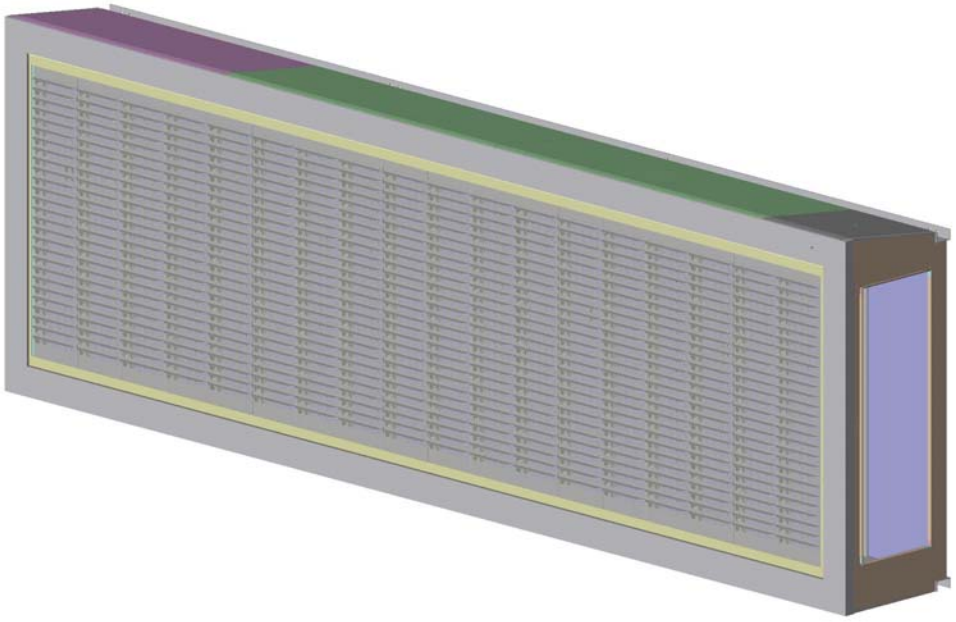
AlphaXpress DMS Walk-in Sign with Ground Controller Maintenance Manual

Florida Turnpike P1509-7/8/12/15



Manual part number: 1509610306 rev. B

Revision date: April 15, 2008

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Contents

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Safety

Safety information

Equipment symbols

Chassis ground

Warnings and cautions

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

Battery backup

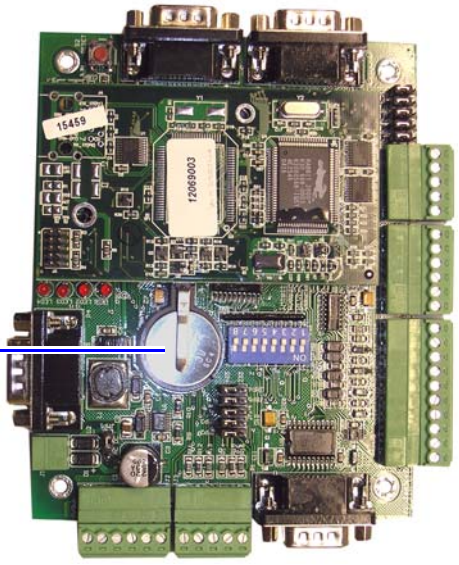
In the event of a power loss, two lithium batteries provide power to the sign's controllers.

Note: The lithium batteries only provide enough power to backup the sign's controllers memory during a power loss, not the sign's LED displays.

3V lithium backup batteries

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.

Figure 1. One 3V lithium battery is located on each of the sign's controller boards.



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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
1509610306 rev. A	July 10, 2007	Initial Release.
1509610306 rev. B	April 15, 2008	Added information regarding the addition of a 4th controller board including component identification and replacement.

Related documentation

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

Part #	Manual title	Description
TechMemo #05-0005	Preventing Electrostatic Discharge (ESD) Damage	Describes the precautions to take to protect electronic components from ESD damage.
1509650204	P1509-7/8/12/15 27x126 Wiring diagram	Sign wiring diagram revision B or higher.

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Installation

Fan and light switch location

Two, 12-hour timer switches that control sign lighting and fans are located at the sign entrance.

Figure 2. Lighting and fan timer switches

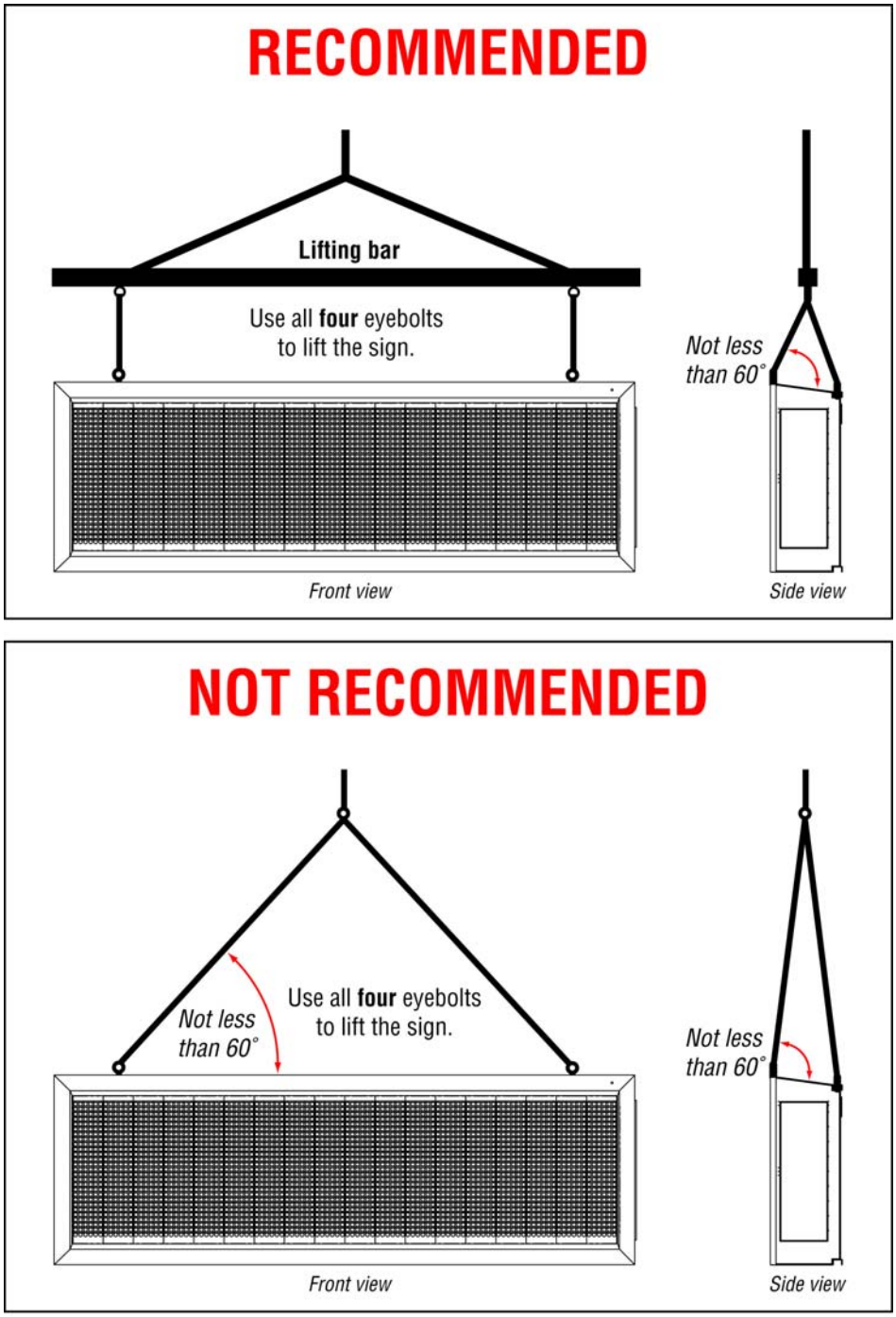
Mechanical installation

Lifting the sign

WARNING! Crush hazard! Do not lift sign with more than a 15 degree tilt.

Always use lifting bar to lift sign. Otherwise eyebolts may break and sign may fall, causing serious injury or death.

Figure 3. Sign lifting guidelines.



Mounting the sign

Figure 4. Use all girder brackets on the back of the sign to attach the unit to a support structure.

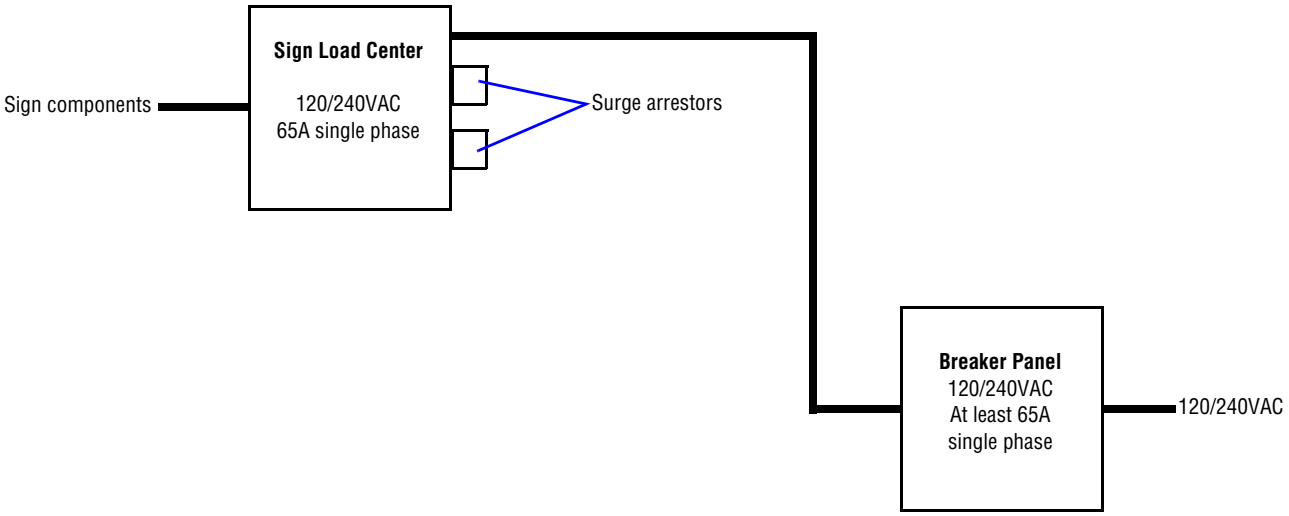
Girder brackets — use **all brackets** to mount the sign.

- Attach the sign to the support structure using **all eight bolts** on each of the brackets.
- Tighten each bolt to 45 foot-pounds.

Electrical installation

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

Figure 5. Electrical installation details.

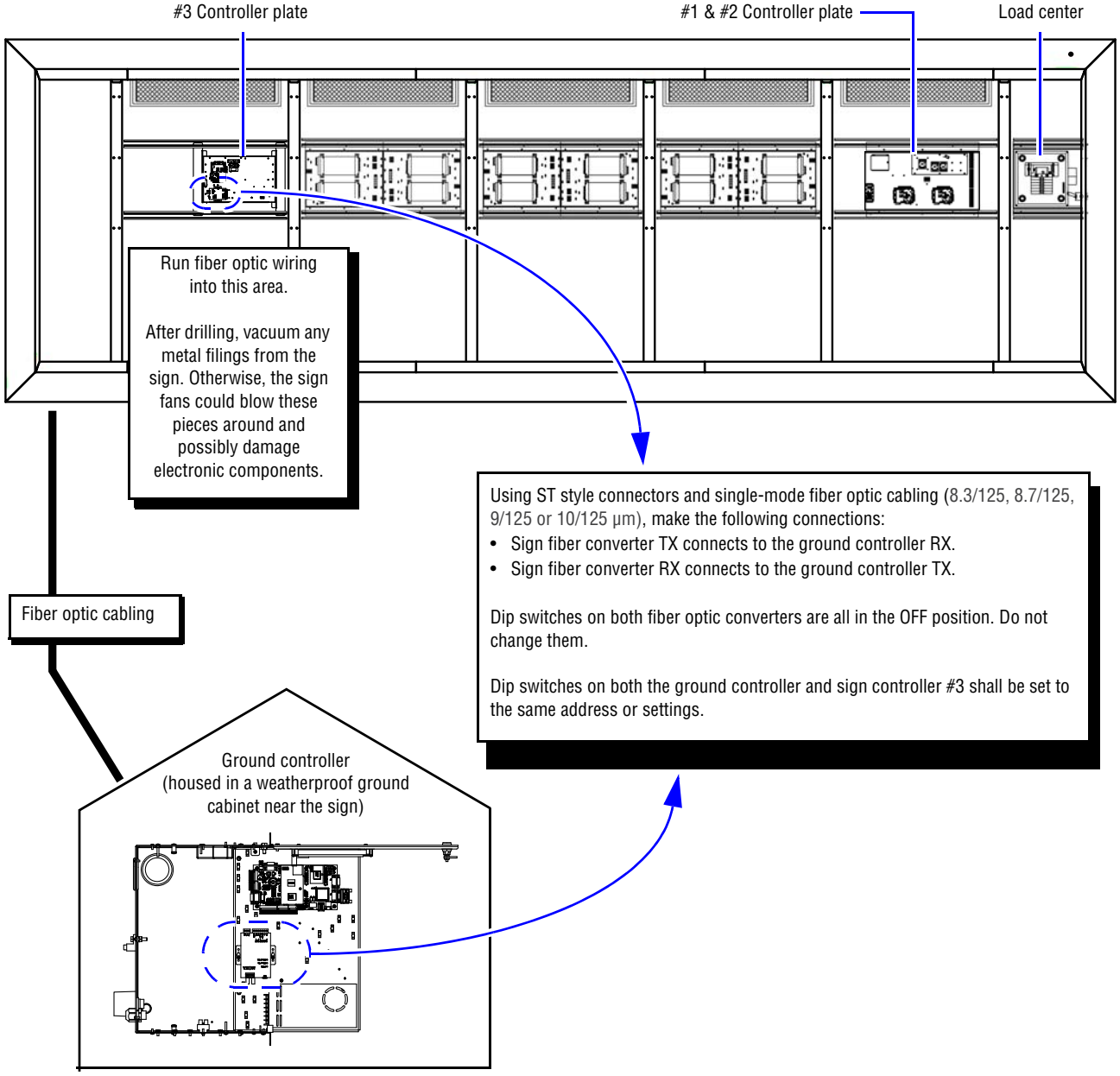


Notice: The principal breaker in the Sign Load Center removes power from all the sign components *except the surge arrestors.*

To remove power from the surge arrestors, power must be switched off at the customer provided Breaker Panel.

Sign Controller #3 to ground controller network connection

Figure 6. Inside sign view.



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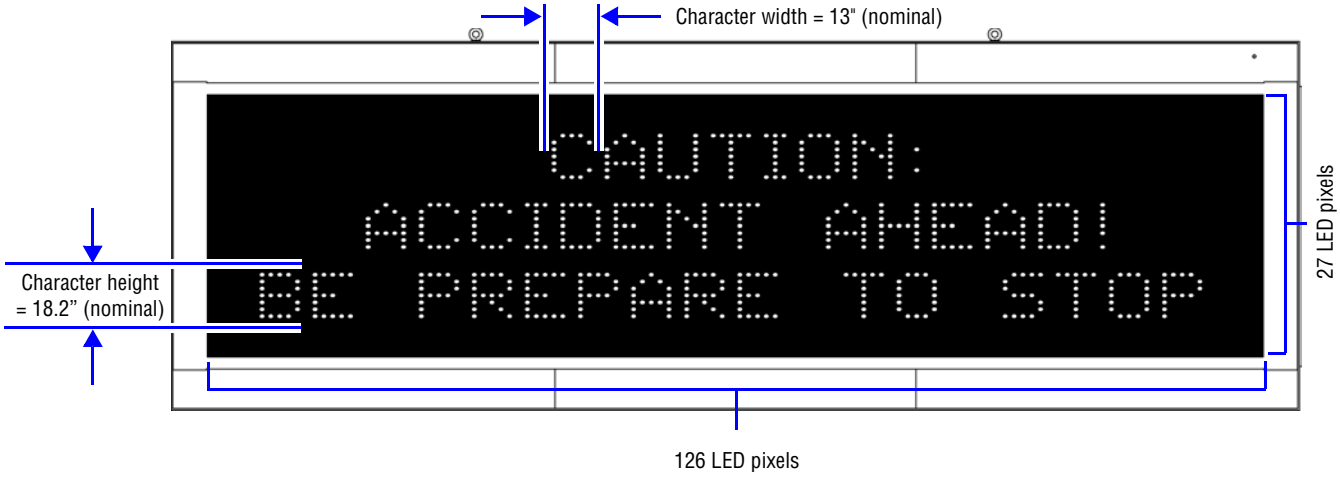
Equipment description

General description

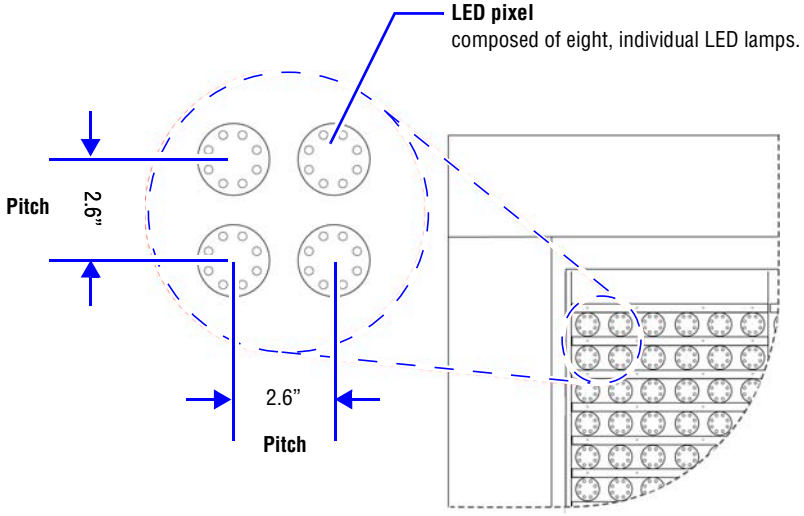
- Serviceability: Walk in.
- Weight: 4500 pounds (Not to exceed, excluding mounting beams).
- Display technology: LED
- Display size: 27 rows x 126 columns (see Figure 7).
- LED matrix: 9 pixels high x 6 pixels wide.
- Character height: 18 inches, nominal (see Figure 7).
- Character width: 9 inches, nominal (see Figure 7).

Figure 7. Display size.



- Pitch (distance between each LED pixel): 2.6 inches:

Figure 8. LED pitch

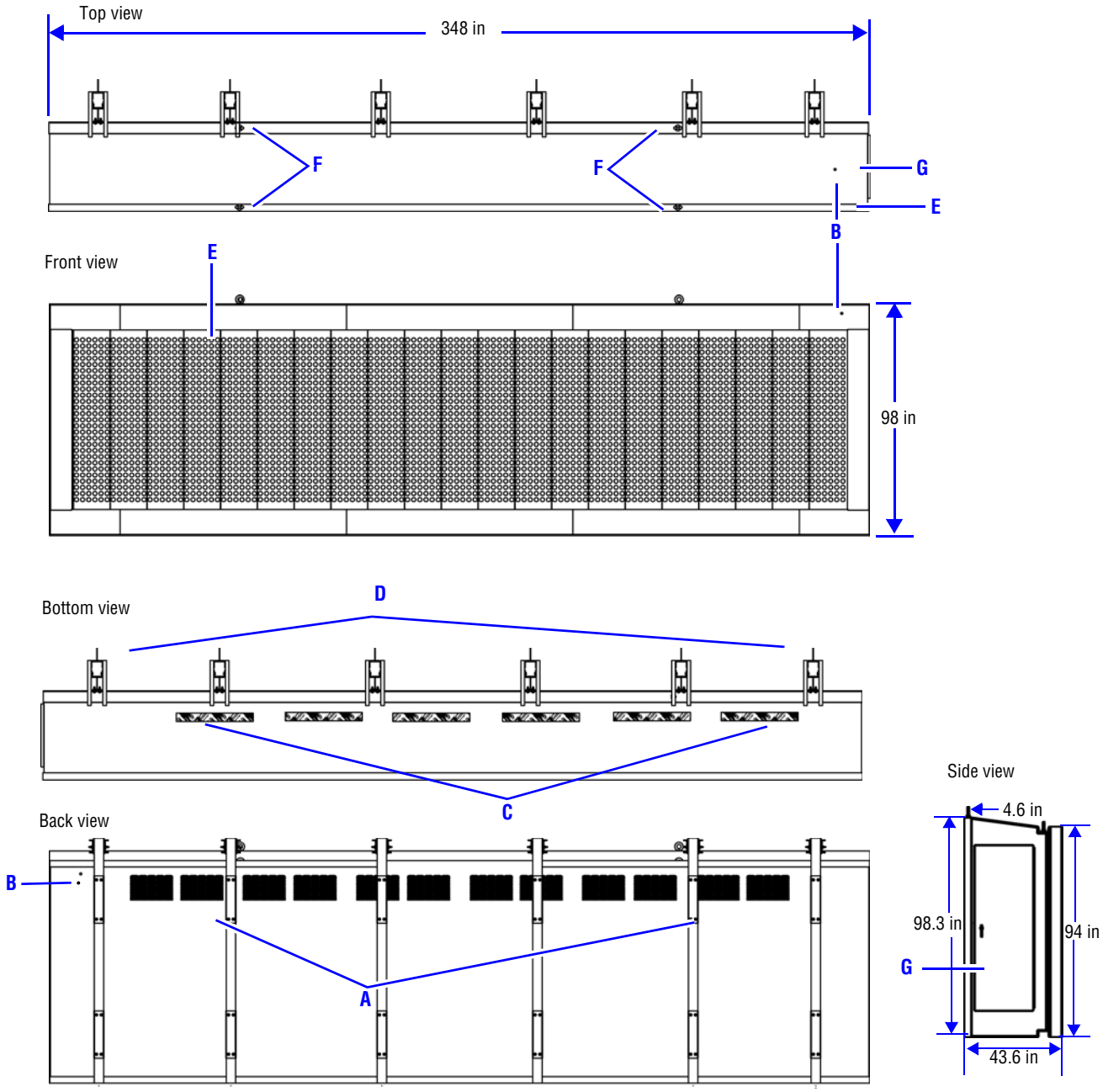


Equipment identification

An equipment label is located inside the sign near the door, above the load center panel.

Item	Name	Description
A	MODEL NUMBER	AX9700FM–27X126–18A Character height (18 inches) Character color (“A” = amber) Display size “FM” = Full Matrix AlphaXpress 9700 Walk-in sign
B	ELECTRICAL INFORMATION	Input voltage, frequency, and amperage.
C	DATE OF MANUFACTURE	Month, date, and year the sign was made.
D	SERIAL NUMBER	Consecutive, unique identification number.

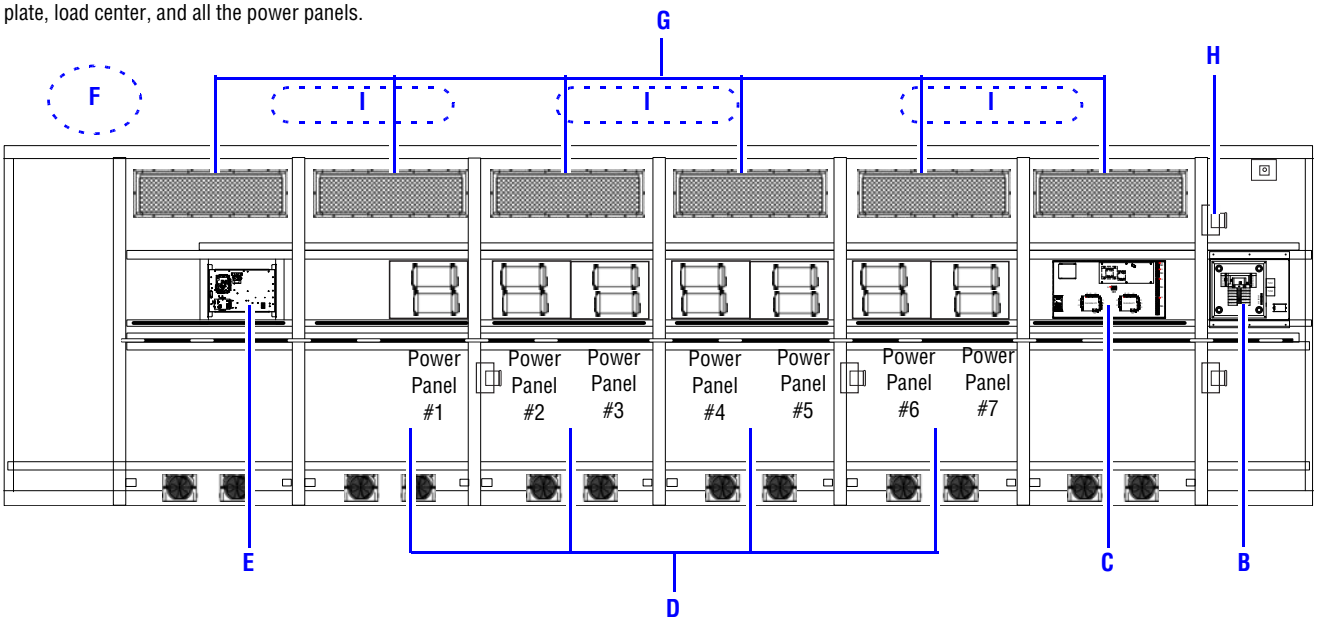
Outside views



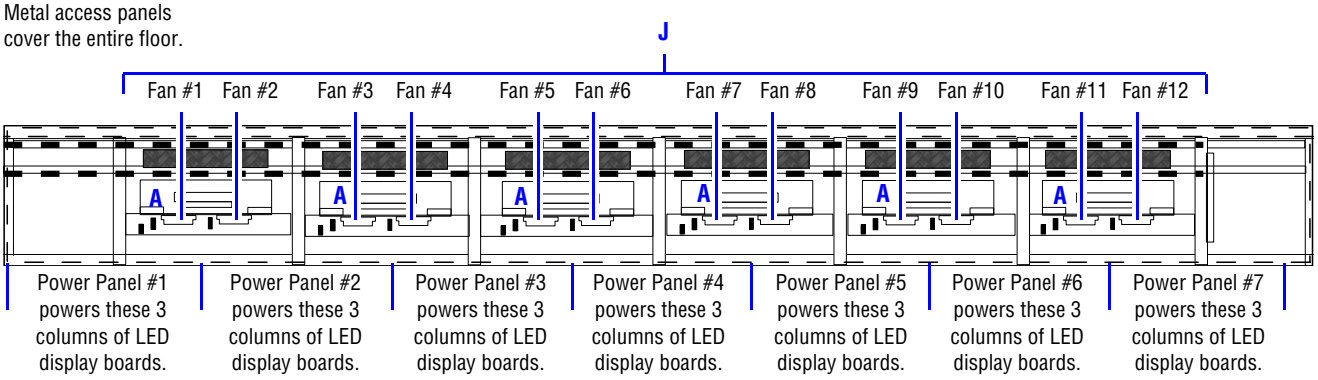
Item	Name	Description
A	EXHAUST VENTS	Fans located on the sign floor *push* air out of the sign and through these vents.
B	LIGHT SENSOR	Used for dimming the sign LEDs. There are 3 light sensors used in the sign.
C	FLOOR VENTS	Fans located on the floor *pull* air through the floor vents.
D	MOUNTING BEAMS	Six beams used to mount the sign on a structure.
E	LEDS	Used to display messages.
F	LIFTING EYEBOLTS	Used to lift the sign into place for mounting. **All four eyebolts must be used to lift this sign** (see “Mechanical installation” on page 10).
G	ACCESS DOOR	Allows walk-in entry to the inside of the sign. **Note:** To keep the door open, use the locking arm inside the sign.

Inside views

Inside front view
Protective panels cover the controller plate, load center, and all the power panels.



Inside bottom view
Metal access panels cover the entire floor.

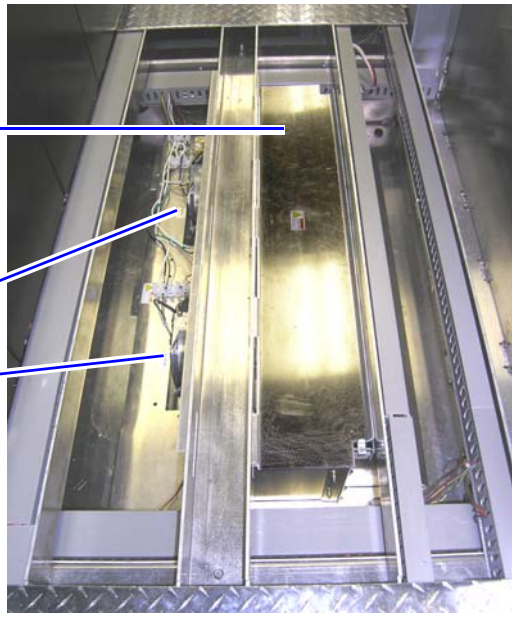


Item	Name	Description
A	HEATER	Used to reduce humidity inside the sign. Heaters are enclosed inside a metal case suspended above the sign floor.
B	LOAD CENTER	See “Load center panel” on page 29.
C	CONTROLLER PLATE	Used for controllers #1 and #2. See “Controller plate with sign controllers #1 and #2” on page 20.
D	POWER PANELS	Provides DC power for driver boards, fan monitor boards, controllers, light sensors, and other devices powered from DC voltage. See “Sign power panels” on page 28.
E	CONTROLLER PLATE	Used for controller #3. See “Controller plate with sign controller #3” on page 21.
F	FLUORESCENT BULB	One compact fluorescent bulb (pn 50600001) in the ceiling of the walk-in: 18W, 120V.
G	AIR VENT FILTER	Clean and replace as needed.
H	TIMER SWITCHES	Light and fan timer switches.
I	LIGHT FIXTURE	Three light fixtures in the ceiling of the walk-in. Each holds two fluorescent bulbs (pn 50600009) in the ceiling of the walk-in: 45W, 36”, T12, HO.

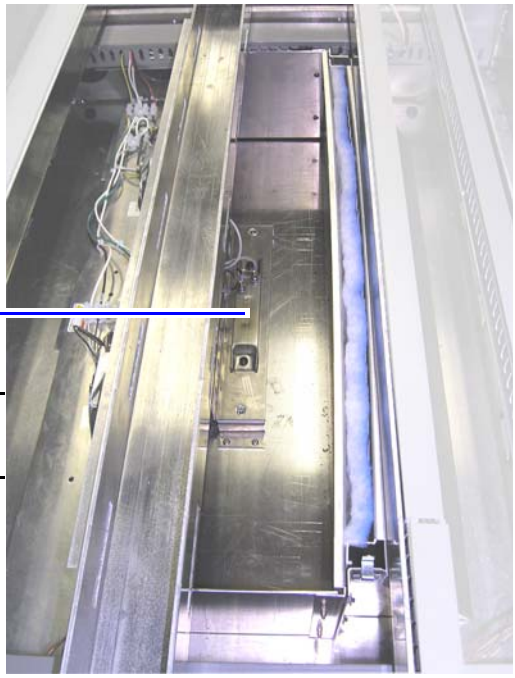
J	FAN HOUSING	A total of 12 fans are located underneath the sign's metal flooring. The fans blow air into the sign from the vents in the bottom of the sign:

Heater and fan filter cover

Fans
(metal flooring over fans
has been removed)

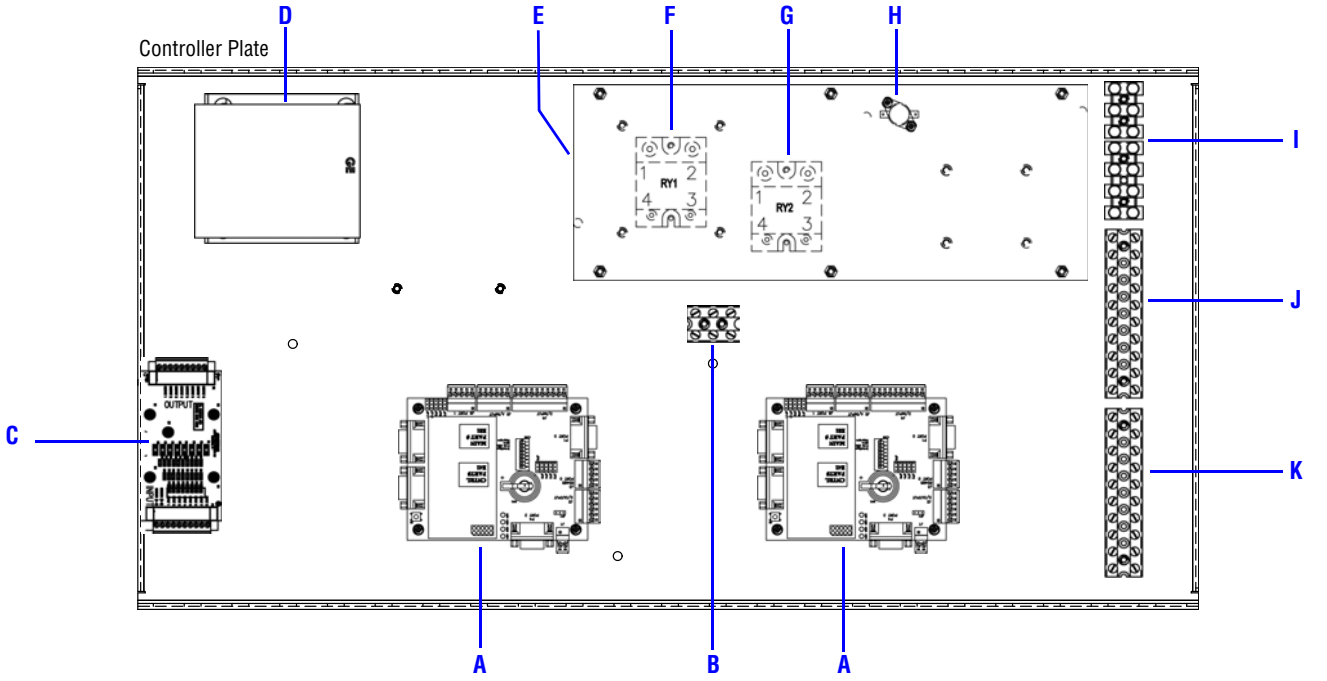


Heater
(protective cover removed)



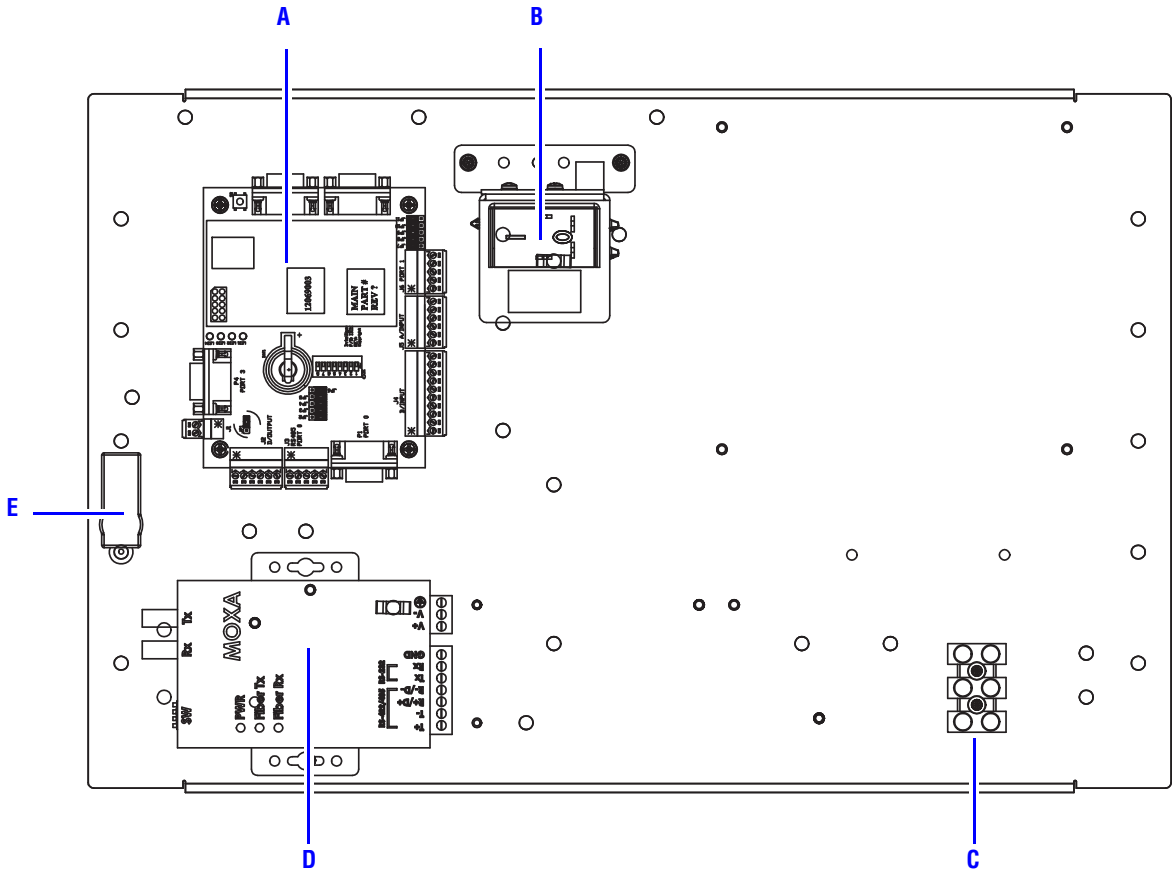
WARNING! Burn hazard. Hot surface. Do not touch.

Controller plate with sign controllers #1 and #2



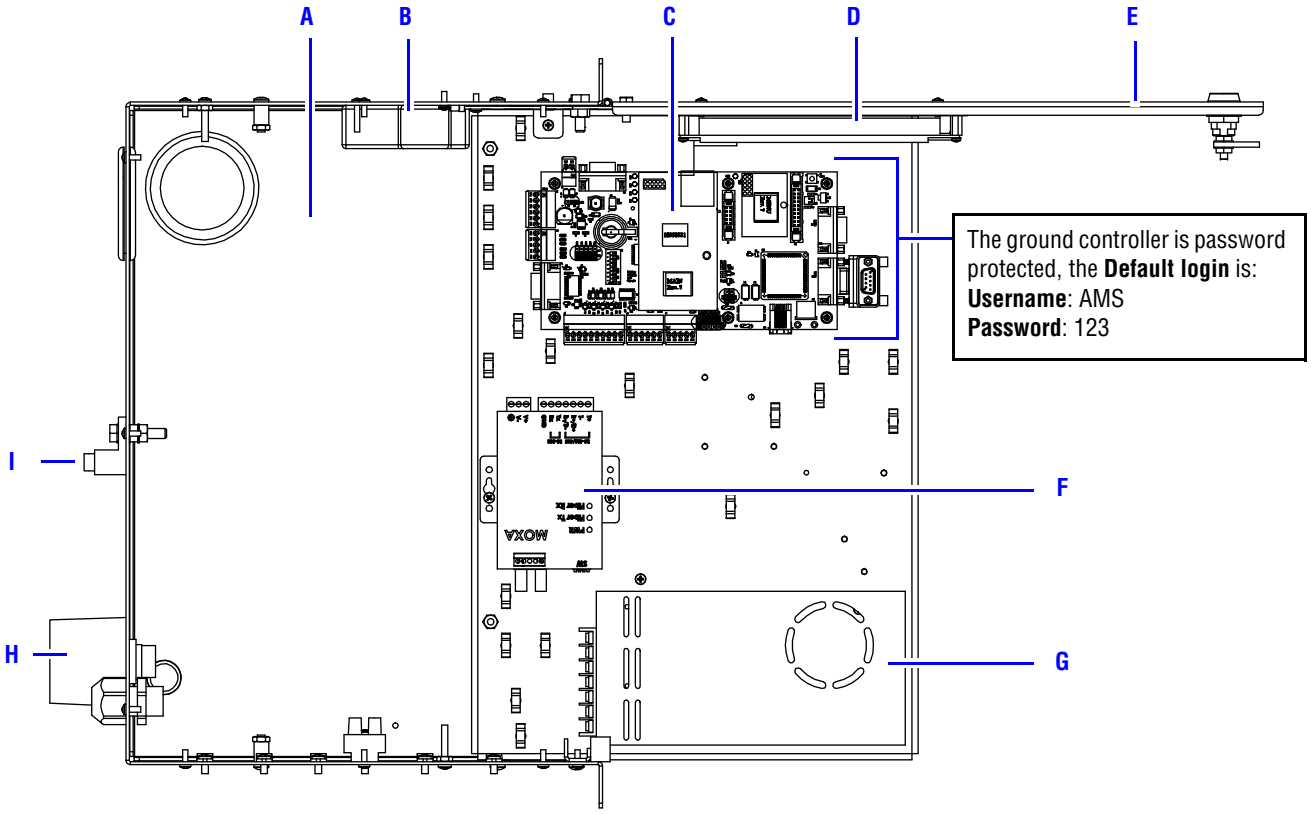
Item	Name	Part #	Description
A	CONTROLLER #1 CONTROLLER #2	12069003	These two boards control sign operation in conjunction with controller #3 which is connected to the ground controller.
B	TERMINAL BLOCK #1	43201044	Distributes power to the relays and humidity sensor.
C	VOLTAGE DIVIDER BOARD	1509101202	For supplied voltages over 5.0 VDC, scales the voltage (V_{out}) which is proportional to the voltage (V_{in}). Supplied voltages may be from batteries, power supplies, and other external analog signals.
D	HUMIDITY SENSOR	30676015	Measures internal relative humidity within 2% accuracy.
E	PLASTIC COVER	1509000501	Protection against hazardous voltages from the relays underneath the cover.
F	RELAY #1	48000009	Normally open. When closed, this relay activates the heaters.
G	RELAY #2	48000009	Normally open. When closed, this relay activates the fans.
H	THERMOSTAT	30670005	Normally open. Closes when temperature > 120°F and activates the fans. Opens when temperature < 90°F.
I	TERMINAL BLOCK #2 AND #3	43201036 (TB2) 43201047 (TB3)	Distributes AC through relays and thermostats to heaters, and fans.
J	TERMINAL BLOCK #4	43201054	Provide wiring for status signals such as power fail signals for power supplies, fan monitoring, door switch, and DC power for the controller assembly.
K	TERMINAL BLOCK #5	43201054	

Controller plate with sign controller #3

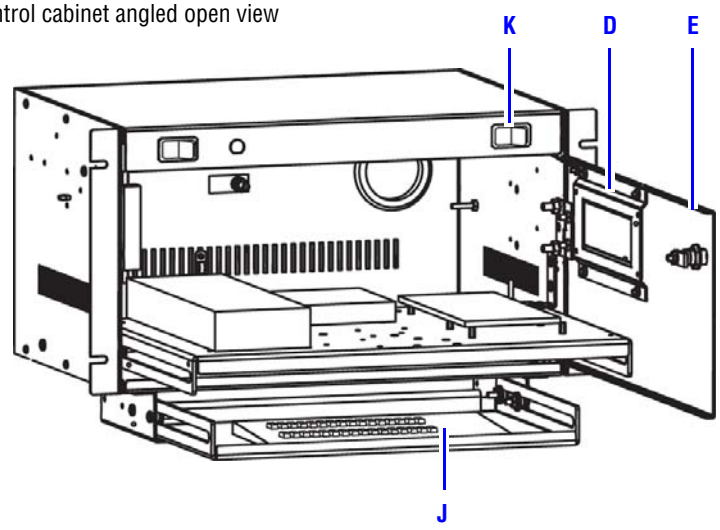


Item	Name	Part #	Description
A	CONTROLLER #3	15029101	This board controls sign operation in conjunction with sign controller boards (#1 and #2), and the ground controller which is connected to the NTCIP network.
B	LOCAL REMOTE SWITCH	41000233	DPDT, 20A Push to go to Local Mode (cannot set via the Ethernet port). Push to go to Central Mode (can set via the Ethernet port). **Note:** Local remote switch must be set to “0” for ground controller to function.
C	TERMINAL BLOCK	43201036	Supplies DC power for the controller assembly.
D	FIBER OPTIC CONVERTER	45509001	Converts RS422 signal to fiber.
E	ETHERNET SURGE SUPPRESSOR	1507101201	Protects the Ethernet data line.

Ground controller cabinet

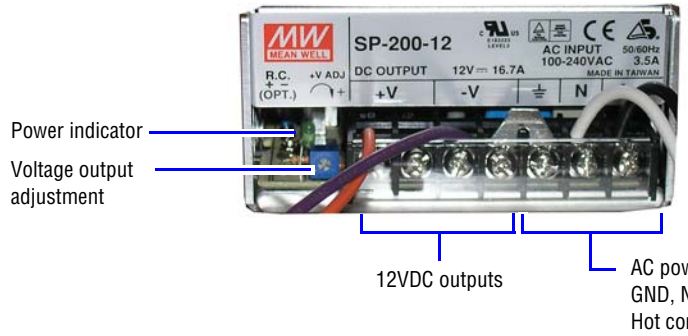
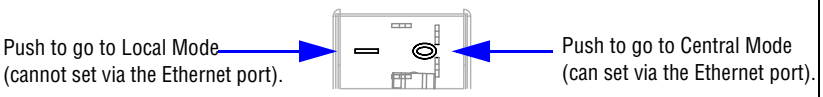


Ground control cabinet angled open view



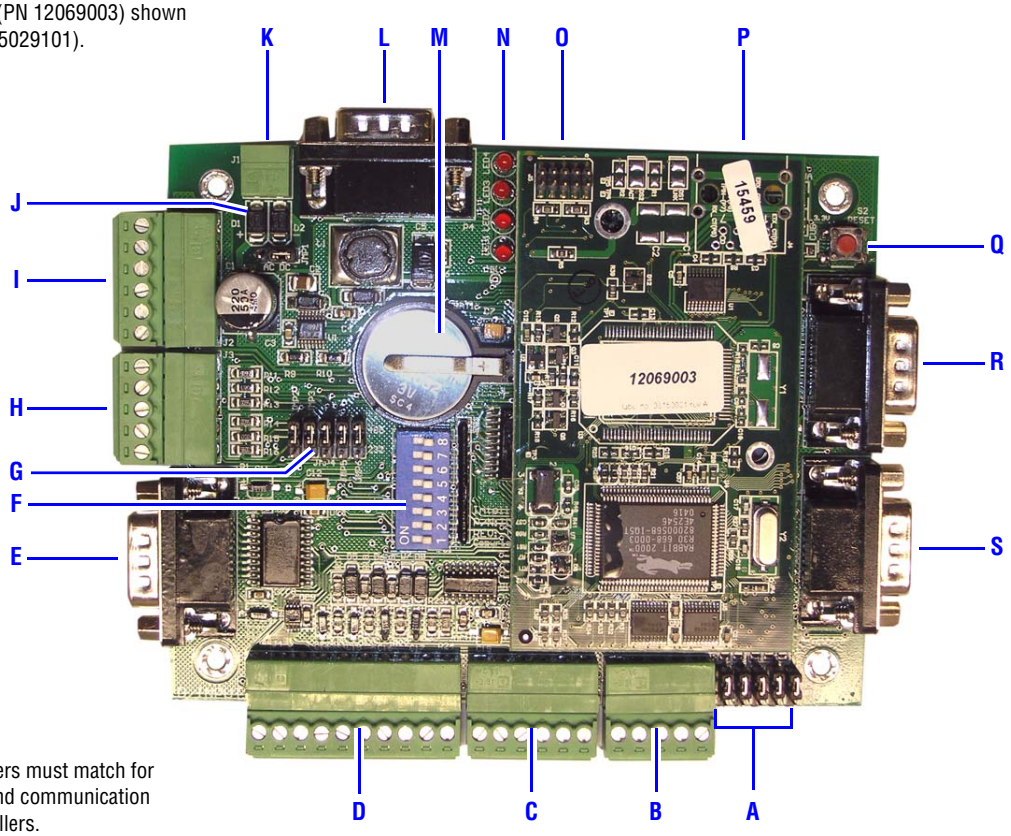
The local remote switch (K) must be set to "1" for use of the keyboard and LCD interface. Depress switch to "0" to return the ground controller to central after use.

Item	Name	Part #	Description
A	GROUND CONTROL CABINET	—	19" rack mounted ground controller cabinet.
B	ETHERNET SURGE SUPPRESSOR	1507101201	Protects an Ethernet data port from damaging surges. Compatible with Power over Ethernet (PoE) and 10/100/1000 Base-T networks.
C	GROUND CONTROLLER	10950221	The ground controller is connected to the NTCIP network and works in conjunction with the three sign controller boards to control sign operation. Refer to wiring diagram 1509650204 for the proper firmware part number to be loaded into this assembly.
D	LCD MODULE SCREEN	15009308	240 x 64 pixel LCD display.
E	CABINET DOOR	—	Cabinet door with lock. 5/32 Hex tool required to open the cabinet.

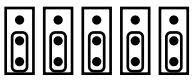
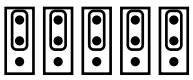
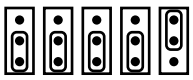
F	FIBER OPTIC CONVERTER	45509001	Converts RS422 signal to fiber.
G	POWER SUPPLY	40656304	Meanwell SP-200-12 switching power supply, 12VDC output: 
H	SURGE ARRESTOR	30352001	Protect systems against transient surge events.
I	GROUND LUG	—	Connects to a customer supplied ground.
J	KEYBOARD	10729911	The keyboard is used to type commands into the ground controller.
K	LOCAL REMOTE SWITCH	41000233	DPDT, 20A  **Note:** Local remote switch must be set to “0” for central to be able to activate and control sign.

Sign controllers

Controller #1 & #2 (PN 12069003) shown
Controller #3 (PN 15029101).

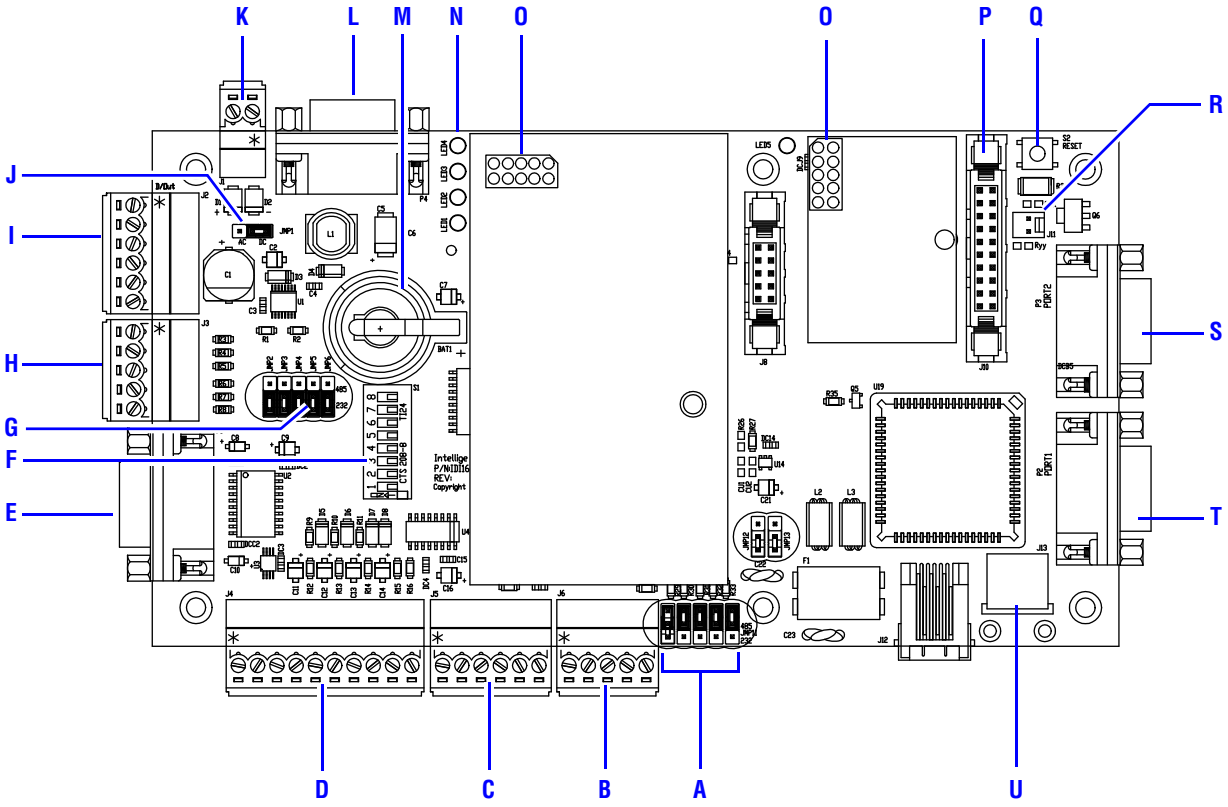


Item A and G jumpers must match for proper operation and communication between the controllers.

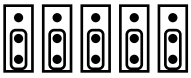
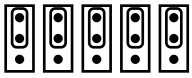
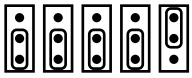
Item	PCB label	Name	Description
A	JP7 TO JP11	COMM PORT SELECTION JUMPERS FOR J6 AND P2	Set all Controller #1, #2, and #3 to RS485 with termination enabled for this port. Jumper settings must match Item G jumpers. RS232  RS485 with termination  RS485 without termination 
B	J6	RS485 PORT 1	
C	J5 A/INPUT	ANALOG INPUTS	
D	J4 D/INPUT	DIGITAL INPUTS	
E	P1	RS232 PORT	Only used for Controller #3. Not used for Controller #1 or Controller #2.
F	S1	DIP SWITCHES	
G	JMP2 TO JMP6		Refer to jumper termination settings for Item A; these settings must match for proper operation and communication between the controllers.
H	J3	RS422 PORT	
I	J2	DIGITAL OUTPUTS	
J	JMP1		Set to DC.
K	J1	POWER CONNECTOR	Connects to Power Panel for DC Power.
L	P4	RS232 PORT	Not used.

M	BAT1	MEMORY BACKUP	3V lithium battery (Panasonic CR2032 or equivalent).
N	LED1 TO LED4	DIAGNOSTIC LEDS	• LED1—All controllers = Heartbeat. • LED2: ❏ Controller #1 & #2 = Communications from Controller #3 on J3. ❏ Controller #3 = Communications from Central/Local port P1 and P3. • LED3: ❏ Controller #1 & #2 = Not used. ❏ Controller #3 = Flashes only when transmitting to sign controllers 1 or 2. • LED4: ❏ Controller #1 = Flashes when transmitting out of J6 LED display board. ❏ Controller #2 = Flashes when transmitting out of J6 light sensor. ❏ Controller #3 = Flashes when receiving communication from sign controllers 1 or 2.
O	J5	PROGRAMMING PORT	Used to program the controller with a rabbit programming cable.
P		ETHERNET PORT	Installed only on the Controller #3.
Q	S2 RESET	CONTROLLER RESET SWITCH	Used to do a soft reset on the controller.
R	P3		Used on sign controllers #1 and #2 to obtain status information. On Controller #3, typically used for a local laptop top connection. Local remote switch must be on for power to activate diagnostic messages and for the P3 port to be used for diagnostics.
S	P2		Not used.

Ground controller

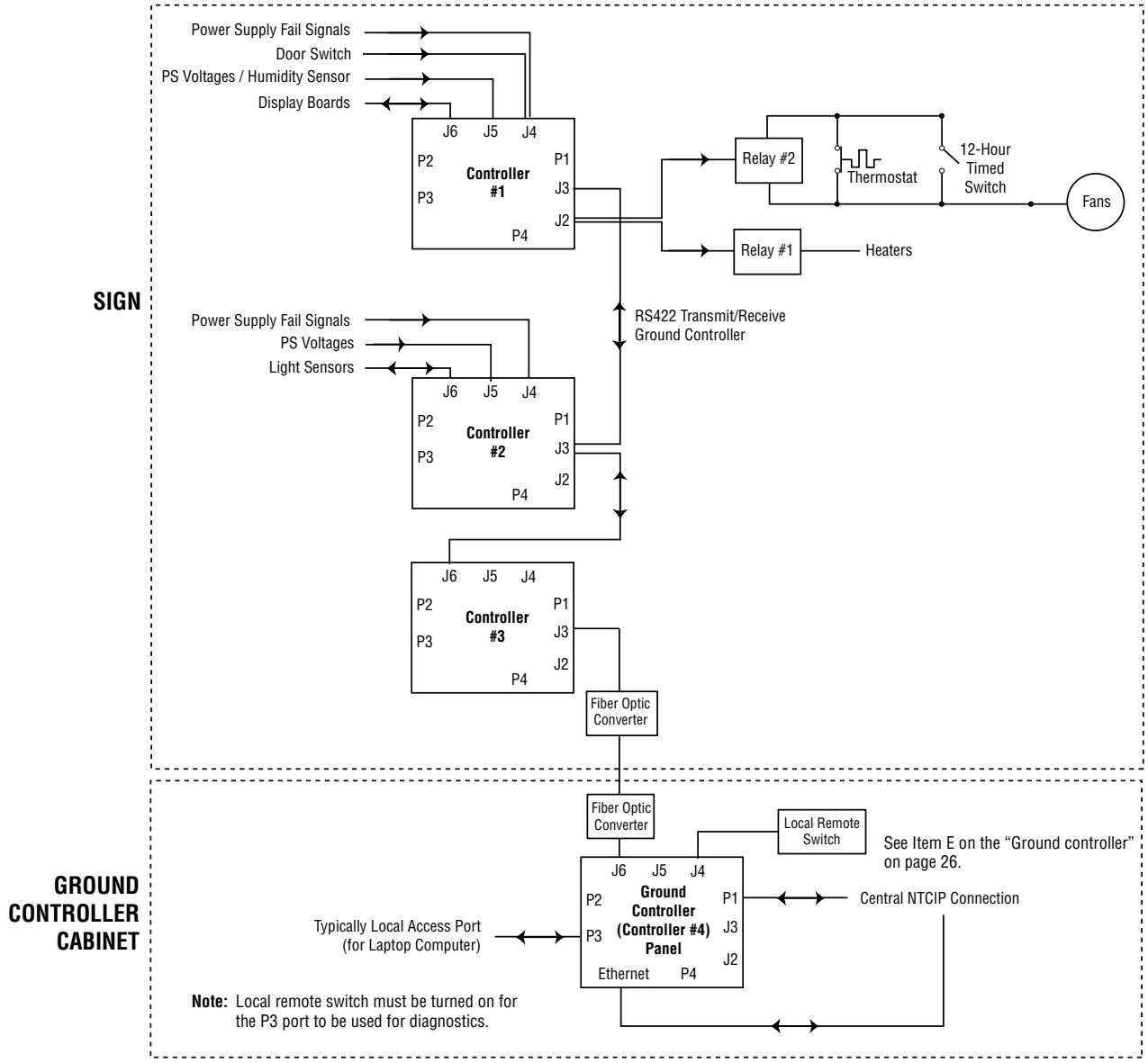


Item A and G jumpers must match for proper operation and communication between the controllers.

Item	PCB label	Name	Description
A	JP7 TO JP11	COMM PORT SELECTION JUMPERS FOR J6 AND P2	Set to RS485 with termination. Jumper settings must match Item G jumpers. RS232  RS485 with termination  RS485 without termination 
B	J6	COMM PORT	Jumper configured for RS232 or RS422. This port used for the display array.
C	J5 A/INPUT	ANALOG INPUTS	
D	J4 D/INPUT	DIGITAL INPUTS	
E	P1	RS232 PORT	Central control port.
F	S1	DIP SWITCHES	Dipswitch for addressing the ground controller.
G	JMP2 TO JMP6		Refer to jumper termination settings for Item A; these settings must match on the ground controller for proper operation and communication between the controllers.
H	J3	COMM PORT	Not used.
I	J2	DIGITAL OUTPUTS	
J	JMP1		Set to DC.
K	J1	POWER CONNECTOR	Connects to Power Panel for DC Power.
L	P4	COMM PORT	Connects to a local laptop or debug port.
M	BAT1	MEMORY BACKUP	3V lithium battery (Panasonic CR2032 or equivalent).

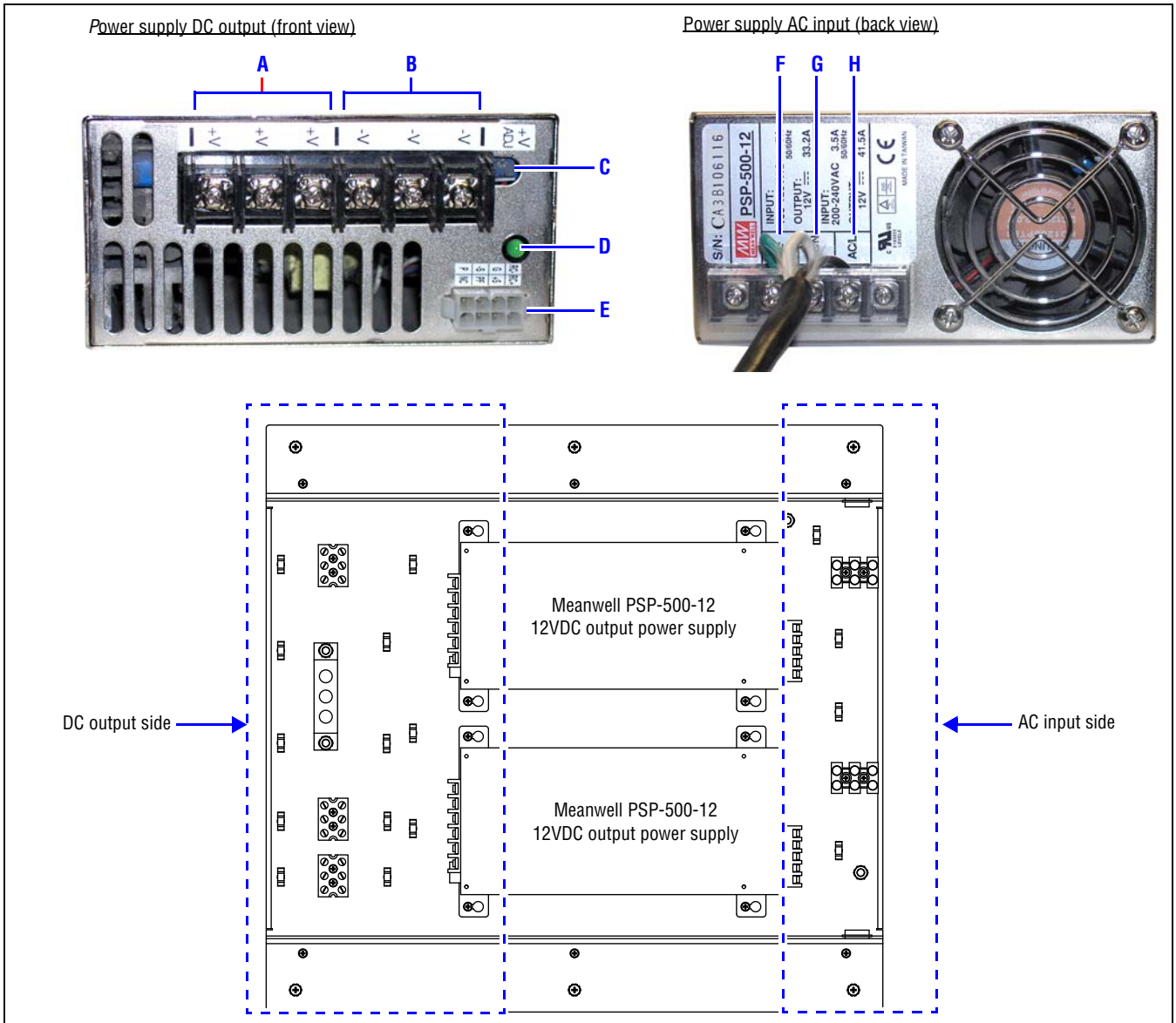
N	LED1 TO LED4	DIAGNOSTIC LEDS	• LED1—Controller Heartbeat. • LED2—Flashes when receiving communications from Central/Local port P1 or P3. • LED3—Flashes when receiving communications from menu processor. • LED4—Flashes with communications to and from sign controller #3.
O	J5	PROGRAMMING PORT	Used to program the controller with a rabbit programming cable.
P	J10	LCD HEADER	
Q	S2 RESET	CONTROLLER RESET SWITCH	Used to do a soft reset on the controller.
R	J11	LCD BACKLIGHT	
S	P3	COMM PORT	Typically used for a local laptop top connection. Local remote switch must be turned on to activate diagnostic messages.
T	P2	COMM PORT	Not used.
U	J13	PS/2 KEYBOARD	Connects to the keyboard.

Controller block diagram



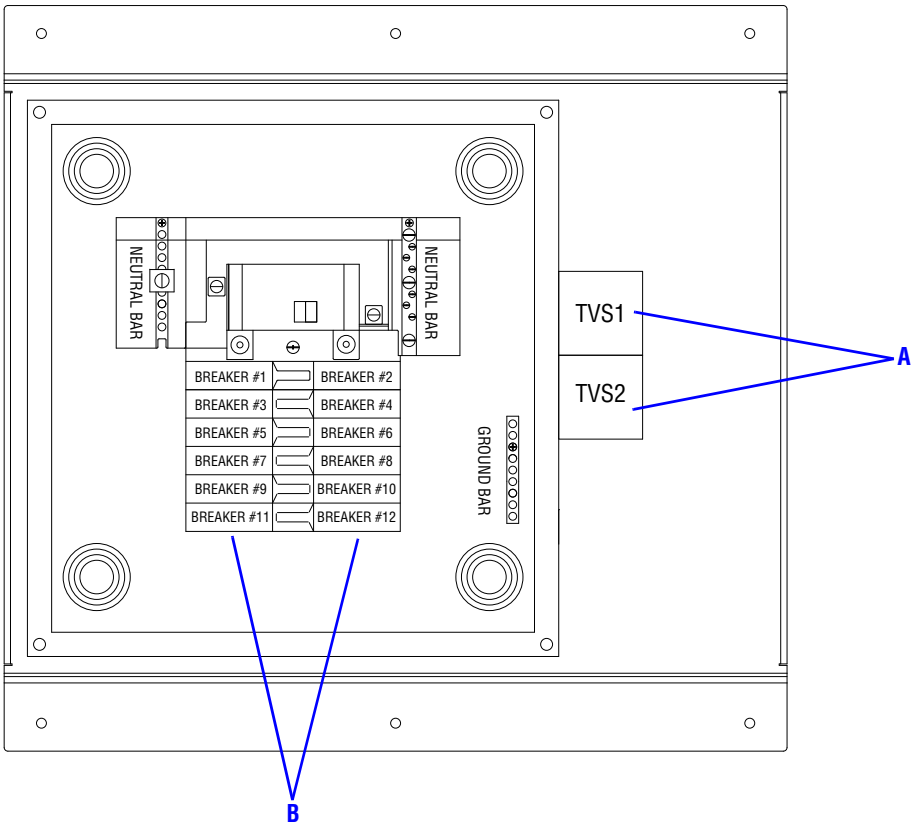
Sign power panels

There are seven power panels in the sign (see “Inside views” on page 18). Each panel contains two, Meanwell PSP-500-12 12VDC output power supplies. **Note:** Both power supplies may not turn on at the same time if there is not enough load present.



Item	Power supply label	Name	Description
A	V+	12VDC +	DC output
B	V-	12VDC -	
C	—	DC OUTPUT VOLTAGE ADJUST	Adjustment range. Output should be set to 12VDC. For power sharing to work correctly, the output of both power supplies must be set to exactly the same voltage.
D	—	INPUT POWER INDICATOR	Green = AC voltage supplied to power supply.
E	—	SIGNAL CONNECTOR	Used for power sharing function, remote sense, and power fail signal.
F	⏚	AC IN GROUND	AC input (90-264VAC, 47-63Hz)
G	AC/N	AC IN NEUTRAL	
H	AC/L	AC IN LINE	

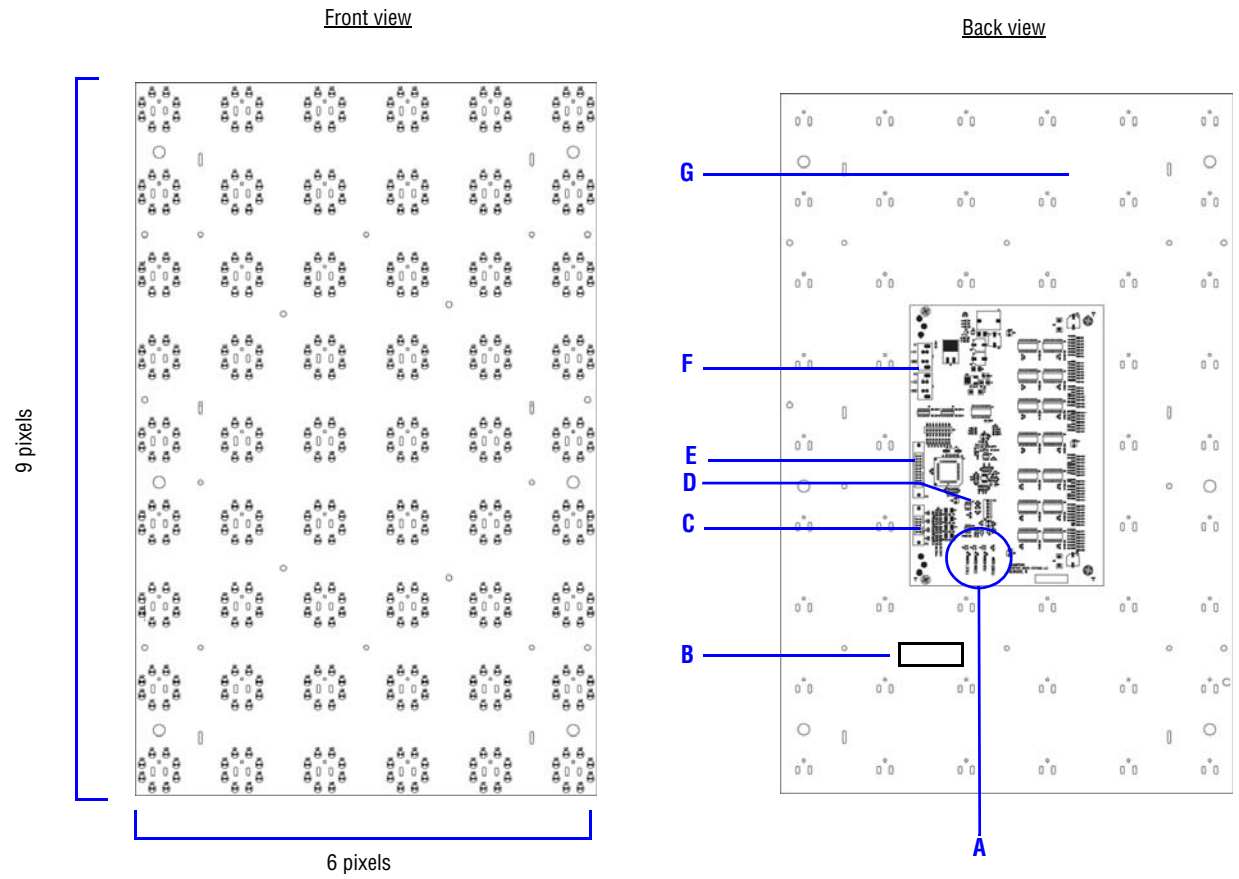
Load center panel



Item	Name		Part #	Description
A	SURGE ARRESTORS		30350019	Citel M18-120 surge arrestor. There is a surge arrestor for each line brought into the sign.
B	SIGN CIRCUIT BREAKERS	BREAKER #1	48100005	PS1, 3, 5, 7, 9
		BREAKER #2	48100005	PS 2, 4, 6, 8, 10
		BREAKER #3	48100005	PS 9, 11, 13
		BREAKER #4	48100005	PS 10, 12, 14
		BREAKER #5	48100005	Lights
		BREAKER #6	48100005	Fans
		BREAKER #7	48100006	Outlets
		BREAKER #8	48100006	Heaters
		BREAKER #9 - 12	—	Not Used

LED driver board

There are 63 LED driver boards in a sign. Each board is 6 x 9 pixels, and each pixel is composed of eight LED lamps.



Item	PCB label	Name	Description
A	LD1	POWER	On = 12V supplied to LED driver board.
	LD2	FAULT	On = one or more faulty LED lamps on the LED driver board (if in normal operating (addressed) mode).
	LD3	COMM	• On = There is NO communication from sign controller. • Off = There is communication from the sign controller.
	LD4	RUN	Flashing = LED driver board processor operating.
B		BIN LABEL	Information on the intensity and wavelength of the LED lamps.
C	P3	DATA	Connects to Controller #1 via a ribbon cable.
D	P5		Programming port for the LED driver board processor.
E	P2	ADDRESS PLUG	Addressing is preset from the factory via the wire assembly (p/n 1509100701). See the wiring diagram listed in “Related documentation” on page 7.
F	P1	+V1	Supplies DC power to the LED driver board.
G	N/A	PART NUMBER LABEL	The module’s part number is located here.

Maintenance

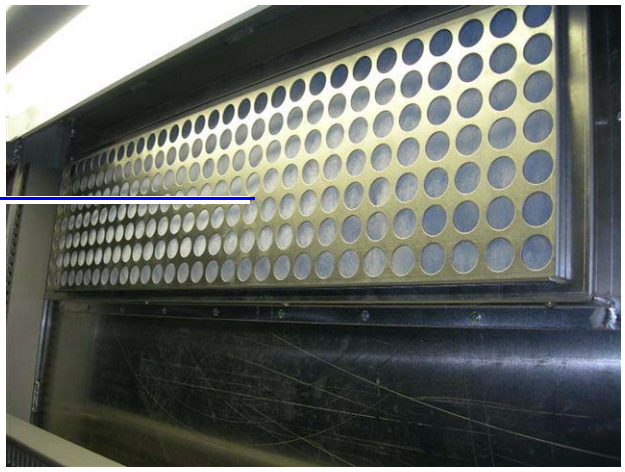
Air filter cleaning

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 the air vent filter**

1. Locate the air vents (see “Inside views” on page 18.)
2. Remove the air vent cover.



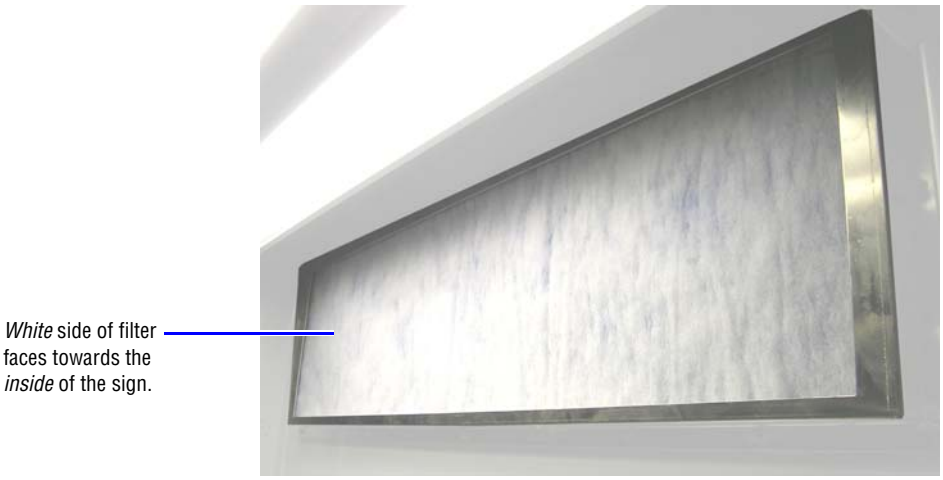
3. Pull out the air vent filter.

4. If the air vent filter needs cleaning, wash it using warm water and dish cleaning liquid. Rinse the filter in clean water. Then dry the filter with a clean cloth.

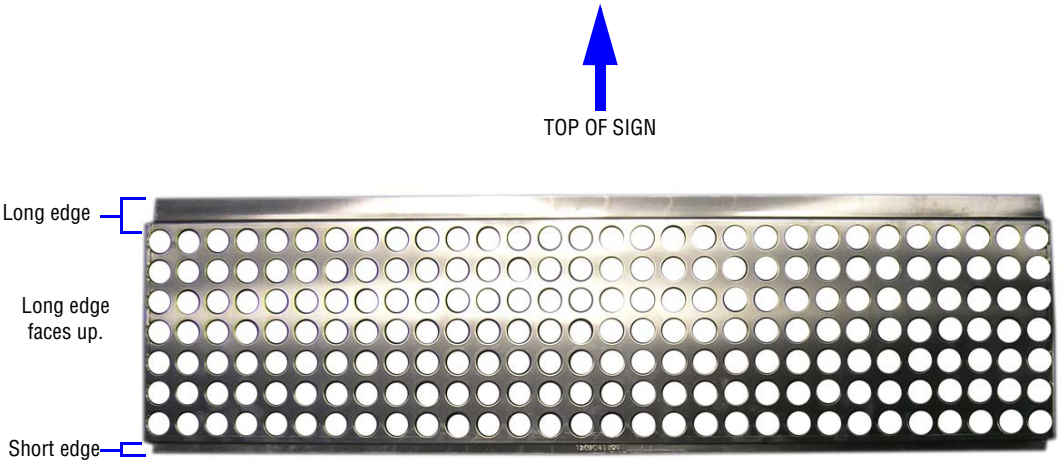
   If the filter needs to be replaced, the filter material is available under McMaster-Carr p/n 2122K254.

   The filter must be cut to size.

5. Return the clean air vent filter to the sign.



6. Reattach the air filter cover.



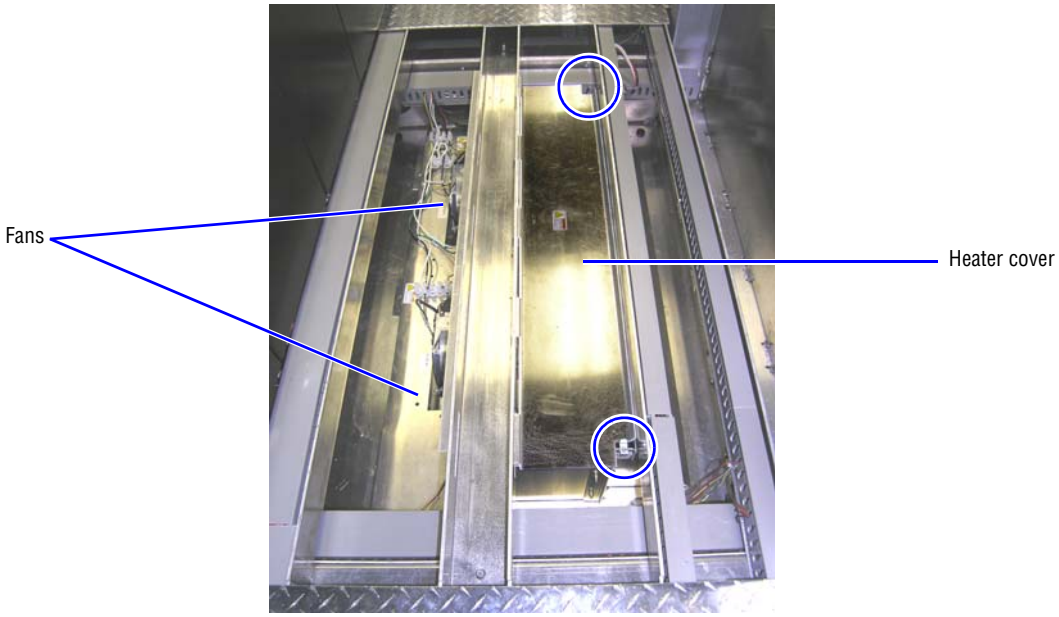
Fan filter cleaning

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

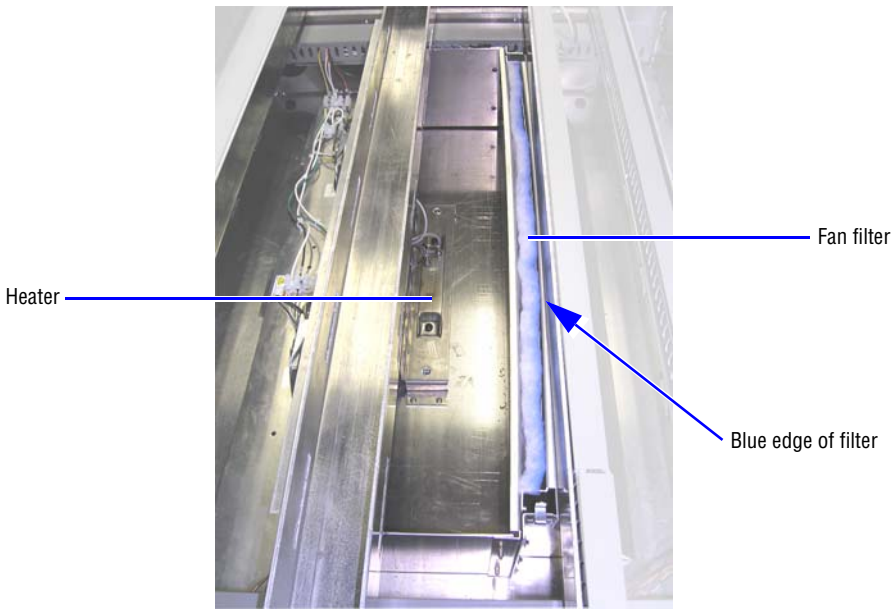
⇨ **To clean fan filters**

1. Locate the fan housing (see “Inside views” on page 18).
2. Lift the metal access floor panel from over the fan and heater housing. Detach the two latches (circled below) holding the heater cover to the sign.

CAUTION! Heater may be very hot and may burn you if it has been activated due to humidity.



3. Remove the heater cover.



4. Remove the fan filter.

5. If the fan filter needs cleaning, wash it using warm water and dish cleaning liquid. Rinse the filter in clean water. Then dry the filter with a clean cloth.
6. Reinstall the fan filter. See step 3 for details.
7. Replace the fan cover.
8. Place the metal access cover back over the heater and fan housing.

Physical Inspection

Exterior inspection

- Check for any physical damage to the exterior of the sign.
- Check for loose nuts, bolts, hinges, doors, etc. on the sign.
- Check for corrosion, especially on the mounting hardware.
- Check the electronics for foreign debris and general cleanliness.
- Check the interior of the sign 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 each surge protector on the load side of the sign (see “Inside views” on page 18). Make sure the LED on each device is lit.

If the LED indicator on a surge protector is off, the surge protector (pn 30352001SP2) must be replaced.

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

Note: Verify the 100A breaker is turned on in the breaker panel.

Troubleshooting

This chapter contains the LED Variable Message Sign (VMS) Troubleshooting and a general explanation of how each problem can be isolated through a step by step direction.

Introduction

Due to the complexity of the electronic equipment, it is impossible to describe every possible malfunction that could occur. The intent of this section is to follow a path from the beginning to the end of each system so that a general understanding of the operating system is established. When the sign is not functioning properly, these procedures should help you access the electronics and isolate the defective component(s) in the sign. The defective components may then be removed and replaced with a known good component. The topics discussed and most common problems that you might experience are listed below.

If none of the procedures suggested in this chapter produce a satisfactory solution, you may contact the Adaptive Micro Systems Service Department at 414-357-2020 during normal business hours.

Tools required for troubleshooting and repair

In all cases of troubleshooting and repair, some tools are required to perform these tasks. The following is a list of common test equipment and tools required to test, remove and replace a defective PCB and/or piece of hardware:

- DMM (Digital multimeter)
- 1/8" slotted screwdriver
- 3/16" slotted screwdriver
- #2 Phillips screwdriver
- #3 Phillips screwdriver
- 3/16" nutdriver
- 1/4" nutdriver
- 3/8" nutdriver
- 7/16" nutdriver
- 6" or 8" slip joint pliers
- Needle nose pliers
- Wire strippers (multi-gauge)

Access to the electronics and operating system is required to perform the procedures listed herein. Make sure that you have all codes, keys, combinations, and special entry tools.

Common problems

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

Inoperative AC power		
Possible cause	**Recommended solutions**	**Notes**
1. Cable connection not properly secured or came off 2. Faulty power supply 3. Circuit breaker tripped 4. Corroded terminals 5. Blown lighting arrestor	• Check all cables to make sure they are properly connected and making positive contact. • Verify AC power is flowing to the panel providing power to the sign controllers. • In the load center, verify AC is applied to the power supply boxes across the breakers. • If a problem is found during testing, repair or replace the faulty component.	In the power supply panels, verify AC power is supplied to all the power supplies, across input terminals. Referring to the wiring diagram listed in “Related documentation” on page 7 for the power supply panel view, measure across TB1 and TB2 to verify AC voltage is present.

Inoperative DC power		
Possible cause	**Recommended solutions**	**Notes**
1. Cable connection not properly secured or came off 2. Faulty power supply 3. Faulty printed circuit board 4. Corroded terminals	• Check the DC power side of the sign. • In the power supply panels, verify 12VDC power is present at the +V (orange) and -V (violet), terminals TB3 and TB4. • Verify the LED driver board is receiving power. Check the LED indicator LD1 (labeled POWER). If it is lit, then the board is receiving power. Also check the power connector for 12VDC (V+ is orange and V- is violet). • On the light sensor/temperature sensor board LS0-2, check for +12VDC (pin 11) and GND (pin 9) on the boards. • If a problem is found during testing, repair or replace the faulty component.	

Nonfunctional brightness control, nonfunctional sign		
Possible cause	**Recommended solutions**	**Notes**
All three photocell sensors in the sign are not functioning.	• Check all connections to and from the photocell sensor board to make sure they are secure. • Check for 12VDC power at the photocell. • Check the sign software to make sure the sign is not in a “blank” mode. • Check the address switch on the photocell. • Check the configuration jumpers on the controller board. • Verify the light sensors are addressed properly. Verify the COM LED indicator is flashing on each light sensor. ❏ Use Intelligent Control to make sure the sign is in Photocell mode. ❏ Front light sensor verification: — Cover the back and top light sensors. — Using Intelligent Control, check the Status screen to see if a photocell reading is present. If above 2 out of 15, cover the front photocell. The value should decrease to 1. If all is as described, go to top light sensor verification. — If the value is less than 2 out of 15, shine a floodlight on photocell to saturate the light sensor. The value should change within 30 seconds. If status of the light value increases, continue to top light sensor verification. If status does not increase, then replace the light sensor board. ❏ Top light sensor verification: — Cover the front and back light sensors. — Using Intelligent Control, check the Status screen to see if a photocell reading is present. If above 2 out of 15, cover the top photocell. The value should decrease to 1. If all is as described, go to back light sensor verification. — If the value is below 2 out of 15, shine a floodlight on photocell to saturate the light sensor. The value should change within 30 seconds. If status of the light value increases, continue to back light sensor verification. If status does not increase, then replace the light sensor board. ❏ Back light sensor verification: — Cover the top and back light sensors. — Using Intelligent Control, check the Status screen to see if a photocell reading is present. If above 2 out of 15, cover the back photocell. The value should decrease to 1. If all is as described, all light sensors are working properly. — If the value is below 2 out of 15, shine a floodlight on photocell to saturate the light sensor. The value should change within 30 seconds. If status of the light value increases, then all light sensors are working. If value doe not increase, then replace the pcb assembly. — Remove and replace the board.	If at least one photocell is functioning properly, the sign will dim according to ambient light levels.

Nonfunctional single LED(s), functional sign		
Possible cause	**Recommended solutions**	**Notes**
Faulty LED	Remove and replace the LED driver board containing the faulty LED(s).	

Nonfunctional single pixel(s), functional sign		
Possible cause	**Recommended solutions**	**Notes**
Faulty pixel	• In Intelligent Control, run the Pixel Test to locate where the faulty pixel is located. • Remove and replace the LED driver board containing the faulty pixel(s).	

Nonfunctional pixels on entire display board(s), functional sign		
Possible cause	**Recommended solutions**	**Notes**
Faulty pixel	• In Intelligent Control, run the Pixel Test to locate where the faulty pixel(s) is/are located. • Verify that the DC power supplies are not faulty and test for presence of voltage. • If the test indicates a faulty set of power supplies, remove and replace the power supply supplying power to the display boards. If the voltage at the LED driver board is less than 10.5VDC, this may show pixel failures for the pixel diagnostics. • If power supplies are OK, remove and replace the LED driver board containing the faulty pixel(s).	

Part replacement

List of field-replaceable parts

Part name	Page
Sign controllers #1 and #2	page 40
Sign Controller #3	page 43
Ground controller	page 45
Power supplies	page 47
Relay #1 and #2	page 50
Flasher	page 50
LED driver board	page 52
Fans	page 55
Light sensor	page 56

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.

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 controller #1 or #2 board

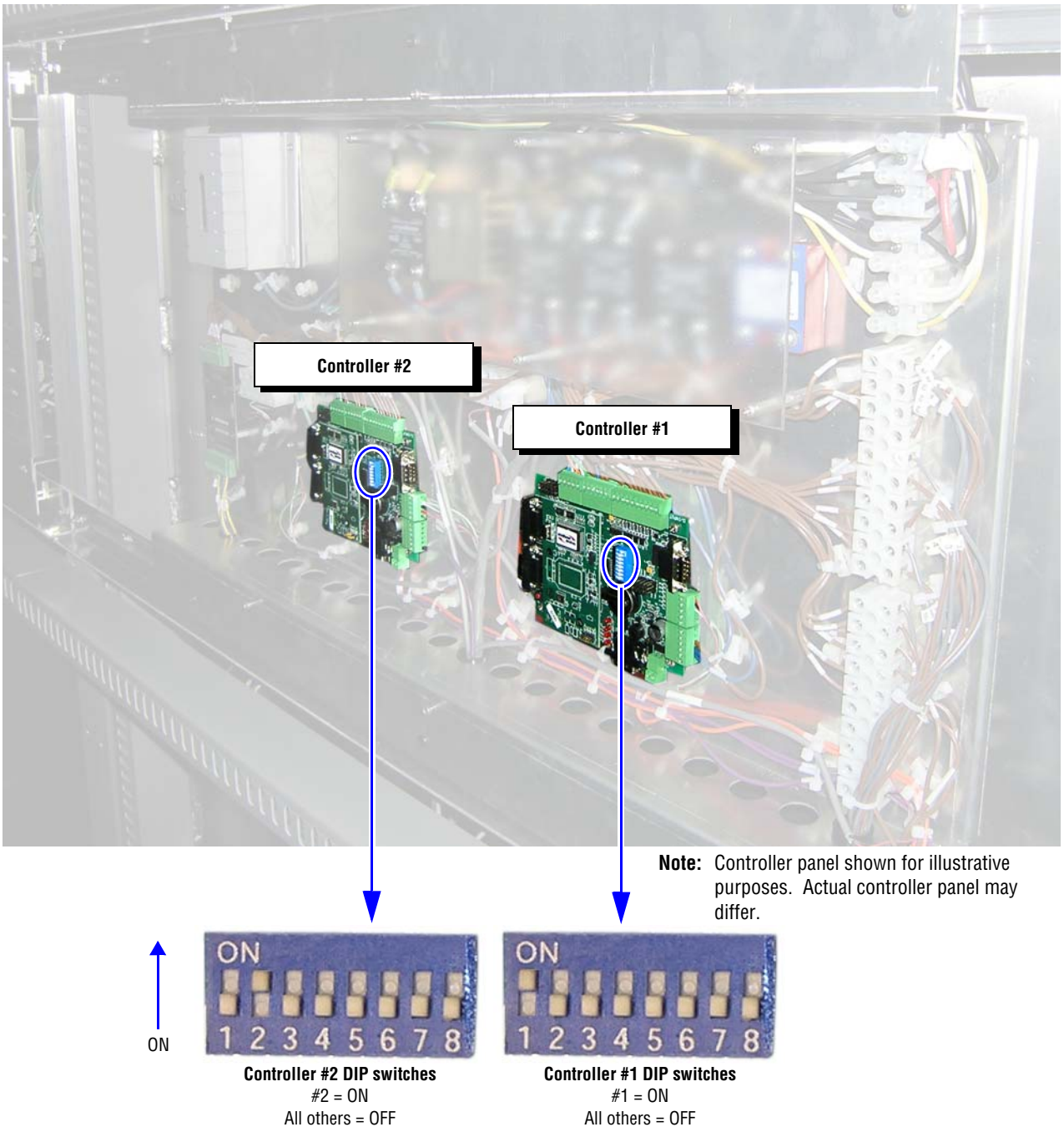
1. Switch all sign breakers to the OFF position, except the breaker for the sign lights. See “Load center panel” on page 29.
2. Loosen, but do not remove, the screws (circled below) on the protective cover over the controller plate. Then remove the cover:

Figure 9. Screw locations on the controller’s cover.

3. Locate the controller board (either Controller #1 or #2) to be replaced. See “Inside views” on page 18.

4. Set the DIP switches and jumpers on the *replacement* controller board so they match the DIP switch settings on the board to be replaced.

Figure 10. DIP switch settings on the sign controller boards.



Note: Controller panel shown for illustrative purposes. Actual controller panel may differ.

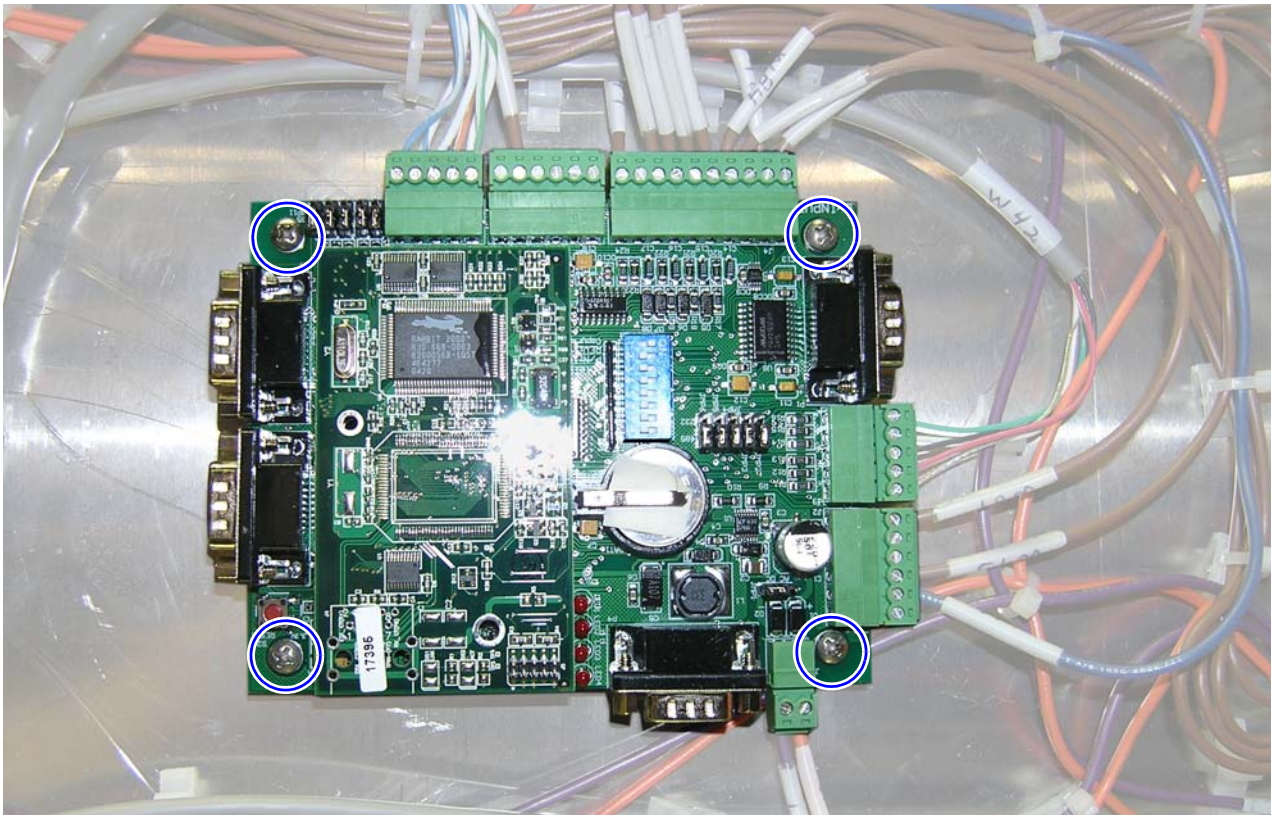
Controller #2 DIP switches
#2 = ON
All others = OFF

Controller #1 DIP switches
#1 = ON
All others = OFF

5. Disconnect all cables from the controller board to be replaced.

6. Remove the four screws (circled below) that hold the controller board to the sign:

Figure 11. Locations of the screws securing the controller board to the sign.



7. Fasten the new controller board to the sign. Then reconnect all the cables to the new board.

8. Reattach the protective cover over the controller plate.

9. Close the sign and apply power to the sign.

Controller #3 board replacement

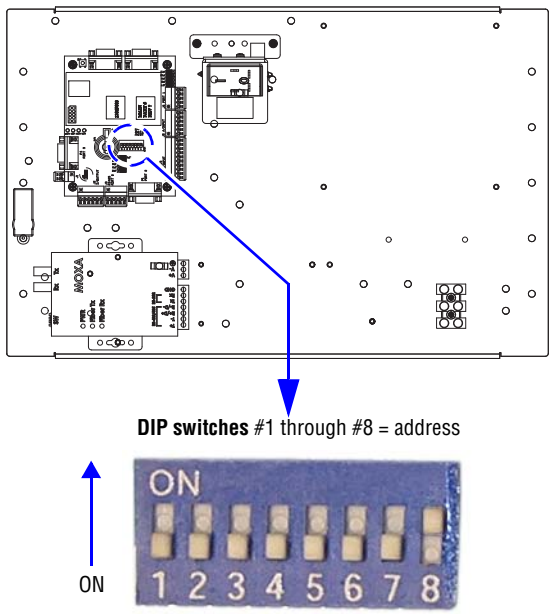
WARNING! Hazardous voltage. Contact with high voltage may cause serious injury or death. Always disconnect power to unit prior to servicing.

⇨ To replace the controller #3 board

1. Switch all sign breakers to the OFF position, except the breaker for the sign lights. See “Load center panel” on page 29.
2. Locate controller #3, see “Inside views” on page 18 for the location.
3. Set the DIP switches and jumpers (JMP2-6 and JP7-11) on the replacement board to match the settings on the board being replaced. At least one dip switch must be on for the controller to function properly.

   Note: Controller #3 and the ground controller’s dip switch addresses must match for them to communicate.

   Figure 12. Controller #3 panel DIP switch settings.



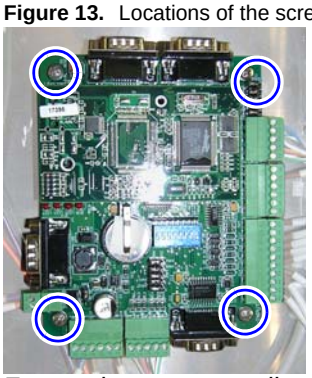
Notice: Turning all dip switches off will cause the controller to lose its IP, Subnet mask, and Ethernet routing information.

DIP switch addressing

Dipswitch	Address
1	1
2	2
3	4
4	8
5	16
6	32
7	64
8	128

4. Disconnect all the cables from the controller board to be replaced.
5. Remove the four screws (see Figure 13) that hold the controller board to the panel. Remove the controller board from the sign.

   Figure 13. Locations of the screws securing the controller board to the panel.



6. Fasten the new controller board to the sign.
7. Reconnect all the cables to the new controller board.
8. Apply power to the controller plate.

⇨ If applicable, change the IP address for the new Controller #3 board

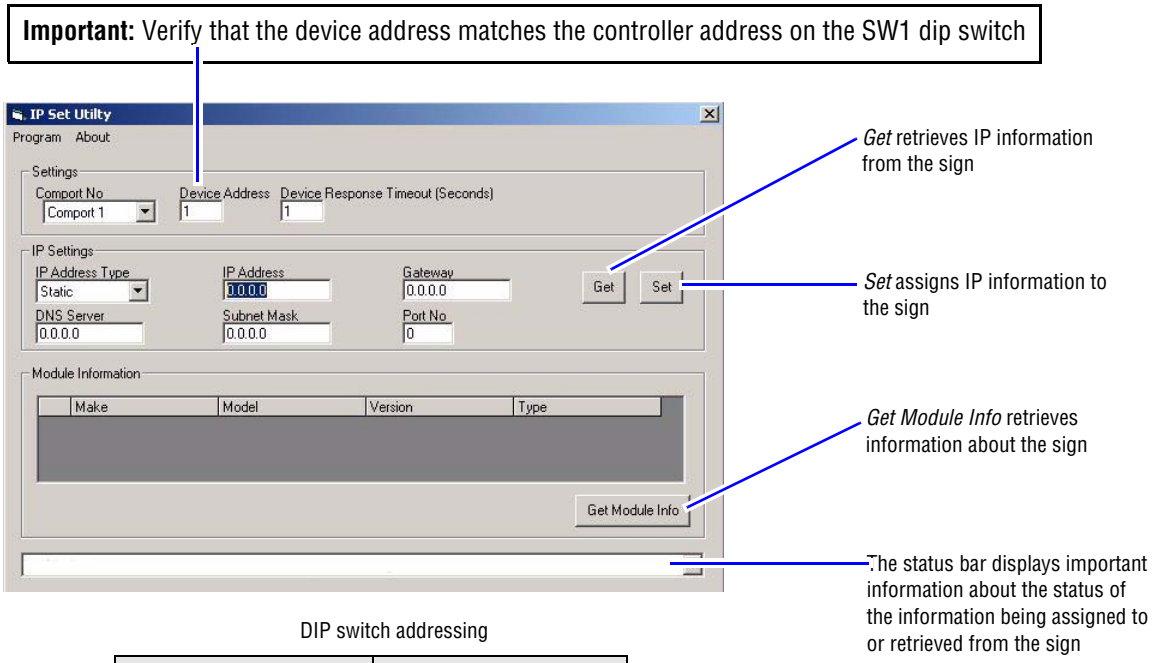
To assign an IP address, the IP Set Utility program must be installed on the computer that will be communicating to the sign. Contact Adaptive Technical Services at (800) 558-7022 or (414) 357-2020 if you do not have this program.

Note: If the IP address on Controller #3 is changed the ground controller IP address must be changed to match the new address.

1. Using a null modem cable, connect a laptop computer to the controller board at P3 (next to the Reset button). See “Sign controllers” on page 24 for the 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 Figure 14).

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

Figure 14. Setting the IP address for the controller.



DIP switch addressing

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.

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. Reset the controller and verify operation of controller.

Ground controller replacement

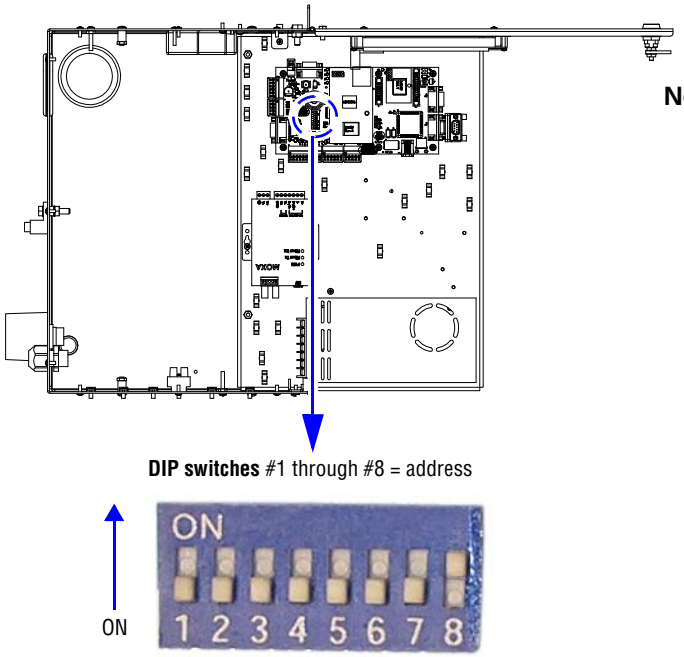
WARNING! Hazardous voltage. Contact with high voltage may cause serious injury or death. Always disconnect power to unit prior to servicing.

⇨ To replace the ground controller board

1. Remove power to the ground controller cabinet.
2. With a 5/32 hex tool, unlock the ground control cabinet door and open. Slide out the controller board panel.
3. Set the DIP switches and jumpers (JMP2-6 and JP7-11) on the replacement board to match the settings on the board being replaced. At least one dip switch must be on for the controller to function.

   Note: The ground controller and Controller #3's dip switch addresses must match for them to communicate.

   Figure 15. Ground controller panel DIP switch settings.



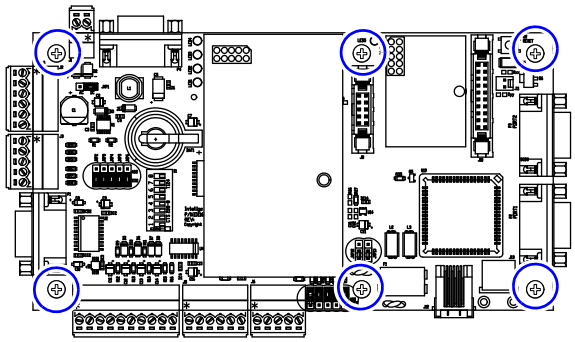
Notice: Turning all dip switches off will cause the controller to lose its IP, Subnet mask, and Ethernet routing information.

DIP switch addressing

Dipswitch	Address
1	1
2	2
3	4
4	8
5	16
6	32
7	64
8	128

4. Disconnect all the cables from the controller board to be replaced.
5. Remove the six screws (see Figure 16) that hold the controller board to the panel. Remove the controller board from the cabinet.

   Figure 16. Locations of the screws securing the controller board to the panel.



6. Fasten the new controller board to the cabinet.
7. Reconnect all the cables to the new controller board.
8. Apply power to the controller plate.

⇨ If applicable, change the IP address for the new ground controller board

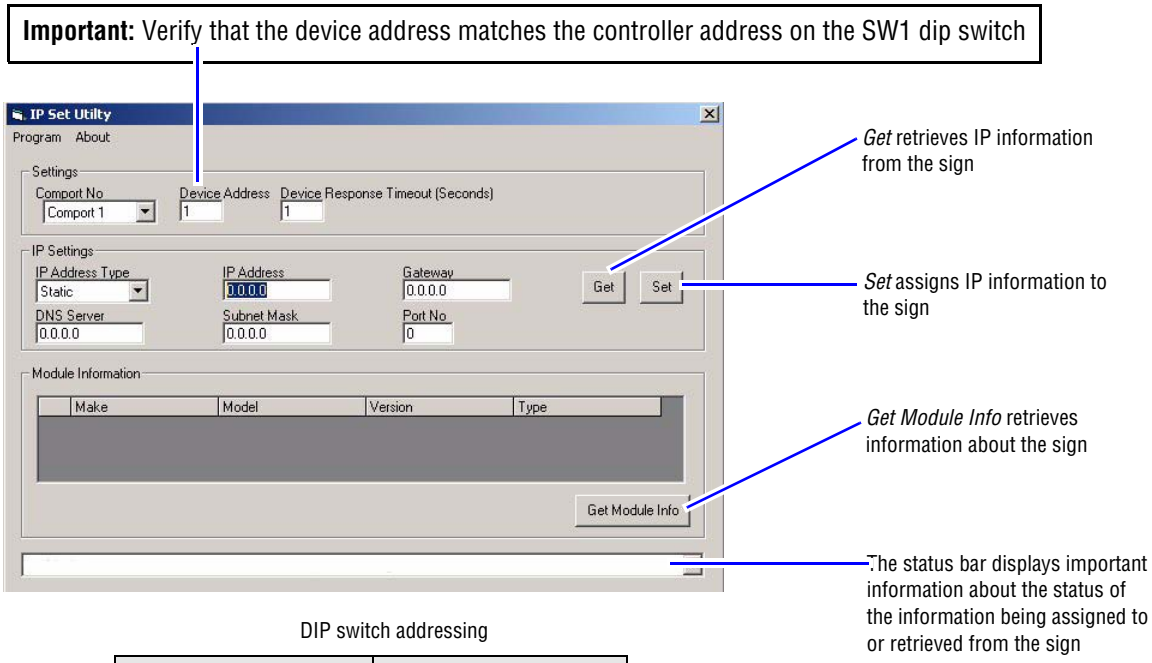
To assign an IP address, the IP Set Utility program must be installed on the computer that will be communicating to the sign. Contact Adaptive Technical Services at (800) 558-7022 or (414) 357-2020 if you do not have this program.

Note: If the IP address on the ground controller is changed controller #3's IP address must be changed to match the new address.

1. Using a null modem cable, connect a laptop computer to the controller board at P3. See "Ground controller" on page 26 for the 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 Figure 17).

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

Figure 17. Setting the IP address for the controller.



DIP switch addressing

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.

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. Reset the controller and verify operation of controller.

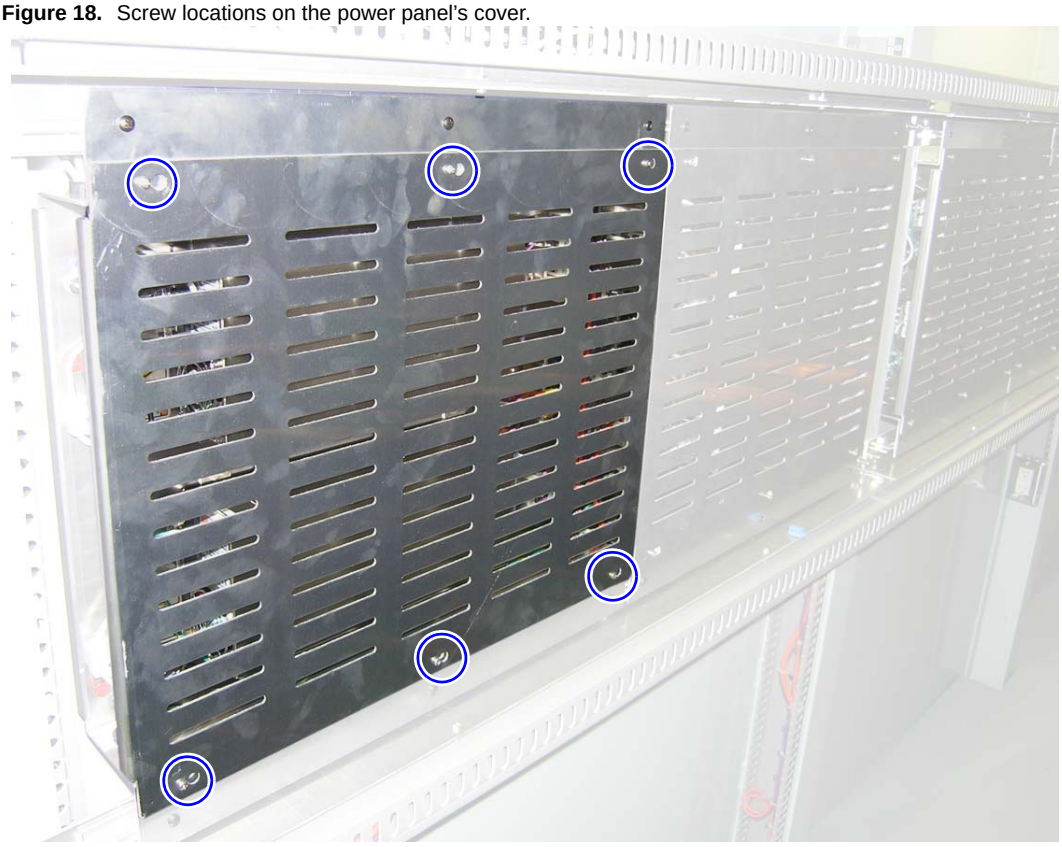
Power supply replacement

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

⇨ To replace the sign power supplies

1. Turn all sign breakers to the OFF position, except the breaker for the sign lights. See “Load center panel” on page 29.
2. Loosen, but do not remove, the screws (circled below) on the protective cover over the power panel. Then remove the cover.

Figure 18. Screw locations on the power panel’s cover.



3. Remove all wires from the power supply to be replaced:

DC connections:

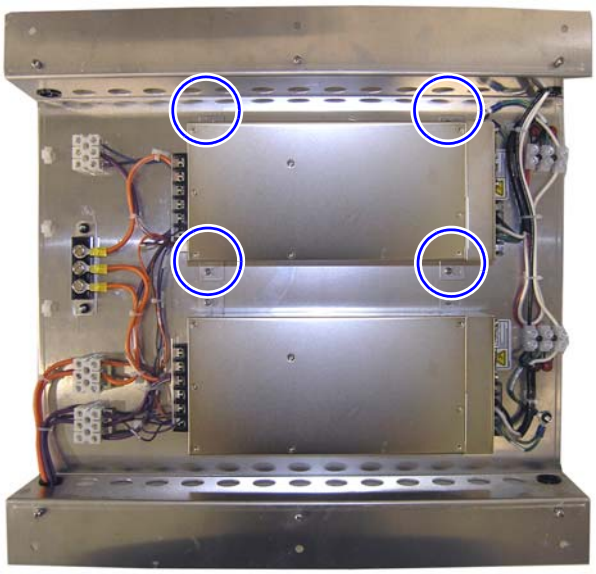
- V+ (orange-colored wire)
- V- (violet-colored wire)
- Signal harness (may be easier to remove once the power supply brackets are loosened)

AC connections:

- Hot \ Line (black wire)
- Neutral \ N (white wire)
- Safety Ground (green wire)

4. Loosen the four screws (circled below) that hold the power supply to the power panel. Then slide the power supply out.

Figure 19. Locations of the screws securing the power supply to the power panel.



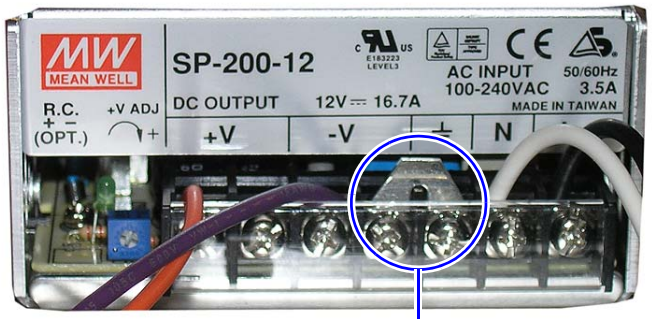
5. Fasten the new power supply to the power panel. Then reconnect all the wires to the new power supply. See step 3 for details.
6. Reattach the protective cover to the power panel.
7. Apply power to the sign and verify operation.

⇨ To replace the ground controller power supply

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

1. Remove power from the ground control cabinet.
2. With a 5/32 hex tool, unlock the ground control cabinet door and open. Pull and slide out the controller board plate.
3. From underneath the ground controller plate, remove the 4 screws holding the power supply to the ground controller plate. Then cut the tie-wraps around the wires to remove the power supply.
4. Remove all wires connected to the power supply.

Figure 20. Power supply



If the replacement power supply does not have a ground spade connecting -V and ⏚.

Then transfer this ground spade to the replacement power supply (if one is present).

5. Reconnect all the wires to the new power supply.
6. Refasten the wires to the plate with the tie-wraps provided in the spare part kit.
7. Secure the power supply to the controller plate with the 4 previously removed screws.
8. Close the ground controller cabinet and apply the power source.

Relay replacement

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

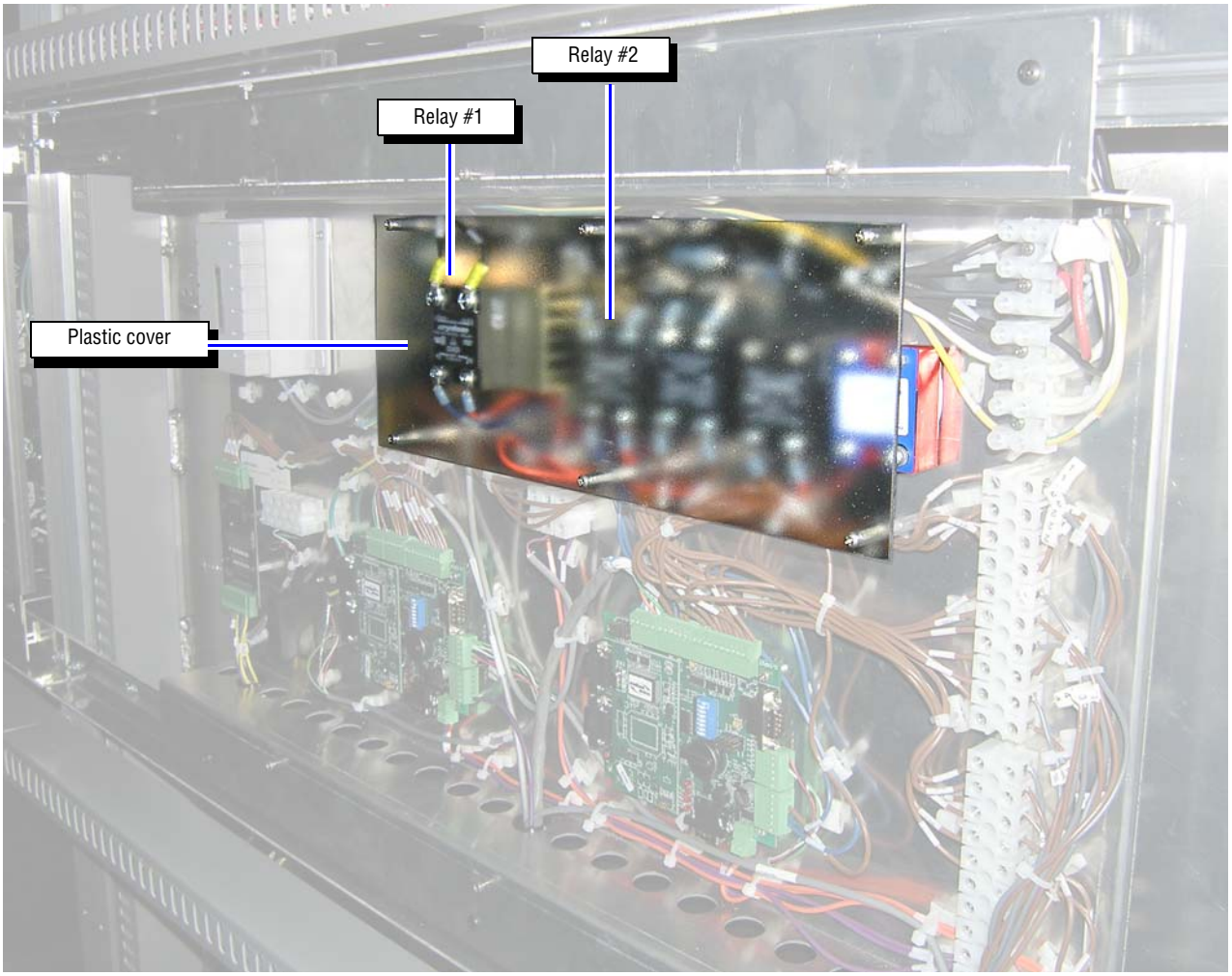
⇨ **To replace the relay**

1. Switch all sign breakers to the OFF position, except the breaker for the sign lights. See “Load center panel” on page 29.
2. Loosen, but do not remove, the screws (see Figure 21) on the protective cover over the controller plate. Then remove the cover.

Figure 21. Locations of the screws on the controller plate’s cover.

3. Locate the relay (or the flasher) to be replaced.

Figure 22. Relay locations.



4. Before disconnecting the wires attached to the relay, mark the location of each wire so that the replacement relay can be connected properly.

5. Disconnect the wires.

6. Remove the screws holding the relay to the controller panel.

7. Attach the new relay to the controller panel.

8. Connect the wires to the new relay, referencing how they were marked in STEP 4. Refer to the P1509-7/8/12/15 27x126 Wiring Diagram (pn 1509650204) for factory configuration.

9. Reattach the plastic cover over the relays.

10. Reattach the protective cover over the controller plate.

11. Apply power to the sign and verify operation.

LED driver board replacement

Note: To match the color and intensity of the sign's LEDs, you may need to determine the BIN letter of the LED driver board to be replaced (see "LED driver board" on page 30).

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

⇨ **To replace an LED driver board**

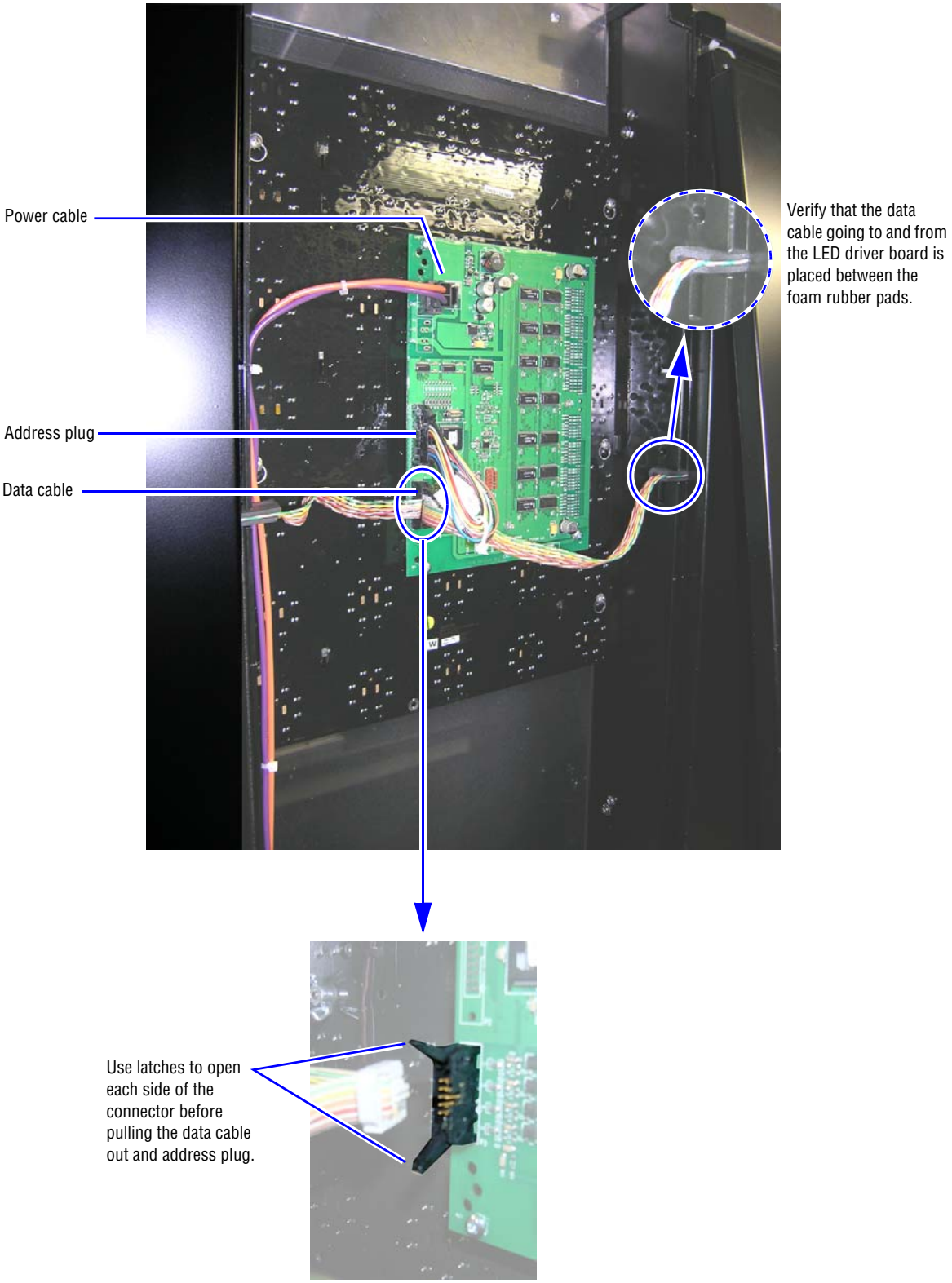
1. Switch all sign breakers to the OFF position, except the breaker for the sign lights. See "Load center panel" on page 29.
2. Locate the LED driver board to be replaced.
3. Remove the protective panel that covers the back of this LED driver board.

Figure 23. Hand hold locations on the protective panel.

4. In the following order, remove the following from the back of the LED driver board:

- Power cable (P1)
- Address plug (P2)
- Communications cable (P3)

Figure 24. P1, P2, and P3 locations on the LED driver board (representative view).

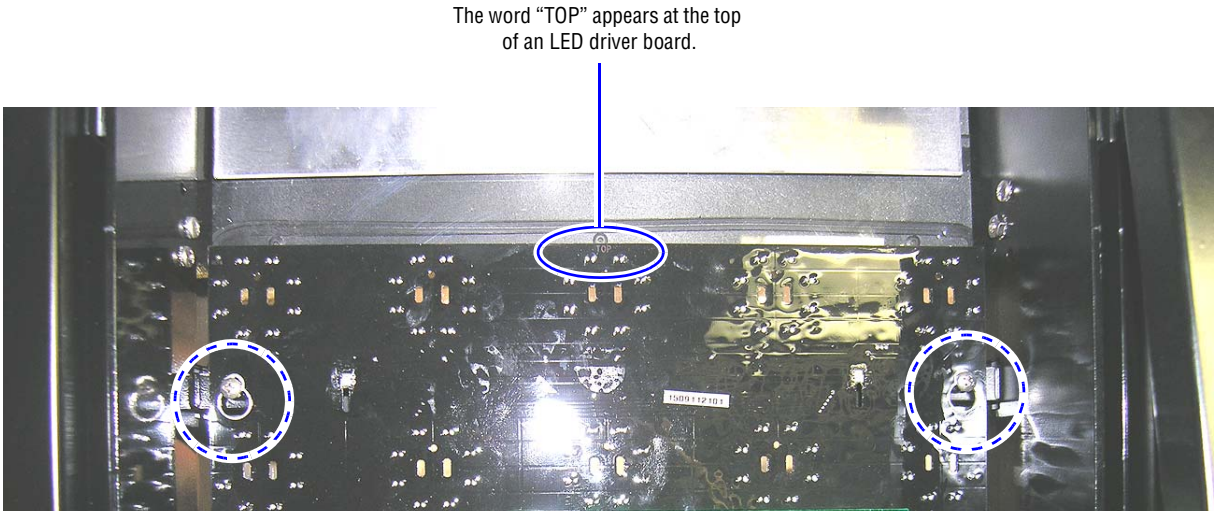


5. **Attach a failure tag indicating failure details so the problem can be diagnosed and the fix verified.**

   Note: The failure tag is required for all warranty repairs to be recognized.

6. Loosen the six screws (two are circled below) that hold the LED driver board to the sign. Then remove the board.

   Figure 25. Screw locations on the LED driver board.



7. Attach the new LED driver board to the LED panel.

   Note: The top of the LED driver board is marked with the word “TOP” on the front of the board.

8. Connect the following in the order listed:
   - Address plug (P2)
   - Comm ribbon cable (P3)
   - Power (P1)
9. Reattach the protective panel that covers the back of this LED driver board.
10. Apply power to the sign.

Fan replacement

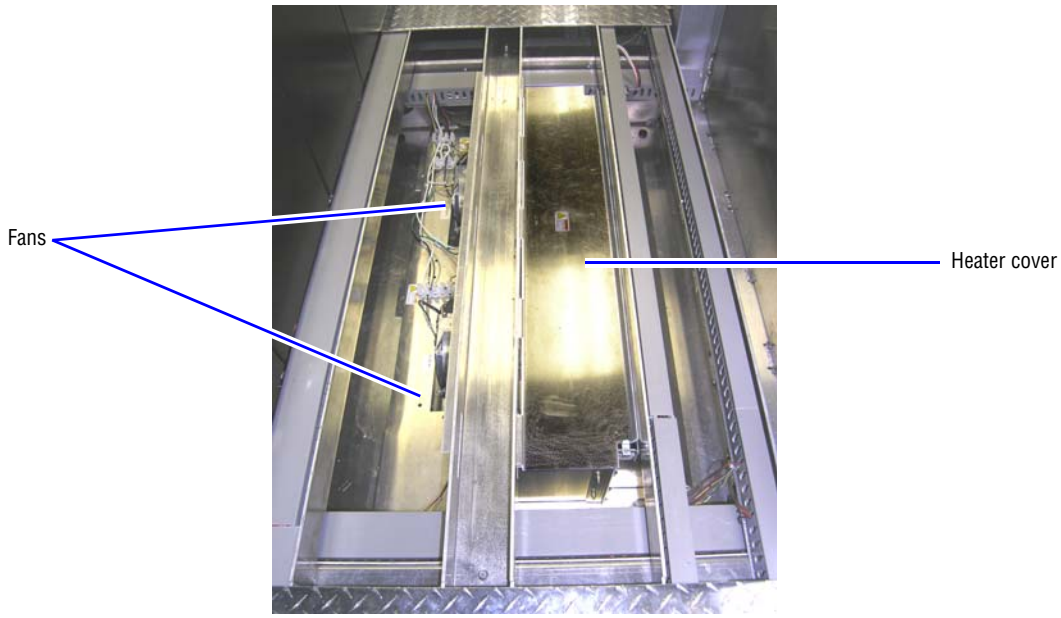
Note: To replace the filter for a fan, see “Fan filter cleaning” on page 33.

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. Switch all sign breakers to the OFF position, except the breaker for the sign lights. See “Load center panel” on page 29.
2. Remove the metal access floor panel from over the fan that will be replaced:

Figure 26. Fan locations.



3. Remove the fan to be replaced from the fan assembly. Note the orientation. Fan arrows point toward the front of the sign.

   Note: Before removing the wires attached to the fan, mark the location of each wire so that the replacement fan can be connected properly.

4. Cut the wires on the new fan to length and strip 3/8-inch off the ends.

Notice: Do **NOT** combine DC and AC wiring!

5. Attach the replacement fan by connecting the following wiring:

AC Wiring	DC Wiring
Black to Black	Red to Red
White to White	Blue to Blue
	Yellow to Yellow

6. Apply power and test the fan by verifying that it is blowing toward front of sign and run a fan test.
7. Place the metal access floor panel back.
8. Close the sign.

Light sensor replacement

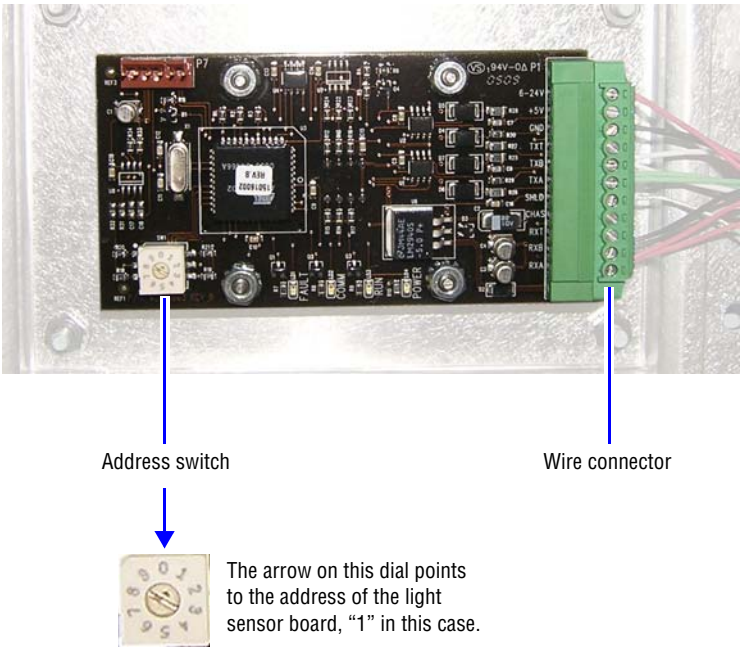
WARNING! Hazardous voltage. Contact with high voltage may cause serious injury or death. Always disconnect power to unit prior to servicing.

⇨ To replace the light sensor

1. Switch all sign breakers to the OFF position, except the breaker for the sign lights. See “Load center panel” on page 29.
2. Locate the light sensor to be replaced.

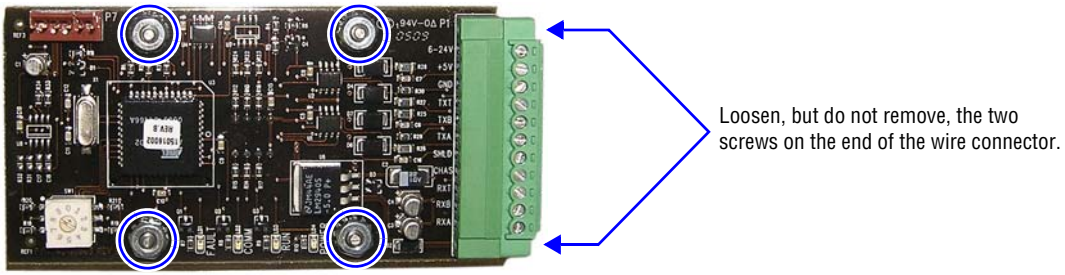
   Note: Three light sensors are used in the sign. All three are located above the sign entrance door.

   Figure 27. Light sensor.



3. Set the address switch on the *replacement* light sensor board to the setting on the board that will be replaced:
   - Address 0 = light sensor on *front* of sign.
   - Address 1 = light sensor on *top* of sign.
   - Address 2 = light sensor on *back* of sign.
4. Use a small, flat blade screwdriver to remove the wire connector from the light sensor that is being replaced. Then remove the four nuts (circled below) that hold the board to the sign.

   Figure 28. Light sensor board.



5. Attach the replacement light sensor to the sign and verify the address as indicated in Step 3.
6. Reapply power to sign.
7. Verify replacement light sensor is functioning properly.