

STEP 1: Read Safety section before starting, see page 4

STEP 2: Mechanical installation, see page 6

STEP 3: How many signs are installed?

ONE SIGN

- Go to STEP 4.

TWO OR MORE SIGNS



STEP 3a: Must all signs display the *same* message at the *same* time?

YES

All signs must be the same size.

- If two signs are mounted back-to-back, follow directions on page 10. Then go to STEP 4.
- If not, see page 14. Then go to STEP 4.

NO

- If two signs are mounted back-to-back, follow directions on page 12. Then go to STEP 4.
- If not, see page 16. Then go to STEP 4.

STEP 4: How will messages be sent from a computer to the sign(s)?

Method	Directions
WIRED (RS232)	• Follow directions on page 18. Then go to STEP 5.
WIRED (RS485)	• Follow directions on page 19. Then go to STEP 5.
FIBER OPTIC	• Follow directions on page 20. Then go to STEP 5.
ETHERNET	• Follow directions on page 21. Then go to STEP 5.
MODEM	• Follow directions on page 22. Then go to STEP 5.
WIRELESS	• Follow directions on page 23. Then go to STEP 5.
EXTERNAL CONNECTION BOX	• Follow directions on page 24. Then go to STEP 5.

STEP 5: Electrical installation, page 25

STEP 6: Use AlphaNET v2.0.3 or greater software to send messages to the sign(s)

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Safety

Equipment symbols

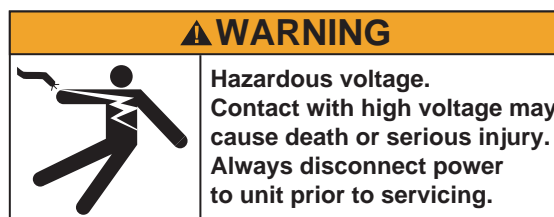


Chassis ground



Mains power (1 = ON, 0 = OFF)

Warnings and cautions

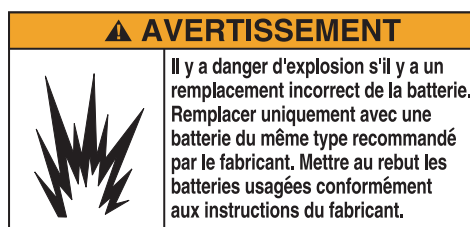
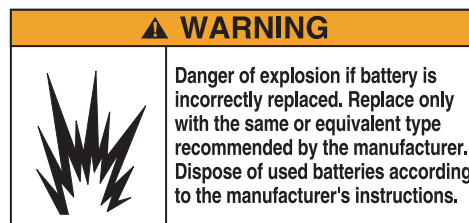


Other warnings and cautions are posted in appropriate locations throughout this manual.

Battery backup

In the event of a power loss, backup batteries in an AlphaEclipse™ sign provide short-term power in order to retain information such as messages and time settings.

Backup batteries are soldered to the Controller board and should not be replaced by anyone other than a qualified Adaptive® technician.



Controlling Electrostatic Discharge (ESD)



This equipment signs contain 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 our web site at <http://www.adaptivedisplays.com>.

Changing from Master/Slave to Master/Master operation

Master/Slave sign operation (see page 10 and page 14) — in this mode, a message will be displayed on all the signs at the same time. Also, in this mode, there is just one Master sign, but there can be multiple Slave signs. Messages are sent to the Master sign using a wire, modem, or wireless connection. Then these messages are sent and displayed on all the Slave signs (plus the Master sign) at the same time.

Master/Master sign operation (see page 12 and page 16) — in this mode, each sign can display a different message. However, a message cannot be displayed *simultaneously* on all the signs.

Signs are configured for Master/Slave mode by

1. wiring a RS485 connection to each sign’s SERIAL I/O connector (also called the Serial I/O terminal block, see “Appendix A: Sign description” on page 27),
2. wiring a RS485 connection to each sign’s TEMP PORT connector,
3. setting each sign’s Master/Slave DIP switch, depending if the sign is operating as a Master or a Slave. The DIP switches on a sign can be set by either:
 - opening a sign and then physically setting the DIP switches (see “Appendix G: DIP switch settings” on page 44)
 - using AlphaNET v2.0.3 or greater *Diagnostics* software (see the **AlphaNET Version 2.0.3 User Manual** which is available on Adaptive’s web site)

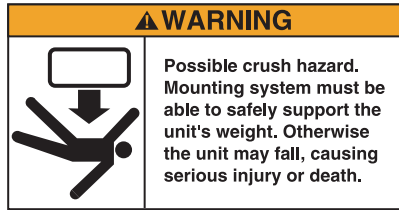
Signs set up as Master/Slave units as described above can NOT be changed to Master/Master operation by just changing a sign’s DIP switches (#3 above). In fact, doing so could damage a sign.

To change Master/Slave signs to Master/Master units, use the directions below:

- “Back-to-back Master/Master sign connection” on page 12 or
- “Multiple Master/Master signs” on page 16.

Mechanical installation

Designing the support structure

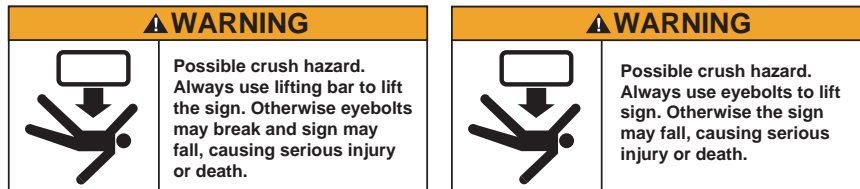


The design of the support structure depends on the mounting methods, sign size, sign weight, and wind loading. Support structure design should only be done by a qualified individual.

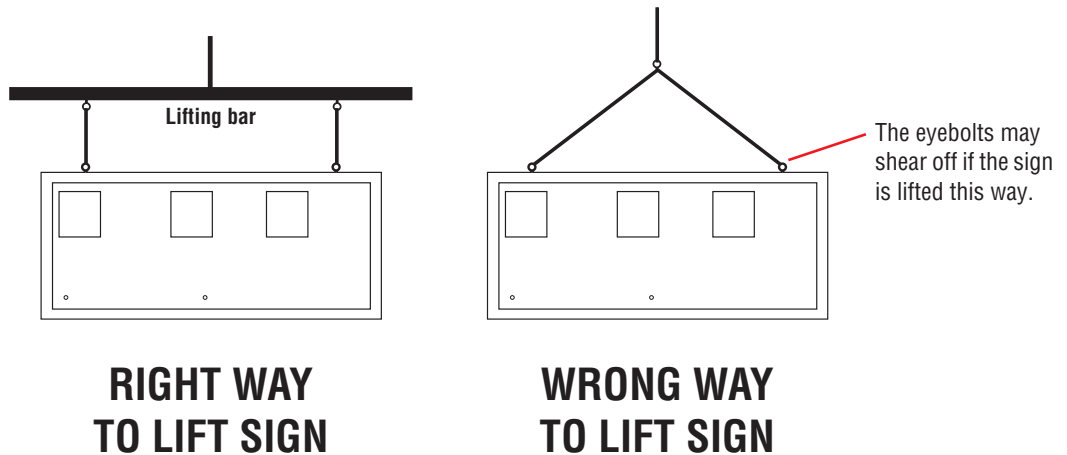
It is the customer's responsibility to ensure that the support structure and sign mounting hardware are capable of supporting the sign and are in compliance with all applicable building codes.

Adaptive Micro Systems is not responsible for installations or the structural integrity of support structures done by others.

Lifting the sign



Use the two eyebolts on the sign with a lifting bar to raise the display:



Mounting the sign

Because every installation site is unique, there is no single, Adaptive-approved procedure for mounting an AlphaEclipse™ sign.

However, follow these guidelines when installing a sign:

- Consult with a professional sign installer to determine the proper mounting system and to comply with all applicable building codes.
- Only use the sign’s mounting support brackets to mount the sign. *Mounting to any other parts of the sign will void the warranty.*
- ALL top and bottom mounting support brackets should be used to mount the sign.
- Drill holes as needed in the sign’s mounting support brackets for fasteners. *Drilling holes in any other place on the sign will void the warranty.* Follow these guidelines when drilling holes in the mounting support brackets:
- Drill the minimum number of holes necessary.
- The distance from the center line of a mounting bolt to the outside edge of a mounting support brackets should NOT be less than two times the diameter of the fasteners.
- Allow fan clearance as shown below:

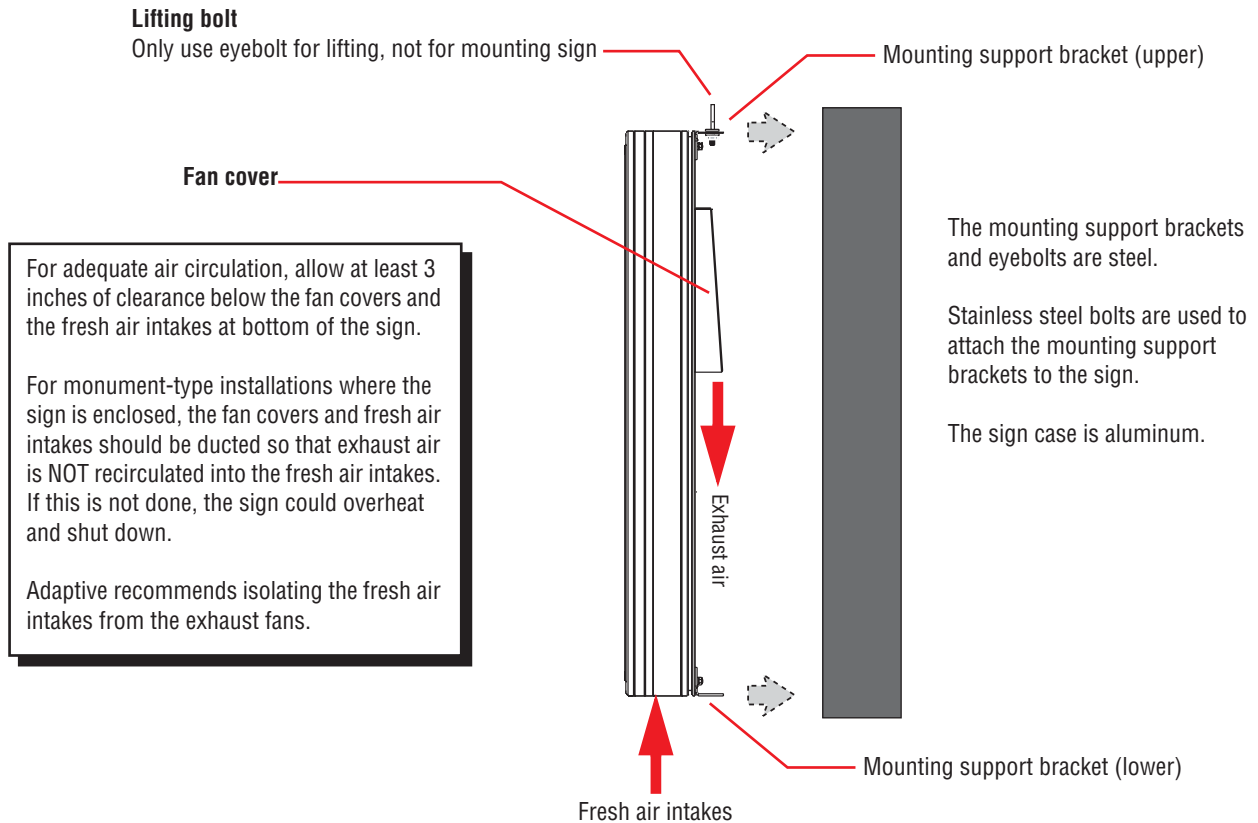


Figure 1: Mounting an AlphaEclipse™ 2500/2600 sign

Mounting a temperature probe

See “Appendix E: Sign options” on page 36.

Model Number Explanation	ASSEMBLY MODEL NO	WEIGHT (lbs)	DIM "A"	DIM "B"	DIM "C"	DIM "D"	DIM "E"
<p>2 _ _ - 192 x 64 R/A</p> <p>Red Lamp/Amber Lamp</p> <p>Width (Pixel Columns) x Height (Pixel Rows)</p> <p>LED Lamp Type (2 digit code)</p> <p>00 = 30 degree lamp</p> <p>01 = 70 degree lamp</p> <p>LED Pitch (2 digit code)</p> <p>25 = 0.45"</p> <p>26 = 0.60"</p>	AlphaEclipse 25 _ _ -96x16 R/A	60	48.73	12.67	43.20	7.20	18.6
	AlphaEclipse 25 _ _ -128x16 R/A	85	63.13	12.67	57.60	7.20	18.6
	AlphaEclipse 25 _ _ -160x16 R/A	105	77.53	12.67	72.00	7.20	18.6
	AlphaEclipse 25 _ _ -192x16 R/A	125	91.93	12.67	86.40	7.20	18.6
	AlphaEclipse 25 _ _ -96x32 R/A	95	48.73	19.87	43.20	14.40	25.8
	AlphaEclipse 25 _ _ -128x32 R/A	115	63.13	19.87	57.60	14.40	25.8
	AlphaEclipse 25 _ _ -160x32 R/A	135	77.53	19.87	72.00	14.40	25.8
	AlphaEclipse 25 _ _ -192x32 R/A	155	91.93	19.87	86.40	14.40	25.8
	AlphaEclipse 25 _ _ -96x48 R/A	110	48.73	27.07	43.20	21.60	33.0
	AlphaEclipse 25 _ _ -128x48 R/A	130	63.13	27.07	57.60	21.60	33.0
	AlphaEclipse 25 _ _ -160x48 R/A	150	77.53	27.07	72.00	21.60	33.0
	AlphaEclipse 25 _ _ -192x48 R/A	170	91.93	27.07	86.40	21.60	33.0
	AlphaEclipse 25 _ _ -96x64 R/A	155	48.73	34.27	43.20	28.80	40.2
	AlphaEclipse 25 _ _ -128x64 R/A	175	63.13	34.27	57.60	28.80	40.2
	AlphaEclipse 25 _ _ -160x64 R/A	195	77.53	34.27	72.00	28.80	40.2
	AlphaEclipse 25 _ _ -192x64 R/A	215	91.93	34.27	86.40	28.80	40.2
	AlphaEclipse 25 _ _ -96x80 R/A	185	48.73	41.47	43.20	36.00	47.4
	AlphaEclipse 25 _ _ -128x80 R/A	205	63.13	41.47	57.60	36.00	47.4
	AlphaEclipse 25 _ _ -160x80 R/A	225	77.53	41.47	72.00	36.00	47.4
	AlphaEclipse 25 _ _ -192x80 R/A	255	91.93	41.47	86.40	36.00	47.4
	AlphaEclipse 26 _ _ -96x16 R/A	85	63.13	15.07	57.60	9.60	21.0
	AlphaEclipse 26 _ _ -128x16 R/A	120	82.33	15.07	76.80	9.60	21.0
	AlphaEclipse 26 _ _ -160x16 R/A	145	101.53	15.07	96.00	9.60	21.0
	AlphaEclipse 26 _ _ -192x16 R/A	175	120.73	15.07	115.20	9.60	21.0
	AlphaEclipse 26 _ _ -96x32 R/A	135	63.13	24.67	57.60	19.20	30.6
	AlphaEclipse 26 _ _ -128x32 R/A	160	82.33	24.67	76.80	19.20	30.6
AlphaEclipse 26 _ _ -160x32 R/A	185	101.53	24.67	96.00	19.20	30.6	
AlphaEclipse 26 _ _ -192x32 R/A	215	120.73	24.67	115.20	19.20	30.6	
AlphaEclipse 26 _ _ -96x48 R/A	155	63.13	34.27	57.60	28.80	40.2	
AlphaEclipse 26 _ _ -128x48 R/A	180	82.33	34.27	76.80	28.80	40.2	
AlphaEclipse 26 _ _ -160x48 R/A	205	101.53	34.27	96.00	28.80	40.2	
AlphaEclipse 26 _ _ -192x48 R/A	235	120.73	34.27	115.20	28.80	40.2	
AlphaEclipse 26 _ _ -96x64 R/A	215	63.13	43.87	57.60	38.40	49.8	
AlphaEclipse 26 _ _ -128x64 R/A	240	82.33	43.87	76.80	38.40	49.8	
AlphaEclipse 26 _ _ -160x64 R/A	265	101.53	43.87	96.00	38.40	49.8	
AlphaEclipse 26 _ _ -192x64 R/A	295	120.73	43.87	115.20	38.00	49.8	
AlphaEclipse 26 _ _ -96x80 R/A	255	63.13	53.47	57.60	48.00	59.4	
AlphaEclipse 26 _ _ -128x80 R/A	280	82.33	53.47	76.80	48.00	59.4	
AlphaEclipse 26 _ _ -160x80 R/A	305	101.53	53.47	96.00	48.00	59.4	
AlphaEclipse 26 _ _ -192x80 R/A	345	120.73	53.47	115.20	48.00	59.4	

Figure 3: AlphaEclipse™ installation diagram - Part 2

Back-to-back Master/Slave sign connection

- Open the sign according to “Appendix D: Opening and closing the sign” on page 33.

Connect signal wire

- Connect the two signs as shown below:
 - The Master sign will have a modem or wireless transceiver inside, or the Master sign will be connected to a computer by wire, fiber optic cable, or an external connection box.
 - The Slave sign will only be connected to a Master sign.

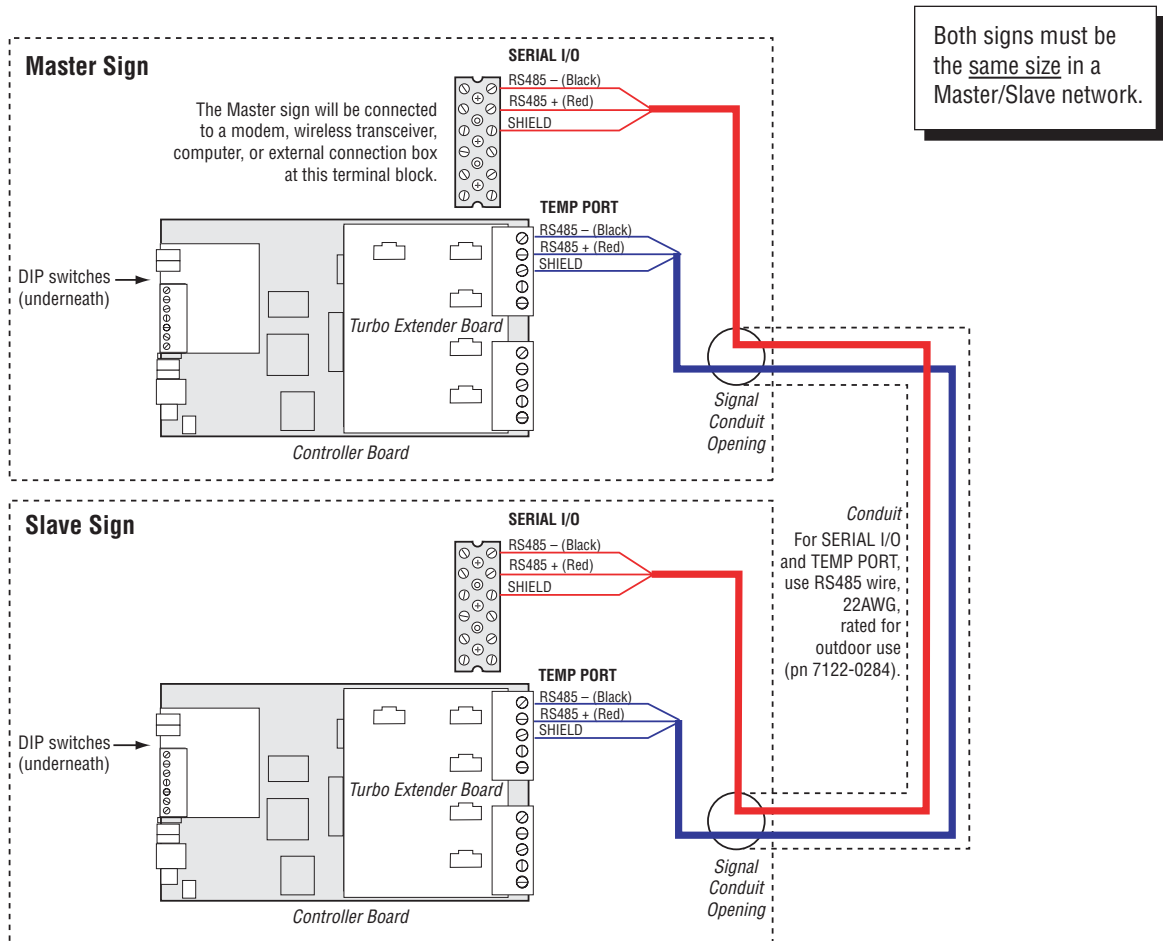
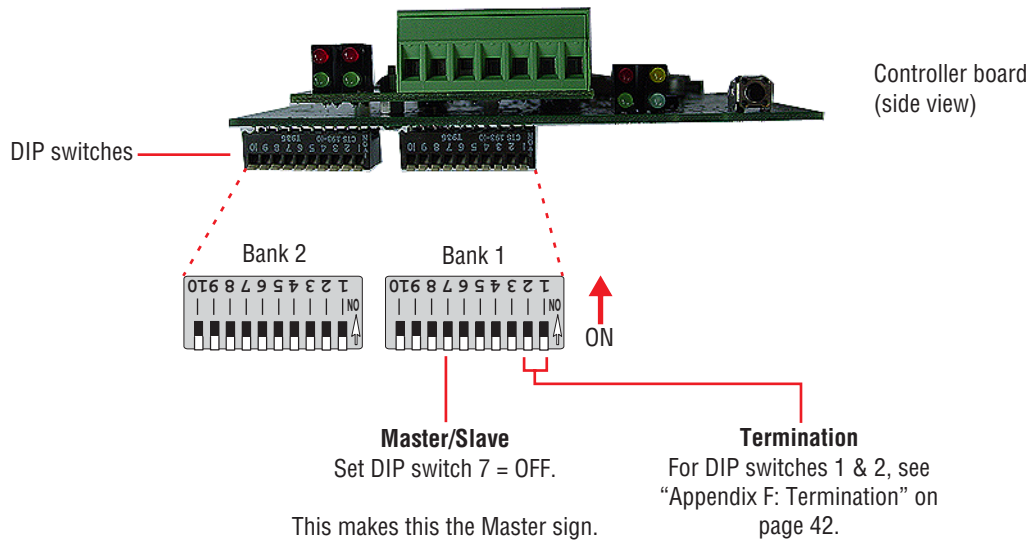


Figure 4: Back-to-back Master/Slave sign connection

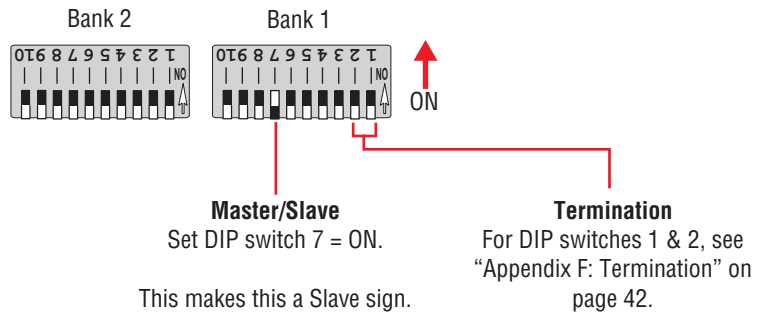
Set DIP switches

These are the recommended DIP switch settings for a Master/Slave back-to-back sign connection:

Master sign settings:



Slave sign settings:



Back-to-back Master/Master sign connection

1. Open the sign according to "Appendix D: Opening and closing the sign" on page 33.

Connect signal wire

2. Connect the two signs as shown below:

- Each Master sign will have a modem or wireless transceiver inside, or one of the Master signs will be connected to a computer by wire, fiber optic cable, or an external connection box.
- If both Master signs have a modem or a wireless transceiver inside or each sign is connected to an external connection box, then the wire connecting both signs shown below is not necessary.

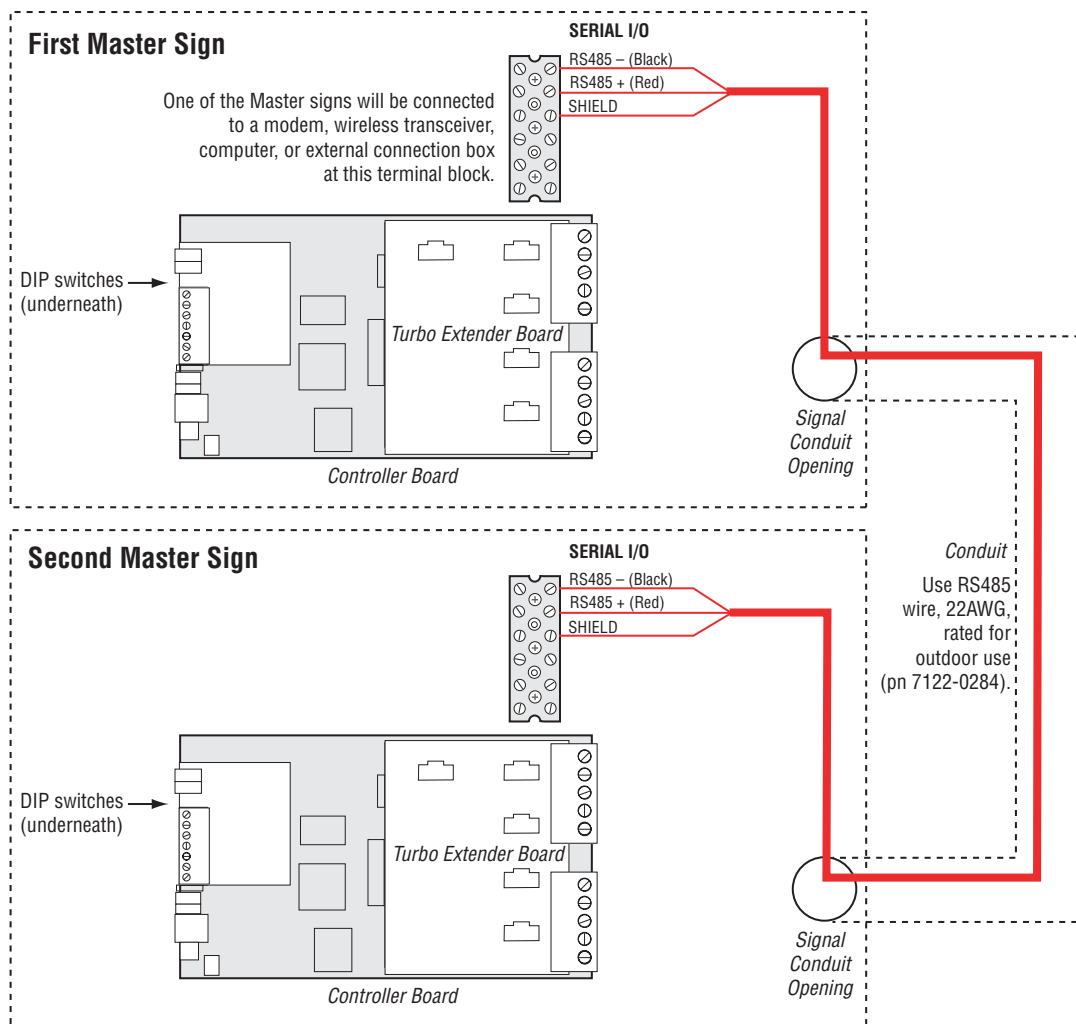
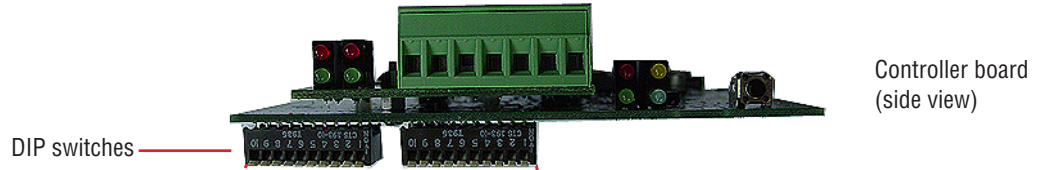


Figure 5: Back-to-back Master/Master sign connection

Set DIP switches

These are the recommended DIP switch settings for a Master/Master back-to-back sign connection:

First Master sign settings:



Serial address
Set DIP switch 1 = ON.

This sets the first Master sign's address = 1.

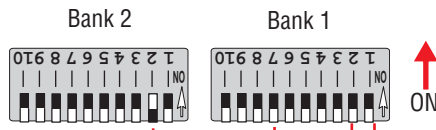
This allows you to send messages to just the first Master sign if you send messages to sign address 1. (See **AlphaNET™ version 2 User Manual** for more information.)

Master/Slave
Set DIP switch 7 = OFF.

This makes this the Master sign.

Termination
For DIP switches 1 & 2, see
"Appendix F: Termination" on
page 42.

Second Master sign settings:



Serial address
Set DIP switch 2 = ON.

This sets the second Master sign's address = 2.

This allows you to send messages to just the second Master sign if you send messages to sign address 2. (See **AlphaNET™ version 2 User Manual** for more information.)

Master/Slave
Set DIP switch 7 = OFF.

This makes this a Master sign.

Termination
For DIP switches 1 & 2, see
"Appendix F: Termination" on
page 42.

Multiple Master/Slave sign connection

1. Open the sign according to “Appendix D: Opening and closing the sign” on page 33

Connect signal wire

2. Connect the signs as shown below:
 - The Master sign will have a modem or wireless transceiver inside, or the Master sign will be connected to a computer by wire, fiber optic cable, or an external connection box.

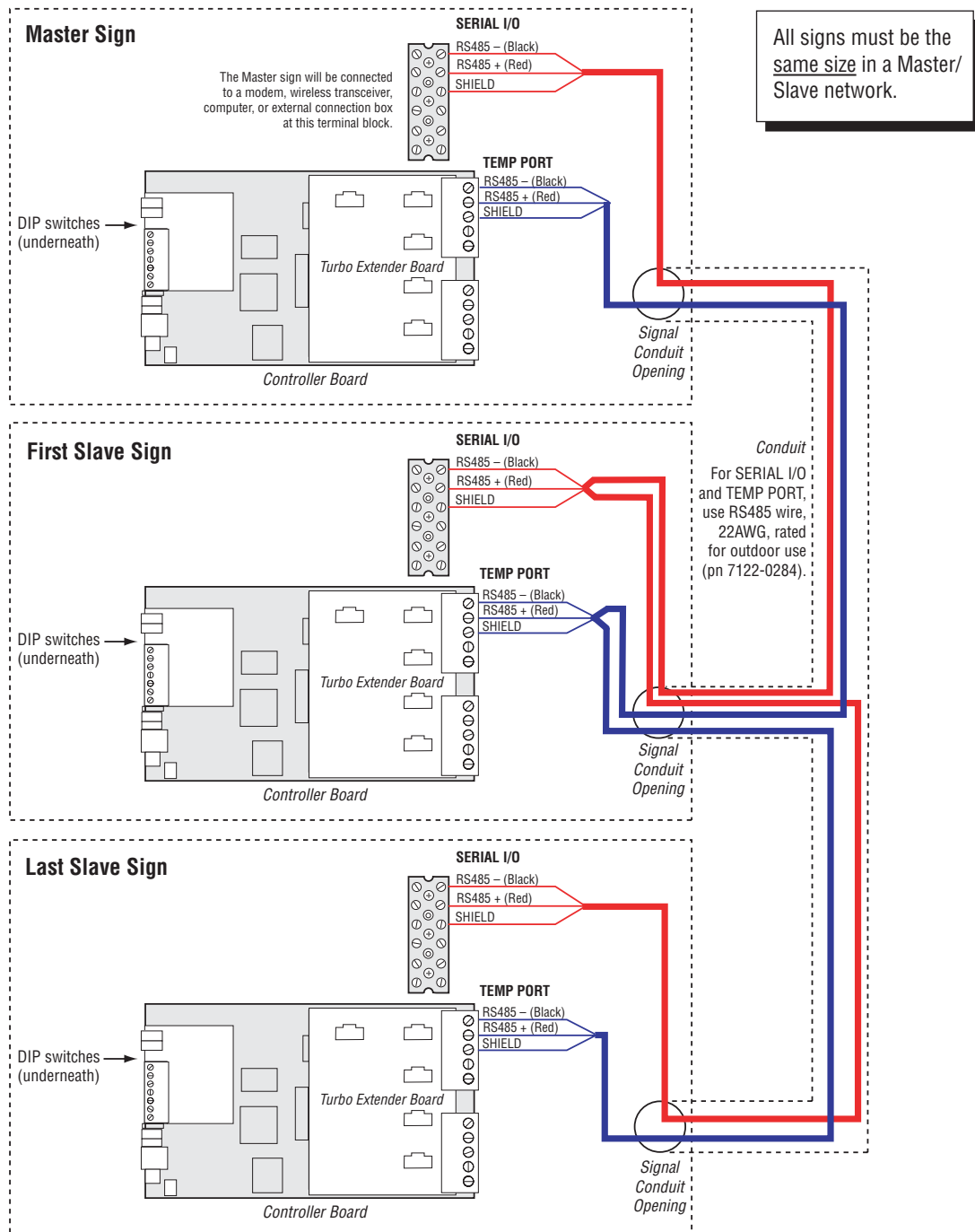


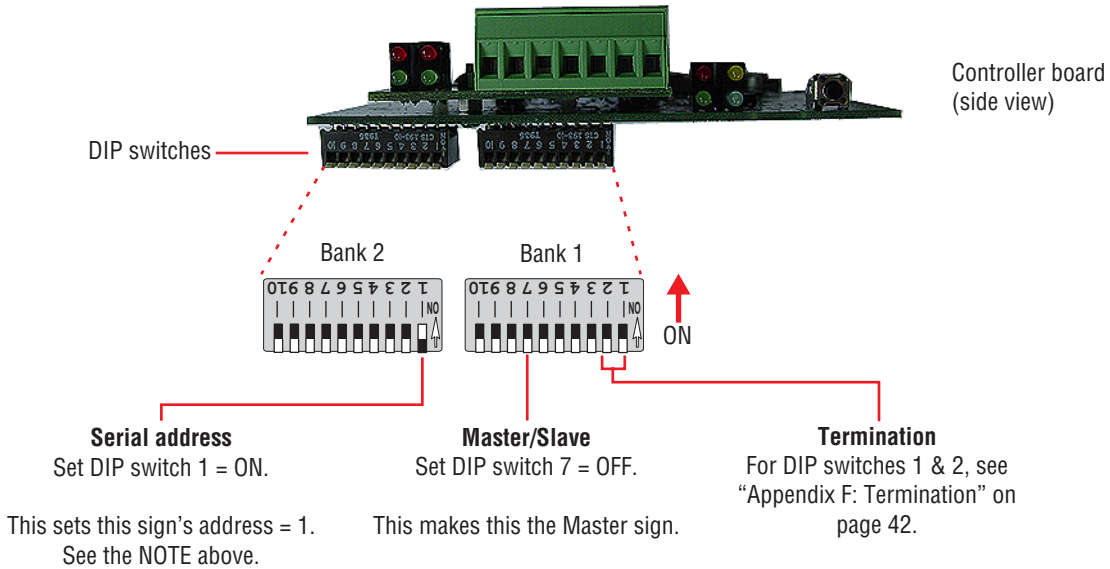
Figure 6: Multiple Master/Slave sign connection

Set DIP switches

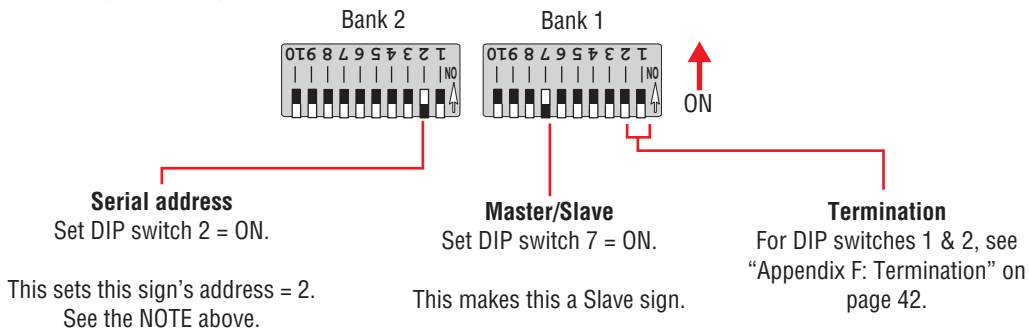
These are the recommended DIP switch settings for Master/Slave multiple sign connection:

NOTE: Though the signs below are set up to display a message sent to the Master sign on *all* the Slave signs, AlphaNET software can be used to display *different* messages on *each* sign. To do this, use the AlphaNET *Diagnostics* software to set all signs to Master mode. Then use each sign's serial address to send a message to a specific sign. (See "Using AlphaNET software to set DIP switches" on page 47.)

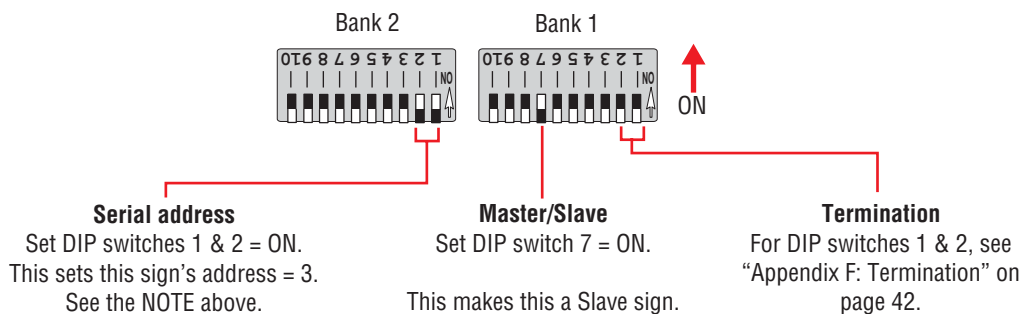
Master sign settings:



First Slave sign settings:



Last Slave sign settings:



(If this was the 4th sign, then set the serial address = 4.)

Multiple Master/Master signs

1. Open the sign according to "Appendix D: Opening and closing the sign" on page 33

Connect signal wire

2. Connect the signs as shown below:

- Each Master sign will have a modem or wireless transceiver inside, or one of the Master signs will be connected to a computer by wire, fiber optic cable, or an external connection box.
- If all Master signs have a modem or a wireless transceiver inside or each sign is connected to an external connection box, then the wire connecting the signs shown below is not necessary.

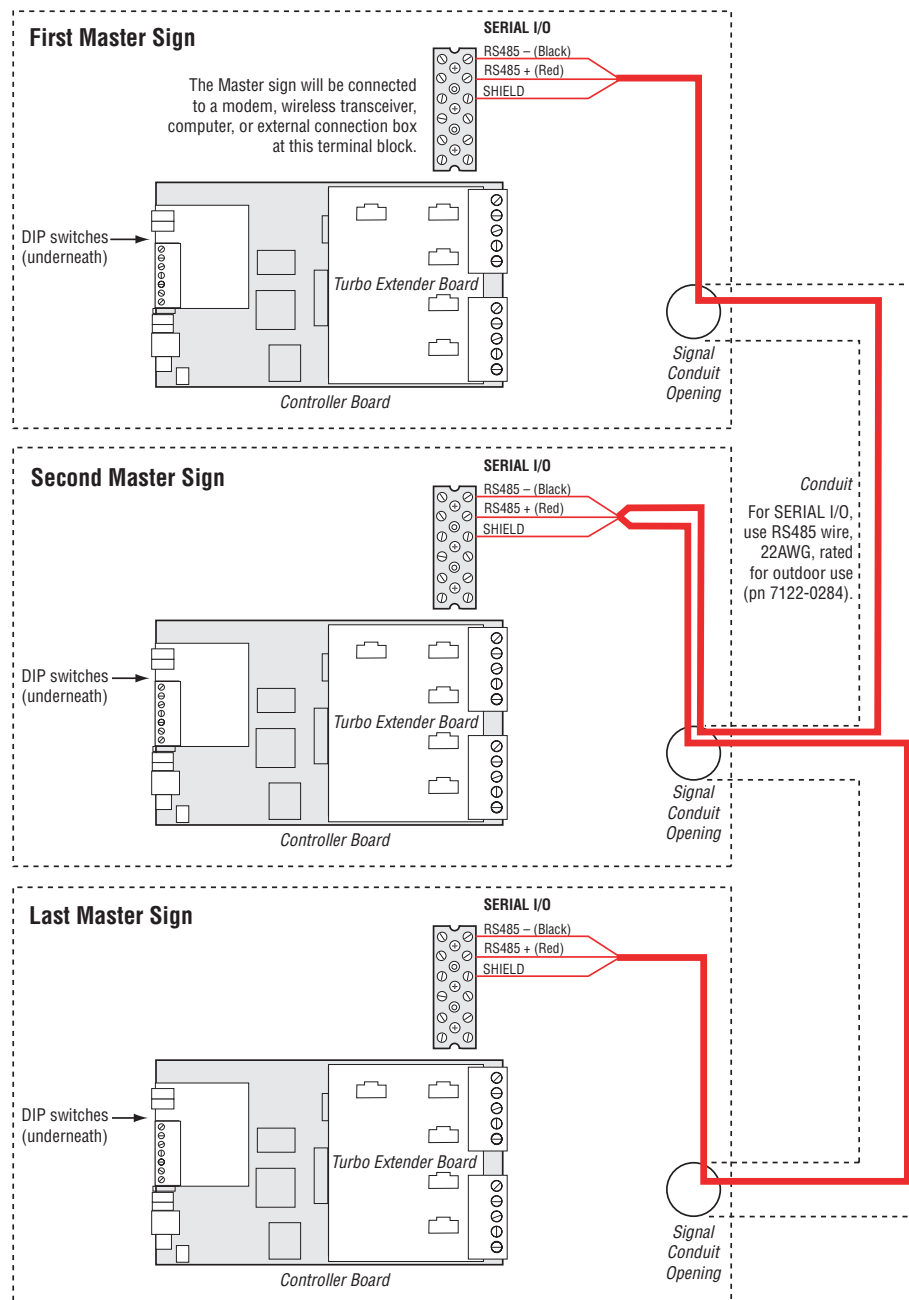
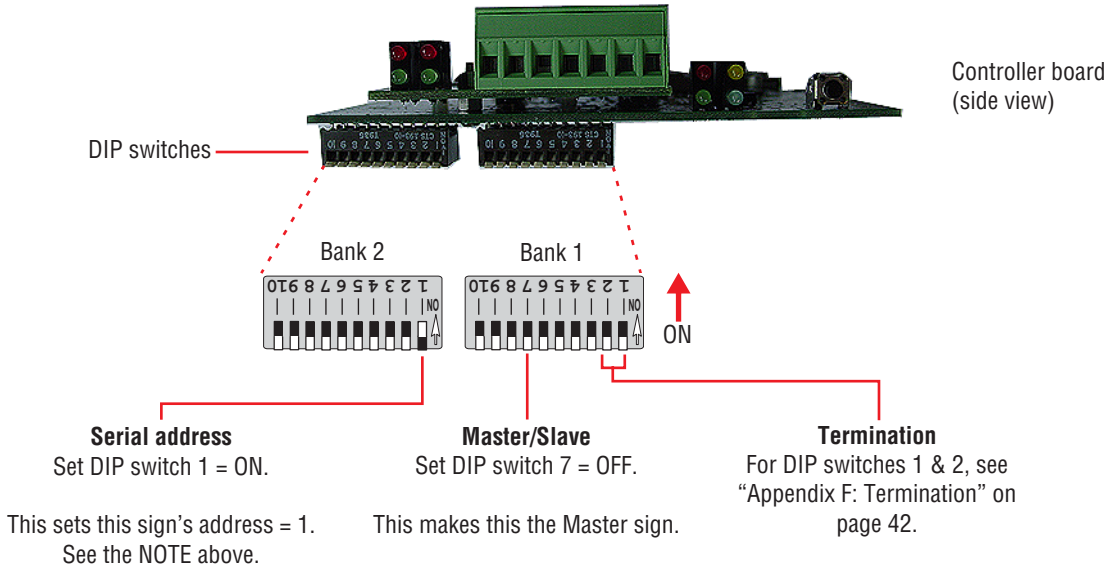


Figure 7: Multiple Master/Master sign connection

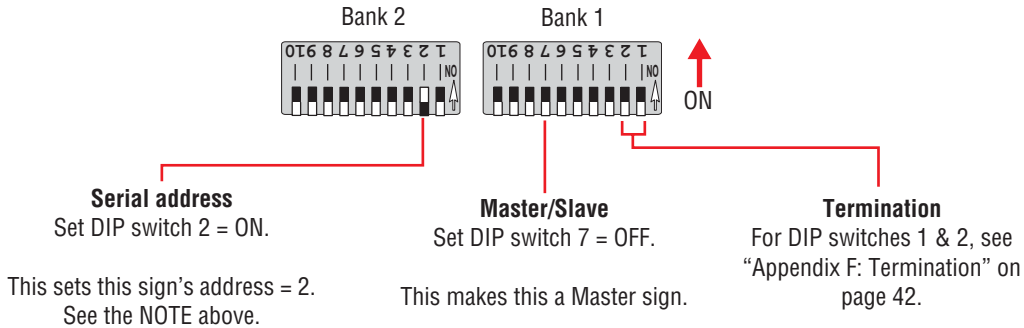
Set DIP switches

These are the recommended DIP switch settings for Master/Master multiple sign connection:

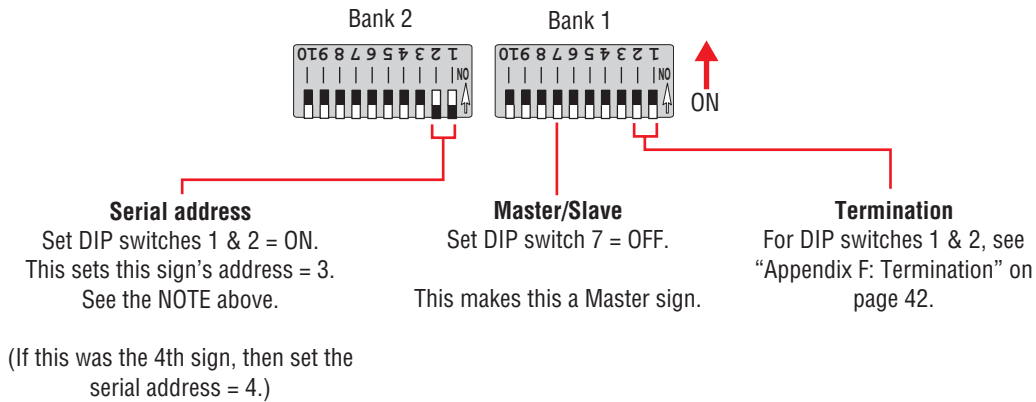
First Master sign settings:



Second Master sign settings:



Last Master sign settings:



Wired (RS232) computer-to-sign connection

1. Open the sign according to “Appendix D: Opening and closing the sign” on page 33.
2. Connect the computer to the sign as shown below:

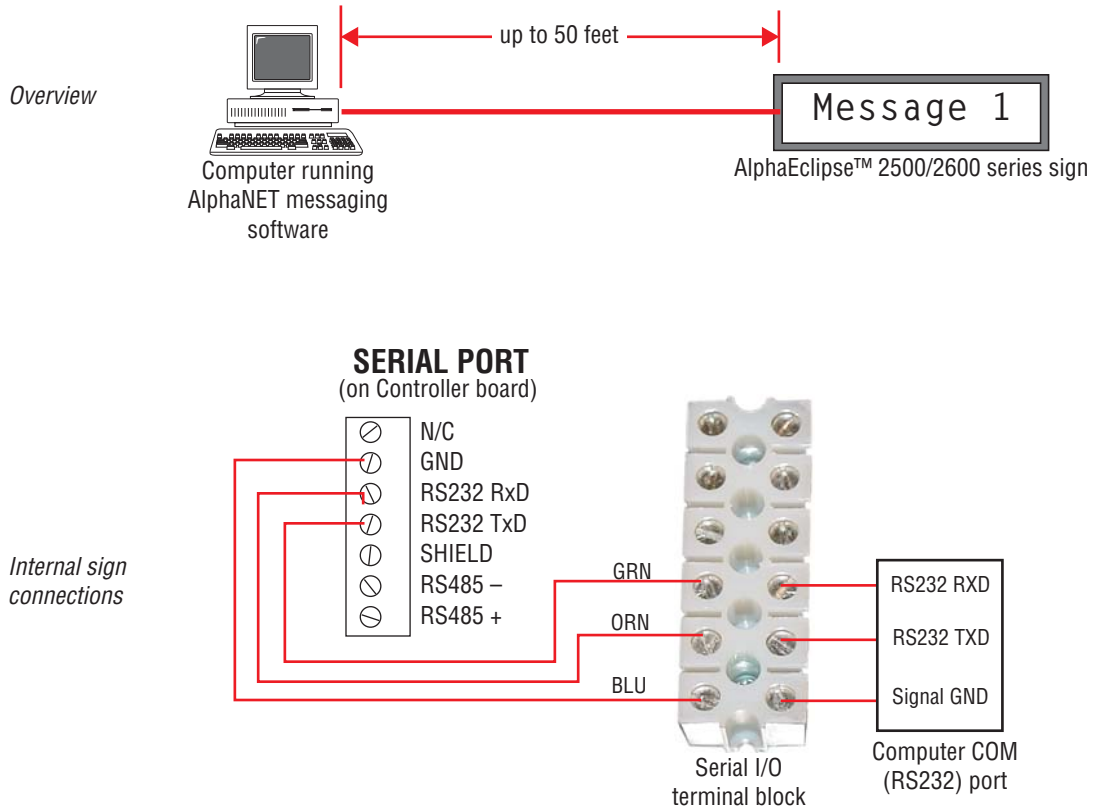


Figure 8: Wired RS232 computer-to-sign connection

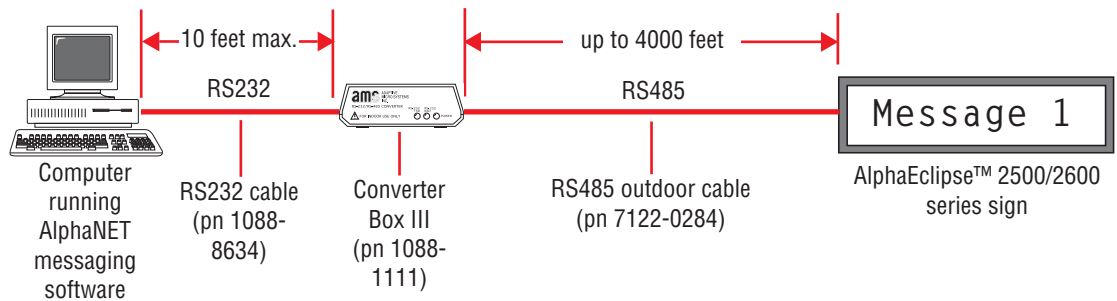
Wired (RS485) computer-to-sign connection

1. Open the sign according to “Appendix D: Opening and closing the sign” on page 33.
2. Connect the computer to the sign as shown below:

NOTE: AlphaEclipse™ signs that are connected using RS485 must be properly “terminated” in order for the signs to operate. See “Appendix F: Termination” on page 42 for more information.

NOTE: The Converter Box III cannot be located outdoors

Overview



Internal sign connections

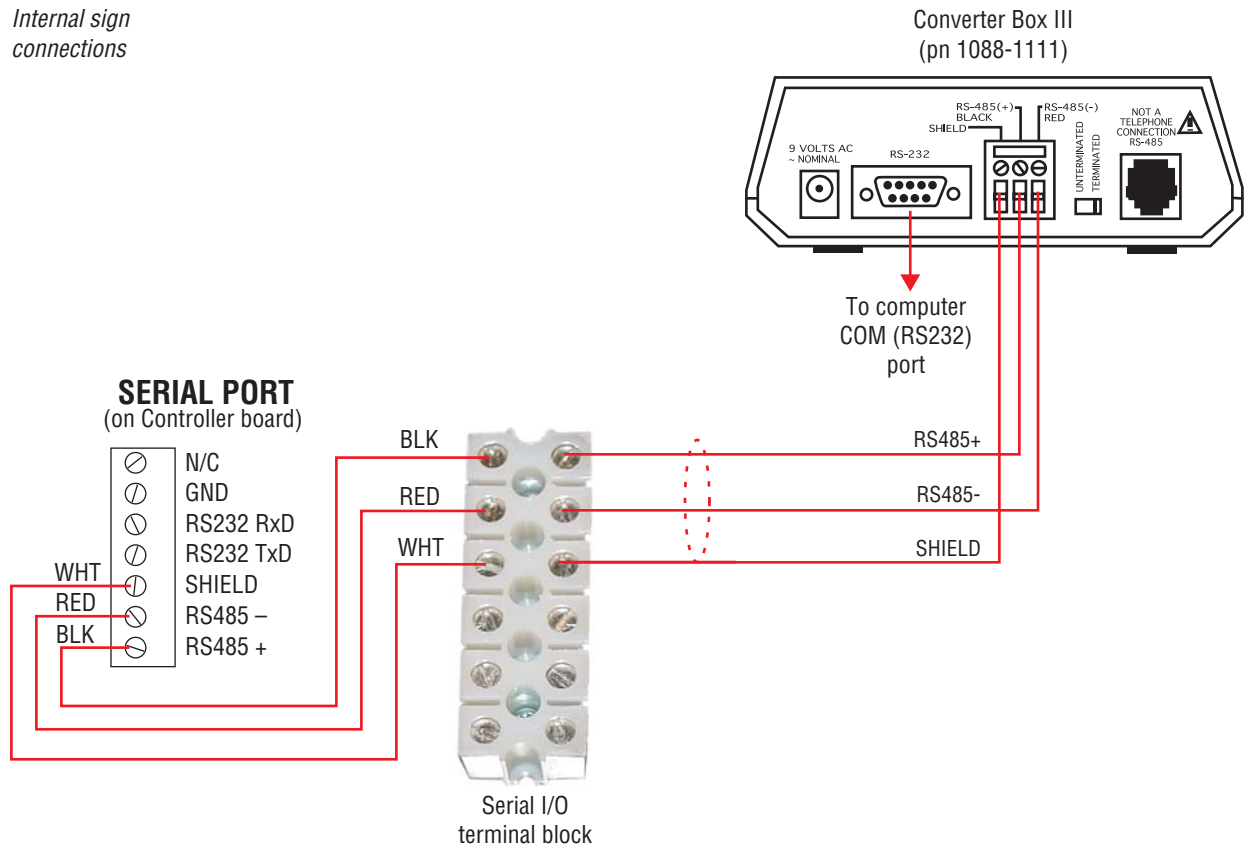


Figure 9: Wired RS485 computer-to-sign connection

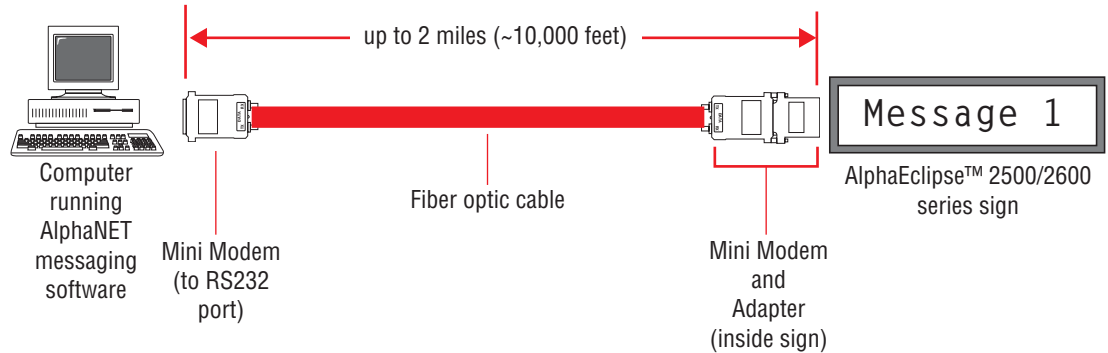
Fiber optic computer-to-sign connection

See also “Fiber optic modem option” on page 40.

1. Open the sign according to “Appendix D: Opening and closing the sign” on page 33.
2. Connect the computer to the sign as shown below:

NOTE: Sign networks that use fiber optic cable should only be installed by a qualified fiber optic technician.

Overview



Internal sign connections

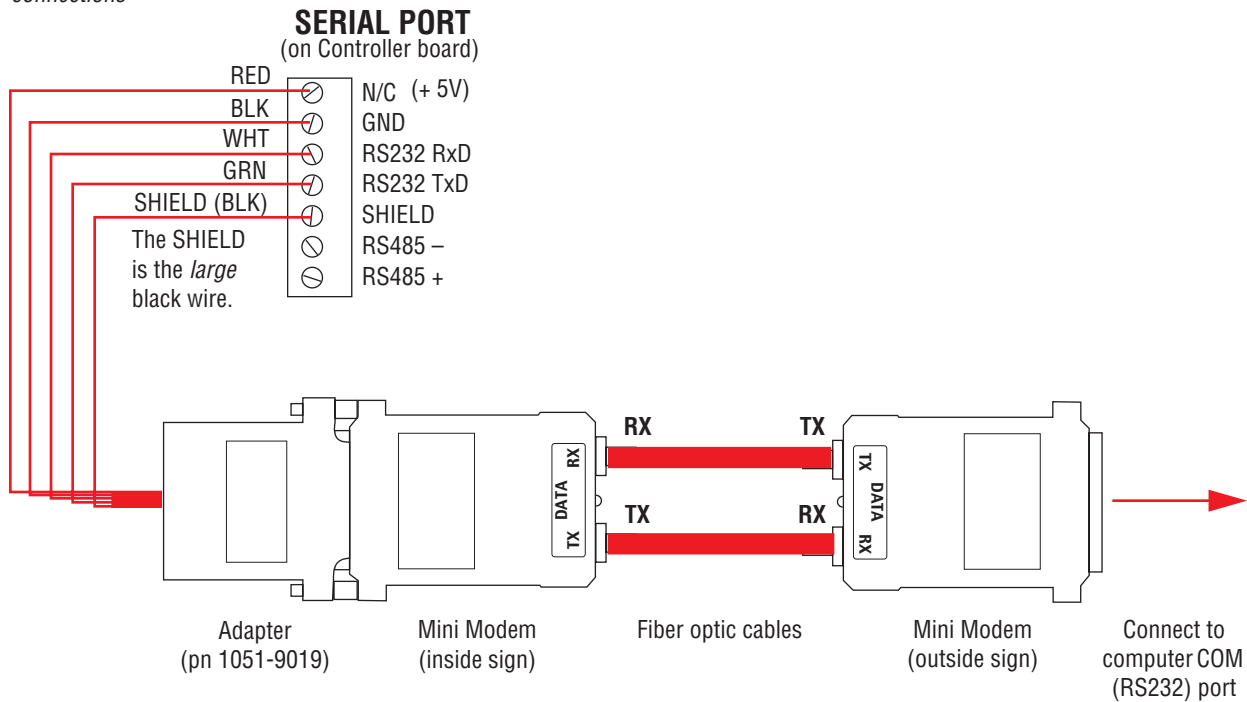


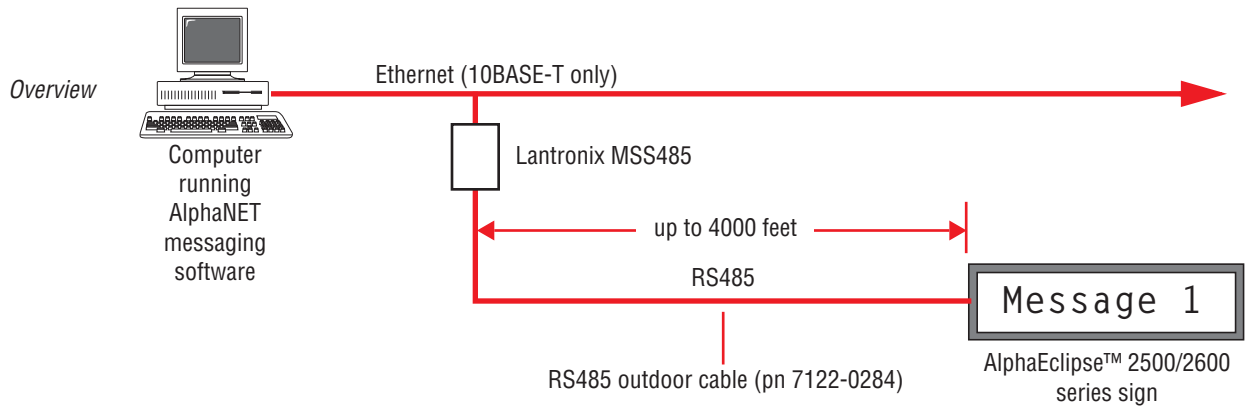
Figure 10: Fiber optic computer-to-sign connection

Ethernet computer-to-sign connection

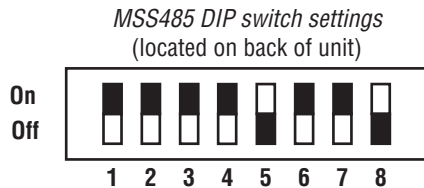
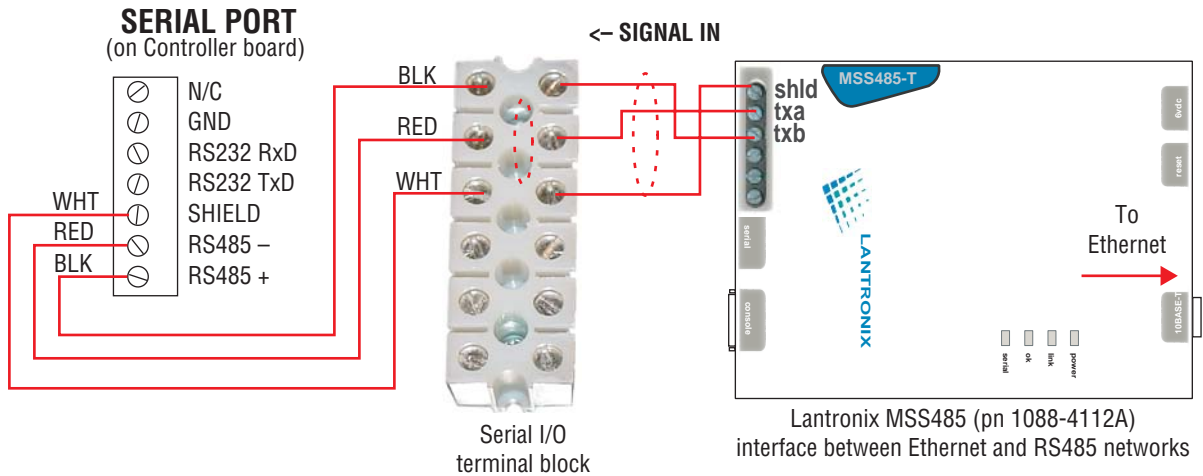
1. Open the sign according to “Appendix D: Opening and closing the sign” on page 33.
2. Connect the computer to the sign as shown below:

NOTE: AlphaEclipse™ signs that are connected using RS485 must be properly “terminated” in order for the signs to operate. See “Appendix F: Termination” on page 42 for more information.

NOTE: The Lantronix MSS485 cannot be located outdoors



Internal sign connections



Switch(es)	Setting	Meaning
1, 2, 3	On / On / On	2-wire RS485
4, 5	On / Off	2-wire RS485 termination
6, 7	On / On	RX biasing
8	Off	Float shield

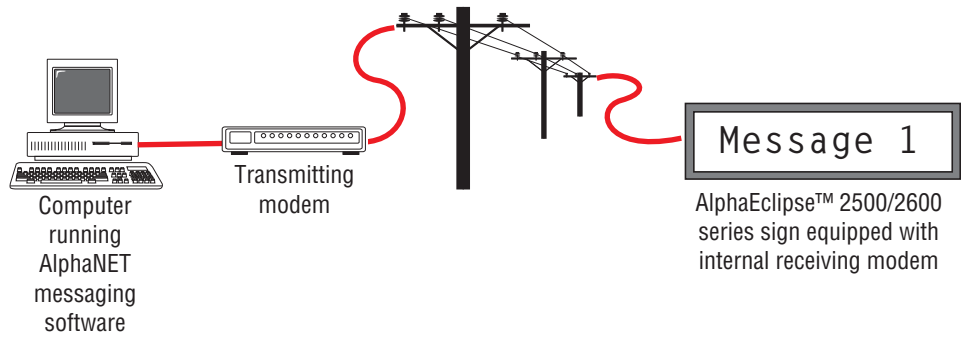
Figure 11: Ethernet computer-to-sign connection

Modem computer-to-sign connection

See also “Modem option” on page 37.

1. Open the sign according to “Appendix D: Opening and closing the sign” on page 33.
2. Connect the computer to the sign as shown below:

Overview



Internal sign connections

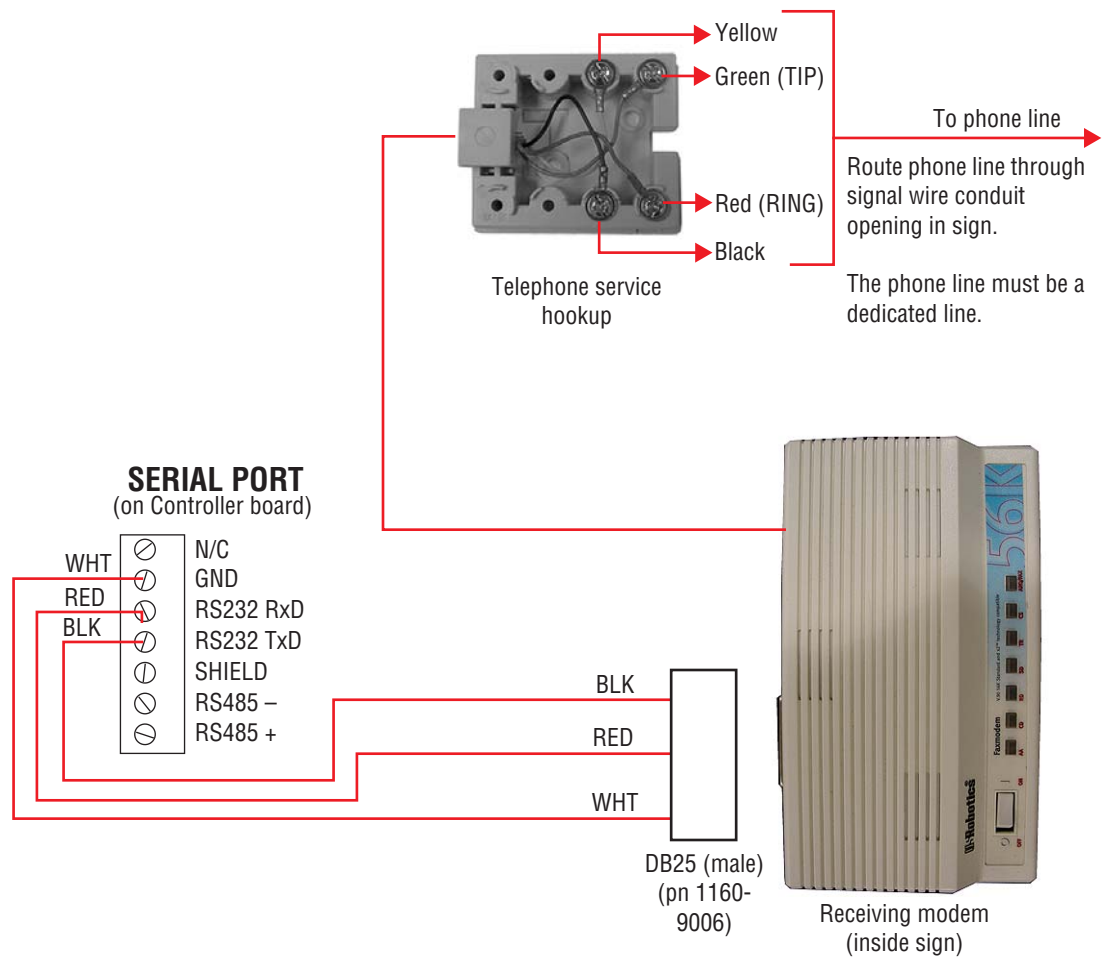


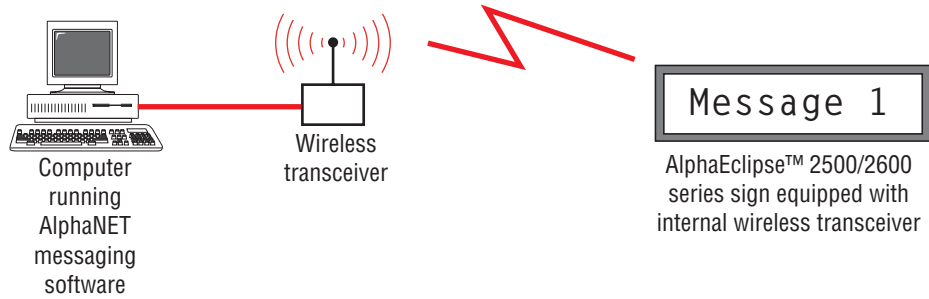
Figure 12: Modem computer-to-sign connection

Wireless computer-to-sign connection

See also “Wireless transceiver option” on page 38.

1. Open the sign according to “Appendix D: Opening and closing the sign” on page 33.
2. Connect the computer to the sign as shown below:

Overview



Internal sign connections

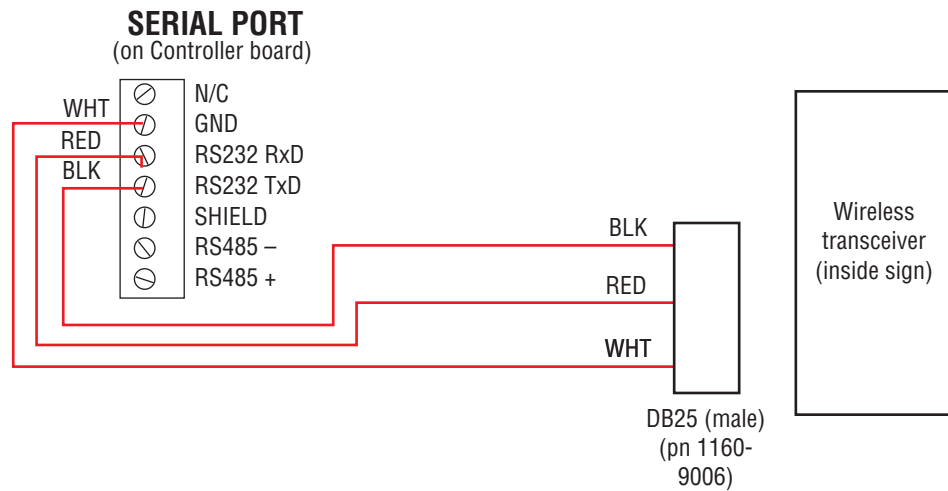


Figure 13: Wireless computer-to-sign connection

External connection box computer-to-sign connection

When a sign is not permanently connected to a computer, use this option to create a temporary RS485 connection to a computer:

1. Open the sign according to “Appendix D: Opening and closing the sign” on page 33.
2. Connect the computer to the sign as shown below

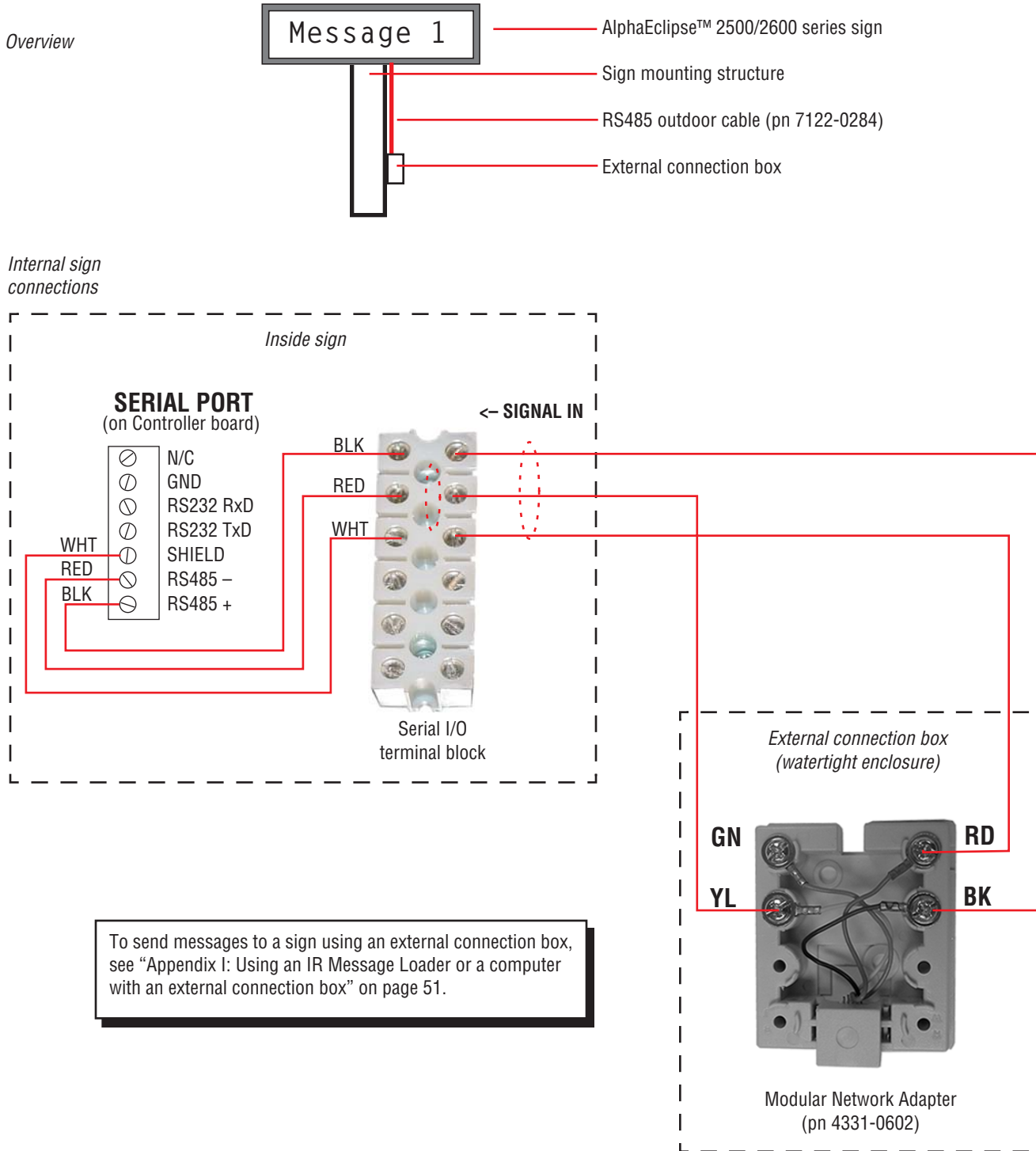
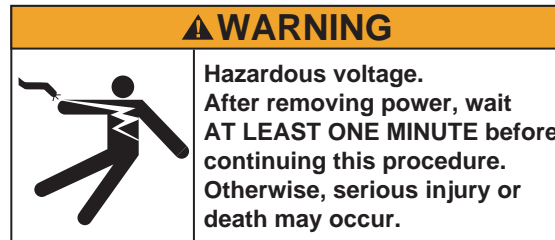
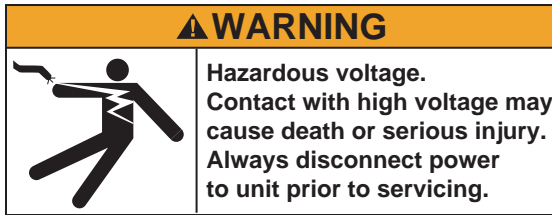


Figure 14: External connection box

Electrical installation

Electrical installation should only be attempted by a qualified electrician. Electrical connection must comply with all applicable national and local codes.



Guidelines for electrical installation

- Inspect all internal sign cabling for proper connection and seating.
- All power wiring must be from circuit breaker-protected lines.
- A two-pole disconnect device must be installed in the building wiring for each branch circuit supplying the sign.
- The sign must be properly earth grounded. The sign's support structure should NOT be used as ground.
- Run separate conduits for signal wires (for example, RS232, RS485) and for power wires.
- All electrical connections must be watertight.
- Use minimum 85° C copper wire only.

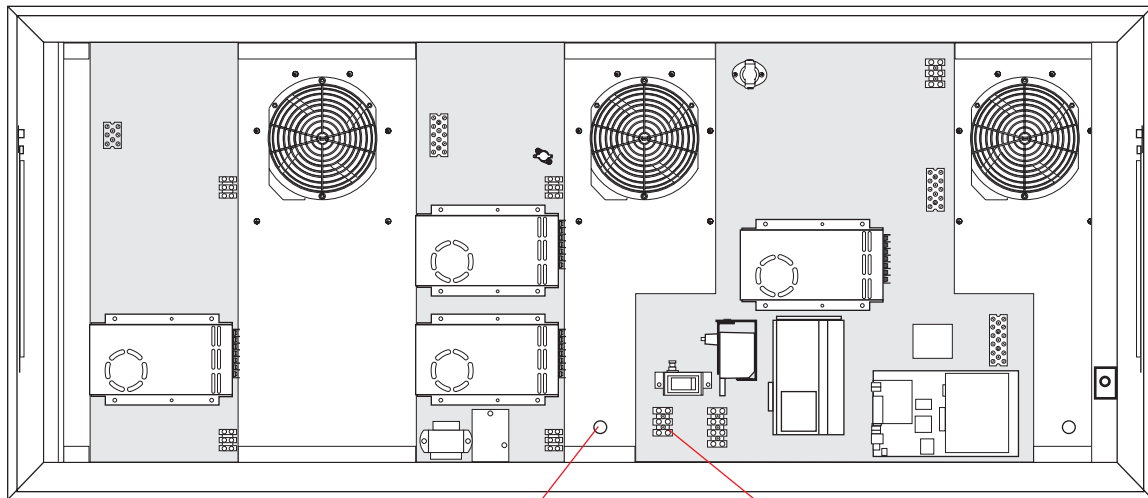
Utiliser uniquement un fil en cuivre pouvant supporter 85° C minimum.

Open the sign

1. Open the sign according to “Appendix D: Opening and closing the sign” on page 33.

Connect power to the sign

2. Connect the sign to an appropriate power source:
 - For an AlphaEclipse™ 2500 sign, see Table 3 on page 49.
 - For an AlphaEclipse™ 2600 sign, see Table 4 on page 50.



Power line conduit opening
Connect power lines to a
20-amp dedicated service
breaker.

Terminal block	120V	240V
1	LINE	LINE 1
2	NEUTRAL	LINE 2
3	GROUND	GROUND

Ground the sign

3. The sign must be properly earth grounded. *The sign's support structure should NOT be used as ground.*

Test the exhaust fans

4. Apply power to the sign.
5. Push 1 on the sign's internal power switch.
6. If the exhaust fans are not already on, press the fan test button which is located on the sign's internal power switch. All the exhaust fans should start up.

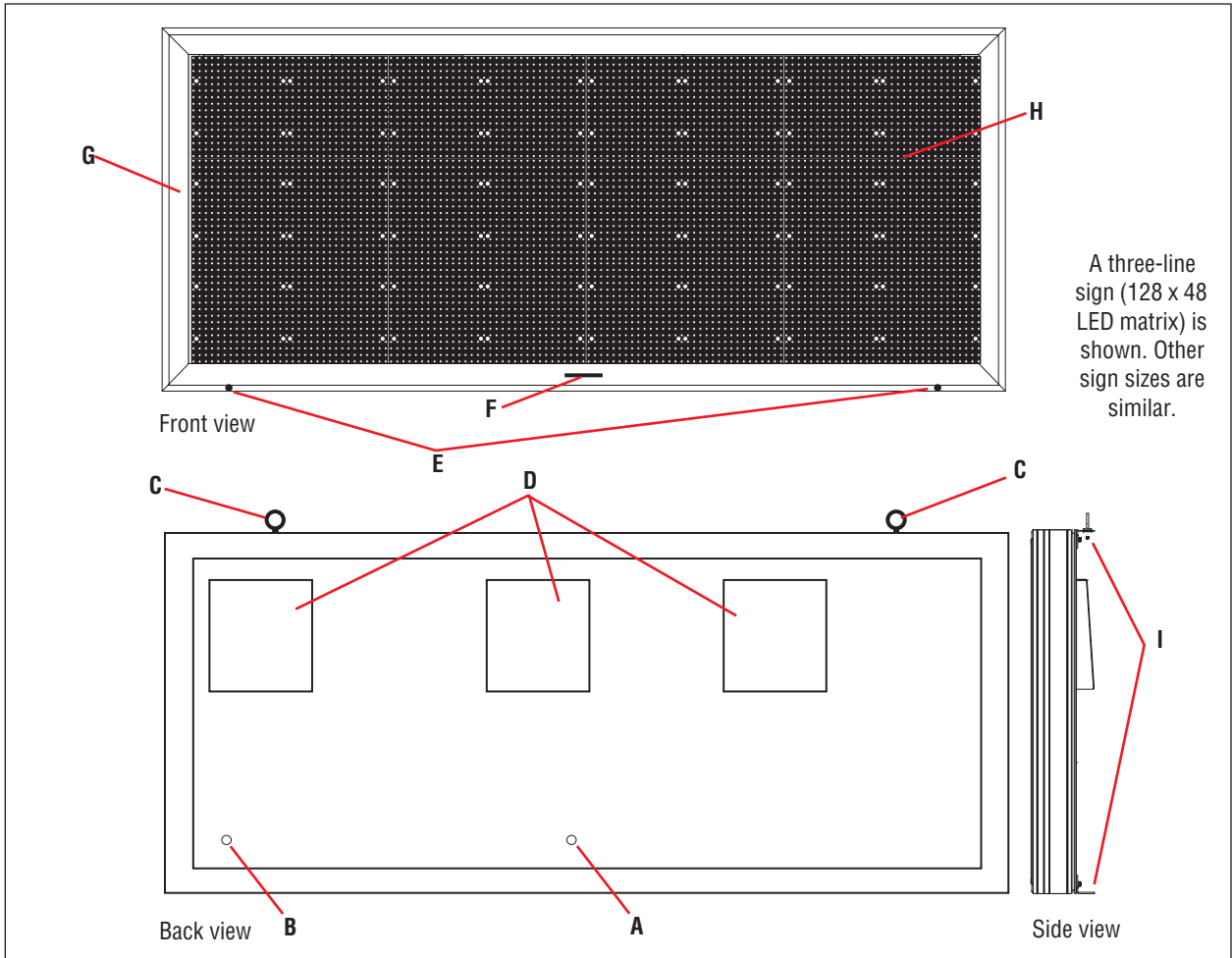
Close the sign

7. See “Appendix D: Opening and closing the sign” on page 33.

Appendix

Appendix A: Sign description

Outside view


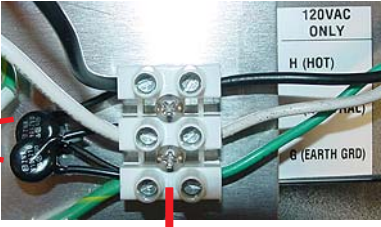


Item	Name	Description
A	Power conduit opening	Access for electrical power. Must be sealed with weather-proof conduit during installation.
B	Signal conduit opening	Access for RS232/RS485 communication signals and for wireless transceiver option. Must be sealed with weather-proof conduit during installation.
C	Lifting eyebolt	Used to lift the sign. These should NOT be used to mount the sign.
D	Fan covers	Weather-resistant louvers allow air movement through the sign
E	Locking latches	Locks the sign door closed. Requires 5/32-inch hex key tool to open.
F	Door handle	Used to open the sign door.
G	Sign door	Opens for access to internal sign components. Metal safety bars hold the door open. The door can be removed from its hinges.
H	LED lens cover	Polycarbonate lens cover in the sign door
I	Mounting brackets	Used to attach sign to mounting structure.

Inside view

Shown below is a 3-line sign (128 x 48 LED matrix). Other sign sizes are similar.

Item	Name	Description
A	5-volt power supply	Provides power to the LED and the Controller boards
B	Safety bar	Keeps sign door from closing when the sign door is raised.
C	5-volt distribution terminal	Distributes 5-volt power to LED boards.
D	120/240-volt distribution terminal	Distributes 120/240-volt power to the fans and power supplies.
E	Exhaust fan, 55 CFM, 120V	For 1-LED row sign
	Exhaust fan, 55 CFM, 240V	
	Exhaust fan, 110 CFM, 120V	For 2-LED rows sign
	Exhaust fan, 110 CFM, 240V	
	Exhaust fan, 170 CFM, 120V	For 3-LED rows sign
	Exhaust fan, 170 CFM, 240V	
	Exhaust fan, 220 CFM, 120V	For 4- and 5-LED rows sign
Exhaust fan, 220 CFM, 240V		
F	Exhaust fan thermostat	Turns on exhaust fans when the temperature inside of unit is at or above 30°C (85°F). The location of this thermistor varies on the size of the sign.
G	Sign shutdown thermostat	Shuts down the sign when the temperature inside of the unit exceeds 82°C (180°F). During shutdown, only the sign's fan will operate.
H	Telephone service hookup (part of modem option)	Used to connect a 4-wire telephone line to a modem.

I	Signal I/O terminal block	<p>Used to connect an RS232 or RS485 network to the sign:</p> 
J	Photocell	Used to dim the sign's LEDs.
K	Signal conduit opening	Access for RS232/RS485 communication signals and the wireless transceiver option. Must be sealed with weather-proof conduit during installation.
L	Controller board	Controls sign operation
	Turbo Extender board	Plugs into the Controller board and sends data to the sign's LED boards. The Turbo Extender board has two terminal-type connectors: TEMP PORT for the temperature probe and RS485 Master/Slave sign networks SYNC PORT unused
M	Modem kit, 120V (option)	Allows sending messages to sign via a modem (option)
	Modem kit, 240V (option)	
	Transceiver kit, 120V (option)	Allows sending messages to sign via wireless transmitter (option)10
	Transceiver kit, 240V (option)	
Fiber optic modem (option)	Allows sending messages to sign via fiber optic mini-modems (option)	
N	Power switch	Used to disconnect sign from power source. An intermittent switch on this assembly allows exhaust fans to be turned in order to test their operation.
O	Power supply terminal block	<p>Used to connect the sign to an appropriate power supply. Two surge suppressors (circled below) are used per sign.</p>  <p style="text-align: center;">Surge suppressors</p> <p style="text-align: center;">Power supply terminal block</p>
P	Power conduit opening	Access for electrical power. Must be sealed with weather-proof conduit during installation.
Q	240V modem transformer and fuses (option)	Used as part of the 240V modem option.

Appendix B: Equipment identification

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:
 (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE.
 (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRE OPERATION.
 This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.
 Cet appareil numérique de la class A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

CERTIFIED TO CSA STD. C22.2 No. 60950-00-CAN/CSA CONFORMS TO UL STD. No. 60950 3RD EDITION

TYPE 3R ENCLOSURE

ADAPTIVE Adaptive Micro Systems Inc Milwaukee, Wisconsin 53224 USA

MODEL NO: **2500 — 192X80R**
 SERIES: **A**
 VOLTS: **120/240 VAC ~**
 Hz: **50/60 Hz**
 AMPS: **14.88 A**
 DATE OF MANUFACTURE: **5/1/2002**
 SERIAL NO: **EF0002208**

PARTS SERVICEABLE BY TRAINED TECHNICIANS ONLY! DISCONNECT POWER BEFORE SERVICING

Item	Name	Description
A	Model number	<p>2500 — 192X80A</p> <p>LED lamp color: • A = Amber • R = Red</p> <p>Width (pixel columns) Height (pixel rows)</p> <p>LED lamp viewing angle: • 00 = 30 degree • 01 = 70 degree</p> <p>LED pitch: • 25 = 0.45-inch pitch • 26 = 0.60-inch pitch</p>
B	Series letter	Used to differentiate sign versions
C	Electrical information	Input voltage, frequency, and amperage
D	Date of manufacture	Month, day, and year the sign was made
E	Serial number	Consecutive, unique identification number

Appendix C: Networking signs

NOTE: Sign networks that use fiber optic cable should only be installed by a qualified fiber optic technician

NOTE: In order to display messages on an AlphaEclipse™ sign, a sign must be connected to a computer that has sign messaging software, like AlphaNET software, installed.

Computer-to-sign communication methods

There are a number of ways to connect an AlphaEclipse™ sign to a computer:

- Wired (RS232, RS485)
- Fiber optic
- Modem
- Wireless
- External connection box

Distance from computer to sign (feet)	Indoor use					Outdoor use				
	Networking method									
	Wired			Modem ¹	Wireless ^{1,2}	Wired			Modem ¹	Wireless ^{1,3}
	RS232	RS485	Fiber optic			RS232	RS485	Fiber optic		
up to 50	Yes	Yes	Yes ⁴	Yes	Yes	Yes	Yes	Yes ⁴	Yes	Yes
50 to 1000	No	Yes	Yes ⁴	Yes	Yes	No	Yes	Yes ⁴	Yes	Yes
1000 - 4000	No	Yes	Yes ⁴	Yes	Yes	No	Yes	Yes ⁴	Yes	Yes
4000+	No	No	Yes ⁴	Yes	No	No	No	Yes ⁴	Yes	Yes

NOTES:

¹ Installed and configured at the factory.

² Maximum indoor range of a Locus OS2400-232 wireless transceiver is about 1500 feet. Actual operating range depends on local environment, including obstructions and electrical interference.

³ Maximum range of a Locus OS2400-232 wireless transceiver is about 10,000 feet (about 2 miles). Actual operating range depends on local environment, including obstructions and electrical interference.

⁴For a fiber optic data connection, the maximum distance between the sign and computer is 2 miles (~10,000 feet).

Sign-to-sign communication methods

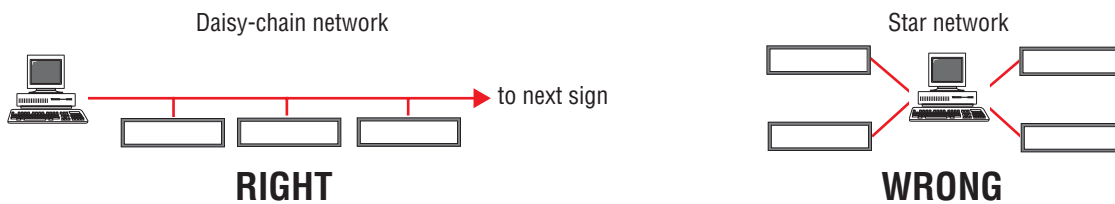
Also, there are several ways to *interconnect* two or more AlphaEclipse™ signs together:

- Wired (RS485)
- Modem
- Wireless

Networking method		Description
Wired	Master/Master	Signs connected this way can each display a unique message. One of the signs must be connected to a computer which is used to create and send messages.
	Master/Slave	Signs connected this way display the same message at the same time. This is called <i>simultaneous messaging</i> and is often used when signs are mounted back-to-back. The Master sign must be connected to a computer. The computer is used to create and send messages.
Modem (option)		Each sign must be equipped with the internal receiving modem which requires a dedicated telephone line per sign. Messages are sent to the sign from a computer that is connected to a transmitting modem.
Wireless (option)		Each sign must be equipped with an internal wireless transceiver. Messages are sent to the sign from a computer that is connected to a wireless transceiver.

Sign network design

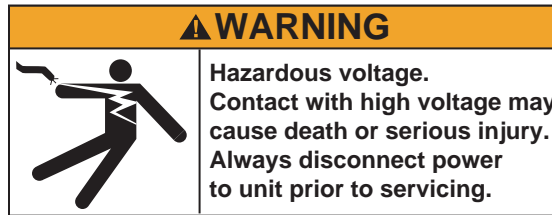
- Signs that are networked using RS485 should be “daisy chained” or connected one sign after the other. “Star” type network connections should not be used.



- In multi-sign networks, set a unique serial address for each sign. *However, don't use serial address 0.* For example, set the serial address = 1 for the first sign, set the serial address = 2 for the second sign, and so on. See “Sign operation settings (Bank 1 and Bank 2 DIP switches)” on page 45.

Appendix D: Opening and closing the sign

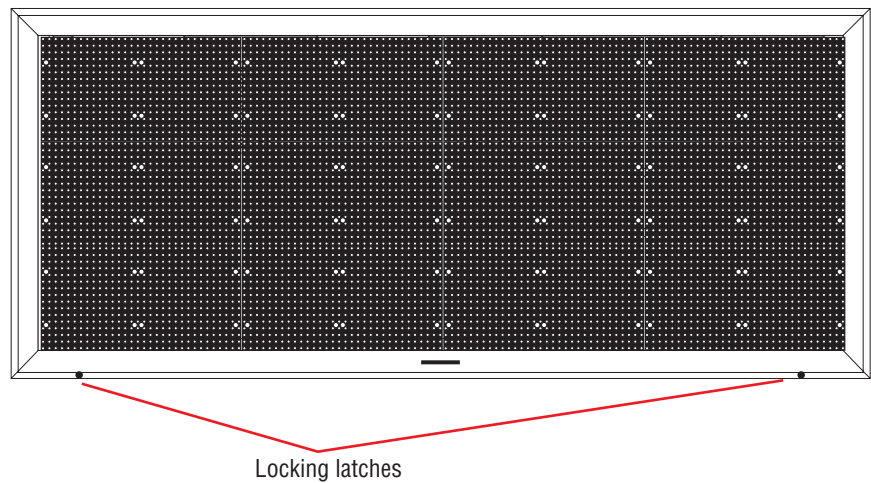
NOTE: Do NOT attempt to open the door on a sign in windy conditions because if winds are sufficiently strong, the door could be damaged or blown off the sign.



1. Disconnect power from the sign.

Unlock and open the door

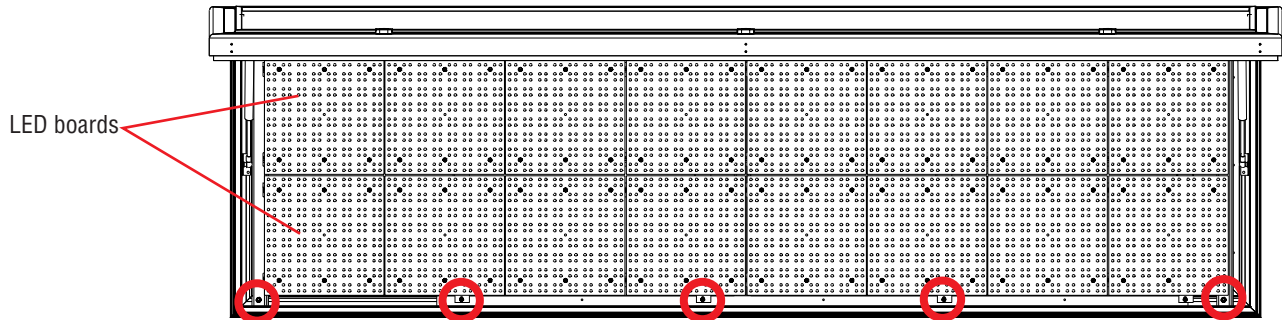
2. Use a 5/32-inch hex key tool to open the locking latches which are located along the lower edge of the sign's front:



3. Stand away from the front of the unit. Then lift the door upward. Swing each safety bar up and attach it to the bolt inside the sign using the supplied wing nut. (See Figure 15 on page 34.)

Raise the LED boards

- Remove the rail screws (circled below) at the bottom of each internal vertical rail. The number of rail screws varies with the size of the sign:



- Carefully lift the LED boards up by placing your fingers in the mounting rail holes — not underneath an LED board



- Unfasten each red prop rod from underneath the LED boards. Then place each rod in its fastener hole:

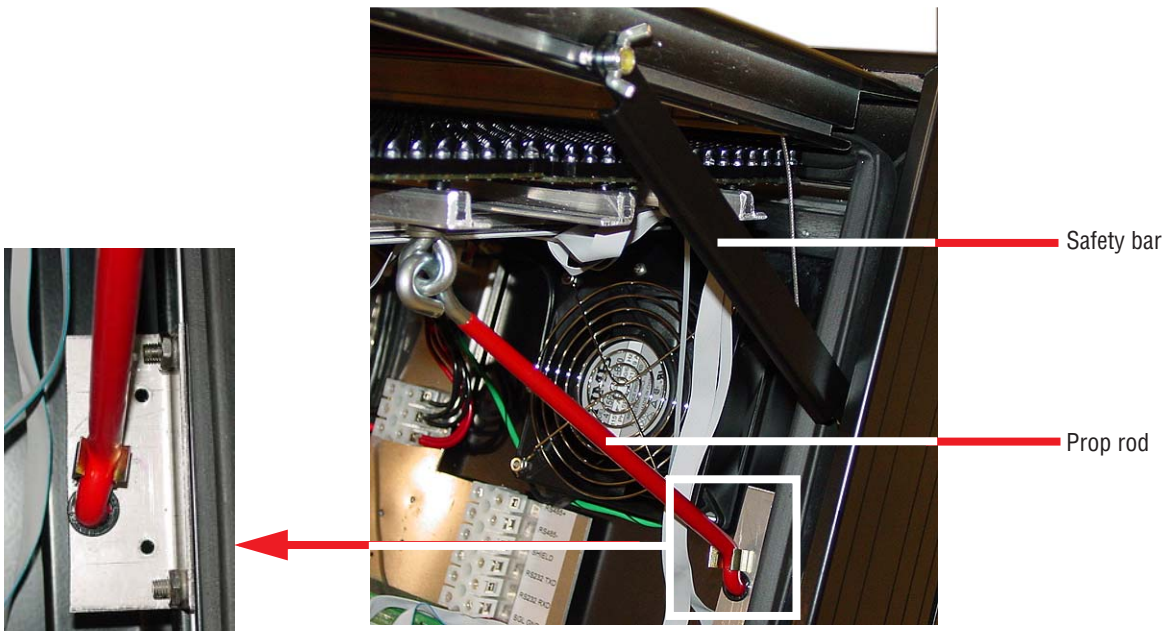


Figure 15: Safety bar and prop rod

- After the LED boards are raised and all the prop rods are fastened, turn off the sign's internal power switch by pressing 0 on the switch.

Closing the sign

1. Push **1** on the sign's internal power switch.
2. Raise each red prop rod out of its hole and fasten each rod to a clip underneath the LED boards.
NOTE: If a prop rod is not fastened, it could swing free and damage internal sign components.
3. Lower the LED boards.
4. Refasten rail screws to the internal vertical rails.
5. Unfasten each safety bar and place inside the sign.
6. Lower the sign's door.
7. Using the 5/32-inch hex key tool, turn each locking latch to lock the door shut.
8. Apply power to the sign.

Appendix E: Sign options

Temperature probe option

Mounting guidelines

- A good place to locate the temperature probe is underneath the eaves of a protected overhang. Choose a location where air movement is not restricted by nearby walls or other obstructions. Mount the temperature probe housing so that convection currents, or rising hot air flows, are not blocked by the mounting plates.
- A location on the north side of a building, at least 6 feet off the ground, or other large structure will afford protection from the afternoon sun. Shield the probe from the effect of the direct sun, reflected heat, or any nearby sources of heat, such as chimneys, vents, or HVAC ducts.
- A light-colored background is preferable to a dark-colored mounting background. A location above vegetation is preferable to a location above asphalt or blacktop.

Installation

1. Mount the temperature probe vertically using the mounting plate on each side of the probe. The temperature probe can be mounted on either a flat or a curved surface.
2. Run the temperature probe cable into the sign through the signal wire conduit opening. Connect the temperature probe cable to the TEMP PORT on the Turbo Extender board (see “Appendix J: Controller board” on page 52):

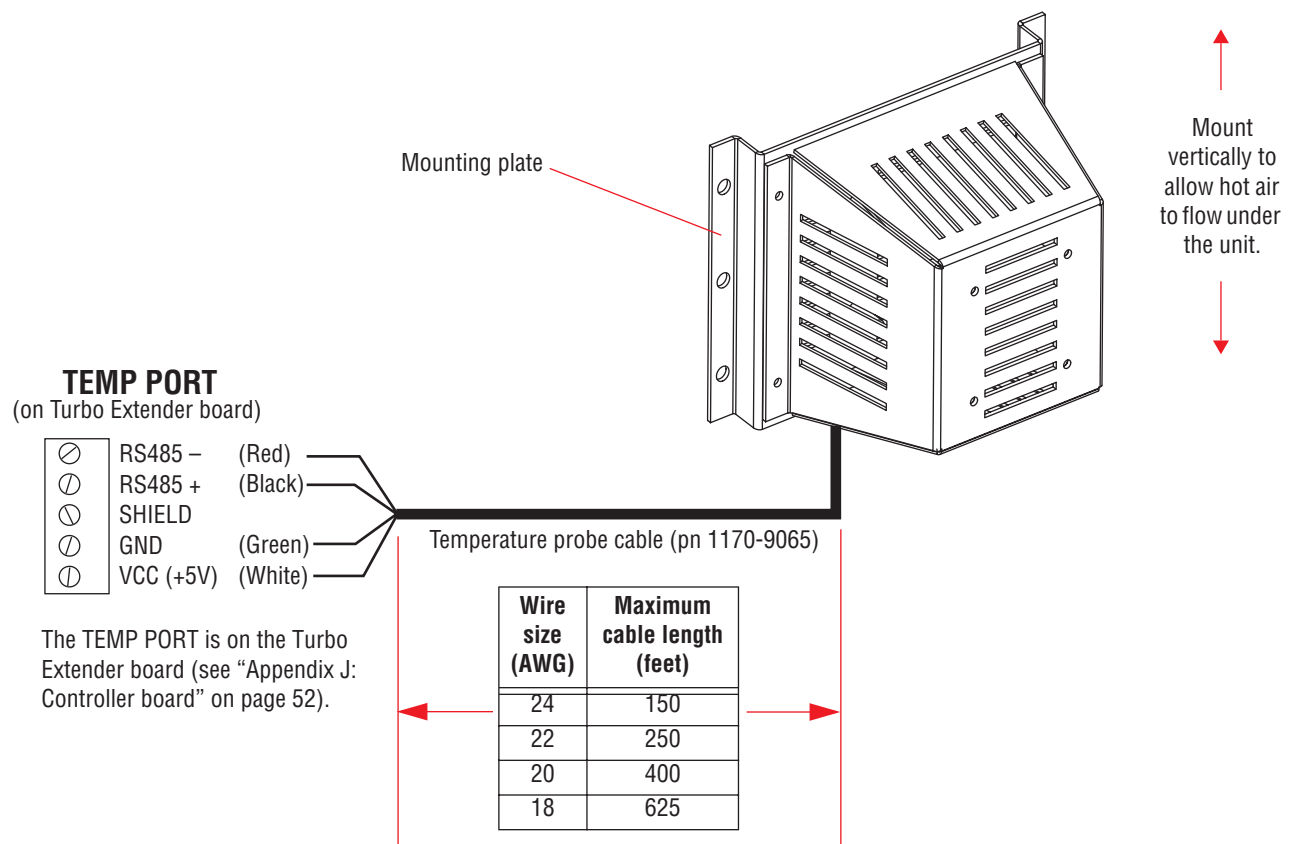


Figure 16: Temperature probe installation

Modem option

This option allows messages to be sent from a computer that has a transmitting modem to a sign that has a receiving modem installed. Each modem must be attached to its own phone line.

NOTE: The modem option only includes the installation of a receiving modem in a sign. The purchase and installation of the transmitting modem, which is attached to a computer, is the responsibility of the sign buyer.

The US Robotics 56K modem is used as the receiving modem. This brand is also recommended as the transmitting modem.



Figure 17: US Robotics 56K modem

Receiving modem

The receiving modem is installed inside a sign at the factory. For more information, see “Modem option” on page 37.

- Receiving modem DIP switch settings — The eight DIP switches on the US Robotics receiving modem are set as follows:

1	2	3	4	5	6	7	8
On	Off	On	Off	Off	Off	Off	On
Modem ignores DTR	Verbal (word) result codes	Display result codes	Echo offline commands	Auto answer on	Carrier detect on	Load user-defined configuration from memory.	Smart mode (recognize AT command set)

- Receiving modem internal configuration — The following AT command is sent to the modem with a program like HyperTerminal:

<p>AT&H0&R1&B1&N6&Y0&W0</p>					
Disables flow control	Modem ignores RTS	Fixed serial port rate	Connection speed = 9600 baud	Loads Profile 0 into memory when modem is powered on.	Writes this current setup to Profile 0 in memory.

Transmitting modem

The US Robotics 56K modem is recommended for use as the transmitting modem. This modem does not require any special setup for sending messages to a sign.

Wireless transceiver option

For this option, one wireless transceiver (the “master”) is connected to a computer and sends messages to another transceiver (the “remote”) inside a sign. Both transceivers require antennas and both are programmed at the factory.



On the remote transceiver, this antenna would be mounted outside of the sign. See “Antenna installation” on page 39.

Figure 18: Locus OS2400-232 wireless transceiver

Transceiver setup

NOTE: This information is based on Adaptive document number OTI00313A.

NOTE: For more information about the Locus OS2400-232, see the product manual **OS2400 Radio Modem User’s Manual** or visit the company’s web site: <http://www.overairsolutions.com>.

Using the OverAir Solutions software from Locus, the following parameters were set for the master and the remote transceivers:

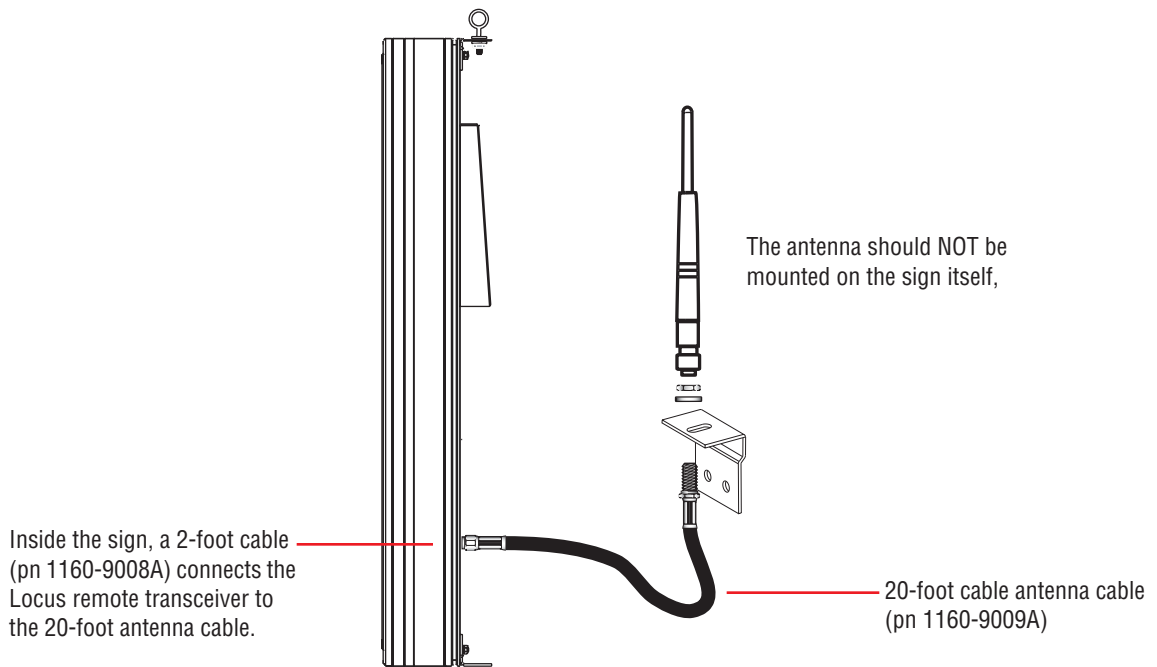
Parameter	Master transceiver (connected to computer)	Remote transceiver (installed inside sign)
Network Name	Network 1	
Network Type	Point to point	
Network Channel	1	
Radio Name	Master	Receive
Baud Rate	9600	9600
Parity	None	None
Data Bits	8	8
Stop Bits	1	1
Handshaking	None	None
Transmit Power	Max	Max

Antenna installation

Follow these guidelines for mounting the remote transceiver antenna:

- Install the antenna and bracket on a support structure other than the sign or the sign's mounting brackets. Do NOT drill a hole in the sign enclosure.
- Install the antenna in a location that will allow optimum line-of-sight transmission and reception of signals between the sending transceiver and the antenna. Do not install the antenna so that the sign is between the sending transceiver and the receiving antenna.
- Install the antenna in an unobstructed area, keeping adequate clearance from any objects that could block the signal.
- Install the antenna in a more elevated location than the sign, and, if possible, keep it vertical.

Mount the sign as shown:



Fiber optic modem option

Description

The fiber optic modem option allows messages to be sent from a computer to a sign at distances up to 2 miles. Fiber optic transmissions are not subject to electrical noise, ensure data security because eavesdropping is virtually impossible, and electrically isolate a computer from a sign so there is no spark hazard.

Two mini modems are necessary:

- a mini modem inside the sign connected with the 1051-9019 adapter, and
- a mini modem connected to the computer which will be used to send messages to the sign. The 1051-9019 adapter is not used. However, a RS232 cable (DB25-to-DB9 or DB25-to-DB25) is needed to connect this mini modem to a computer COM (RS232) port.

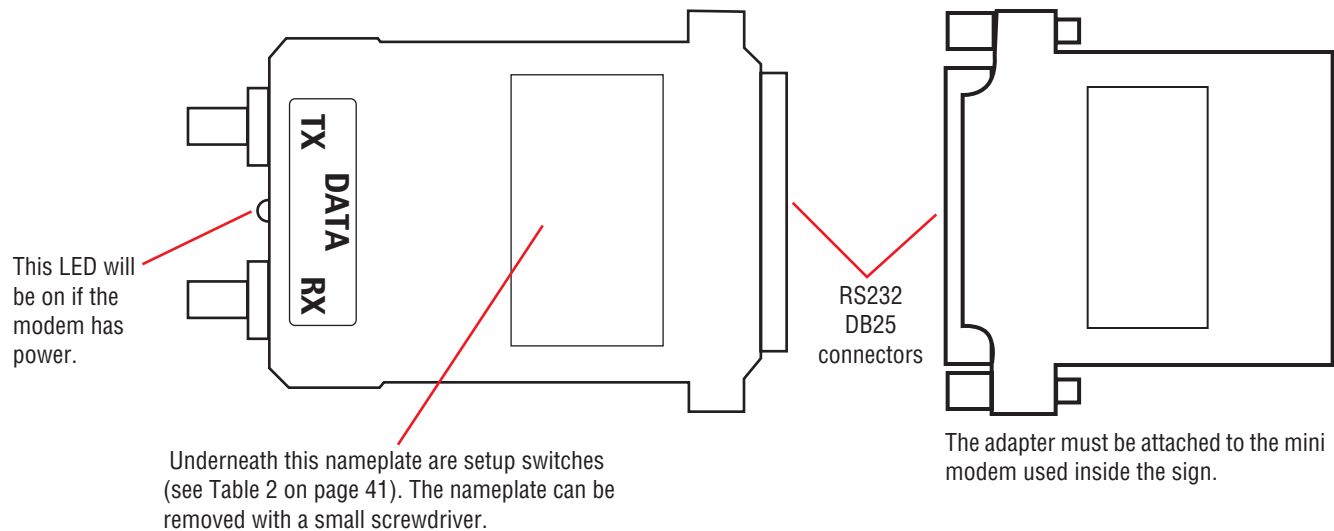


Figure 19: Black Box ME605A async fiber optic mini modem (left) and 1051-9019 adapter (right)

Specifications

Table 1: Fiber optic mini modem specifications

Data rate:	Up to 19.2 Kbps
Pulse width distortion:	Less than 25%
Transmission line:	Duplex optical cable
Transmission mode:	Asynchronous, full- or half-duplex
Transmission controls:	Carrier constantly on or controlled by RTS
Optical output levels:	-28 dBm into 100/140 fiber -32 dBm into 62.5/125 fiber -36 dBm into 50/125 fiber
Receiver sensitivity:	-45 dBm
Operating wavelength:	850 nm

Table 1: Fiber optic mini modem specifications

Operating range:	Maximum range is 2 miles (3 km) of continuous fiber with the following fibers: <ul style="list-style-type: none"> • 100/140 fiber with attenuation of 4 dB/km • 62.5/125 fiber with attenuation of 3.5 dB/km • 50/125 fiber with attenuation of 3 dB/km
Indicators:	One power LED
Terminal interface:	One ITU V.24/EIA RS232C integral DB25 connector
Fiber optic interface:	Two ST connectors
Operating conditions:	<ul style="list-style-type: none"> • Temperature — 32 to 122°F (0 to 50°C) • Humidity — up to 90%, non condensing
Size:	0.7 x 2.1 x 3.1 in (1.8 x 5.3 x 7.8 cm)
Weight:	1.3 oz (36 g)

Table 2: Fiber optic modem setup switches

Switch	Function	Position	Factory setting																																										
CARR	Selects carrier constantly on or controlled by RTS.	<ul style="list-style-type: none"> • ON — carrier constantly on • CL — carrier controlled by RTS 	ON																																										
DLY	Selects RTS/CTS delay	<ul style="list-style-type: none"> • 2 msec • 15 msec 	2 msec																																										
DCE/DTE	Selects DCE or DTE	<ul style="list-style-type: none"> • DTE <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">DCE position</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right;">TD 2</td> <td style="text-align: center;">←</td> <td style="text-align: left;">DI</td> </tr> <tr> <td style="text-align: right;">RD 3</td> <td style="text-align: center;">→</td> <td style="text-align: left;">DO</td> </tr> <tr> <td style="text-align: right;">RTS 4</td> <td style="text-align: center;">←</td> <td style="text-align: left;">CD</td> </tr> <tr> <td style="text-align: right;">CTS 5</td> <td></td> <td style="text-align: left;">N.C.</td> </tr> <tr> <td style="text-align: right;">DSR 6</td> <td></td> <td style="text-align: left;">N.C.</td> </tr> <tr> <td style="text-align: right;">DCD 8</td> <td></td> <td style="text-align: left;">N.C.</td> </tr> <tr> <td style="text-align: right;">DTR 20</td> <td style="text-align: center;">←</td> <td style="text-align: left;">300 ohm +V</td> </tr> </table> </div> • DCE <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">DCE position</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right;">TD 2</td> <td style="text-align: center;">→</td> <td style="text-align: left;">DI</td> </tr> <tr> <td style="text-align: right;">RD 3</td> <td style="text-align: center;">←</td> <td style="text-align: left;">DO</td> </tr> <tr> <td style="text-align: right;">RTS 4</td> <td style="text-align: center;">→</td> <td style="text-align: left;">RTS</td> </tr> <tr> <td style="text-align: right;">CTS 5</td> <td style="text-align: center;">←</td> <td style="text-align: left;">D</td> </tr> <tr> <td style="text-align: right;">DSR 6</td> <td style="text-align: center;">←</td> <td style="text-align: left;">300 ohm +V</td> </tr> <tr> <td style="text-align: right;">DCD 8</td> <td style="text-align: center;">←</td> <td style="text-align: left;">CD</td> </tr> <tr> <td style="text-align: right;">DTR 20</td> <td></td> <td style="text-align: left;">N.C.</td> </tr> </table> </div> 	TD 2	←	DI	RD 3	→	DO	RTS 4	←	CD	CTS 5		N.C.	DSR 6		N.C.	DCD 8		N.C.	DTR 20	←	300 ohm +V	TD 2	→	DI	RD 3	←	DO	RTS 4	→	RTS	CTS 5	←	D	DSR 6	←	300 ohm +V	DCD 8	←	CD	DTR 20		N.C.	DCE
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RD 3	→	DO																																											
RTS 4	←	CD																																											
CTS 5		N.C.																																											
DSR 6		N.C.																																											
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DSR 6	←	300 ohm +V																																											
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DTR 20		N.C.																																											

Appendix F: Termination

Location of termination DIP switches

A sign must be correctly terminated in order to work properly. Termination is either ON or OFF. A pair of DIP switches on the sign's Controller board are used to terminate a sign:

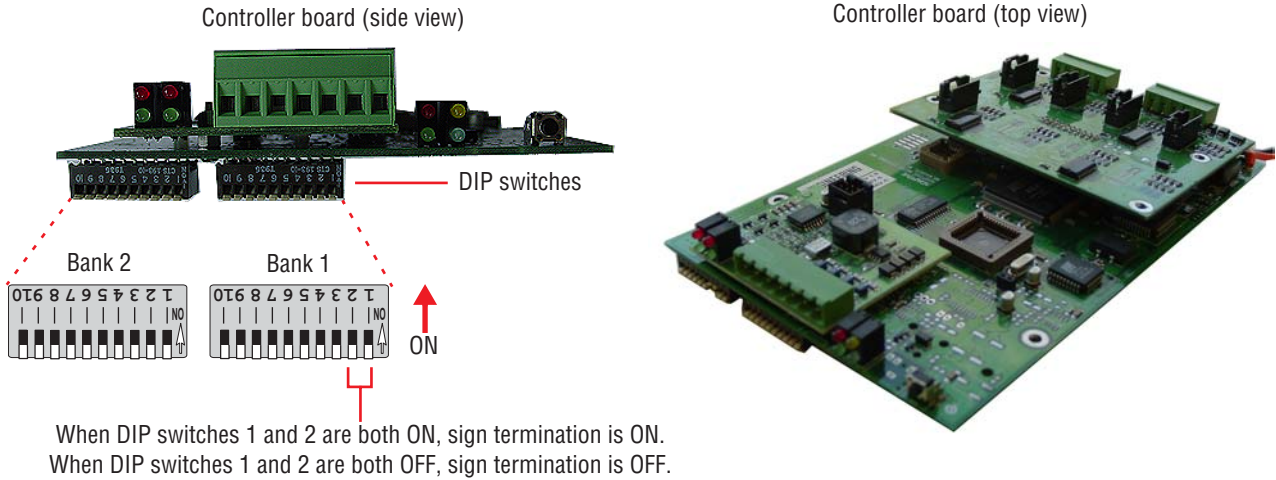


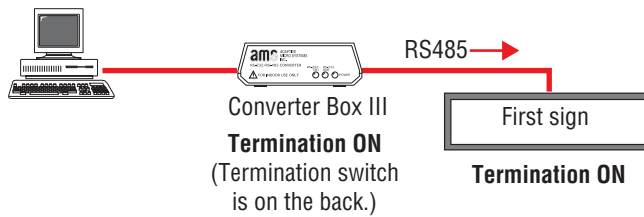
Figure 20: Location of termination DIP switches

How to set the termination DIP switches

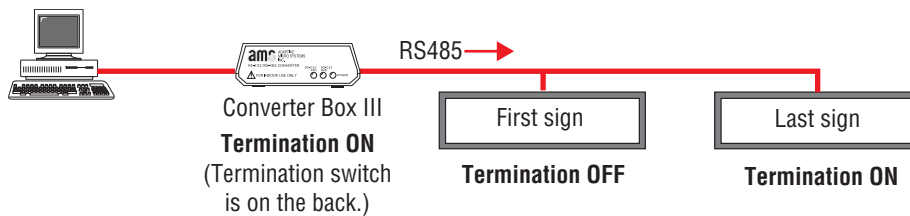
When the sign receives messages from a computer connected to the sign using RS485 wiring

In this case, a Converter Box III is used to connect a computer to a sign. To terminate a Converter Box III, set the switch on the back of this unit to "Terminated":

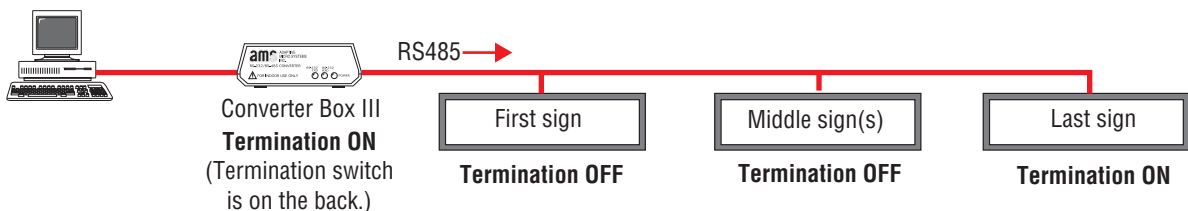
One sign network:



Two sign network:

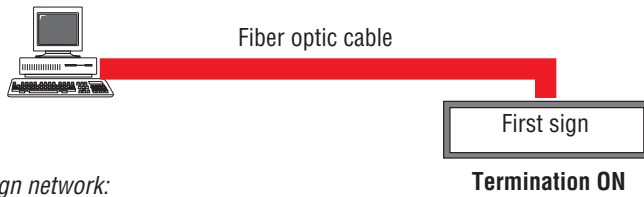


Three sign network:

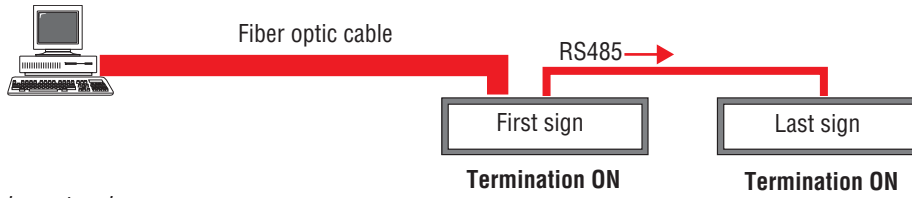


When the sign receives messages from a computer connected to the sign using fiber optic cable

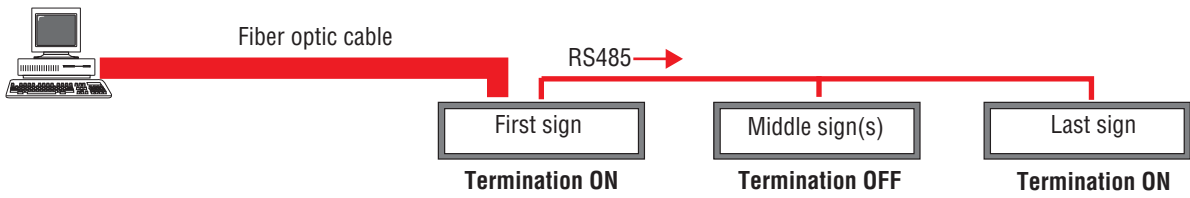
One sign network:



Two sign network:



Three sign network:

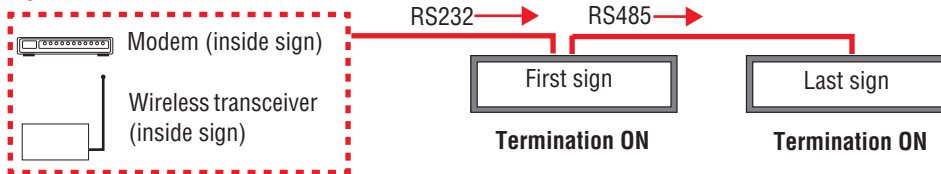


When the sign receives messages from a computer via a modem or wireless transceiver

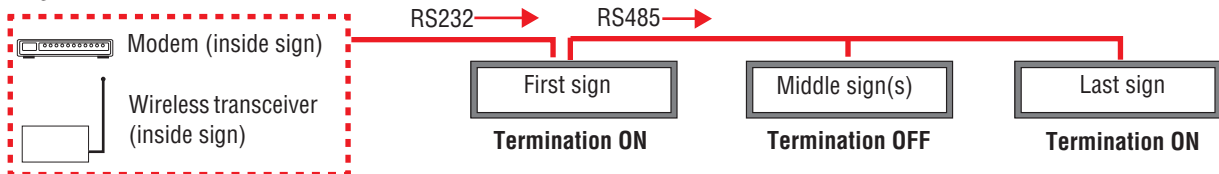
One sign network:



Two sign network:



Three sign network:



Appendix G: DIP switch settings

DIP switch locations

DIP switches are used to set various sign parameters. DIP switches are located on the Controller board: Bank 1, Bank 2, and Bank 3:

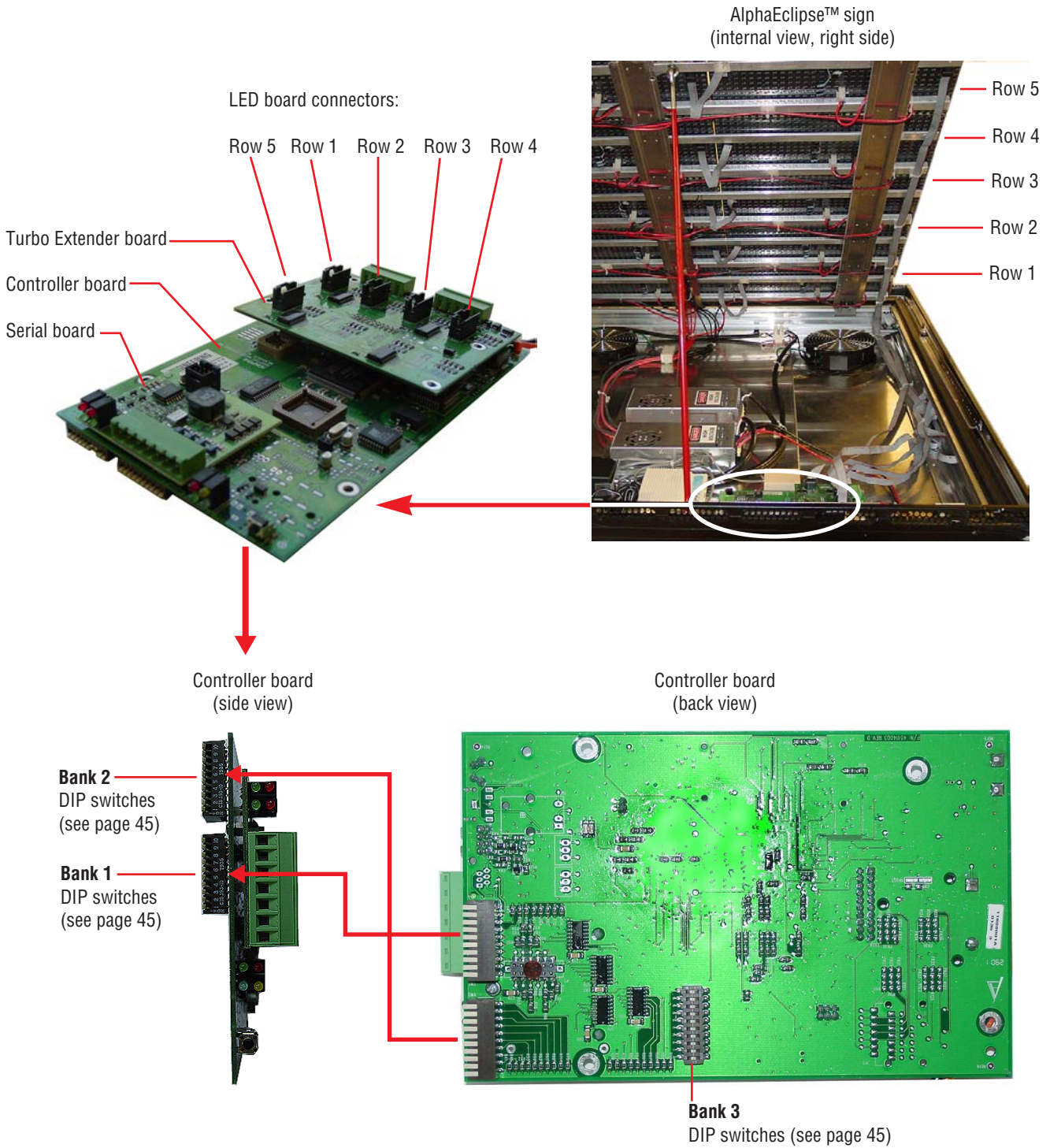
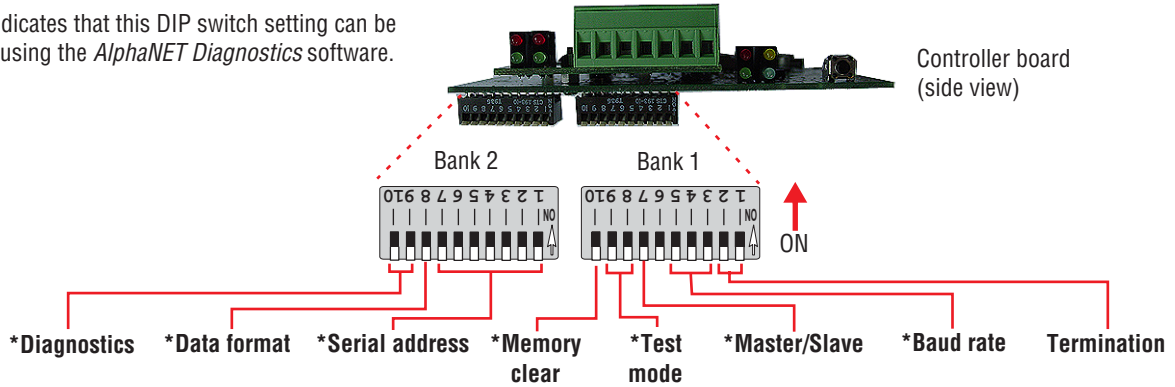


Figure 21: DIP switch locations

Sign operation settings (Bank 1 and Bank 2 DIP switches)

* indicates that this DIP switch setting can be set using the *AlphaNET Diagnostics* software.



Bank 2 DIP switches

Bank 1 DIP switches

	10	9	Description
Diagnostics	Off	Off	Normal messaging (default)
	Off	On	Goes through several test patterns to test for unlit LEDs and other irregularities
	On	Off	All LEDs are lit to test for uniform LED display
	On	On	Software override — When enabled, prevents setting DIP switches from software, and the sign will operate using the current DIP switch settings. <i>DIP switches 9 and 8 on Bank 1 must also be both on.</i>

	10	Description
Memory Clear	Off	Do NOT clear memory (default)
	On	Clear memory on powerup

	8	Description
Data format	Off	8N1 — 8 data bits, No parity, 1 stop bit (default)
	On	7E2 — 7 data bits, Even parity, 2 stop bits

	9	8	Description
Test Mode	Off	Off	Normal mode (default)
	Off	On	Production test mode
	On	Off	Display temperature test
	On	On	Software override — When enabled, prevents setting DIP switches from software, and the sign will operate using the current DIP switch settings. <i>DIP switches 10 and 9 on Bank 2 must also be both on.</i>

	7 (MSB)	6	5	4	3	2	1 (LSB)	Address		
								Dec	Hex	
Serial address (address 0 = default)	Off	Off	Off	Off	Off	Off	Off	0	00	
	Off	Off	Off	Off	Off	Off	On	1	01	
	Off	Off	Off	Off	Off	On	Off	2	02	
	Off	Off	Off	Off	Off	On	On	3	03	

	On	On	On	On	On	Off	On	125	7D	
	On	On	On	On	On	On	Off	126	7E	
	On	On	On	On	On	On	On	127	7F	

	7	Description
Master/Slave	Off	Master mode (default)
	On	Slave mode

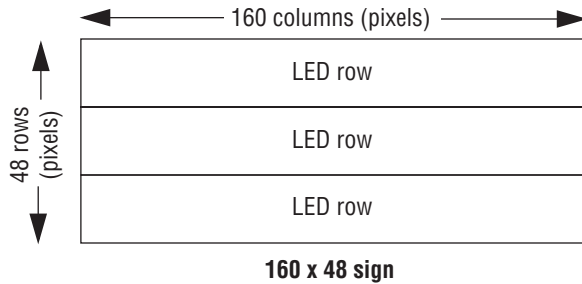
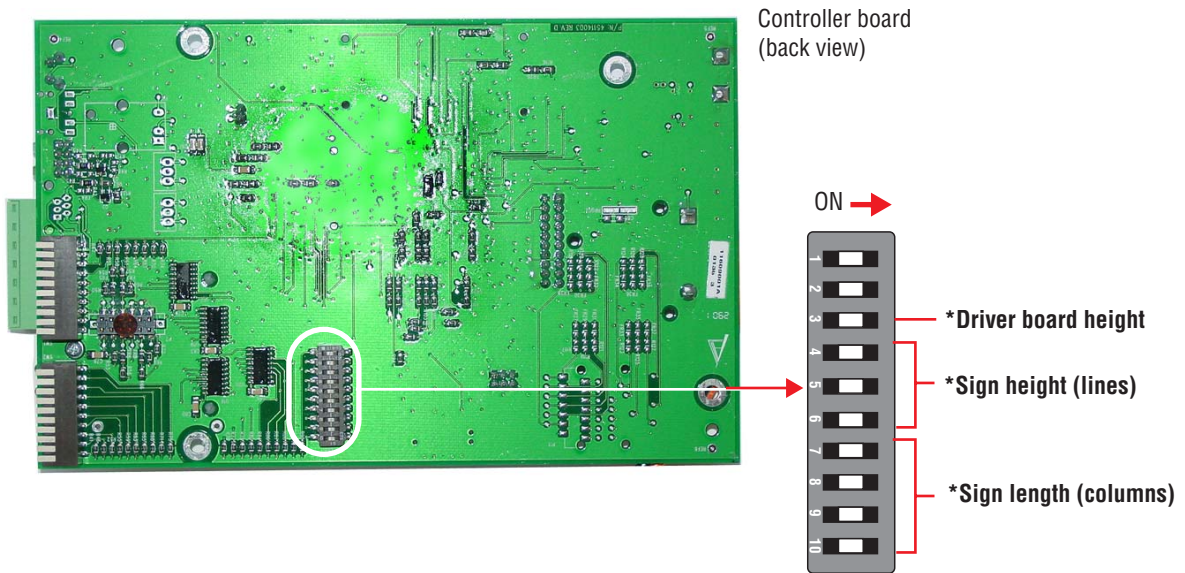
	5	4	3	Description
Baud rate	Off	Off	Off	Autobaud (see NOTE below)
	Off	Off	On	1200
	Off	On	Off	2400
	Off	On	On	4800
	On	Off	Off	9600
	On	Off	On	19200
	On	On	Off	38400
	On	On	On	Autobaud (see NOTE below)

NOTE: When Autobaud is on, the sign will automatically try to set itself to the baud rate and data format (8N1 or 7E2) of the transmitting modem. Also, make sure that Data format (Bank 2, switch 8) is set to Off.

	2	1	Description (see page 42)
Termination	Off	Off	Termination off (default)
	On	On	Termination on

Sign size settings (Bank 3 DIP switches)

* indicates that this DIP switch setting can be set using the *AlphaNET Diagnostics* software.



How to calculate Sign height and Sign length:

Sign size is typically represented in pixels, like 160 (columns) x 48 (rows). This means the sign is 160 pixels long and 48 pixels high. In AlphaEclipse™ 2500/2600 signs, each line is 16 pixels high. So a 160 x 48 sign has a Sign height = 3 (48/16) and a Sign length = 160.

Bank 3 DIP switches

Sign length (columns)				Description
10	9	8	7	
Off	Off	Off	Off	64 columns (default)
Off	Off	Off	On	16 columns
Off	Off	On	Off	32 columns
Off	Off	On	On	48 columns
Off	On	Off	Off	64 columns
Off	On	Off	On	80 columns
Off	On	On	Off	96 columns
Off	On	On	On	112 columns
On	Off	Off	Off	128 columns
On	Off	Off	On	144 columns
On	Off	On	Off	160 columns
On	Off	On	On	176 columns
On	On	Off	Off	192 columns
On	On	Off	On	208 columns
On	On	On	Off	224 columns
On	On	On	On	240 columns

Sign height (lines)			Description
6	5	4	
Off	Off	Off	1 line (default)
Off	Off	On	2 lines
Off	On	Off	3 lines
Off	On	On	4 lines
On	Off	Off	5 lines
On	Off	On	6 lines
On	On	Off	7 lines
On	On	On	8 lines

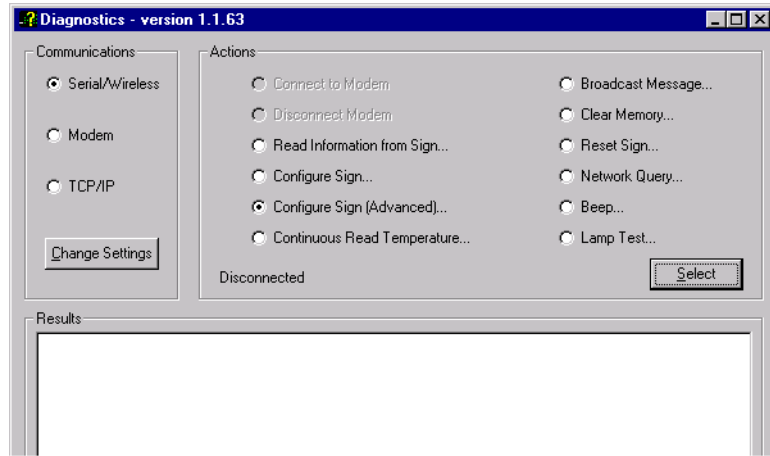
Not valid for 2500/2600 signs

Driver board height	
3	Description
Off	8-row high (default)
On	16-row high — use for a 2500/2600 sign

Using AlphaNET software to set DIP switches

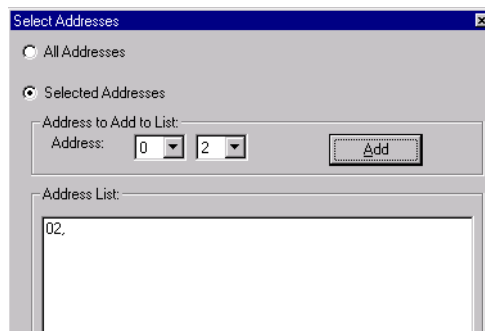
AlphaNET software version 2.0.3 and greater can be used to set the Bank 1, 2, or 3 DIP switches explained previously.

1. To do this, select the AlphaNET *Diagnostics* software:



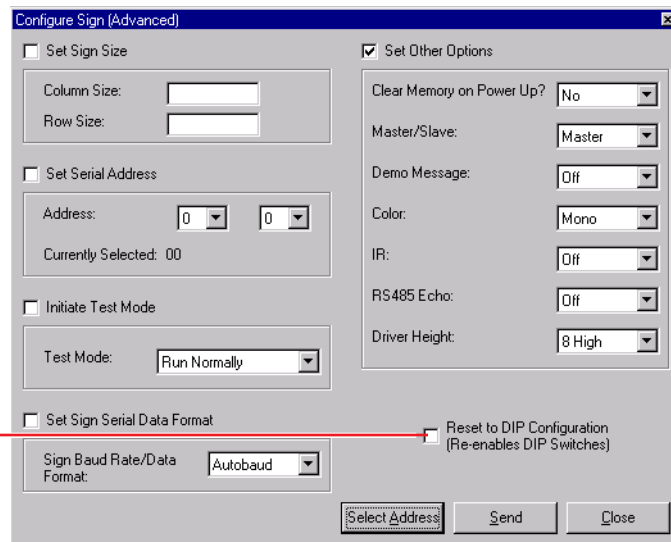
2. Select *Configure Sign (Advanced)* > *Select Address*:

Select the serial address(es) of the signs you want to configure.



3. Select one or more of the available options (*Set Sign Size*, *Set Serial Address*, and so on) and click on *Send*:

To set the sign to its DIP switch settings, check this box.



Appendix H: Sign Specifications

EMI compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with installation guidelines, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Temperature protection

In order to protect itself from damage, a sign will automatically turn on its exhaust fans and dim or turn off its LEDs when the sign reaches a predetermined internal temperature.

Internal sign temperature:	< 30°C (85°F)	30° - 49°C (85° - 120°F)	50° - 70°C (122° - 158°F)	71° - 81°C (160° - 178°F)	82°C or greater (180°F)
LEDs:	Normal		Dim ¹	Off ²	Off ³
Controller board:	Normal				Off
Exhaust fans: ⁴	Off	On			

NOTES:

¹ Between 50° - 60°C (122° - 140°F), LED brightness can decrease between 62.5% - 100% of normal, depending on display load.
 Between 60° - 65°C (140° - 149°F), LED brightness can decrease between 50% - 87.5% of normal, depending on display load.
 Between 65° - 70°C (149° - 158°F), LED brightness can decrease between 37.5% - 75% of normal, depending on display load.
 (*Display load* means the number of LEDs that are on. For example, a graphic that lights up most of a sign's LEDs will have more of a display load than a simple text message that lights up only some LEDs.)

² When the LEDs are turned off because the sign is too hot, two LEDs in the left most corner will remain on to indicate a thermal shutdown.

³ All LEDs will be off.

⁴ At or above 30° C (85° F), the exhaust fans are switched on by the exhaust fan thermostat. If the temperature drops to 20° C (67° F), then the exhaust fans are turned off.

Technical specifications

AlphaEclipse™ 2500 sign

Table 3: AlphaEclipse™ 2500 sign technical specifications

Lines	LED Rows	LED Columns	Rated Input Current (amperes)		LED boards	Power supplies	Dimensions			Weight (pounds)
			at 120 VAC	at 240 VAC			Height (inches)	Width (inches)	Depth (inches)	
1	16	96	1.55	0.78	3	1	See Figure 2 on page 8			
	16	128	2.10	1.05	4	2				
	16	160	2.56	1.28	5	2				
	16	192	3.11	1.55	6	2				
2	32	96	3.08	1.54	6	2				
	32	128	4.16	2.08	8	3				
	32	160	5.07	2.54	10	4				
	32	192	6.15	3.08	12	4				
3	48	96	4.55	2.27	9	3				
	48	128	6.14	3.7	12	4				
	48	160	7.51	3.75	15	5				
	48	192	9.10	4.55	18	6				
4	64	96	6.07	3.03	12	4				
	64	128	8.19	4.09	16	6				
	64	160	10.02	5.01	20	7				
	64	192	12.14	6.07	24	8				
5	80	96	7.44	3.72	15	5				
	80	128	10.02	5.01	20	7				
	80	160	12.30	6.15	25	9				
	80	192	14.88	7.44	30	10				

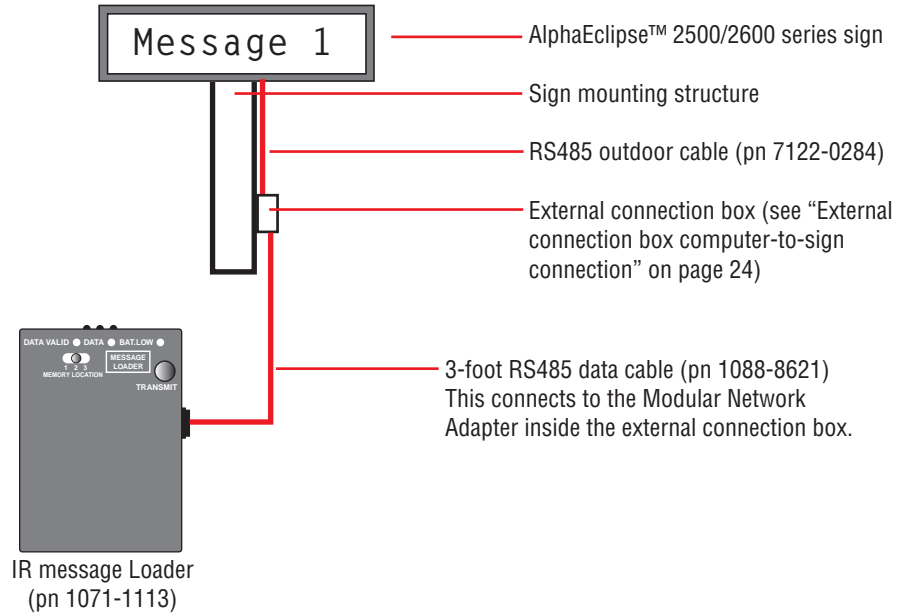
AlphaEclipse™ 2600 sign

Table 4: AlphaEclipse™ 2600 sign technical specifications

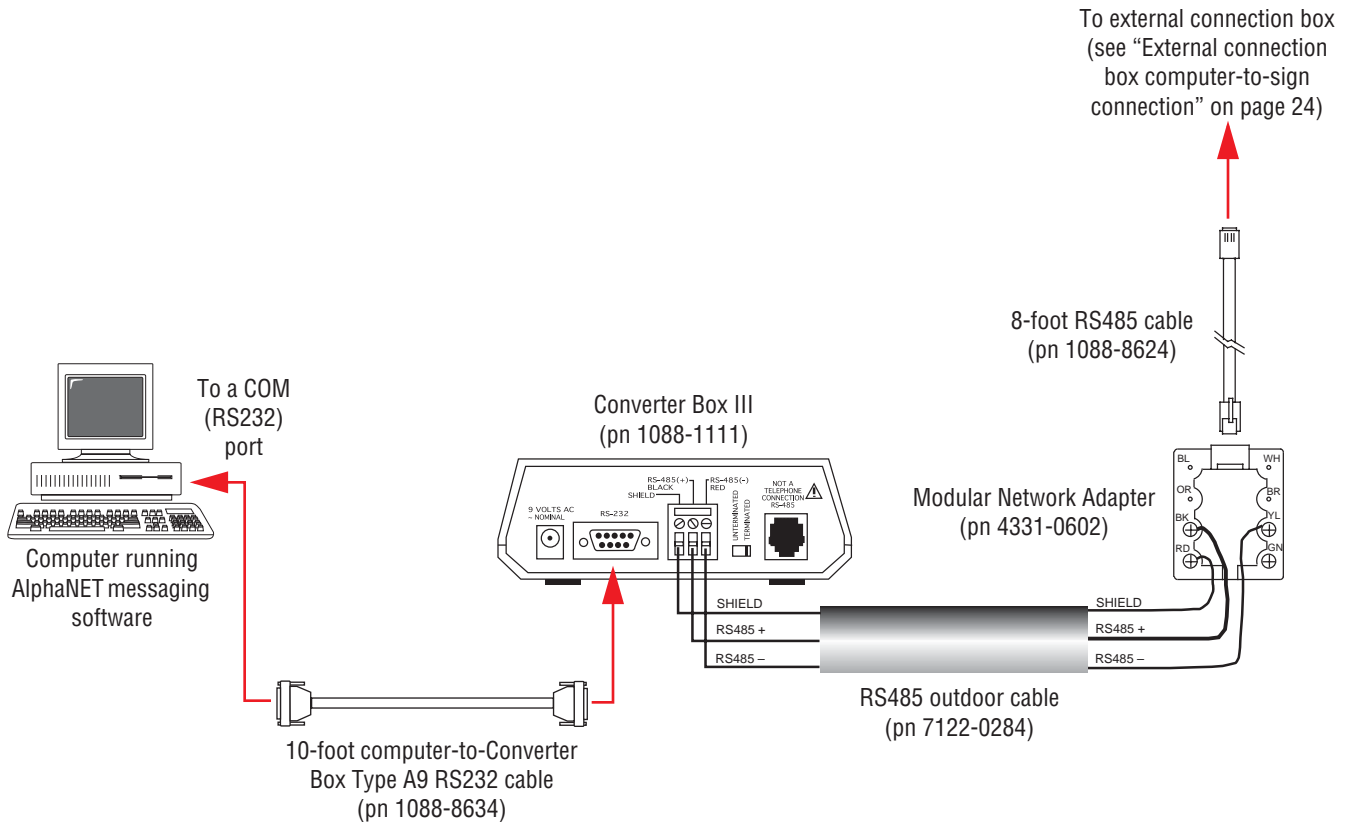
Lines	LED Rows	LED Columns	Rated Input Current (amperes)		LED boards	Power supplies	Dimensions			Weight (pounds)
			at 120 VAC	at 240 VAC			Height (inches)	Width (inches)	Depth (inches)	
1	16	96	1.74	0.87	3	1	See Figure 2 on page 8			
	16	128	2.35	1.17	4	2				
	16	160	2.87	1.43	5	2				
	16	192	3.48	1.74	6	2				
2	32	96	3.44	1.72	6	2				
	32	128	4.64	2.32	8	3				
	32	160	5.68	2.84	10	4				
	32	192	6.88	3.44	12	4				
3	48	96	5.10	2.55	9	3				
	48	128	6.87	3.43	12	4				
	48	160	8.42	4.21	15	5				
	48	192	10.19	5.10	18	6				
4	64	96	6.80	3.40	12	4				
	64	128	9.16	4.58	16	6				
	64	160	11.24	5.62	20	7				
	64	192	13.60	6.80	24	8				
5	80	96	8.35	4.18	15	5				
	80	128	11.24	5.62	20	7				
	80	160	13.83	6.91	25	9				
	80	192	16.71	8.35	30	10				

Appendix I: Using an IR Message Loader or a computer with an external connection box

IR Message Loader

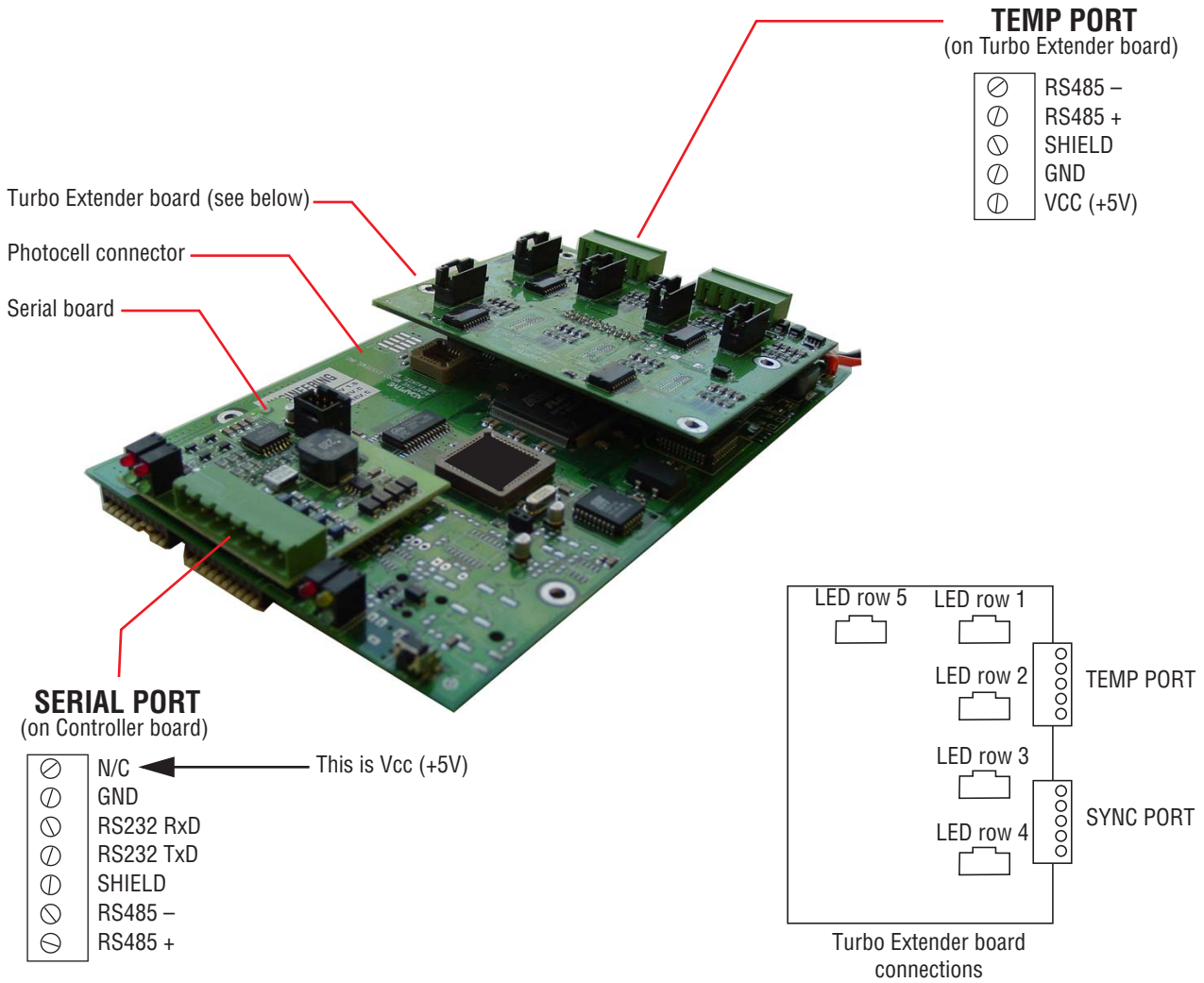


Computer



Appendix J: Controller board

Description



LED row numbering

