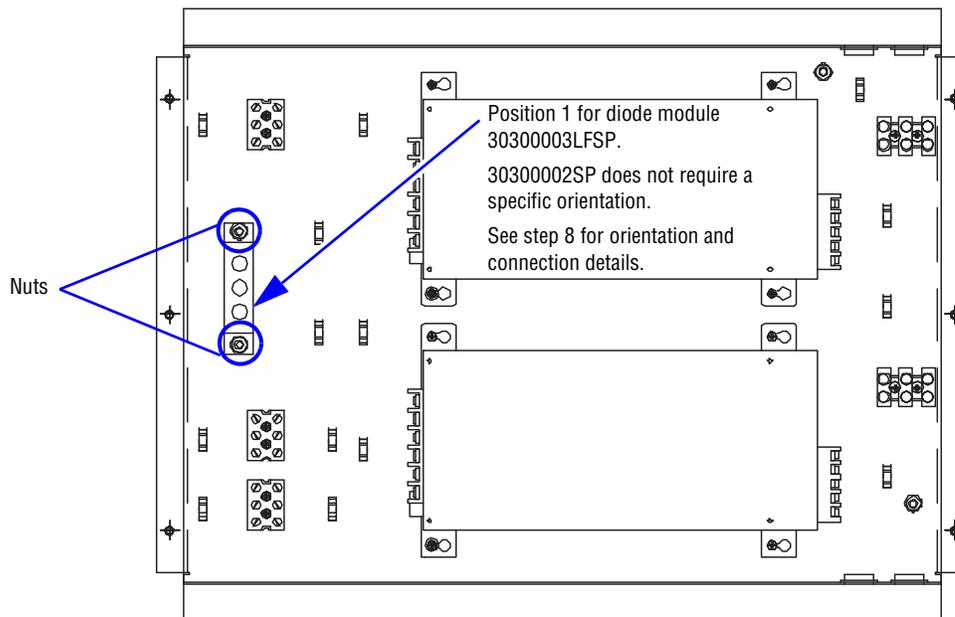
6. Fasten the new power supply to the sign.
7. Reconnect all the wires to the new power supply.
8. Apply AC power and verify that the new power supply operates correctly by measuring 12VDC on DC TB3 and TB4.  
**Note:** Make sure both power supplies are on when performing this test.
9. Reattach power panel cover.

## Diode module replacement

**WARNING!** Hazardous voltage. Contact with high voltage may cause serious injury or death. Always disconnect power to unit prior to servicing.

### ⇒ To replace the diode module

1. Open the sign. See "Opening and closing a sign" on page 28.
2. Turn the sign breaker to the OFF position.
3. Remove the power panel cover.
4. Loosen the screws to disconnect the wiring from the diode module.
5. Remove the nuts (circled) securing the diode module to the power panel plate.

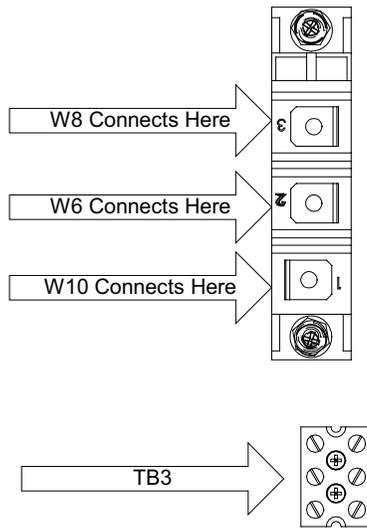


**Figure 31.** Nuts securing the diode module to the power plate

6. Apply thermal joint compound (pn 67004105) to the bottom of the replacement diode module (pn 30300003LFSP or 30300002SP).
7. Bolt the replacement diode module to the power panel plate.
  - Module 30300002SP will mount to 1/4-20 x 3/4" PEM studs.
  - Module 30300003LFSP will mount to 8-32x1" screws.

8. Reconnect wiring to the diode module and tighten the screws.

Diode module part number: 30300003LFSP



Diode module part number: 30300002SP

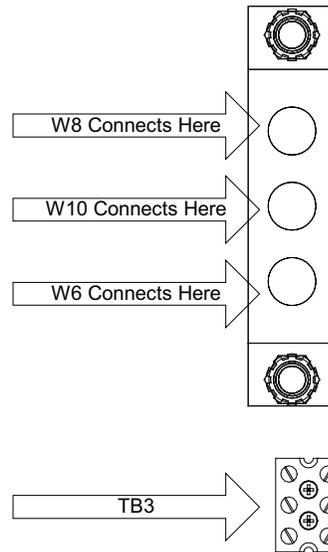


Figure 32. Diode module connections

## Relay replacement

**WARNING!** Hazardous voltage. Contact with high voltage may cause serious injury or death. Always disconnect power to unit prior to servicing.

### ⇒ To replace a relay

1. Open the sign. See "Opening and closing a sign" on page 28.
2. Turn the sign breaker to the OFF position.
3. Locate the relay to be replaced. Relay part number: 48000009SP.

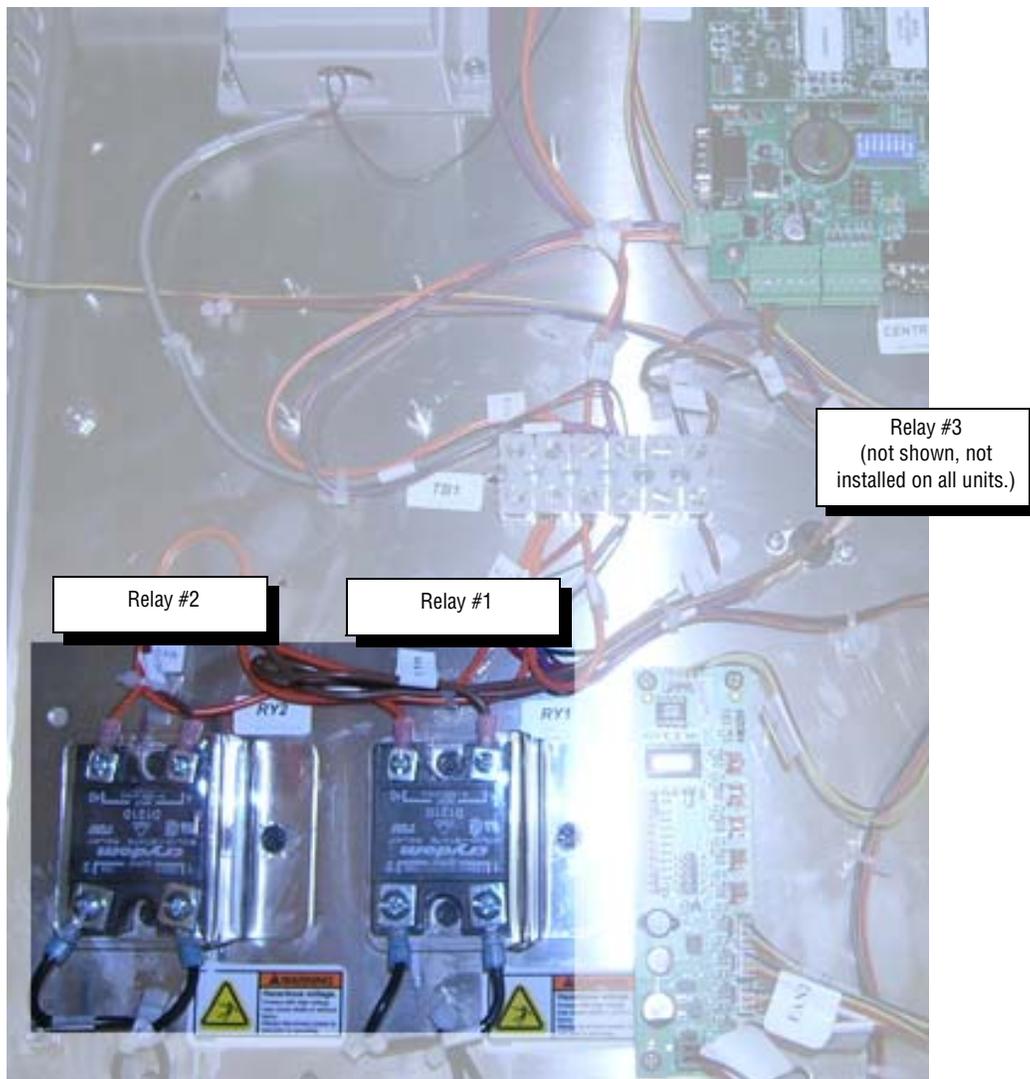
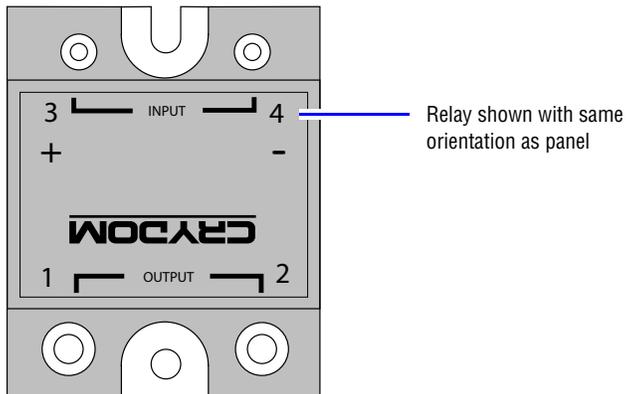


Figure 33. Relay locations

4. Mark each wire with the terminal number (1 to 4) to which it is connected and disconnect the wires from the relay.

**Note:** If there is a cover over the relay to be replaced, remove it.



**Figure 34.**Relay

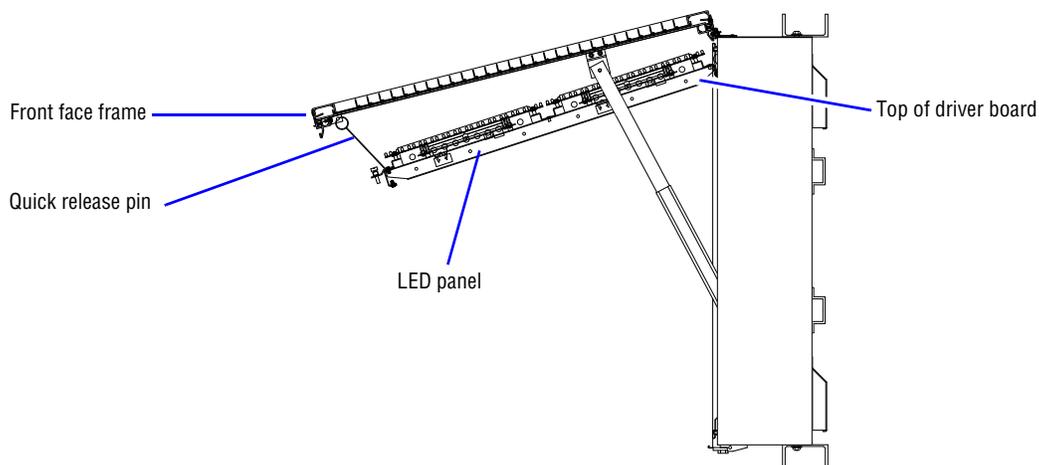
5. Remove the screws holding the relay to the sign.
6. Attach the new relay to the sign.
7. Reconnect the wires to the new relay and reattach the relay cover, if applicable. See the wiring diagrams provided with the sign.
8. Close the sign and apply power to the sign.

## LED driver board replacement

**WARNING!** Hazardous voltage. Contact with high voltage may cause serious injury or death. Always disconnect power to unit prior to servicing.

### ⇒ To replace a driver board

1. Open the sign. See “Opening and closing a sign” on page 28.
2. Turn the sign breaker to the OFF position.
3. Locate the LED driver board to be replaced and remove the following cables from the back of the driver board:
  - Power cable (P1)
  - Addressing cable (P2)
  - Communications cable (P3)
4. Unfasten the LED panel from the front face frame and lower the LED panel.



**Figure 35.** Example of a 1.07-inch/1.35-inch pitch sign. The larger 1.75-inch pitch signs have lift arms and winch handles

5. From the front of the LED panel, remove the four screws that hold the LED driver board to the LED mounting panel.
6. Attach the new LED driver board to the LED mounting panel.
7. Raise the LED mounting panel up and fasten the panel to the front face frame.
8. Reconnect the cables to the LED driver boards (P1, P2, and P3).
9. Reapply power to the sign, close the door and verify operation.

## Fan replacement

**WARNING!** Hazardous voltage. Contact with high voltage may cause serious injury or death. Always disconnect power to unit prior to servicing.

### ⇒ To replace a fan

1. Open the sign. See “Opening and closing a sign” on page 28.
2. Turn the sign breaker to the OFF position.
3. Locate the fan to be replaced.

28x96 1.35-inch pitch sign shown.

See “Internal view — 1.07-inch pitch sign” on page 17

or “Internal view — 1.75-inch pitch sign” on page 19 for locations.

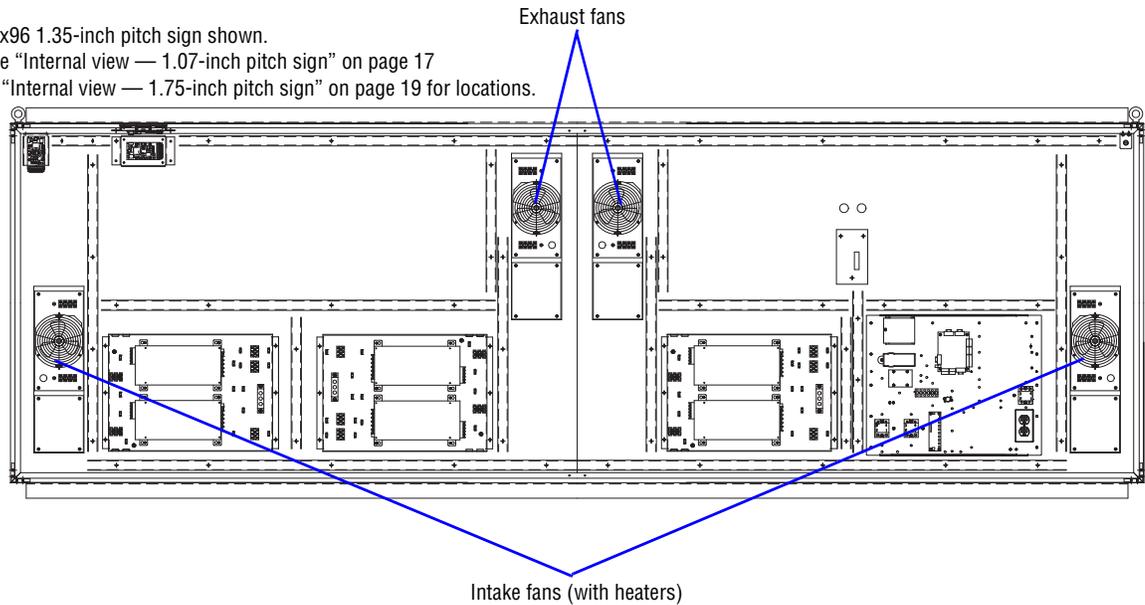


Figure 36. Fan locations

4. Disconnect the wire harness from the failed fan.
5. Loosen the four screws (circled) on the fan panel housing and slide the fan panel out of the panel slot.

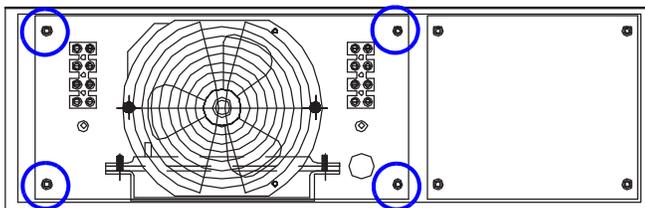


Figure 37. Screws securing the fan panel housing

6. Holding the front fan guard secure against the fan panel, remove the two 6-32 nuts (circled) from the top of the fan guard and remove the fan.

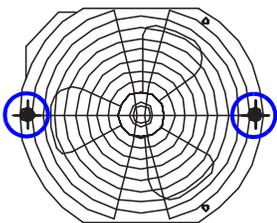


Figure 38. Locations of the 6-32 nuts on the fan guard

7. Slide the new fan into the frame pointing in the correct direction (intake fan pointing toward inside of sign, exhaust fan pointing toward outside of sign).
8. Reattach the fan guards with the 6-32 screws and nuts.
9. Reinstall the fan panel by sliding the panel in the fan panel slot.
10. Retighten the fan panel with the four screws.
11. Cut wires to length and strip 5/16".
12. Connect the fan wire harness to the terminal blocks.
  - Black to black.
  - White to white.
  - Yellow to yellow.
  - Blue to blue.
  - Red to red.
13. Verify that the wires are connected correctly; incorrect wiring will result in damage.
14. Apply AC to the sign.

### Fan test

Use a heat gun directed at the fan thermostat to verify fan operation. The thermostat must be heated to 120°F (50°C) to initiate fan operation.

**Notice:** Move the heat gun around to avoid burning the wiring.

- Verify the fan is blowing in the correct direction (intake fan pointing toward inside of sign, exhaust fan pointing toward outside of sign).
- Have the controller of sign run a fan test to verify fan status.

## Heater replacement

**WARNING!** Hazardous voltage. Contact with high voltage may cause serious injury or death. Always disconnect power to unit prior to servicing.

⇒ **To replace a heater**

1. Open the sign. See “Opening and closing a sign” on page 28.
2. Turn the sign breaker to the OFF position.
3. Locate the heater to be replaced.

**WARNING!** Do not touch the heater. The surface is hot and may result in injury.

4. Remove the 1/4-20 bolts securing the heater to the fan frame.
5. Disconnect the two 10-32 screws connecting the heater to AC power.
6. Attach wiring to the new heater and secure the heater to the fan frame with the 1/4-20 bolts.

**Note:** Make sure the wiring does not come in contact with the heater. Wiring can be connected to any post on heater (no polarization).