

Networking Alpha® Signs

For the most recent update of this manual, go to:
<http://www.adaptivedisplays.com/support/network>

This manual applies to these signs	This manual does NOT apply to these signs:
200 series	AlphaTicker™ (see the AlphaTicker™ LED Sign Installation Instructions manual, pn 9711-2401)
300 series	AlphaEclipse™ (see the AlphaEclipse™ 3500 Series Sign Installation and Service Manual, pn 9711-6009)
400 series	Alpha® Solar (see the Alpha® Solar Operation and Installation Manual, pn 9705-1002)
Big Dot®	AlphaVision™ InfoTracker™ (see the AlphaVision™ InfoTracker™ LED Sign Installation Instructions, pn 9711-2202)
Personal Priority Display®	
4000 series	
7000 series	
AlphaPremiere™ 9000 series	
Director™	
AlphaVision™	
Serial Clock	

This manual ships automatically with the following:

- Converter Box III—see “Converter Box III (pn 1088-1111)” on page 18.
- Alpha® Ethernet Adapter—see “Alpha® Ethernet Adapter” on page 22.
- MSS100 Micro Serial Server—see “Lantronix MSS100 (pn 1088-4113A)” on page 24.
- MSS485 Micro serial Server—see “Lantronix MSS485 (pn 1088-4112A)” on page 25.
- AlphaPremiere™ 9000 series signs

NOTE: Due to continuing product innovation, specifications in this manual are subject to change without notice.

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Contents

Network overview.....	1
Wired network—serial.....	1
Wired network—LAN.....	1
Wireless network—transceiver.....	2
Modem network.....	3
Mixed network.....	3
Detailed information.....	4
Wired networks.....	5
Serial—preliminary information.....	5
RS232—single sign.....	7
RS485—single sign.....	7
RS485—multiple signs.....	8
LAN—preliminary information.....	9
LAN—single sign.....	10
LAN—multiple signs.....	11
Modem networks.....	13
Modem—preliminary information.....	13
Modem—single sign (RS232).....	14
Modem—multiple signs (RS485).....	15
Mixed networks.....	16
Network interfaces.....	17
Converter Box III.....	18
Xircom USB Adapter.....	20
Alpha® Ethernet Adapter.....	22
Lantronix MSS100.....	24
Lantronix MSS485.....	25
Network cables and adapters.....	27
Overview.....	27
25-foot RS232 cable (pn 1036-9010).....	28
3-foot 6-conductor cable (pn 1088-8621).....	29
8-foot RS485 cable (pn 1088-8624).....	30
25-foot RS232 cable (pn 1088-8625).....	31
8-foot RS485 back-to-back cable (pn 1088-8626).....	32
50-foot RS232 cable (pn 1088-8627).....	33
10-foot computer-to-Converter Box III Type A9 RS232 cable (pn 1088-8634).....	34
10-foot modem-to-Converter Box III Type B9 RS232 cable (pn 1088-8635).....	35
1-foot RS485 cable (pn 1088-8636).....	36
End-of-Line (EOL) terminator (pn 1088-9107).....	37
RJ12-to-DB9 adapter (pn 1088-9108).....	38
8-inch Ethernet cable (pn 1088-9317).....	39
Modular Network Adapter (pn 4331-0602).....	40

RS232 cable connector (pn 4331-0603)	41
RJ12-to-DB25 adapter (pn 4370-0001C)	42
Network messaging software	43
Overview.....	43
Alpha® Messaging Software.....	43
AlphaNET™ Software.....	43
Smart Alec® Software.....	44
Alpha® Marquee ActiveX® Control.....	44
Appendix	45
Appendix A—Related documentation	45
Appendix B—End-of-line termination	46
Appendix C—RS485 Echo.....	48
Appendix D—Setting the RS232/RS485 jumper	49
Appendix E—Serial and power connections.....	51
Appendix F—Alternate sign connections.....	52
Appendix G—Modular Network Adapter to Converter Box III wiring	57
Appendix H—Assigning an IP address to a serial server.....	58
Appendix I—Setting up messaging software for TCP/IP networking.....	70
Glossary	79

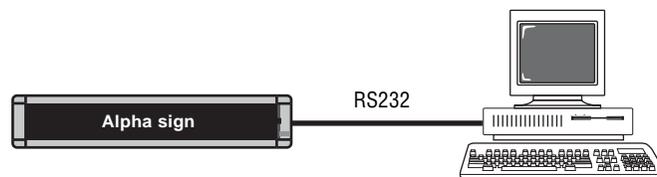
Network overview

Alpha® signs can be networked together in the following ways:

- **Wired**—a network in which there is a physical connection, such as with cables and servers, between a PC and one or more signs. A wired network is either serial or LAN.
- **Wireless**—a network in which there is no physical connection between a PC and one or more signs. A wireless network uses transceivers.
- **Modem**—a network in which there is a telephone line connection between a PC and one or more signs. A modem network uses modems.
- **Mixed**—a combination of a wired, wireless, and modem network.

Wired network—serial

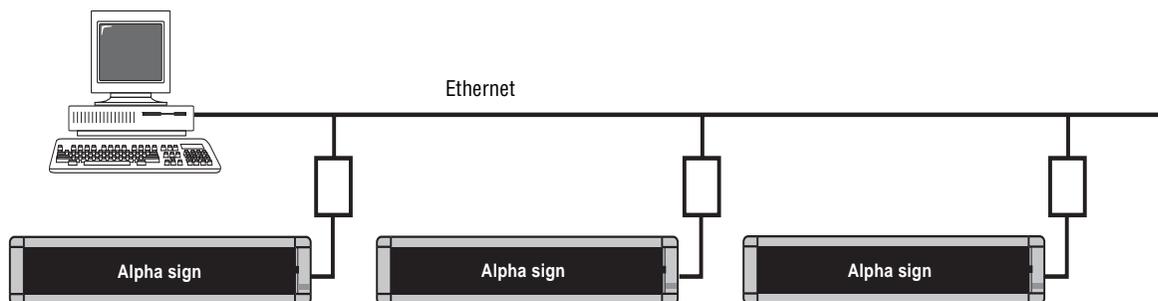
This configuration is a simple serial connection, which means that a sign connects directly to the serial port on a PC through a cable.



Wired network—LAN

There are several ways to connect an Alpha® sign to a TCP/IP network. However, in the configuration below, signs connect to an Ethernet LAN using an Alpha® Ethernet Adapter, which helps a PC communicate with the signs attached to that network. On some signs, this adapter is internal. On other signs, such as the AlphaPremiere™, an internal Ethernet adapter called a CoBox is used.

Signs can also connect to an Ethernet LAN using MSS100 or MSS485 micro serial servers. These configurations are documented later in this manual.



Wireless network—transceiver

A wireless network is an effective choice when:

- the cost of a wired connection is too expensive,
- the sign is at a greater distance than is recommended,
- you cannot physically run wiring to the sign's location, or
- the signs may frequently change location.

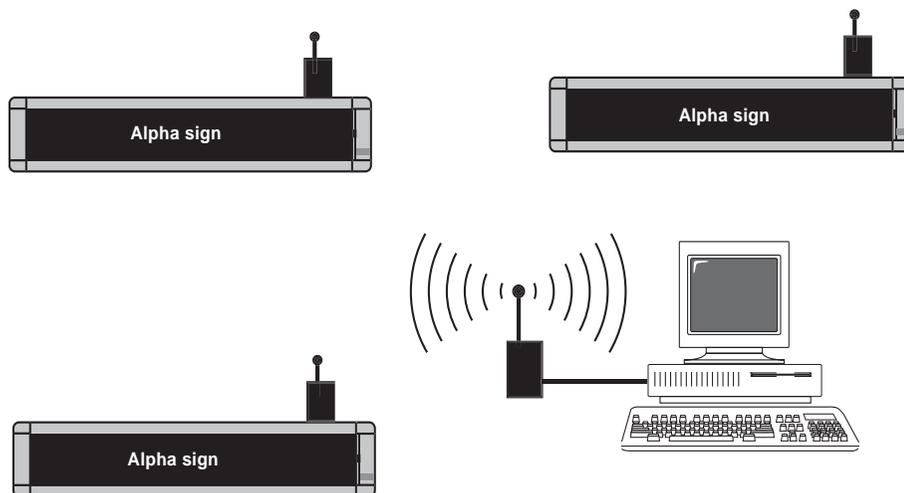
Wireless networks allow you to transfer data between PCs and signs that are not physically connected. A PC communicates with one or more signs through a transceiver (**transmitter/receiver**). One transceiver at the PC (the master transceiver) transmits messages to a second transceiver (the remote transceiver) in or attached to a sign located elsewhere.

There are two types of wireless networks:

- LAWN (Local Area Wireless Network)
- WAWN (Wide Area Wireless Network)

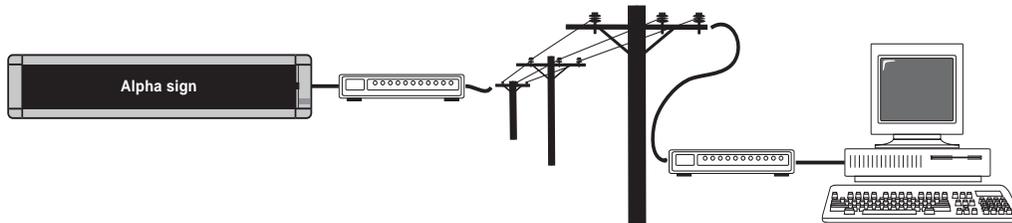
Adaptive Micro Systems does not provide wireless messaging hardware or technical communication services for most Alpha® indoor signs. If you are interested in this type of network, we recommend you visit the following Web sites for more information:

- WaveWare Technologies (<http://www.wirelessmessaging.com>)
- Reach Wireless (<http://www.reachwireless.com>)
- Metrocall/DirectView (<http://www.metrocall.com/directview>)



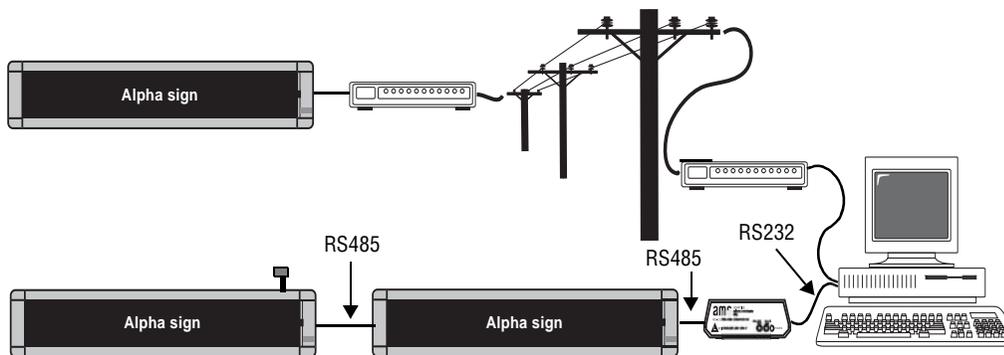
Modem network

This configuration connects signs to a PC through a modem. It is used when the signs and the PCs are a great distance from each other.

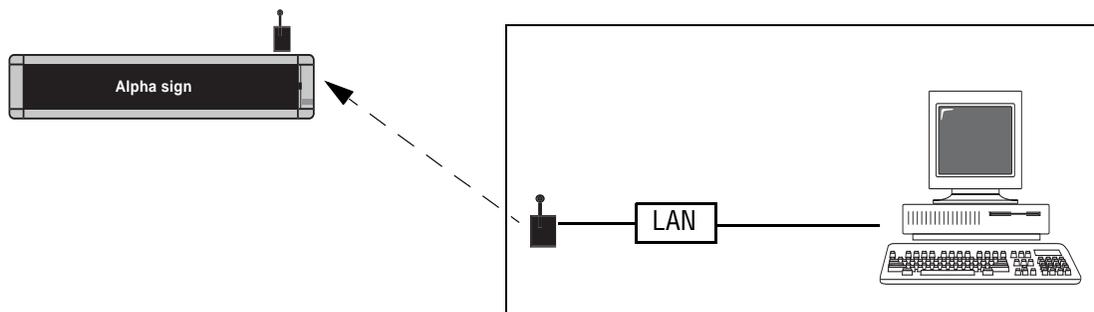


Mixed network

A mixed network involves a combination of two or more network types. In the configuration below, a PC connects to one sign by a modem and additional signs through a serial cable:



In this configuration, a PC on a LAN is connected to an outdoor sign through a wireless network:



Detailed information

To go directly to the type of network you want, use the following:

Network type	Go to page
Wired networks	5
Serial—preliminary information*	5
Serial RS232 (single sign)	7
Serial RS485 (single sign)	7
Serial RS485 (multiple signs)	8
LAN—preliminary information*	9
LAN (single sign)	10
LAN (multiple signs)	11
Modem networks	13
Modem—preliminary information*	13
Modem (single sign)	14
Modem (multiple signs)	15
Mixed networks	16
Wireless networks—transceiver	http://www.wirelessmessaging.com or http://www.reachwireless.com or http://www.metrocall.com/directview
*Contains information you need to know prior to setting up that type of network.	

Wired networks

Serial—preliminary information

With serial connections, either RS232 or RS485 cable is used. Selecting which cable to use depends on the distance from the PC to the sign:

Distance from PC to sign	Recommended cable
Less than 50 feet	RS232 cable
Greater than 50 feet but less than 4000	RS485 cable*
*Additional hardware is needed to accommodate the longer distance.	

All cables should be kept as short as possible to reduce interference and quicken the process of sending the data.

NOTE: Because it will not create toxic fumes, plenum cable (pn 1088-8002 and pn 7122-0283) should be used anytime there is either a potential for fire or where cabling is run near common ventilation, such as in the ceiling, near cold air returns, or as local electrical codes require. Do not use standard cable in these cases (pn 1088-8624 and pn 1088-8636)—RS485 connections only use plenum cable.

On some signs, an internal jumper must be set to either RS232 or RS485 depending on the cabling the sign is using (see “Appendix D—Setting the RS232/RS485 jumper” on page 49 for additional information). Also, some signs may need to be terminated depending upon which type of network and the number of signs you are using (see “Appendix B—End-of-line termination” on page 46 for additional information).

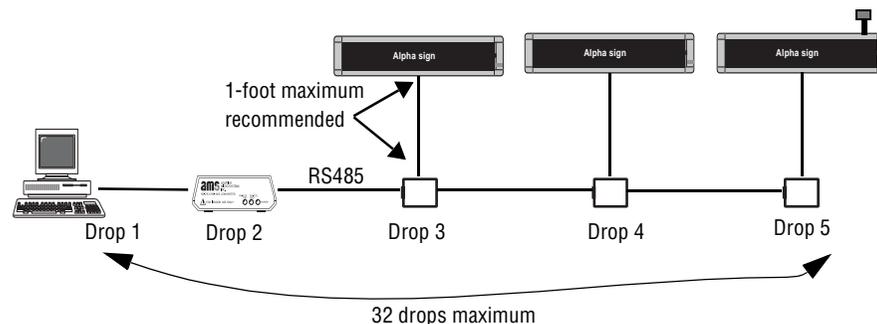
Maximum drops

In an RS485 network, the maximum number of connections (or “taps”) to a network is 32. Taps are also called network drops and they can include PCs, signs, servers, and so on. If more than 32 taps are required, use an RS485 repeater box, which boosts the electrical signal.

NOTE: Star networks, in which a PC is central to all signs on a network in a star pattern, are not recommended.

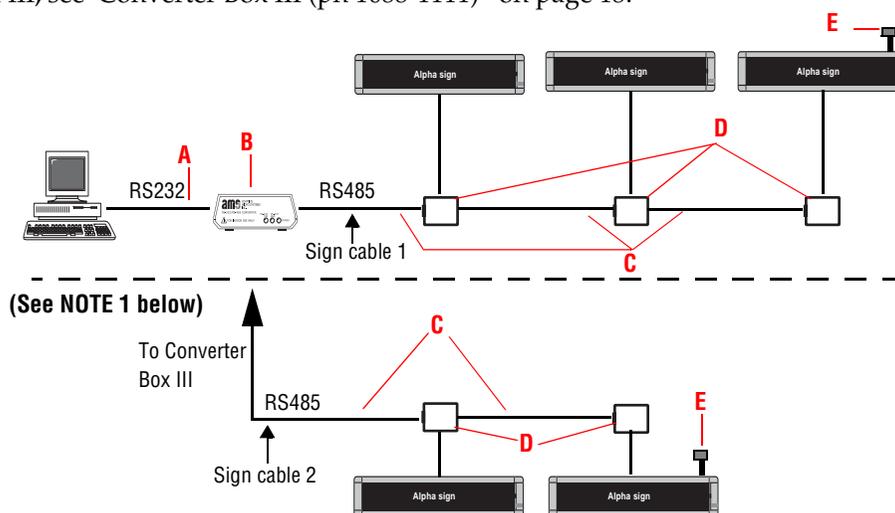
Cable length

In an RS485 network, signs should connect to Modular Network Adapters, similar to phone jacks, with a recommended adapter-to-cable length of 1 foot. This length provides optimum hardware operation and data transmission integrity. However, the 8-foot length will work for most installations and can still be used.



Converter Box III wiring

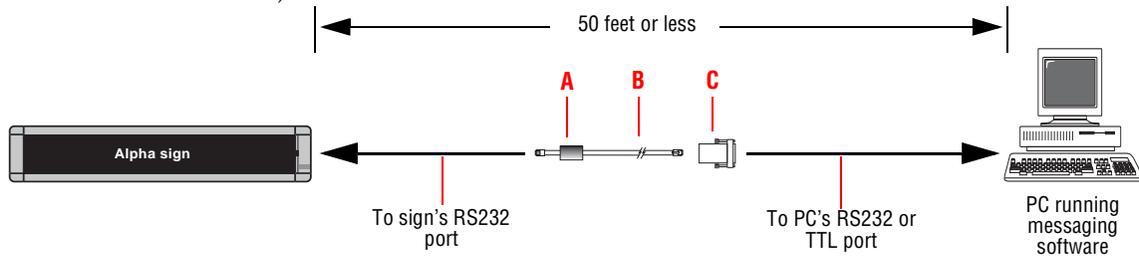
When using a Converter Box III, which converts RS232 signal to RS485, a maximum of two sign cables can connect to the back of it. Therefore, only two “strings” of signs can attach. For more information on the Converter Box III, see “Converter Box III (pn 1088-1111)” on page 18.



Item	Part #	Description
A	1088-8634	Type A9 RS232 cable (connects Converter Box III to PC RS232 port)
B	1088-1111	Converter Box III, set to <i>Terminated</i> for a single sign cable or <i>Unterminated</i> for two sign cables.
C	1088-8624	8-foot RS485 cable
	1088-8636	1-foot RS485 cable
D	4331-0602	Modular Network Adapter
E	1088-9107	End-of-line (EOL) terminator
<p>NOTE 1: The information below the dotted line is the hardware to be added when you want to connect a second sign cable for additional signs. In this situation, the Converter Box III must be set to <i>Unterminated</i>.</p> <p>NOTE 2: Part number 1088-8002, a 1000-foot RS485 shielded plenum cable, can replace pn 1088-8624 or pn 1088-8636.</p>		

RS232—single sign

Use this setup when you want a simple serial (RS232) connection to a PC (one sign to one PC, at a distance of less than 50 feet):

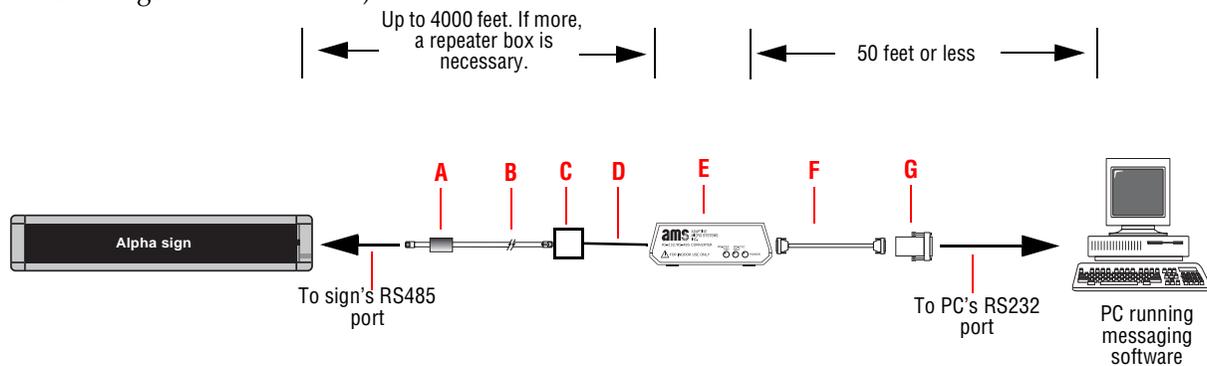


Item	Part #	Description
A	—	Ferrite (ferrite end toward sign)
B	1088-8625	25-foot RS232 cable
	1088-8627	50-foot RS232 cable
C	4370-0001C	RJ11-to-DB25 adapter (for a PC with a 25-pin RS232 port)
	1088-9108	RJ11-to-DB9 adapter (for a PC with a 9-pin RS232 port)

Note: Part number 1036-9010, a 6-conductor RS232 cable, can replace pn 1088-8625 and pn 1088-9108.

RS485—single sign

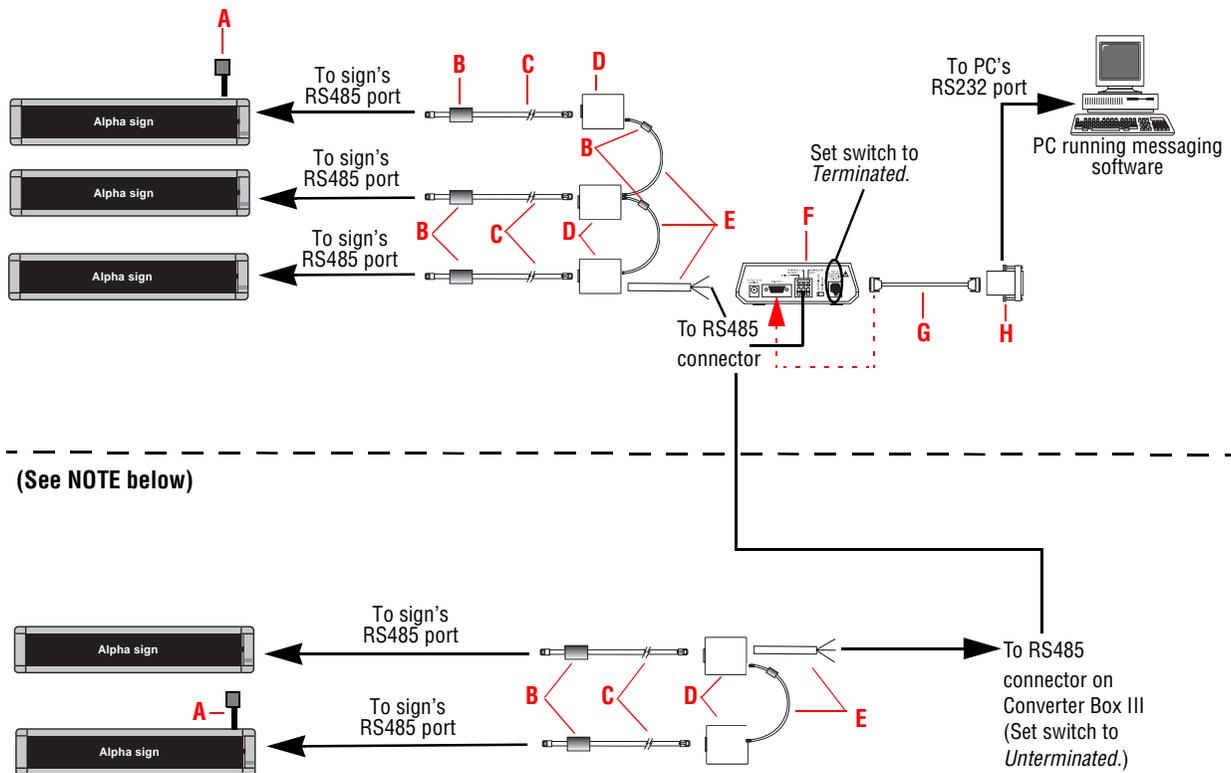
Use this setup when you want a simple serial (RS232) connection to a PC (one sign to one PC, at a distance of greater than 50 feet):



Item	Part #	Description
A	—	Ferrite (ferrite end toward sign)
B	1088-8624	8-foot RS485 cable
	1088-8636	1-foot RS485 cable (recommended)
C	4331-0602	Modular Network Adapter (See "Appendix G—Modular Network Adapter to Converter Box III wiring" on page 57 for specific wiring information.)
D	1088-8002	1000-foot RS485 shielded plenum cable
E	1088-1111	Converter Box III with a Converter Box III AC Adapter: pn 4011-1201 (120 volt) pn 4011-4201 (230 volt)
F	1088-8634	Type A9 RS232 cable (connects Converter Box III to PC RS232 port)
G	—	DB9-to-DB25 adapter (if PC has a 25-pin RS232 port)

RS485—multiple signs

Use this setup when you want to connect a PC to more than one sign (two or more signs to one PC):



Item	Part #	Description
A	1088-9107	End-of-line (EOL) terminator
B	—	Ferrite (ferrite end towards sign)
C	1088-8624	8-foot RS485 cable
	1088-8636	1-foot RS485 cable
D	4331-0602	Modular Network Adapter
E	1088-8002	1000-foot RS485 shielded plenum cable
F	1088-1111	Converter Box III with a Converter Box III AC Adapter: pn 4011-1201 (120 volt) pn 4011-4201 (230 volt)
G	1088-8634	Type A9 RS232 cable (connects Converter Box III to PC RS232 port)
H	—	DB25-to-DB9 adapter (if PC has a 9-pin RS232 port)

NOTE: The information below the dotted line is the hardware to be added when you want the Converter Box III in the middle of the network. In this situation, the Converter Box III must be set to *Unterminated*.

LAN—Preliminary information

The Alpha® Ethernet Adapter, Lantronix MSS100, and Lantronix MSS485 serial servers are used to connect Alpha® signs to an existing TCP/IP network. Serial servers convert data from TCP/IP to serial format and allow you to communicate with Alpha® signs across the room or around the world.

An Alpha® Ethernet Adapter can be mounted on the back of a sign. They draw their power from the sign itself and no separate power supply is needed. The Alpha® Ethernet Adapter and the MSS485 serial server work on a 10BASE-T TCP/IP network and the MSS100 works on a 10BASE-T or a 100BASE-T network. For additional information on serial servers, see “Network interfaces” starting on page 17.

NOTE: Some signs have an internal Alpha® Ethernet Adapter. Other signs, such as the AlphaPremiere™, have an internal Ethernet adapter called a CoBox.

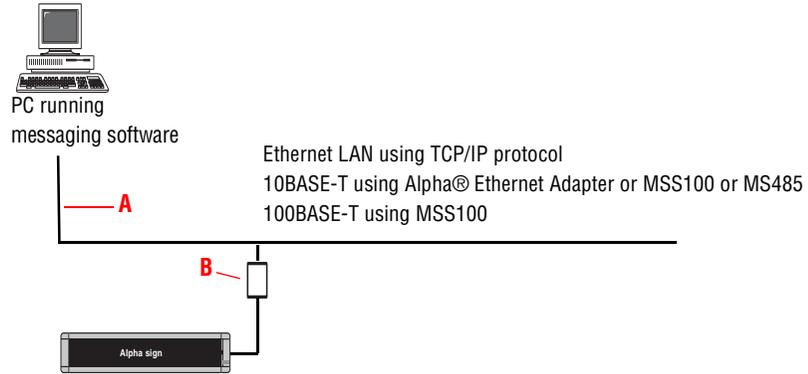
There are three steps to networking Alpha® signs on a TCP/IP network:

1. A unique IP address must be assigned to each serial server prior to setting up the network hardware in order for messages to be sent to a specific sign on the network. See “Appendix H—Assigning an IP address to a serial server” on page 58.
2. Set up the networking hardware using one of the configurations on the following pages.
3. Tasks specific to the messaging software you are using need to be performed once the network hardware has been set up. See “Appendix I—Setting up messaging software for TCP/IP networking” on page 70.

On some signs, an internal jumper must be set to either RS232 or RS485 depending on the cabling the sign is using. See “Appendix D—Setting the RS232/RS485 jumper” on page 49 for more information. Also, some signs may need to be terminated depending upon which type of network and the number of signs you are using. See “Appendix B—End-of-line termination” on page 46.

LAN—single sign

Use this setup when one sign needs to connect to a LAN:

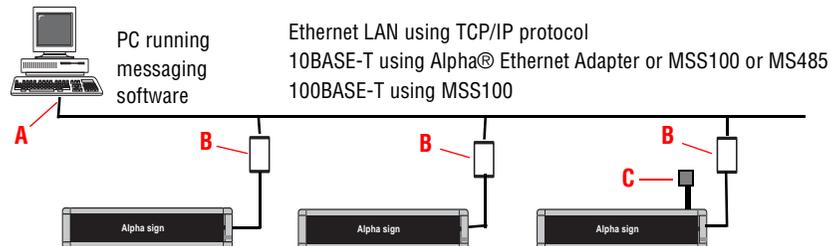


Item	Part #	Description
A	—	The PC must be connected to the Ethernet LAN with a network card.
B	1088-9120	Alpha® Ethernet Adapter kit
	1088-4113A	MSS100 Micro Serial Server
	1088-4112A	MSS485 Micro Serial Server

LAN—multiple signs

TCP/IP network

Use this configuration when connecting signs to a TCP/IP network using unique IP addresses. The number of signs on this network is limited by the number of available IP addresses, but the potential length of the network is unlimited:

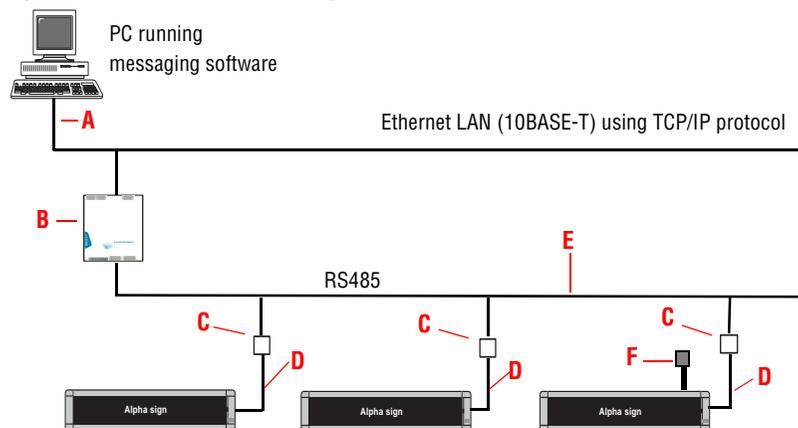


Item	Part #	Description
A	—	This PC must be connected to the TCP/IP network with a network card.
B	1088-9120	Alpha® Ethernet Adapter
	1088-4113A	MSS100 Micro Serial Server
	1088-4112A	MSS485 Micro Serial Server
C	1088-9107	End-of-line (EOL) terminator (if MSS485 is used)

TCP/IP and RS485 network

Use this configuration when connecting multiple signs to a TCP/IP network using only one IP address. One MSS485 Micro Serial Server is used and up to 32 signs can connect to it. Total length of the RS485 network is limited to 4,000 feet at 9600 baud or 9,000 feet at 2400 baud, except if a repeater box is used.

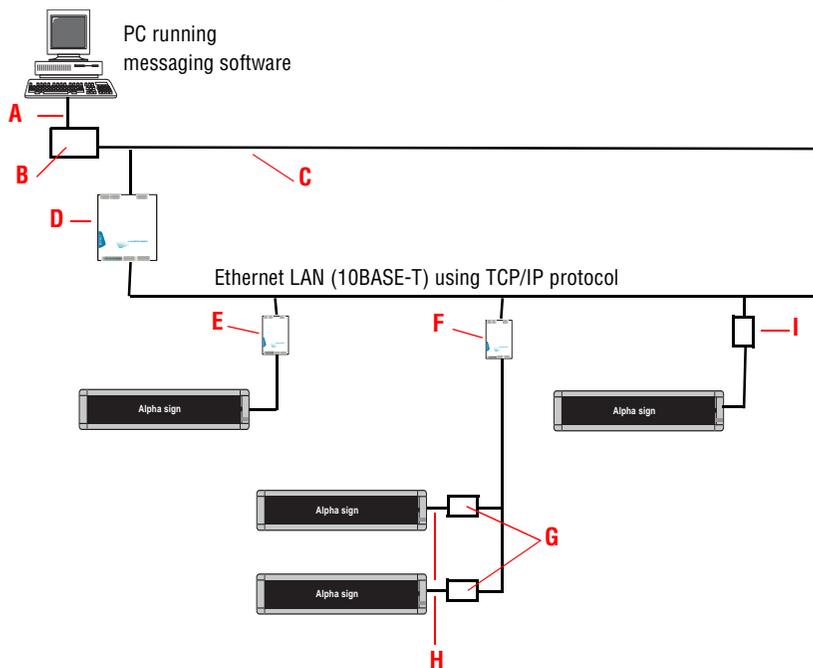
Only one IP address is needed, but each sign on the RS485 network can have its own serial address so it can be sent messages different from other signs:



Item	Part #	Description
A	—	The PC must be connected to the Ethernet LAN with a network card.
B	1088-4112A	MSS485 Micro Serial Server
C	4331-0602	Modular Network Adapter
D	1088-8624	8-foot RS485 cable
	1088-8636	1-foot RS485 cable
E	1088-8002	1000-foot RS485 shielded plenum cable
F	1088-9107	End-of-line (EOL) terminator

Gateway network

Use this configuration when connecting one or more signs to a Gateway network:



Item	Part #	Description
A	—	This PC must be connected to the Ethernet LAN with a network card.
B	—	Alpha® Gateway II interface (varies according to the specific industrial network) Input: 9600 baud, 8 bits, No parity, 1 stop bit, Flow Control=None Output: 9600 baud, 7 bits, Even parity, 2 stop bits, Flow Control=None
C	1088-8002	1000-foot RS485 shielded plenum cable
D	1088-4112A	MSS485 Micro Serial Server (set as local host server)
E	1088-4113A	MSS100 Micro Serial Server (set as remote server)
F	1088-4112A	MSS485 Micro Serial Server (set as remote server)
G	4331-0602	Modular Network Adapter
H	1088-8636	1-foot RS485 cable
	1088-8624	8-foot RS232 cable
I	1088-9120	Alpha® Ethernet Adapter kit

Modem networks

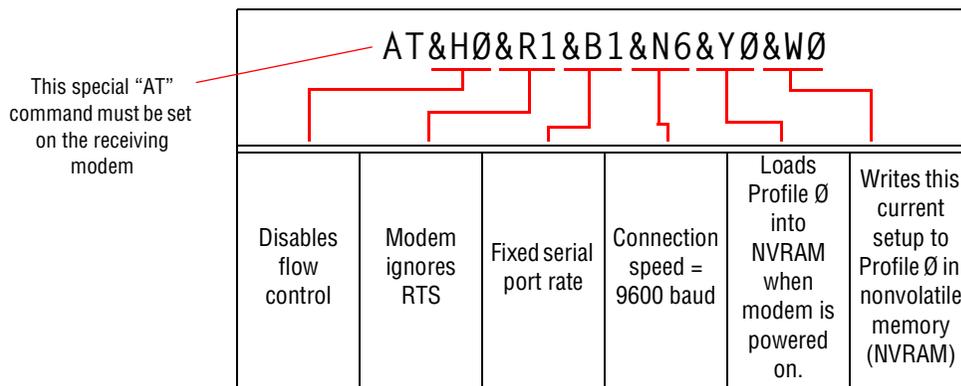
Modem—Preliminary information

In a modem network, messages are sent from the PC to a modem, called the transmitting modem, over telephone wires to another modem, called the receiving modem, and then to a sign. A US Robotics 56K modem is used for the receiving modem and must be configured before it can be used to send data to a sign. The transmitting modem is the responsibility of the sign owner (the same brand is recommended).

If you are using a US Robotics 56K modem for the receiving or transmitting modem, or both, the dip switches on them should be set as follows:



You will need to send commands to the receiving modem from either the modem's software (here, it is US Robotics® *Control Center* software) or Microsoft's *HyperTerminal* software.

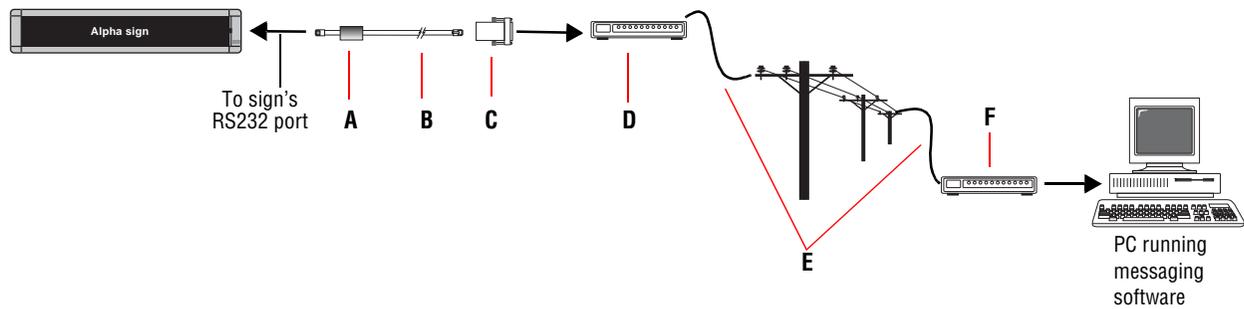


Refer to TechMemo 01-0011, **Modem Setup for Alpha® signs**, for additional information on configuring your modem. Also, since the commands necessary to change the modem's settings vary between modems, the modem's operations manual should always be consulted.

On some signs, an internal jumper must be set to either RS232 or RS485 depending on the cabling the sign is using. See "Appendix D—Setting the RS232/RS485 jumper" on page 49. Also, some signs may need to be terminated depending upon which type of network and the number of signs you are using. See "Appendix B—End-of-line termination" on page 46 for additional information.

Modem—single sign (RS232)

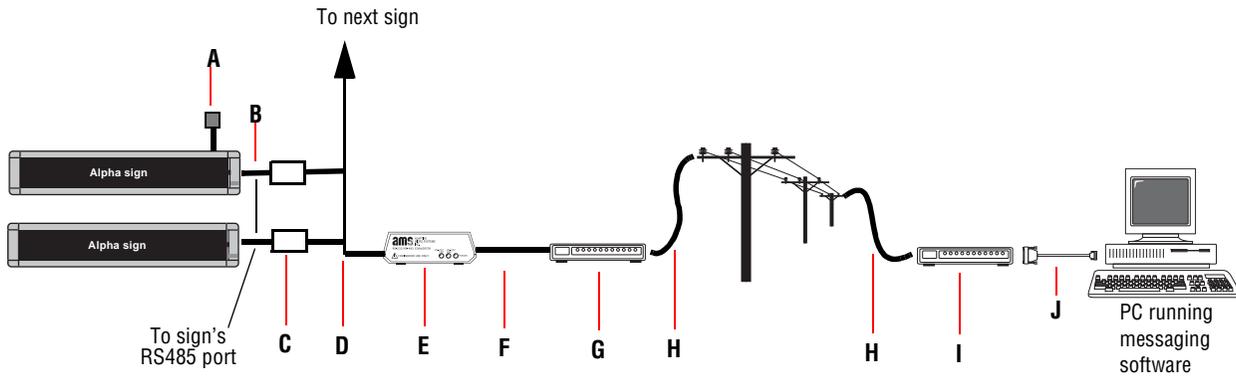
Use this setup when you want to connect a single sign to a modem network:



Item	Part #	Description
A	—	Ferrite (ferrite end toward sign)
B	1088-8625	25-foot RS232 cable
	1088-8627	50-foot RS232 cable
C	—	25 pin sub-D/to 6 pos. RJ11 modem adapter Visit Pacesetter Communications, Inc. at info@pace-setter.com for more information on their part number 2370-0002.
D	US Robotics® 56K Faxmodem	Receiving modem
E	—	Telephone lines
F	US Robotics® 56K Faxmodem	Transmitting modem

Modem—multiple signs (RS485)

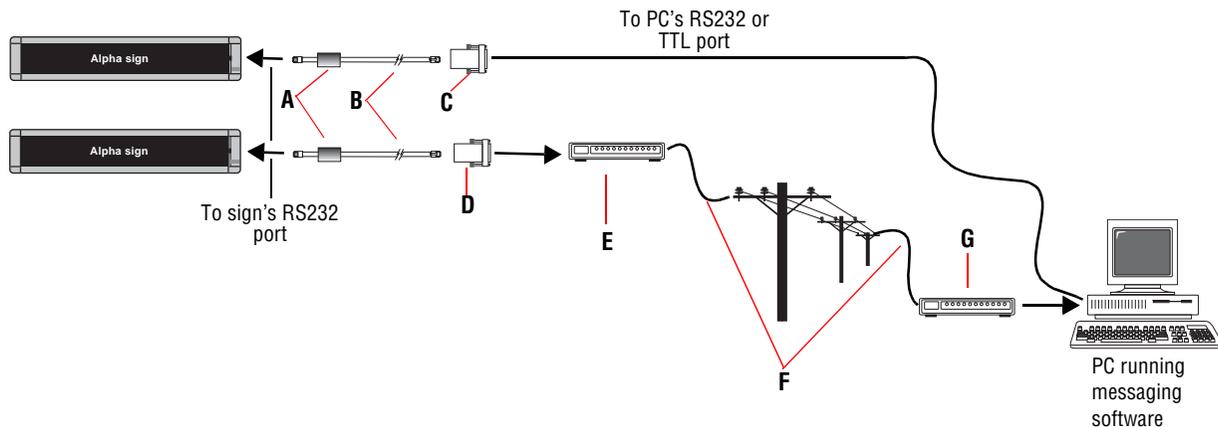
Use this setup when you want to connect multiple signs to a modem network:



Item	Part #	Description
A	1088-9107	End-of-line (EOL) terminator
B	1086-8636	1-foot RS485 cable
C	4331-0602	Modular Network Adapter
D	7122-0283	100-foot RS485 shielded plenum cable
E	1088-1111	Converter Box III with a Converter Box III AC Adapter: pn 4011-1201 (120 volt) pn 4011-4201 (230 volt)
F	1088-8635	10-foot Modem-to-Converter Box cable, DB9 to DB25
G	US Robotics® 56K Faxmodem	Receiving modem
H	—	Telephone line
I	US Robotics® 56K Faxmodem	Transmitting modem
J	Belkin F2L088-06	6-foot Belkin Pro Series AT Serial Modem cable, DB9-to-DB25

Mixed networks

A mixed network is an appropriate choice in many situations. A typical configuration, in which a PC with two COM ports connects to one sign by a modem and additional signs through a serial cable, appears below:



Item	Part #	Description
A	—	Ferrite (ferrite end toward sign)
B	1088-8625	25-foot RS232 cable
	1088-8627	50-foot RS232 cable
C	4370-0001C	RJ11-to-DB25 adapter (for a PC with a 25-pin RS232 port)
	1088-9108	RJ11-to-DB9 adapter (for a PC with a 9-pin RS232 port)
D	—	25 pin sub-D/to 6 pos. RJ11 modem adapter Available from Pacesetter Communications, Inc. at info@pace-setter.com for more information on their part number 2370-0002.
E	US Robotics® 56K Faxmodem	Receiving modem
F	—	Telephone lines
G	US Robotics® 56K Faxmodem	Transmitting modem

NOTE: Part number 1036-9010, a 6-connector RS232 cable, can replace pn 1088-8625 and pn 1088-9108.

Network interfaces

A network interface is used to connect two different types of networks. For example, the Converter Box III is used to join an RS232 and RS485 network. There are two types of network interfaces, PC-to-sign and sign-to-sign.

PC-to-sign interfaces connect a PC to one or more signs. PC-to-sign interfaces include:

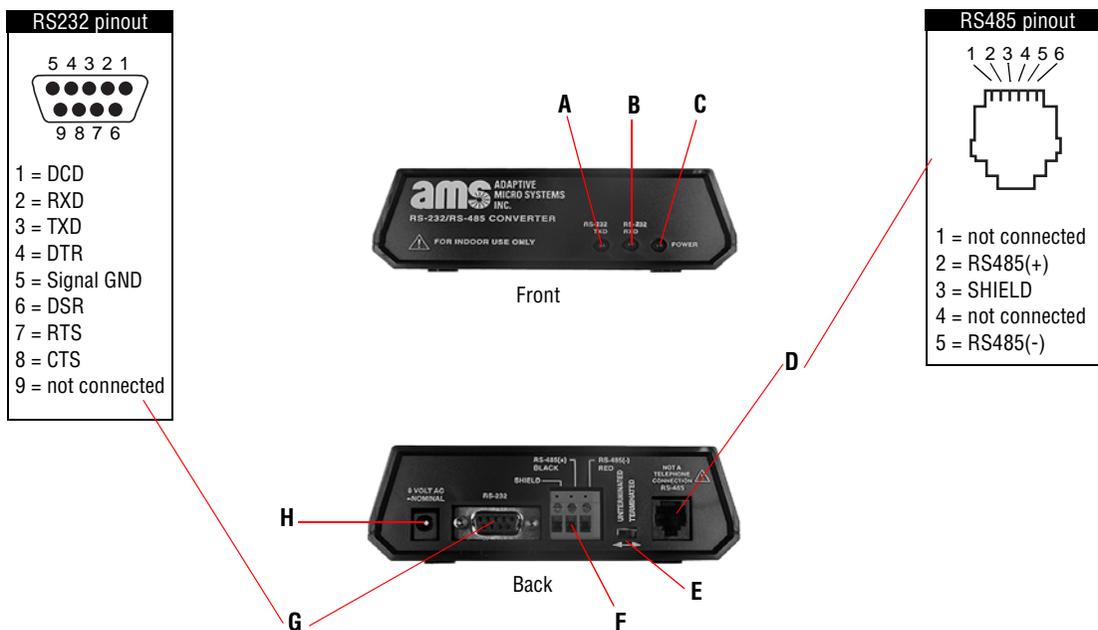
- Converter Box III, which connects a PC's RS232 port to an RS485 network.
- Xircom USB Adapter, which connects a PC's USB port to an RS232 or RS485 network.

Sign-to-sign interfaces connect a sign to a serial or Ethernet (LAN) network. Sign-to-network interfaces include:

- Alpha® Ethernet Adapter, which connects a sign's RS232 port to a 10BASE-T Ethernet network.
- Lantronix MSS100, which connects a sign's RS232 port to a 10BASE-T or 100BASE-T Ethernet network.
- Lantronix MSS485, which connects a sign's RS485 port to a 10BASE-T Ethernet network.

Converter Box III (pn 1088-1111)

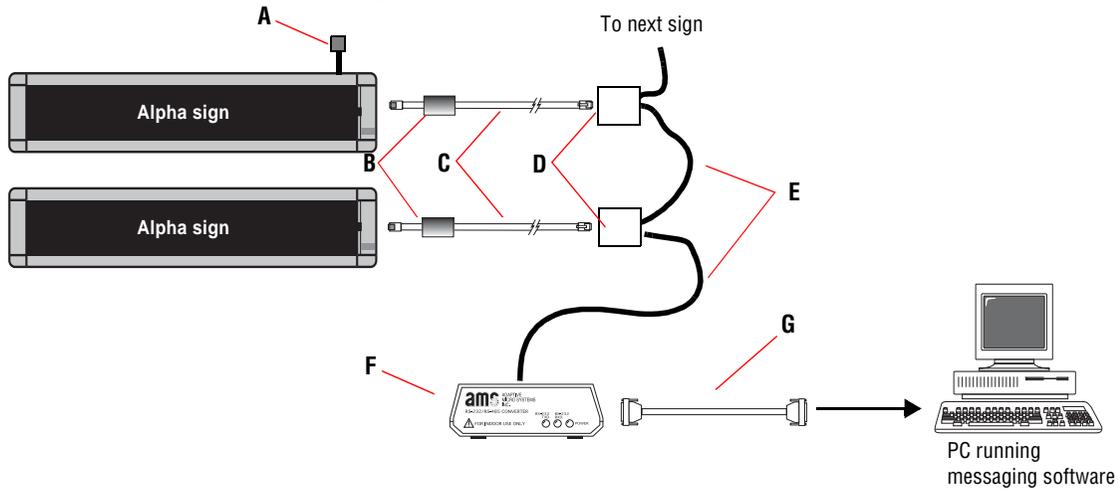
Description



Item	Description
A	RS232 TXD indicator. When lit, indicates that the unit is transmitting data through the RS232 plug and receiving data through one of the RS485 connections.
B	RS232 RXD indicator. When lit, indicates that the unit is receiving data through the RS232 plug and transmitting data through one of the RS485 connections.
C	Power indicator. When lit, indicates that the unit has power.
D	RS485 jack. Connects a single Alpha® sign to the unit. For multiple sign networking, use the RS485 connector block.
E	<p>Termination selector.</p> <p>Set to <i>Terminated</i> if the Converter Box is at one end of a string of signs.</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 5px; margin: 2px;">C</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">S</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">S</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">S</div> <div style="margin-left: 10px;">  </div> </div> <p style="margin-left: 150px;">C=Converter Box S=Sign T=E-O-L terminator</p> <p>Set to <i>Unterminated</i> if the Converter Box is in the middle of a string of signs.</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="margin-right: 10px;">  </div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">S</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">S</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">C</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">S</div> <div style="margin-left: 10px;">  </div> </div> <p style="margin-left: 150px;">C=Converter Box S=Sign T=E-O-L terminator</p> <p>See "Appendix B—End-of-line termination" on page 46 for more information on terminating signs.</p>
F	RS485 connector block. Connects multiple Alpha® signs to a network.
G	RS232 plug. Connects to a PC's RS232 port.
H	Power plug. Supplies 9 VAC to the unit.

Typical use

Used to connect a PC's RS232 port to an RS485 network:



Item	Part #	Description
A	1088-9107	End-of-line (EOL) terminator
B	—	Ferrite (ferrite end toward sign)
C	1088-8624	8-foot RS485 cable
	1086-8636	1-foot RS485 cable
D	4331-0602	Modular Network Adapter
E	1088-8002	1000-foot RS485 shielded plenum cable
	7122-0283	100-foot RS485 shielded plenum cable
	7122-0284	100-foot RS485 outdoor shielded plenum cable
F	1088-1111	Converter Box III with a Converter Box III AC Adapter: pn 4011-1201 (120 volt) pn 4011-4201 (230 volt)
G	1088-8634	Type A9 RS232 cable (connects Converter Box III to PC RS232 port)

Xircom USB Adapter

Description

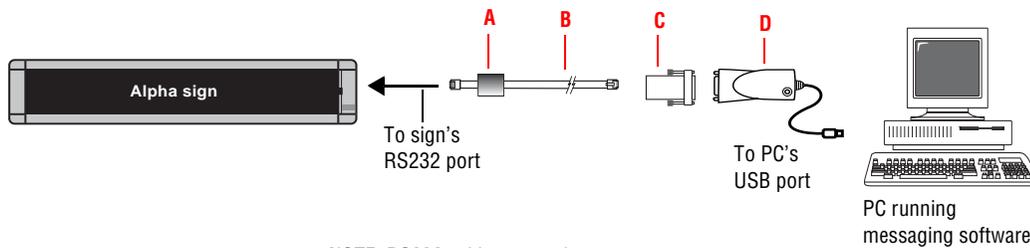


Item	Description
A	RS232 serial DB9 male connector data out
B	USB male connector data in
C	LED indicator light: <ul style="list-style-type: none"> • Red—Power on • Green or amber—Transmitting data • No light—No operation

Typical use

Used to connect a PC's USB port to an RS232 or RS485 network:

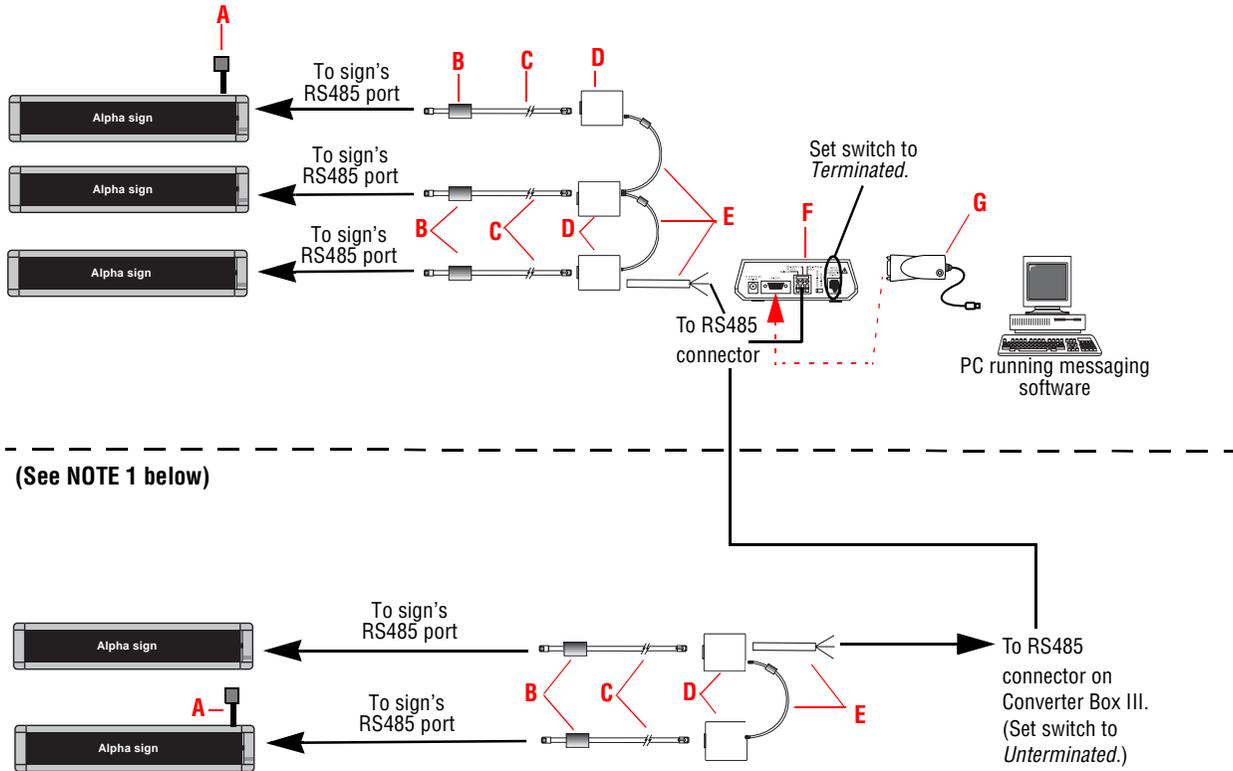
Single sign connection



NOTE: RS232 cable connection can not exceed 50 feet in total length.

Item	Part	Description
A	—	Ferrite (ferrite end toward sign)
B	1088-8625	25-foot RS232 cable
	1088-8627	50-foot RS232 cable
C	1088-9108	RJ11-to-DB9 adapter
D	—	Xircom® PortGear™ USB-to-DB9 serial adapter
NOTE: Part number 1036-9010, a 6-connector RS232 cable, can replace pn 1088-8625 and pn 1088-9108.		

Multiple sign connection



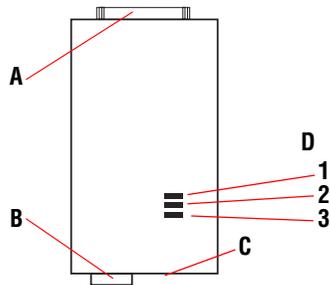
Item	Part #	Description
A	1088-9107	End-of-line (EOL) terminator (must be plugged into the RS232 or TTL plug on last sign)
B	—	Ferrite (ferrite end towards sign)
C	1088-8624	8-foot RS485 cable
	1088-8636	1-foot RS485 cable
D	4331-0602	Modular Network Adapter
E	1088-8002	1000-foot RS485 shielded plenum cable
F	1088-1111	Converter Box III with a Converter Box III AC Adapter: pn 4011-1201 (120 volt) pn 4011-4201 (230 volt)
G	—	Xircom® PortGear™ USB-to-DB9 serial adapter

NOTE 1: The information below the dotted line is the hardware to be added when you want the Converter Box III in the middle of the network. In this situation, the Converter Box III must be set to *Unterminated*.

NOTE 2: The internal jumper in some Alpha® signs must be set to RS485. See “Appendix D—Setting the RS232/RS485 jumper” on page 49.

Alpha® Ethernet Adapter

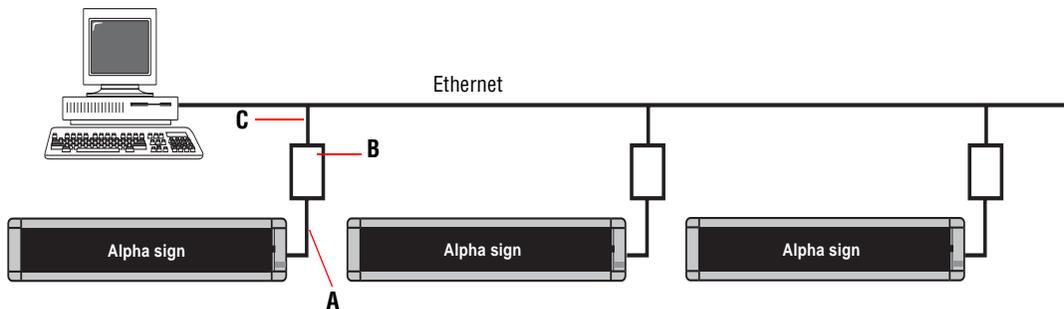
Description



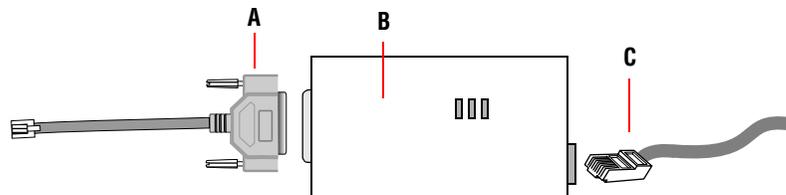
Item	Description
A	DB25 serial port
B	RJ45 TCP/IP port
C	Reset button
D	LED diagnostic lights 1 = ACT (activity) 2 = LNK (network line/connection) 3 = PWR (power)

Typical use

Used to connect a sign's RS232 port to a 10BASE-T Ethernet network:



(Detail)



Item	Part #	Description
A	1088-9317	8-inch Ethernet cable, RJ11-to-DB25 (female)
B	1088-9120	Alpha® Ethernet Adapter Kit
C	—	TCP/IP cable (10BASE-T only)

Additional information

The Alpha® Ethernet Adapter works with the following signs:

- 215C, 215R
- 220C (all shipped after February 1, 2000)
- 300C series
- 4000C, 4000R series (using RS232 jumper and jack)
- 7000C series (using RS232 jumper and jack)
- Alpha® Big Dot
- AlphaVision™ FS
- BetaBrite® one-line displays (P1026, P1036 and P1040), including 213C and BetaBrite® Window Display
- BetaBrite® Director (all shipped after July 1, 2000)
- Personal Priority Display™ (PPD™)

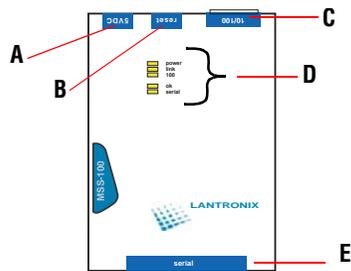
The Alpha® Ethernet Adapter does *not* work with the following signs:

- 210C
- 220C (all shipped prior to February 1, 2000)
- 420
- 790i
- AlphaEclipse™
- AlphaPremiere™
- AlphaVision™ CM, FM, 1.4", 2.1"
- AlphaVision™ Video Screen (VS)
- AlphaVision™ InfoTracker (IT) – works with MSS485 only
- AlphaTicker™ – works with MSS485 only
- BetaBrite Director® (all shipped before July 1, 2000)
- Solar™

For the most recent update, refer to TechMemo 99-0002, **Valid Adaptive signs for the ALPHA Ethernet Adapter.**

Lantronix MSS100 (pn 1088-4113A)

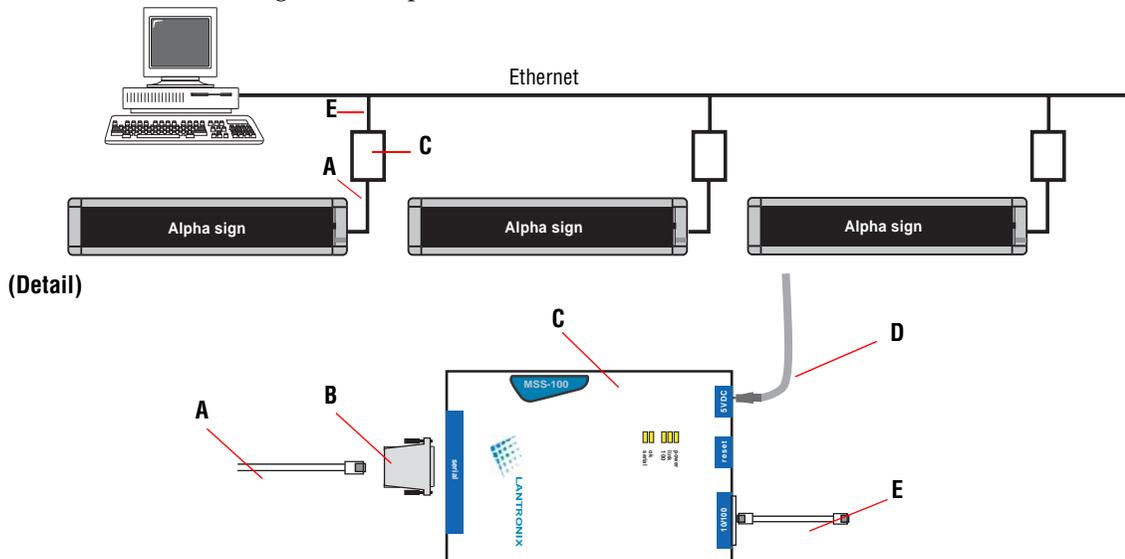
Description



Item	Description
A	Power connection (5 volt only)
B	Reset button
C	RJ45 TCP/IP port
D	LED diagnostic lights 1. Power 2. Link (network link/connection) 3. 100 4. OK 5. Serial
E	DB25 serial port (for RS232 connections)

Typical use

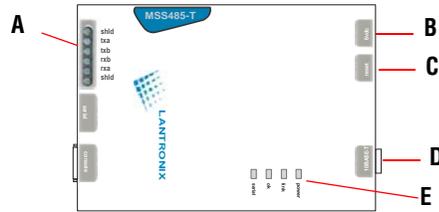
Used to connect a sign's RS232 port to a 10BASE-T or 100BASE-T Ethernet network:



Item	Part #	Description
A	1088-8625	25-foot RS232 cable
	1088-8627	50-foot RS232 cable
B	4370-0001C	DB25-to-RJ11 adapter
C	1088-4113A	MSS100 Micro Serial Server
D	—	Power cable (connects to the power, 5 volt only)
E	—	TCP/IP cable (connects to 10BASE-T or 100BASE-T TCP/IP)

Lantronix MSS485 (pn 1088-4112A)

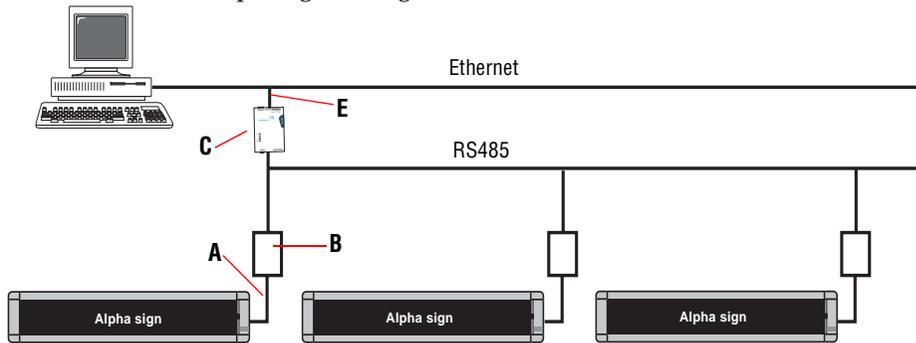
Description



Item	Description
A	Wiring terminal block
B	Power connection (6 volt only)
C	Reset button
D	RJ45 TCP/IP port
E	LED diagnostic lights 1 = Power 2 = Link (network link/connection) 3 = OK 5 = Serial

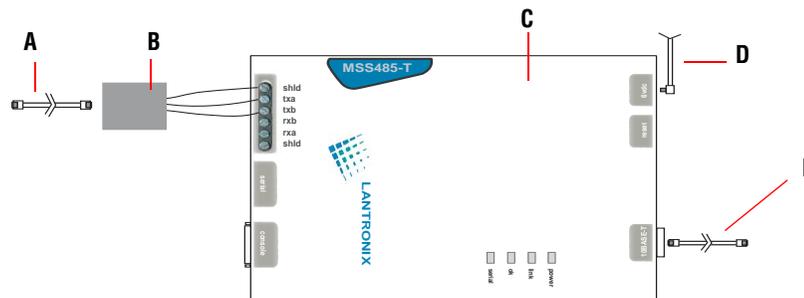
Typical use

Used to connect to multiple signs using one serial server.



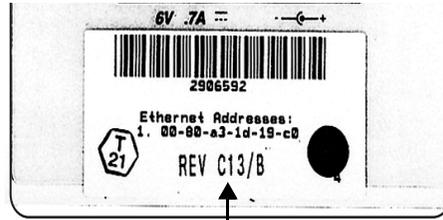
The sign's serial address will allow you to talk to one sign at a time instead of broadcast.

(Detail)

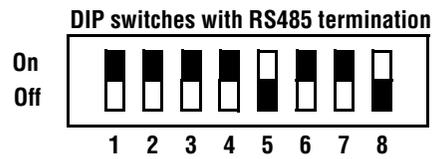


Item	Part #	Description
A	1088-8624	8-foot RS485 cable
	1088-8636	1-foot RS485 cable
B	4331-0602	Modular Network Adapter
C	1088-4112A	MSS485 Micro Serial Server
D	—	Power cable (6 volt only)
E	—	TCP/IP cable (10BASE-T only)

Additional information



Revision C13/B or later is needed.
 Earlier versions may not work correctly.
 If you experience difficulty, contact your
 Customer Account Specialist.



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

Network cables and adapters

Overview

Networking hardware is not possible without cables and adapters. Cables, or wires, connect pieces of a network together. Adapters convert one format to another:

- physical (type of plug)
- electrical (configuration of wiring)
- electronic (computer/monitor interface)

The following information describes the typical use and pinouts of the most commonly used networking cables and adapters.

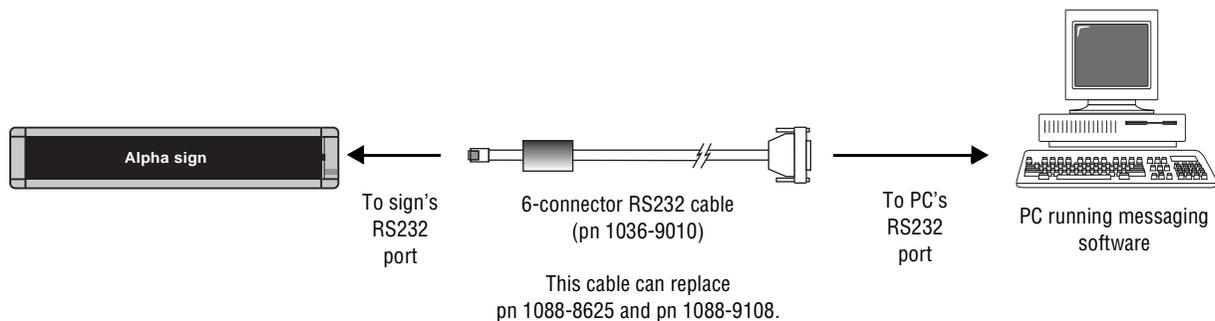
25-foot RS232 cable (pn 1036-9010)

Description



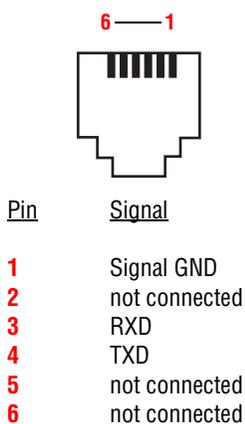
Typical use

Used as part of an RS232 connection between a PC with a DB9 (9-pin) COM port and a sign so that messages can be sent to the sign from the PC:

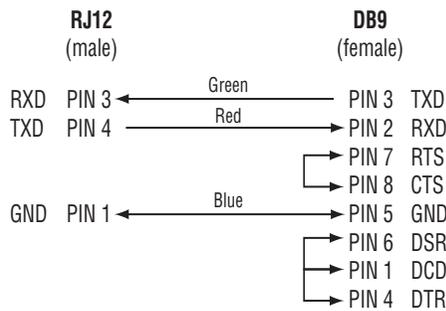
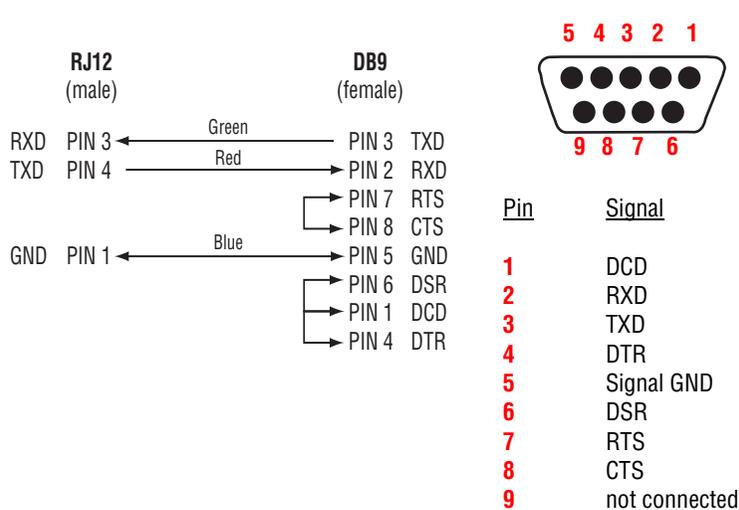


Pinouts

RJ12
(male)



DB9
(female)



3-foot 6-conductor cable (pn 1088-8621)

Description

Left jack
RJ12 (male)

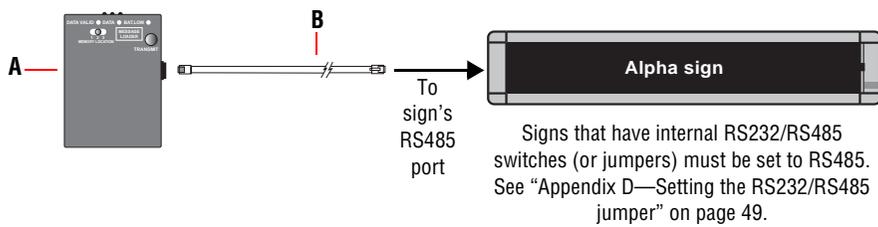


Right jack
RJ12 (male)

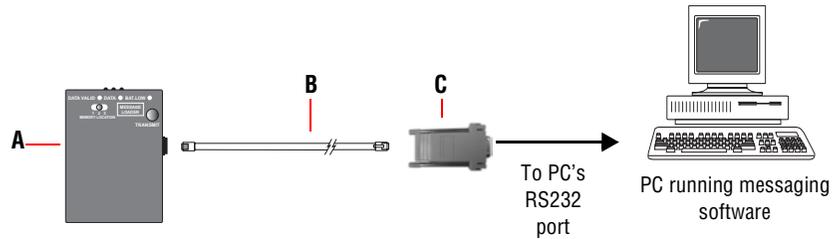
Typical use

Used to connect an IR Message Loader to a sign or to a PC:

IR Message Loader to Alpha® sign



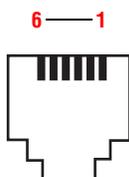
IR Message Loader to PC



Item	Part #	Description
A	1071-1113	IR Message Loader
B	1088-8624	8-foot RS485 cable
C	1088-9108	RJ11-to-DB9 connector

Pinouts

RJ12
(male)



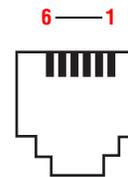
RJ12
(to IR Message Loader)

GND PIN 1
RS485(+) PIN 2
RXD PIN 3
TXD PIN 4
RS485(-) PIN 5
+5V PIN 6

RJ12
(to Alpha® sign or computer)

White PIN 1 GND
Black PIN 2 RS485(+)
Red PIN 3 RXD
Green PIN 4 TXD
Yellow PIN 5 RS485(-)
Blue PIN 6 +5V

RJ12
(male)



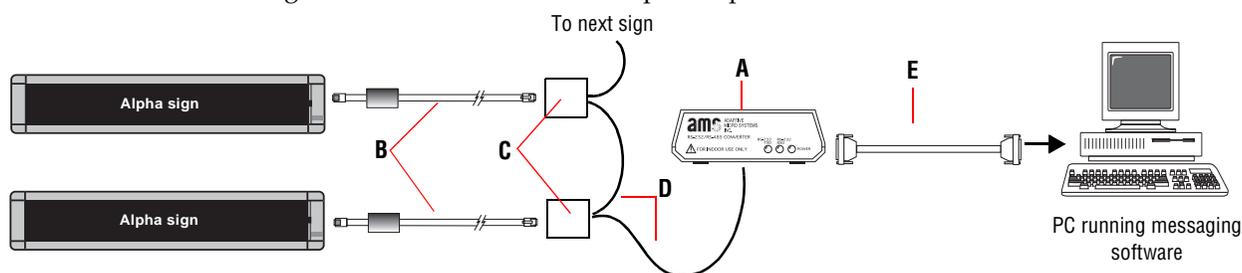
8-foot RS485 cable (pn 1088-8624)

Description



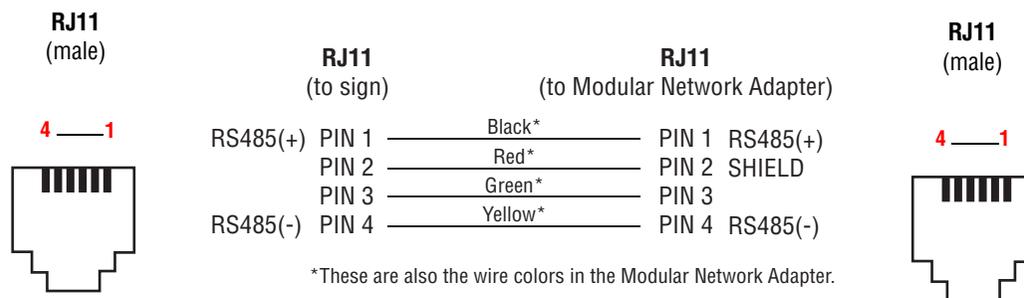
Typical use

Used to connect a sign to a Modular Network Adapter as part of an RS485 network:



Item	Part #	Description
A	1088-1111	Converter Box III with a Converter Box III AC Adapter: pn 4011-1201 (120 volt) pn 4011-4201 (230 volt)
B	1088-8624	8-foot RS485 cable
	1086-8636	1-foot RS485 cable
C	4331-0602	Modular Network Adapter
D	1088-8002	1000-foot RS485 shielded plenum cable
	7122-0283	100-foot RS485 shielded plenum cable
	7122-0284	100-foot RS485 outdoor shielded plenum cable
E	1088-8634	Type A9 RS232 cable (connects Converter Box III to PC RS232 port)

Pinouts



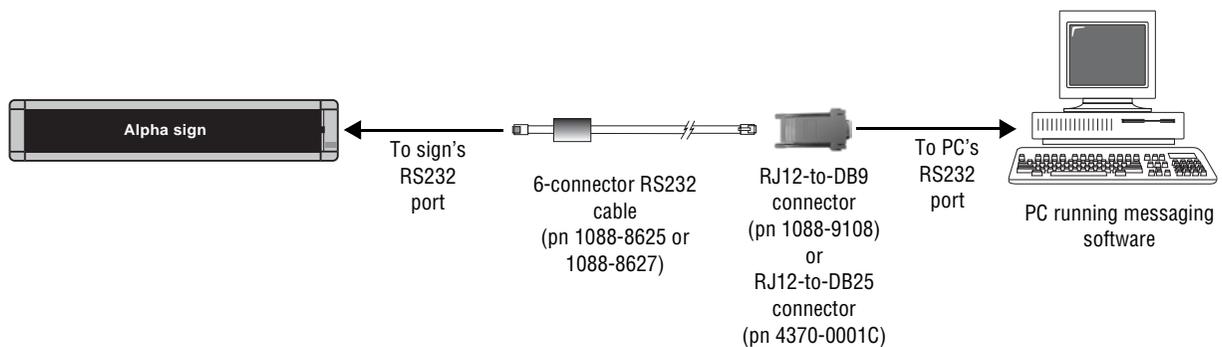
25-foot RS232 cable (pn 1088-8625)

Description

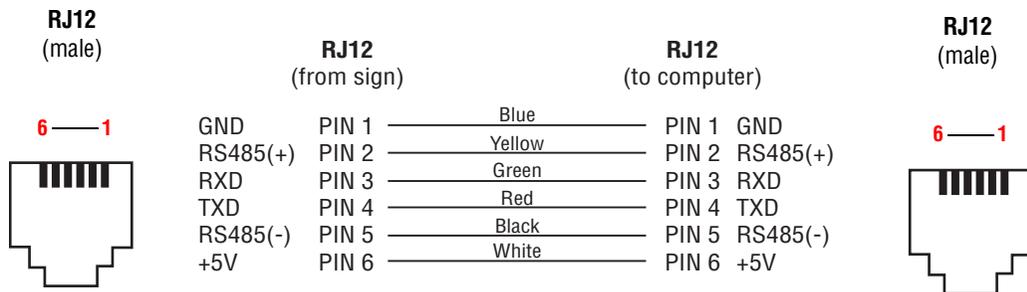


Typical use

Used as part of an RS232 connection between a PC with a DB25 (25-pin) or DB9 (9-pin) COM port and a sign so that messages can be sent to the sign from the PC:



Pinouts



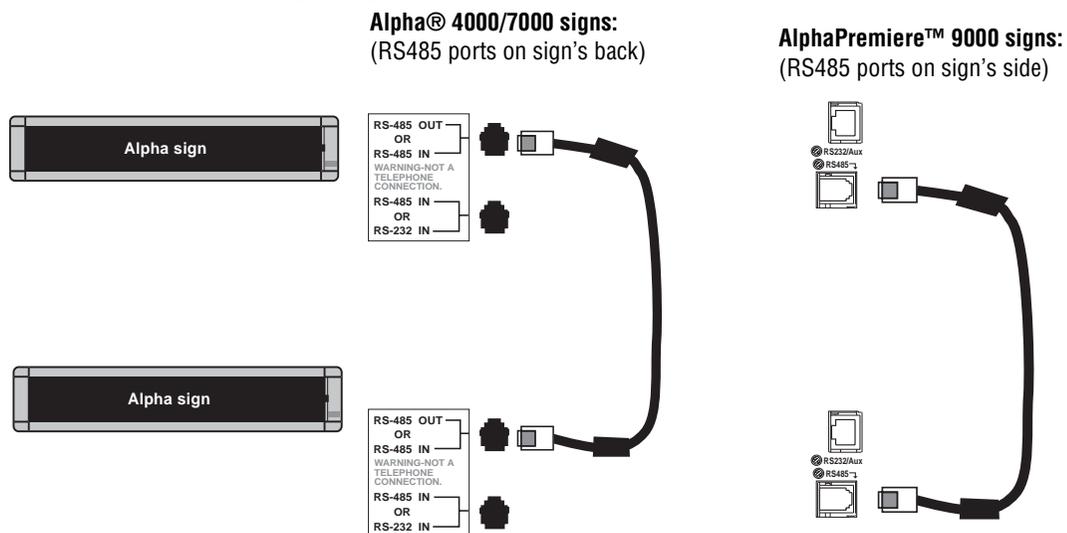
8-foot RS485 back-to-back cable (pn 1088-8626)

Description

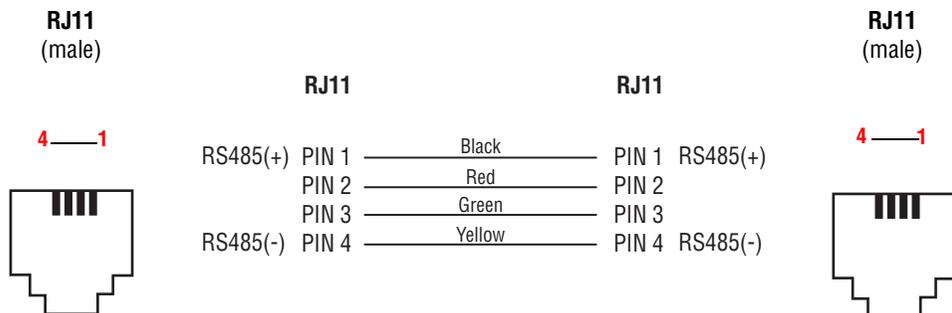


Typical use

Used to connect two signs together into an RS485 network:



Pinouts



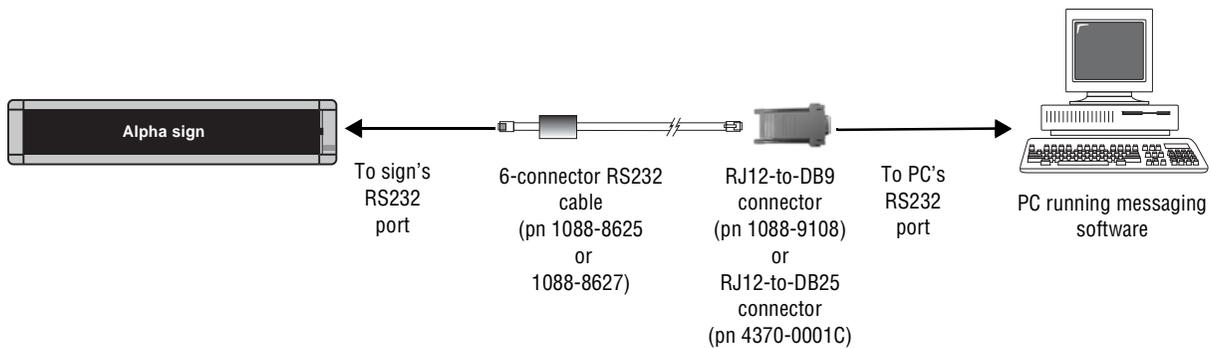
50-foot RS232 cable (pn 1088-8627)

Description



Typical use

Used as part of an RS232 connection between a PC with a DB25 (25-pin) or DB9 (9-pin) COM port and a sign so that messages can be sent to the sign from the computer:



Pinouts



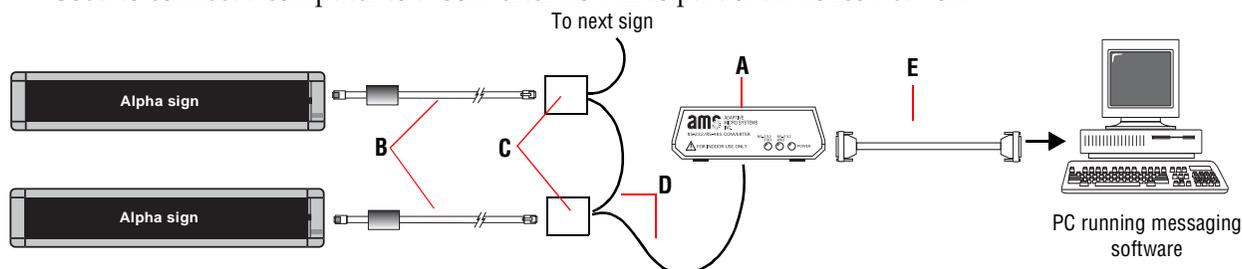
10-foot computer-to-Converter Box III Type A9 RS232 cable (pn 1088-8634)

Description



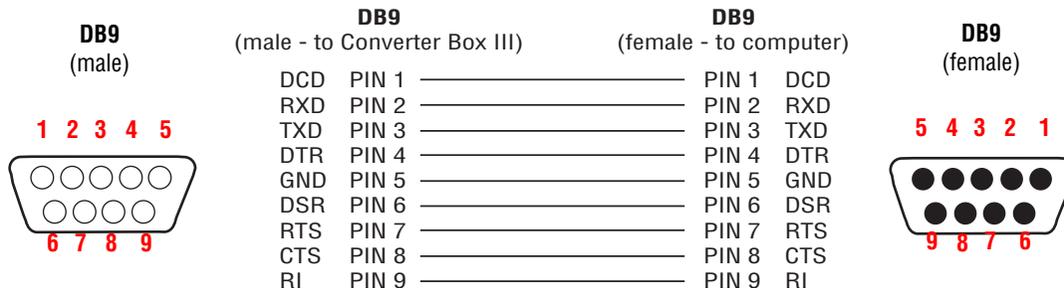
Typical use

Used to connect a computer to a Converter Box III as part of an RS485 network:



Item	Part #	Description
A	1088-1111	Converter Box III with a Converter Box III AC Adapter: pn 4011-1201 (120 volt) pn 4011-4201 (230 volt)
B	1088-8624	8-foot RS485 cable
	1086-8636	1-foot RS485 cable
C	4331-0602	Modular Network Adapter
D	1088-8002	1000-foot RS485 shielded plenum cable
	7122-0283	100-foot RS485 shielded plenum cable
	7122-0284	100-foot RS485 outdoor shielded plenum cable
E	1088-8634	Type A9 RS232 cable (connects Converter Box III to PC RS232 port)

Pinouts



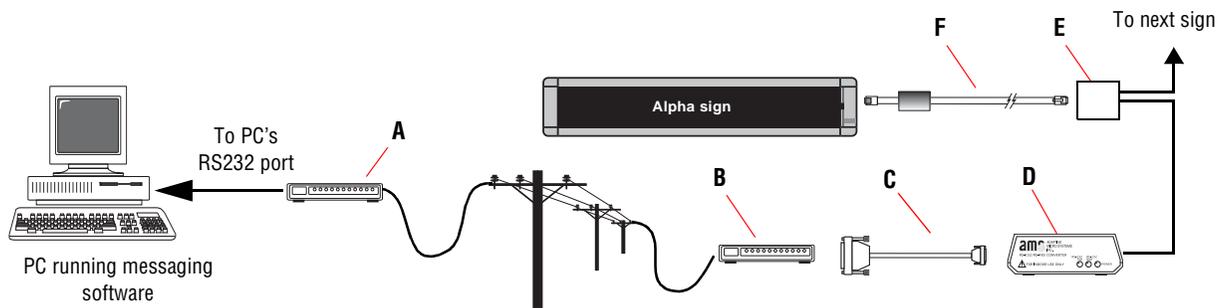
10-foot modem-to-Converter Box III Type B9 RS232 cable (pn 1088-8635)

Description



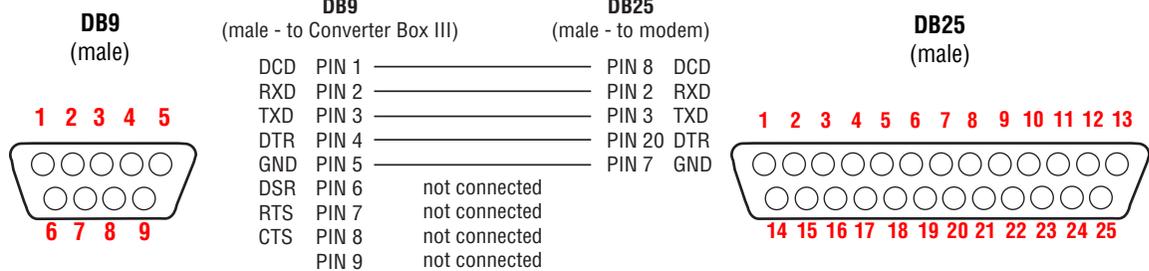
Typical use

Used to connect a sign to a Modular Network Adapter as part of an RS485 network:



Item	Part #	Description
A	—	Transmitting modem
B	—	Receiving modem
C	1088-8635	10-foot Modem-to-Converter Box RS232 cable, DB9 to DB25
D	1088-1111	Converter Box III with a Converter Box III AC Adapter: pn 4011-1201 (120 volt) pn 4011-4201 (230 volt)
E	4331-0602	Modular Network Adapter
F	1088-8624	8-foot RS485 cable
	1086-8636	1-foot RS485 cable

Pinouts



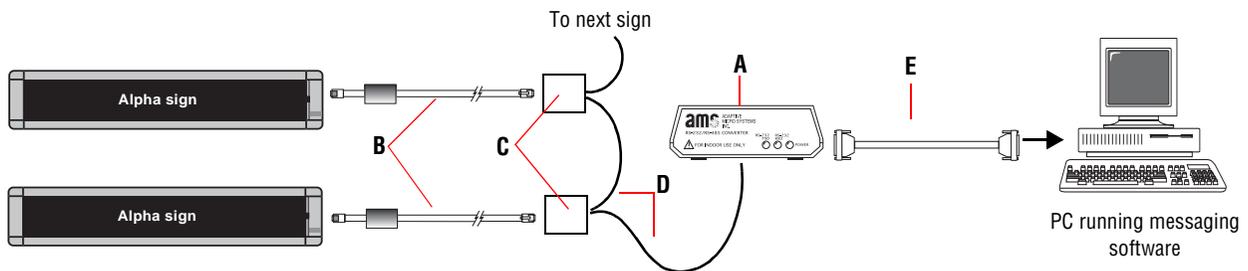
1-foot RS485 cable (pn 1088-8636)

Description



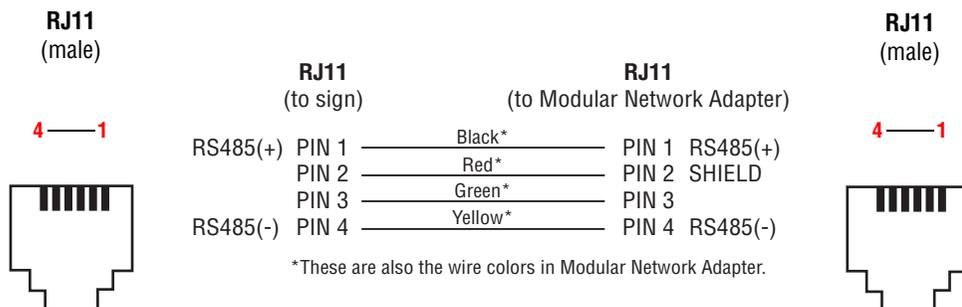
Typical use

Used to connect a sign to a Modular Network Adapter as part of an RS485 network:



Item	Part #	Description
A	1088-1111	Converter Box III with a Converter Box III AC Adapter: pn 4011-1201 (120 volt) pn 4011-4201 (230 volt)
B	1088-8624	8-foot RS485 cable
	1086-8636	1-foot RS485 cable
C	4331-0602	Modular Network Adapter
D	1088-8002	1000-foot RS485 shielded plenum cable
	7122-0283	100-foot RS485 shielded plenum cable
	7122-0284	100-foot RS485 outdoor shielded plenum cable
E	1088-8634	Type A9 RS232 cable (connects Converter Box III to PC RS232 port)

Pinouts



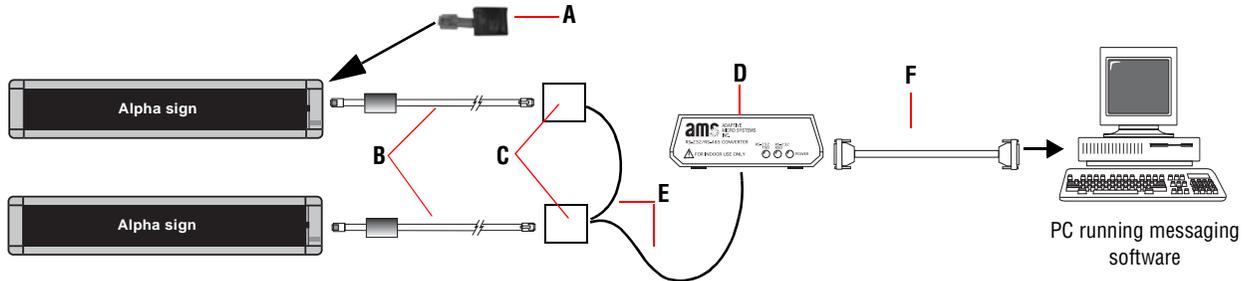
End-of-Line (EOL) terminator (pn 1088-9107)

Description



Typical use

Connects to the RS232 (or TTL) plug of the first or last sign on an RS485 network:



Item	Part #	Description
A	1088-9107	End-of-Line (EOL) terminator
B	1088-8624	8-foot RS485 cable
	1086-8636	1-foot RS485 cable
C	4331-0602	Modular Network Adapter
D	1088-1111	Converter Box III with a Converter Box III AC Adapter: pn 4011-1201 (120 volt) pn 4011-4201 (230 volt)
	1088-8002	1000-foot RS485 shielded plenum cable
	7122-0283	100-foot RS485 shielded plenum cable
	7122-0284	100-foot RS485 outdoor shielded plenum cable
F	1088-8634	Type A9 RS232 cable (connects Converter Box III to PC RS232 port)

Pinouts

RJ12
(male)

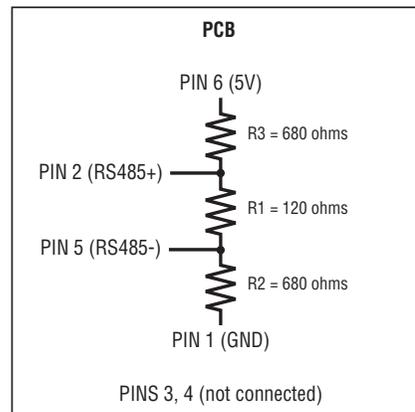
6 — 1



RJ12

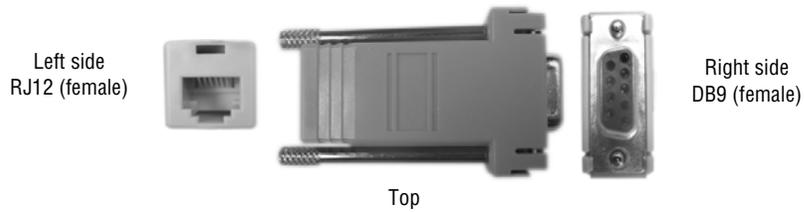
PIN 1	Blue	PIN 6
PIN 2	Yellow	PIN 5
PIN 3	Green	PIN 4
PIN 4	Red	PIN 3
PIN 5	Black	PIN 2
PIN 6	White	PIN 1

PCB



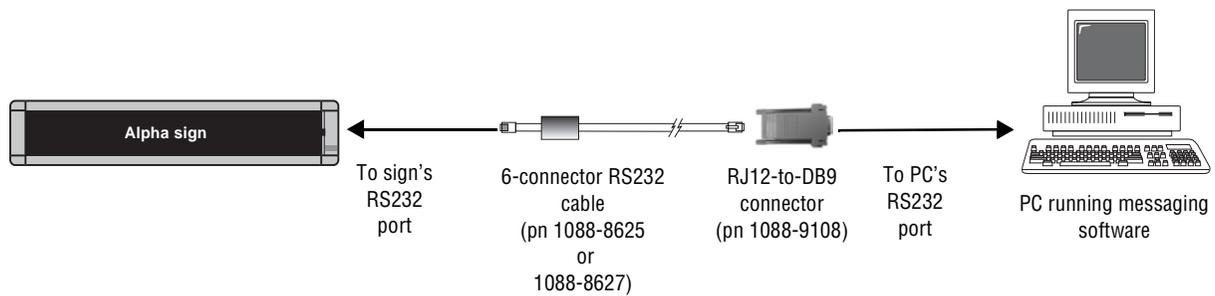
RJ12-to-DB9 adapter (pn 1088-9108)

Description

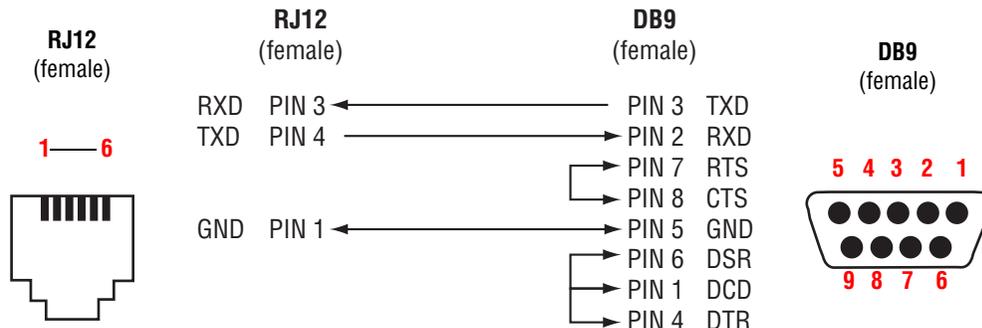


Typical use

Used as part of an RS232 connection between a computer with a DB9 (9-pin) COM port and a sign so that messages can be sent to the sign from the PC:



Pinouts



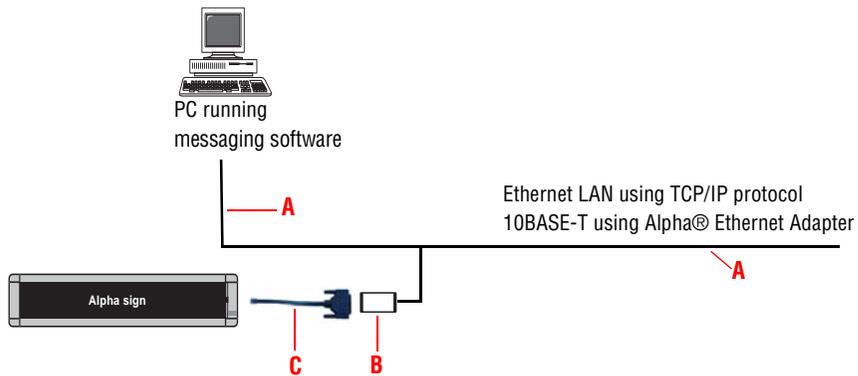
8-inch Ethernet cable (pn 1088-9317)

Description



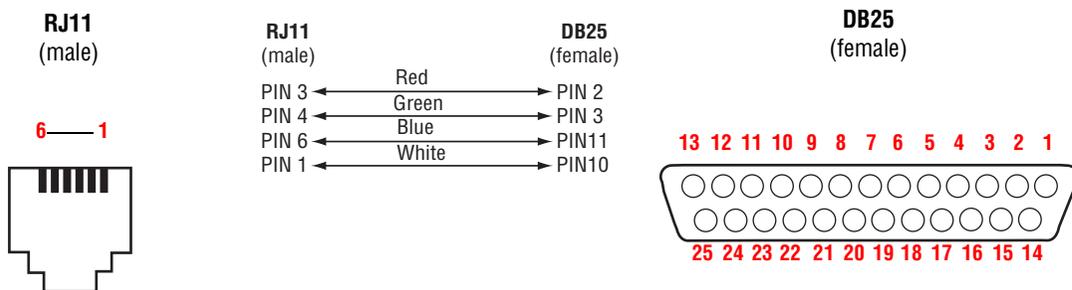
Typical use

Used to connect a sign to an Alpha® Ethernet Adapter on an Ethernet LAN using TCP/IP protocol:



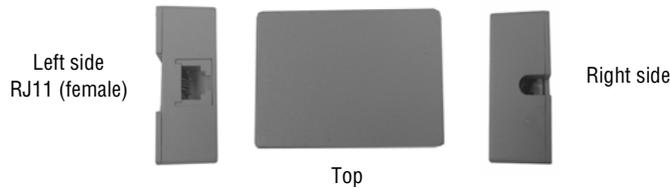
Item	Part #	Description
A	—	The PC must be connected to the Ethernet LAN with a network card.
B	1088-9120	Alpha® Ethernet Adapter kit
C	1088-9317	8-inch Ethernet cable

Pinouts



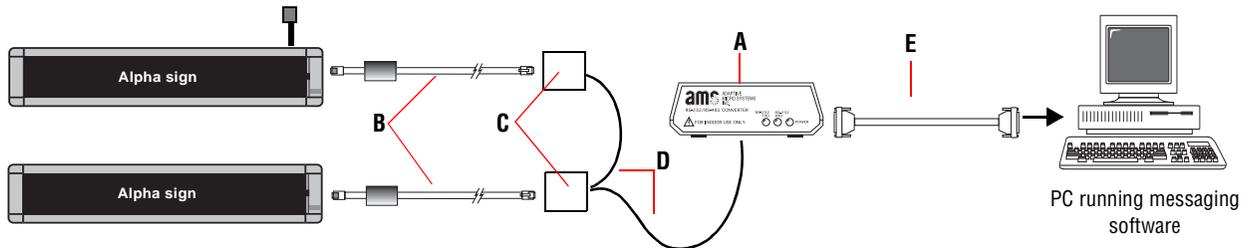
Modular Network Adapter (pn 4331-0602)

Description



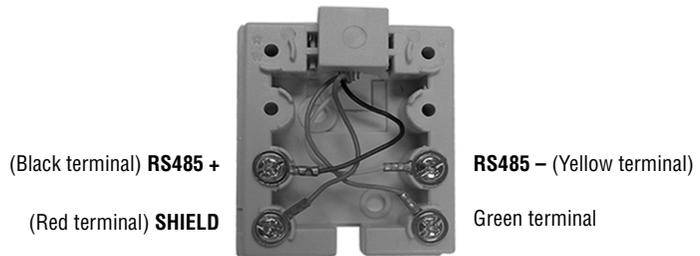
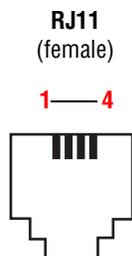
Typical use

Used to connect a PC to a Converter Box III as part of an RS485 network:



Item	Part #	Description
A	1088-1111	Converter Box III with a Converter Box III AC Adapter: pn 4011-1201 (120 volt) pn 4011-4201 (230 volt)
B	1088-8624	8-foot RS485 cable
	1086-8636	1-foot RS485 cable
C	4331-0602	Modular Network Adapter
D	1088-8002	1000-foot RS485 shielded plenum cable
	7122-0283	100-foot RS485 shielded plenum cable
	7122-0284	100-foot RS485 outdoor shielded plenum cable
E	1088-8634	Type A9 RS232 cable (connects Converter Box III to PC RS232 port)

Pinouts

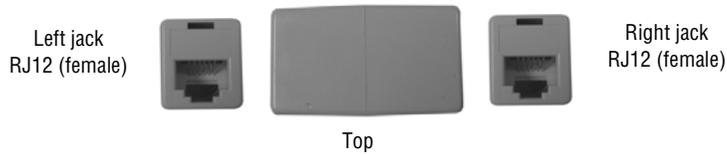


Pin	Signal
1	RS485 +
2	SHIELD
3	Not connected (Green terminal)
4	RS485 -

NOTE: Connecting the SHIELD depends on the sign to which you are connecting it. In other words, if a Modular Network Adapter is connected to an Alpha® Personal Priority Display sign, then connect the two SHIELD wires together from each RS485 cable. However, do NOT connect the connected SHIELD wires to the Red terminal.

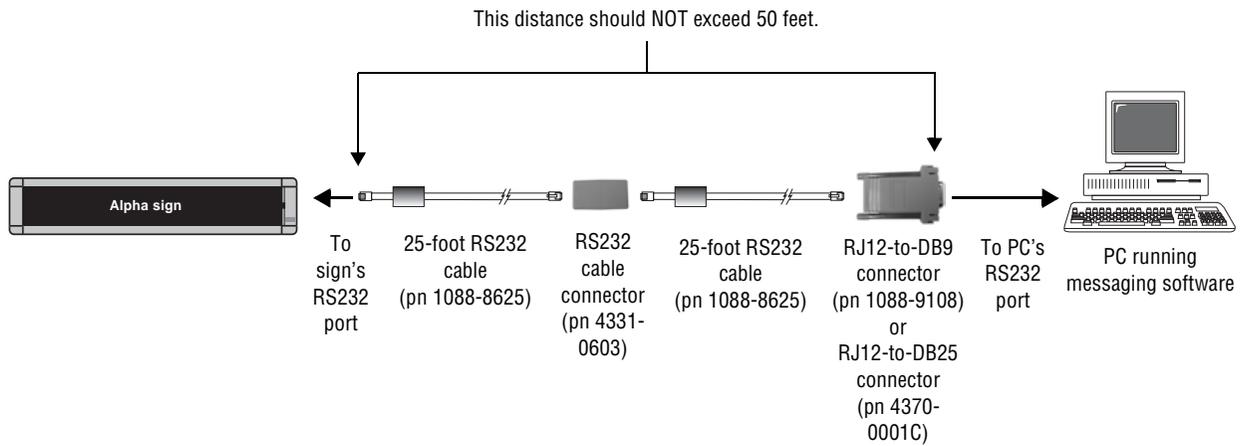
RS232 cable connector (pn 4331-0603)

Description

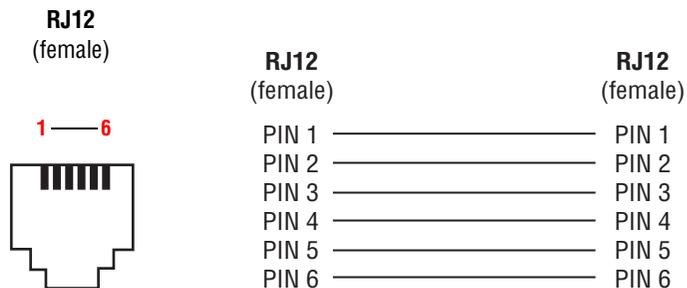


Typical use

Used as part of an RS232 sign network to connect two lengths of 25-foot RS232 cable:



Pinouts



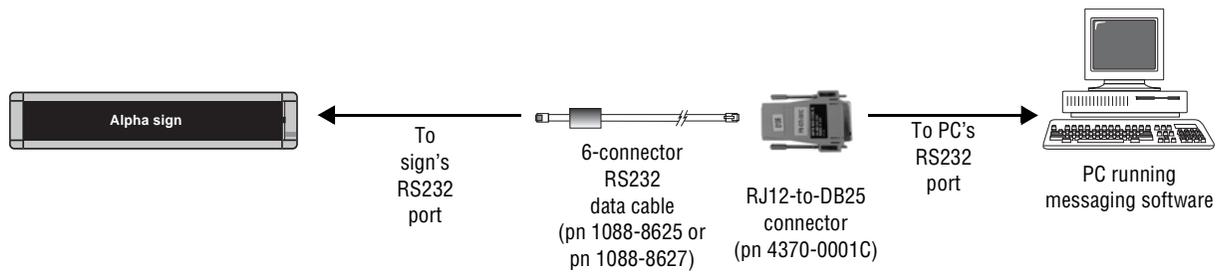
RJ12-to-DB25 adapter (pn 4370-0001C)

Description

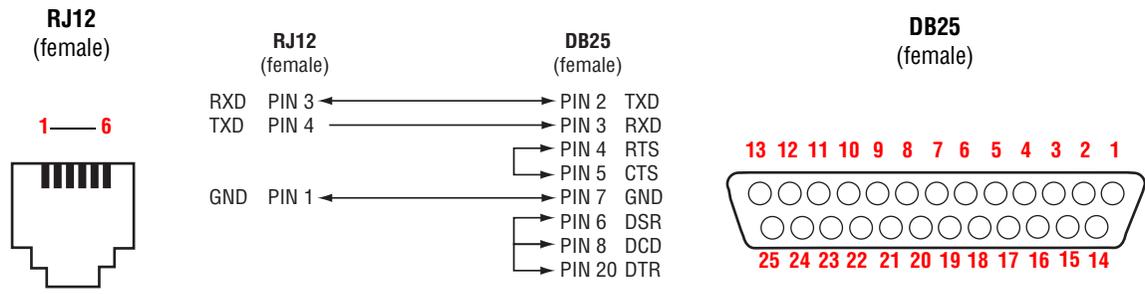


Typical use

Used as part of an RS232 connection between a PC with a DB25 (25-pin) COM port and a sign so that messages can be sent to the sign from the PC:



Pinouts



Network messaging software

Overview

Messaging software is used to create messages on your PC and then send them to Alpha® signs. Depending on the software and sign you use, different features and functions are available to help you personalize your messages:

- Text color
- Fonts
- Modes (flashing or rotating text, for example)
- Time and date insertion
- Graphics
- Animation
- Message simulation

Alpha® Messaging Software

Alpha® Messaging Software is a software program that controls text on standard Alpha® signs. The software includes a Configuration Utility, as well as allows you to preview the text of your message on a sign. You can also specify message attributes, such as presentation styles and idle time, insert the time and date into a message, and select from available display animations.

Alpha® Messaging Software works with serial networks and can send messages to a single Alpha® sign.

AlphaNET™ Software

AlphaNET™ 2.0 is a full-featured software program that controls text and graphics on standard Alpha® signs. The software includes a Message Editor and a Site Editor, and full message simulation allows you to preview a message as it will appear on a sign prior to sending it. Image editing software is also included with AlphaNET™ 2.0 to help you create and edit graphics and animations.

AlphaNET™ 2.0 software works with serial, modem, and LAN networks and can send messages to any individual sign or group of signs.

Smart Alec® Software

Smart Alec® is an extensive software system which can acquire real-time data from manufacturing, warehousing, or other data collection software systems, as well as manual input. Smart Alec prioritizes, schedules, and delivers this information to Alpha® signs, E-mail systems, and alphanumeric pagers. The program includes a Message Manager, Command Manager, Variable Rule Manager, and other system managers, as well as various start-up and advanced utilities.

Smart Alec® works with all types of networks and runs in TCP/IP network environments on PCs with either a Windows® 95, Windows® 98, or Windows® NT operating system. Multiple signs can be connected to the PC or LAN, and Smart Alec® can send messages to any individual sign or groups of signs.

Alpha® Marquee ActiveX® Control

The Alpha® Marquee ActiveX® Control is a development tool that allows programmers to rapidly interface Alpha® signs to any application that supports the use of ActiveX controls. The control comes complete with everything needed to trigger alarms, string messages, and display real-time information on a static display. It communicates to any Alpha® sign through a serial or LAN connection.

Appendix

Appendix A—Related documentation

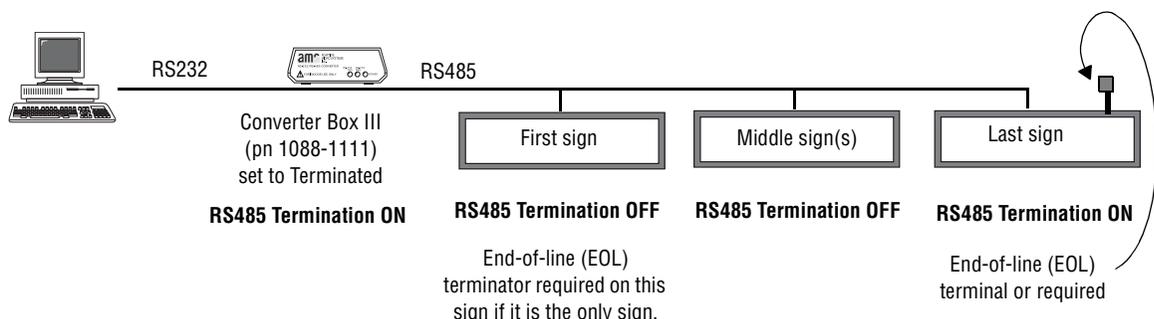
The following documentation may be useful with this manual and can be found on Adaptive’s Web site at <http://www.ams-i.com/Pages/techdoc.htm>.

Part #	Document name	Description
9701-0202	Messaging Software User Manual	Provides step-by-step examples of how to use messaging software.
9702-2005	Alpha® Director™ Sign User Manual	Explains how to set up the aluminum Director™ and includes instructions for basic operating procedures and messaging with the Remote Control.
9704-0002	Alpha Remote Control Programming	Explains how to use the Remote Control to create and send messages to display signs.
9705-1002C	Alpha®Solar™ Series Installation Manual	Describes how to mount the sign, set up the electrical connection, and connect the sign to a PC. Also discusses the basic operation of the sign.
9707-1003	IR Message Loader Instructions	Explains how to use the infrared message loader to transfer messages between display signs and PCs.
9707-7004	ALPHA® NEMA Series Sign Installation Instructions	Explains how to install Alpha® NEMA series signs.
9708-8081	AlphaNet™ 2.0 User Manual	Explains how to install and use the version 2.0 software for AlphaNet™ (formerly called AlphaNet plus™ for Windows®.) Lengthy examples show how to set up and send messages to a network of signs.
9709-2030	Smart Alec Version 3.0 User Manual	Describes how to use the Smart Alec version 3.0 software. Includes basic background, plus setting up and managing the system, as well as advanced functions.
9711-2401B	AlphaTicker™ Installation Instructions	Describes how to install and network AlphaTicker™ signs.
9711-4201C	AlphaPremiere™ 9000 Series Installation Manual	Explains how to install Series 9000 signs.
9711-6009	AlphaEclipse™ 3500 Series Installation and Service Manual	Provides comprehensive setup, installation, troubleshooting, and field repair for AlphaEclipse™ 3500 series outdoor signs.
9711-6501B	AlphaEclipse™ 1500 Series Installation Manual	Explains how to install, set up, and wire the sign and temperature probe. Also provides routine service and technical specifications.
TechMemo 01-0003	Installing a USB-to-DB9 adapter to connect a sign to a PC	Describes how to network signs to a PC with a USB port using the Xircom USB adapter.
TechMemo 01-0011	Modem setup for Alpha® signs	Describes how to set up the transmitting and receiving modems to Alpha® signs.

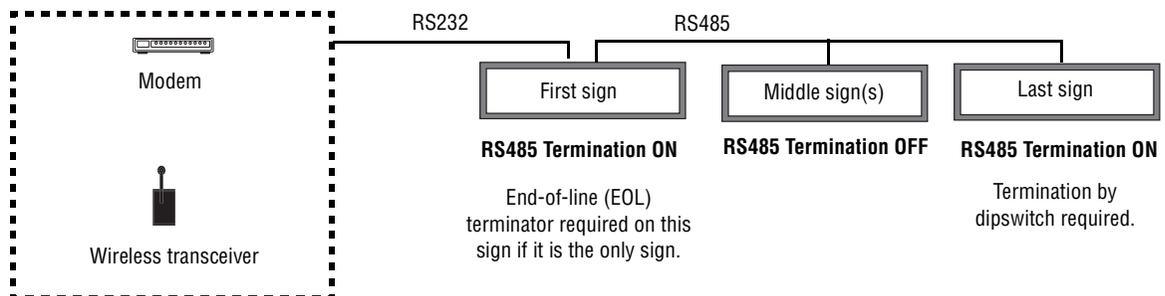
Appendix B—End-of-line termination

When an Alpha® sign is at the end of an RS485 network, a special end-of-line (EOL) terminator is required for the first and last sign. The EOL terminator plugs into the sign’s RS232/TTL port and stops the flow of communication.

On an RS485 network, the PC that sends messages to the networked signs is wired directly to one of the signs using a Converter Box III, which converts the computer’s RS232 signals to RS485 signals. In this case, the Converter Box III must be terminated instead of the first sign in the network. To terminate a Converter Box III, set the switch on the back of the unit to *Terminated*:



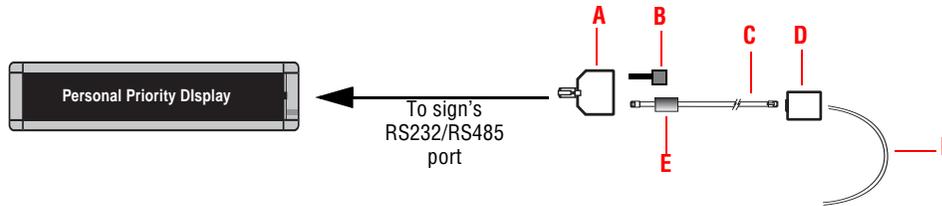
Sometimes, the PC that sends messages to the networked signs is not directly connected to any of the signs. Instead, the PC sends messages to a modem or wireless transceiver attached to the signs. The messages are then relayed to the other signs in the network (using a special feature called RS485 echo):



For more information on RS485 echo, see “Appendix C—RS485 echo” on page 48.

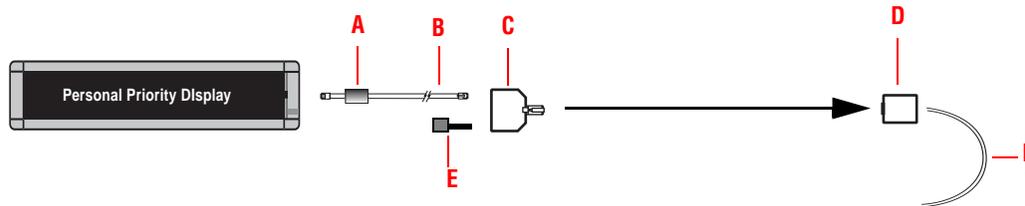
Stand-alone Personal Priority Display®

Detailed use of the EOL terminator can be found throughout this manual. However, its use with a Personal Priority Display® is documented here because a special duplex adapter is needed to accommodate both the EOL termination and networking functions. Adaptive Micro Systems does not carry this adapter. To obtain one, contact Adaptive for a referral or visit your local Radio Shack.



Item	Part #	Description
A	—	Duplex adapter
B	1088-9107	End-of-line (EOL) terminator
C	1088-8624	8-foot RS485 cable
	1088-8636	1-foot RS485 cable
D	4331-0602	Modular Network Adapter
E	—	Ferrite (ferrite end towards sign)
F	1088-8002	1000-foot RS485 shielded plenum cable

Wall-mounted Personal Priority Display®

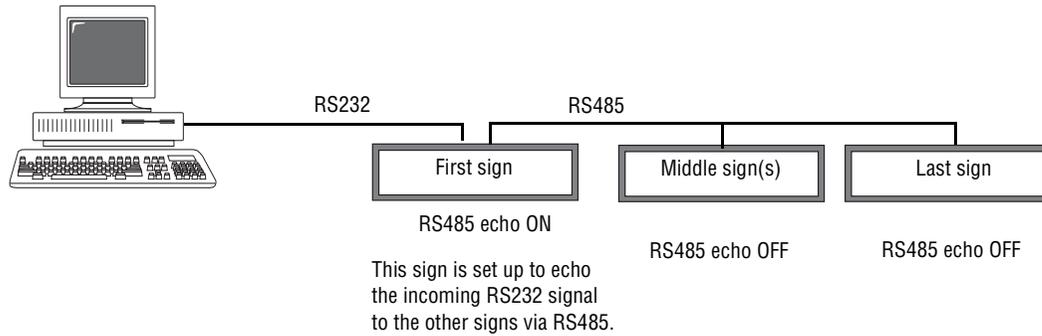


Item	Part #	Description
A	—	Ferrite (ferrite end towards sign)
B	1088-8624	3-foot RS232 cable
C	—	Duplex adapter
D	4331-0602	Modular Network Adapter
E	1088-9107	End-of-line (EOL) terminator
F	1088-8002	1000-foot RS485 shielded plenum cable

Appendix C—RS485 echo

When RS485 echo is on, data coming into a sign via RS232 is sent back out the sign controller board's RS485 terminals. This allows information coming into one sign to be forwarded to other signs.

RS485 echo is best used for modem or wireless applications when the RS232 data source is inside the sign. However, a typical configuration is as follows:

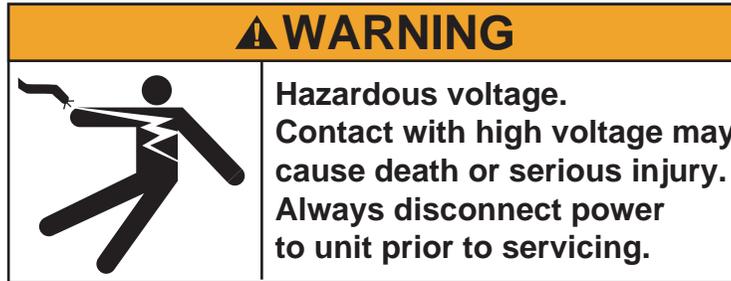


NOTE: RS485 echo is currently available on the AlphaPremiere™ 9000 series and aluminum Director™ signs.

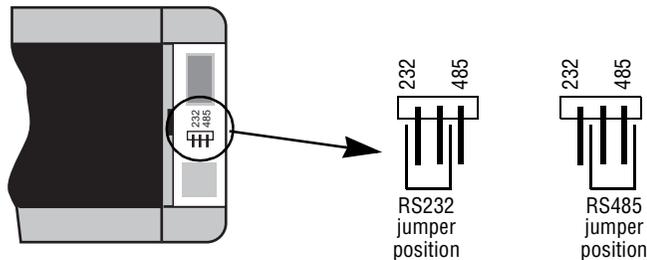
Appendix D—Setting the RS232/RS485 jumper

Typically, if only one sign will be connected to a PC, the sign's jumper is set to RS232. When connecting multiple signs, each sign's jumper should be set to RS485. Some Alpha® signs have an RS232/RS485 auto-sensing port that sets the jumper for you automatically, and not all signs have jumpers. See "Appendix E—Serial and power connections" on page 51 for more information.

NOTE: Make sure the power to the sign is off before changing the position of the jumper.

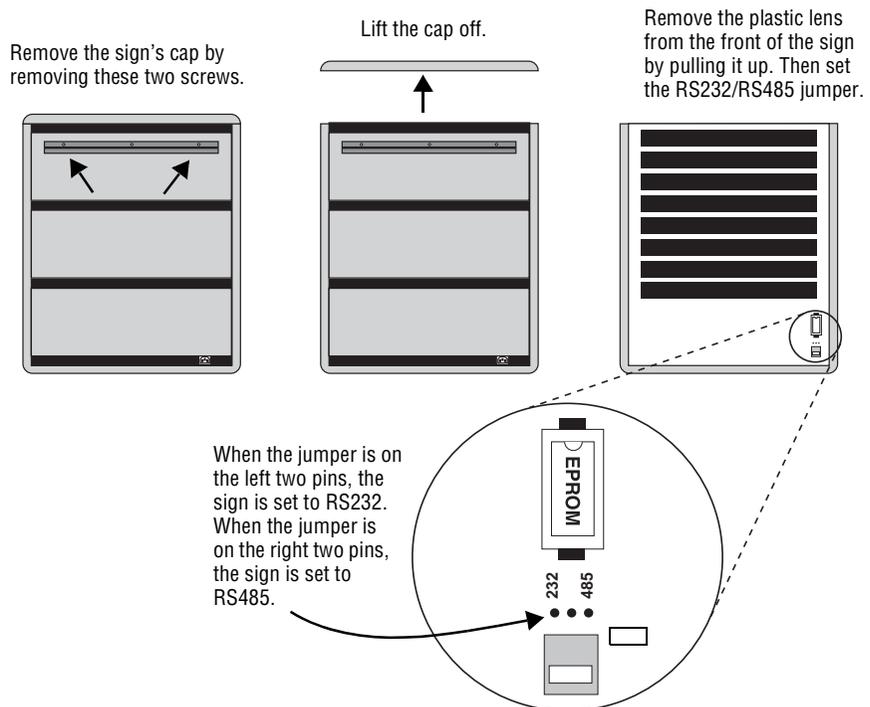


Series 4000 and 7000 signs



Director™ sign

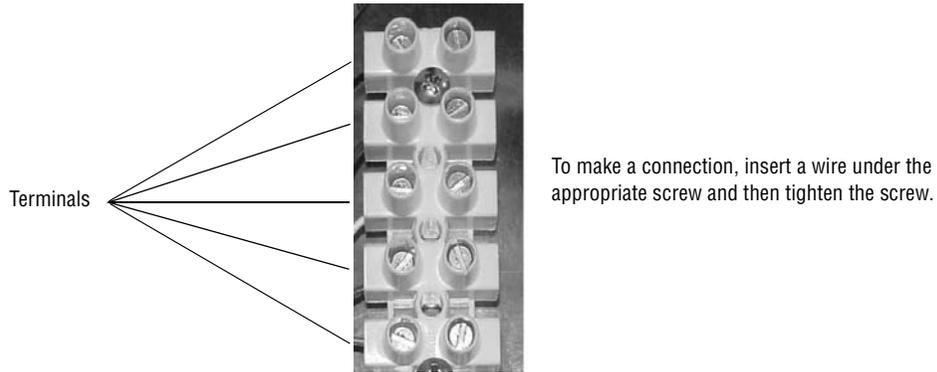
NOTE: This information applies to the wood Director™ only. You do not have to set the jumper in the aluminum Director™ as it is set automatically.



Signs with a terminal block

A terminal block is a group of one or more individual terminals consisting of electrical connectors. Many functions can be wired to the terminal block, such as power distribution or grounding. On some Alpha® signs, serial connections are directly wired to a terminal block as either RS232 or RS485, so there is no jumper to be set. Each sign’s installation manual provides detailed instructions.

“Appendix E—Serial and power connections” on page 51 provides information on which signs have terminal blocks.



Appendix E—Serial and power connections

The table below indicates the communication ports available with each Alpha® sign, where the sign should be terminated, whether the sign has a jumper or terminal block, and where the power connection is located. Detailed information can be found in the manual for each sign type on Adaptive’s Web site at <http://www.ams-i.com/Pages/techdoc.htm>:

Sign		Serial communication port			Jumper	Terminal block	Power
		RS232/RS485	RS485	RS232/RS485 autosensing			
215 Series	215C or R	X	X				Back of sign
220	220C			X			Back of sign
300 Series	320C	X	X				Back of sign
	330C	X	X				Back of sign
400 Series	420C or R			X	X		Inside sign
4000 Series	4080C	X	X		X		Back of sign
	4120C or R	X	X		X		Back of sign
	4160C or R	X	X		X		Back of sign
	4200C or R	X	X		X		Back of sign
	4240C or R	X	X		X		Back of sign
7000 Series	7080C	X	X		X		Back of sign
	7120C	X	X		X		Back of sign
	7160C	X	X		X		Back of sign
	7200C	X	X		X		Back of sign
AlphaPremiere™ 9000 Series	9080C	See note 2 below	X				Back of sign
	9120C	See note 2 below	X				Back of sign
	9160C	See note 2 below	X				Back of sign
	9200C	See note 2 below	X				Back of sign
	9240C	See note 2 below	X				Back of sign
Big Dot®		X	X				Back of sign
Serial Clock		X	X				Back of sign
AlphaVision™		X	X				Back of sign
Director™	Wood	X	X		X		Underneath bottom back panel
	Aluminum		X	X			Back of sign
PPD™				X			Back of sign

NOTE 1: The shaded areas above indicate where the end-of-line (EOL) termination should be.

NOTE 2: AlphaPremiere™ Series 9000 signs are terminated by dipswitch settings. Additionally, they have an RS232-only port and an RS485-only port if a standard configuration is used, and an Ethernet-only port and an RS485-only port if an Ethernet configuration is used.

Appendix F—Alternate sign connections

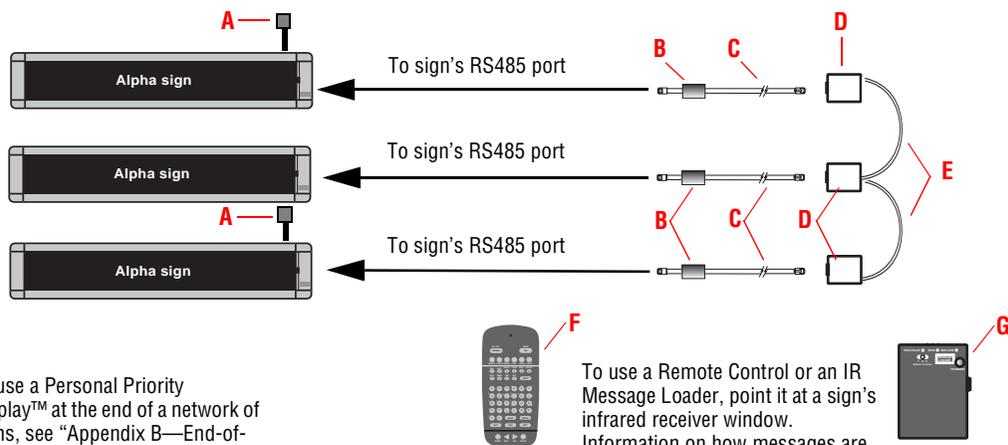
There are ways to connect signs other than the standard PC-to-sign and sign-to-sign configurations.

NOTE: Be aware that, on some signs, an internal jumper must be set to either RS232 or RS485 depending on the cabling the sign is using. See “Appendix D—Setting the RS232/RS485 jumper” on page 49. Also, some signs may need to be terminated depending upon which type of network and the number of signs you are using. See “Appendix B—End-of-line termination” on page 46 for additional information.

Multiple signs without a PC

Use this setup when you want to connect multiple signs without using a PC. In this situation, an infrared Remote Control keyboard or an infrared Message Loader, instead of a PC, is used to send messages to a sign. See “Appendix A—Related documentation” on page 45 for more information on these items.

Although this configuration is not as flexible or as powerful as using a PC to send and schedule messages, the Remote Control or Message Loader is adequate for sending a limited number of messages to a group of signs.



NOTE: To use a Personal Priority Display™ at the end of a network of signs, see “Appendix B—End-of-line termination” on page 46.

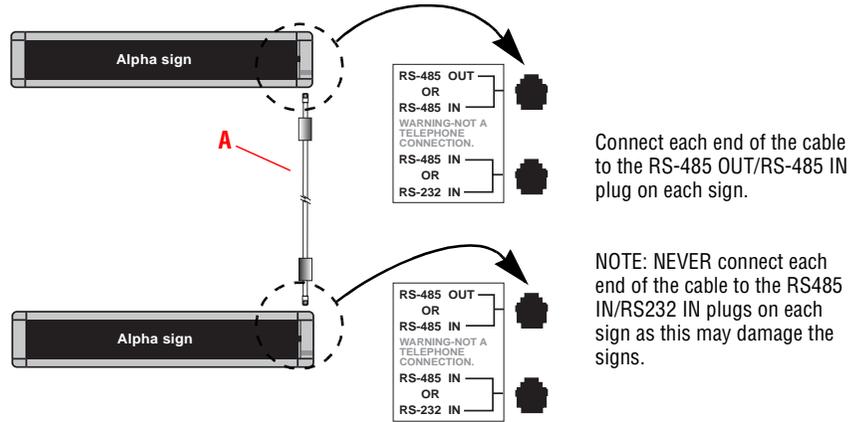
To use a Remote Control or an IR Message Loader, point it at a sign’s infrared receiver window. Information on how messages are sent from one to sign another can be found in the manuals for the Remote Control and IR Message loader. See “Appendix A—Related documentation” on page 45.

Item	Part #	Description
A	1088-9107	End-of-line (EOL) terminator (Must be plugged into the RS232 or TTL plug on the first and the last sign.)
B	—	Ferrite (ferrite end towards sign)
C	1088-8624	8-foot RS485 cable
	1088-8636	1-foot RS485 cable
D	4331-0602	Modular Network Adapter
E	1088-8002	1000-foot RS485 shielded plenum cable
F	1072-1111	Infrared Remote Control keyboard
G	1071-1113	IR Message Loader

NOTE: Be sure to verify whether a jumper needs to be set on the sign you are using. See “Appendix D—Setting the RS232/RS485 jumper” on page 49.

Back-to-back wiring

Back-to-back wiring is the easiest way to network two signs together:



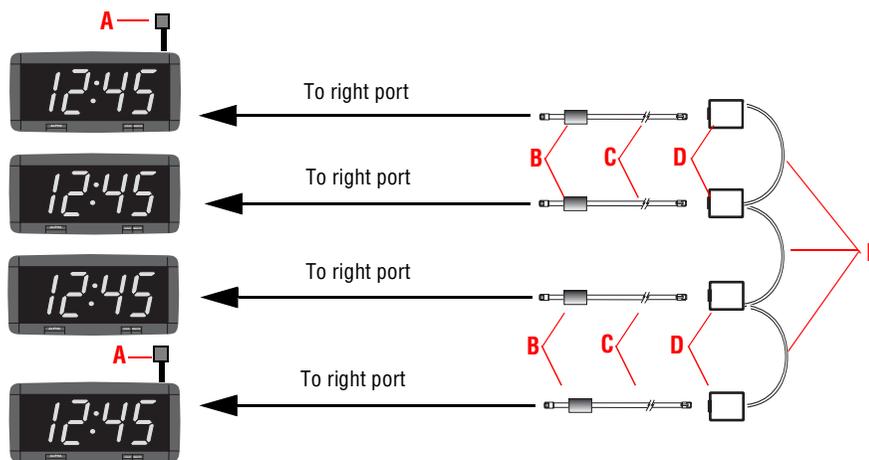
Item	Part #	Description
A	1088-8626	8-foot RS485 back-to-back cable

Alpha® Serial Clocks

The Alpha® Serial Clock displays the time in either 12-hour or 24-hour mode using a 4-inch LED display. It can be used all by itself or networked with other Alpha® clocks or signs. In a network, a clock behaves like an Alpha® sign in that it is used to synchronize all other clocks. In this case, the time is synchronized instead of a message. Also, just like an Alpha® sign, a clock must be terminated when it is the last device on a network.

Used by itself, an Alpha® Serial Clock should be set to Master Mode. In a network composed of all Alpha® Serial Clocks, one clock should be set to Master Mode and the other clocks set to Slave Mode. In a network with a PC that is connected to Alpha® clocks and signs, all the clocks should be set to Slave Mode. For more information on using the Alpha® Serial Clock, see **ALPHA Serial Clock for Networked & Synchronized Timing Applications** (pn 9703-3006).

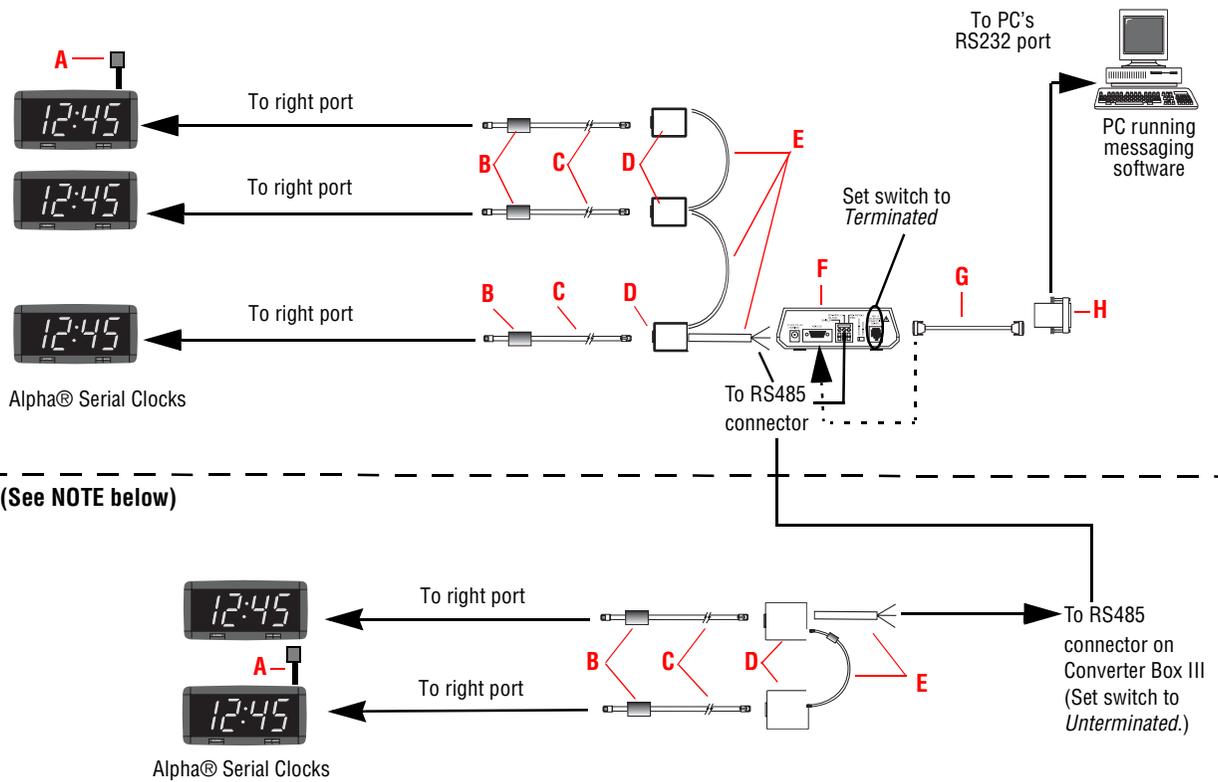
NETWORK OF ALL CLOCKS



Alpha® Serial Clocks

Item	Part #	Description
A	1088-9107	End-of-line (EOL) terminator (Must be plugged into the left—as you face the back of the clock—RJ11 port.)
B	—	Ferrite (ferrite end towards clock)
C	1088-8624	8-foot RS485 cable
	1088-8636	1-foot RS485 cable
D	4331-0602	Modular Network Adapter
E	1088-8002	1000-foot RS485 shielded plenum cable

NETWORK OF CLOCKS ATTACHED TO A PC



Item	Part #	Description
A	1088-9107	End-of-line (EOL) terminator (Must be plugged into the left—as you face the back of the clock—RJ11 port.)
B	—	Ferrite (ferrite end towards clock)
C	1088-8624	8-foot RS485 cable
	1088-8636	1-foot RS485 cable
D	4331-0602	Modular Network Adapter
E	1088-8002	1000-foot RS485 shielded plenum cable
F	1088-1111	Converter Box III with a Converter Box III AC Adapter: pn 4011-1201 (120 volt) pn 4011-4201 (230 volt)
G	1088-8634	Type A9 RS232 cable (connects Converter Box III to PC RS232 port)
H	—	DB25-to-DB9 adapter (if PC has a 9-pin RS232 port)

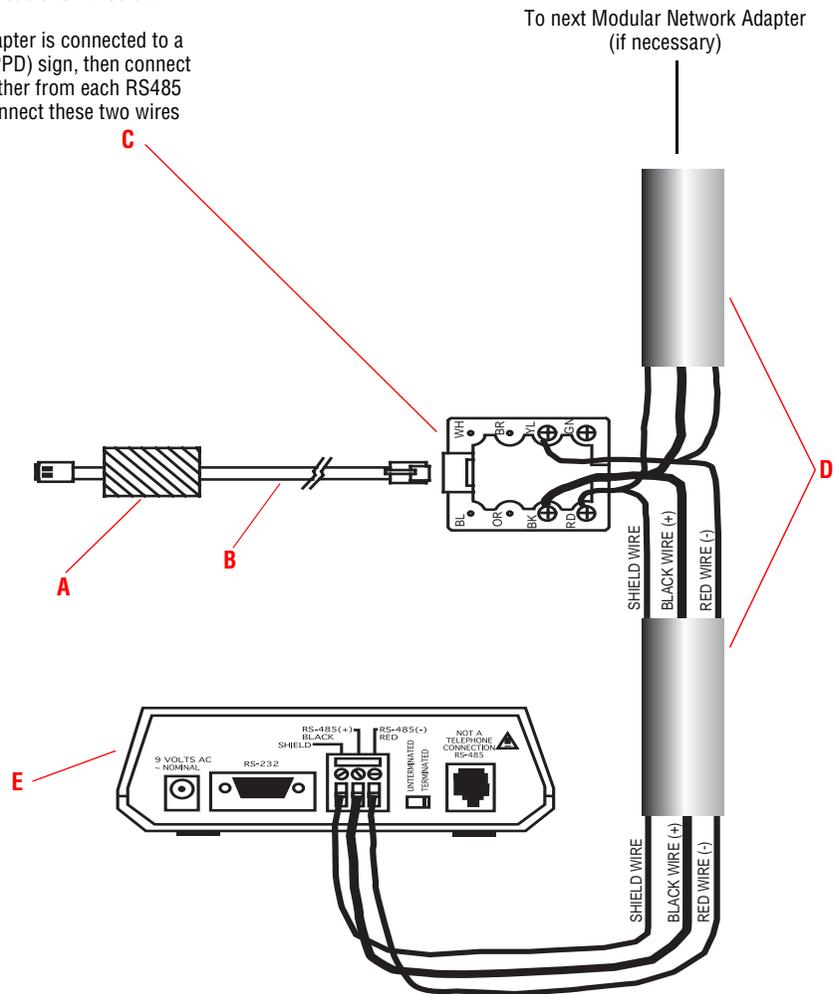
NOTE: The information below the dotted line is the hardware to be added when you want the Converter Box III in the middle of the network. In this situation, the Converter Box III must be set to *Unterminated*.

Appendix G—Modular Network Adapter to Converter Box III wiring

Special wiring is needed to connect the Modular Network Adapter and the Converter Box III:

Connect RED wire from RS485 cable to YL screw.
 Connect BLACK wire from RS485 cable to BK screw.
 Connect SHIELD wire from RS485 cable to RD screw.

NOTE: If the Modular Network Adapter is connected to a Personal Priority Display (PPD) sign, then connect the two SHIELD wires together from each RS485 cable. However, do NOT connect these two wires to the SHIELD screw.



Item	Part #	Description
A	—	Ferrite (ferrite end towards sign)
B	1088-8624	8-foot RS485 cable
	1088-8636	1-foot RS485 cable
C	4331-0602	Modular Network Adapter
D	1088-8002	1000-foot RS485 shielded plenum cable
E	1088-1111	Converter Box III with a Converter Box III AC Adapter: pn 4011-1201 (120 volt) pn 4011-4201 (230 volt)

Appendix H—Assigning an IP address to a serial server

For messages to be sent to a specific sign on the network, each serial server must have a unique IP address associated with it. There are several methods for assigning an IP address that can be used depending on various circumstances. For some of these methods, installation of the serial server hardware must be done while assigning the IP address. For other methods, the IP address can be assigned after the serial server hardware is installed.

To assign an IP address, you will need to know two numbers:

- The IP address to be assigned to each serial server, either the Alpha® Ethernet Adapter, MSS100, or MSS485. The specific address is usually designated by an IS network administrator.
- The hardware address of the serial server. This is found on a label on the back of the server.

Methods 1–5 for assigning an IP address are listed in order from the most simple and most often used to the least often used. Method 6 should only be used when setting the address of an AlphaPremiere™ 9000 Series sign because a different serial server, called a CoBox card, sits inside this sign. The Cobox card has its own software for assigning IP addresses.

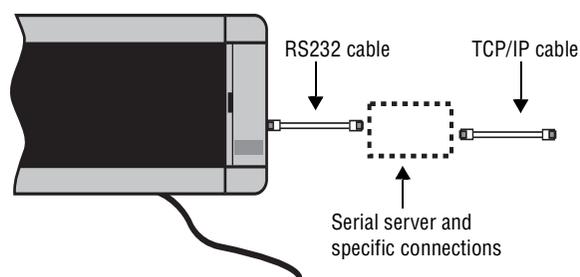
Method 1: EZWebCon

INSTALLING EZWEBCON SOFTWARE

You can get the latest version of EZWebCon for your network platform from either the Alpha® Ethernet Adapter CD or the Lantronix CD, or from the Lantronix Internet site (www.lantronix.com). Just download it to an empty directory on your PC. The following instructions use version 2.0/1 of EZWebCon, which may differ from the version you have.

1. Double-click *ezwebcon.exe* in the downloaded files.
2. The EZWebCon application opens and installs itself on your PC.

CONNECTING THE SERIAL SERVER TO THE SIGN AND THE NETWORK

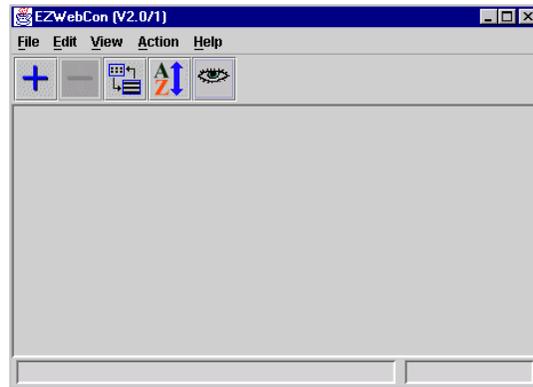


3. Connect a TCP/IP cable to an active port and to the serial server according to the information for your specific serial server in the sign-to-sign interfaces section beginning on page 22.
4. Connect the appropriate power supply to the serial server. For an Alpha® Ethernet Adapter, this will be the sign with its power cable plugged into an outlet. For a Lantronix serial server, this will be its own power cable.

5. Check the LED lights on the serial server:
 - The power light should be solid green, indicating it is properly powered.
 - The link light should be solid green, indicating a valid network connection.
 - The activity light should be blinking green, indicating normal operation.

USING EZWEBCON SOFTWARE TO ASSIGN THE IP ADDRESS

6. Open the EZWebCon software. The main window appears:



7. Select *Action>Assign IP Address* in the main window.

8. The *Assign IP Address to Server* window appears. Complete the information as follows:

This always begin with 00-80-a3. It is also case sensitive and must be in lowercase letters. You do not need to type dashes.

Type both the numbers and decimal points.

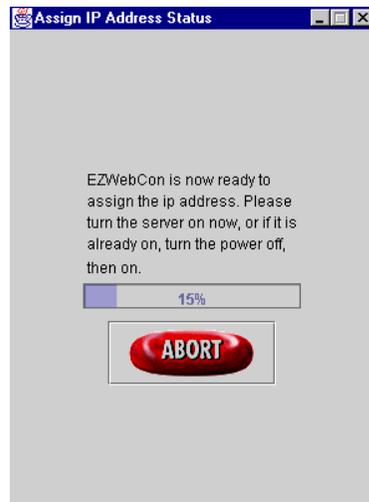
This line should be grayed out and the *None* box checked.

This line should contain zeros, or you can set it as needed for your system.

This box should be checked.

9. Click OK.

10. Reboot the serial server if prompted to do so.

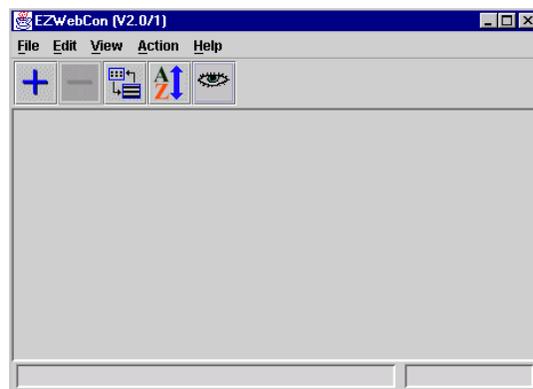


11. Do one or more of the following:

- If the serial server already has an IP address assigned to it and you're assigning the same one, EZWebCon will notify you. Click *OK* to continue.
- If the serial server already has an IP address assigned to it and you're assigning a different one, EZWebCon will ask whether you really want to assign the new address. Click *Yes* to continue.
- If the serial server does not have an existing IP address, EZWebCon will notify you that it will assign the IP address. Click *OK* to continue.

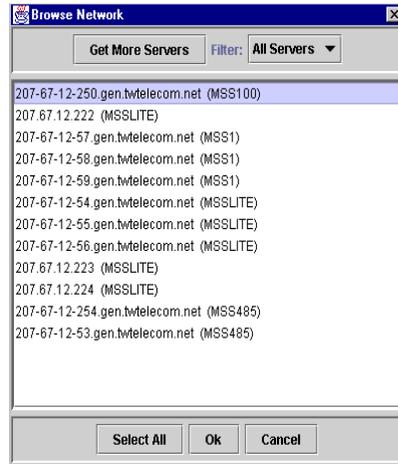
USING EZWEBCON SOFTWARE TO DETECT SERIAL SERVERS AND IP ADDRESSES ON THE NETWORK (OPTIONAL)

12. Open the EZWebCon software. The main window appears:



13. Click *File>Browse Network* to search for existing servers on the network.

14. When the *Browse Network* window appears, it will show IP addresses of existing serial servers on the network, including the IP address just assigned to this serial server. (To print, press *Print Screen* on your keyboard and then paste into a drawing or word processing application.)



NOTE: If the IP address you just assigned does not appear, you can ping the serial server as described in the section for "Method 2: DOS/ARP command". If the IP address still does not appear, you must either assign an IP address to the serial server using a different method or contact IS personnel with the hardware address on the back of the serial server. IS can then use network management software to locate the IP address.

NOTE: It may be a good idea to write the IP address directly on the serial server.

15. Click *Cancel* and close EZWebCon.

Method 2: DOS/ARP command

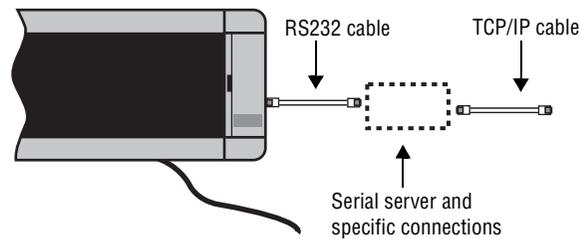
In a DOS window in Microsoft® Windows 95 and Windows NT, the arp command is a simple way to assign an IP address when none has been previously assigned. The arp command is used here in conjunction with the ping command. The ping command is used to test the connection with the serial server and to determine whether the new IP address has taken effect.

NOTE: The arp command will *not* work if any IP address has ever been assigned to the given hardware address. The arp command will not replace an existing IP address with another IP address. You can use Telnet to change or delete an existing IP address. Refer to "Method 3: Telnet" on page 64.

OBTAINING NEW IP ADDRESS(ES)

1. Obtain a valid IP address for each serial server. This is usually assigned by an IS network administrator.

CONNECTING THE SERIAL SERVER TO THE SIGN AND THE NETWORK

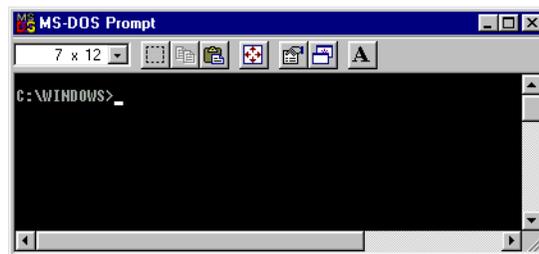


2. Connect the serial server according to the information for your specific adapter in the sign-to-sign interfaces section starting on page 22.

NOTE: Do *not* connect the power cable to the sign at this time.

SETTING UP DOS COMMANDS FOR ASSIGNING AN IP ADDRESS

3. Open a DOS window on the PC by selecting *Start > Programs > MS-DOS Prompt*.



4. Type “ping -t n.n.n.n” (where n.n.n.n is the IP address to be assigned to the serial server) and press *Enter*.

NOTE: This will continuously ping this IP address, allowing you to monitor exactly when communication to the device is established. You can stop the execution of this ping command by pressing *Ctrl+C*.

5. Open another DOS window by selecting *Start > Programs > MS-DOS Prompt* a second time.
6. Type “arp -s n.n.n.n 00-80-a3-x-x-x” (where n.n.n.n is the IP address of the serial server and 00-80-a3-x-x-x is the hardware address of serial server), but do *not* press *Enter*. You must first complete the next step to power up the unit. This arp command will be executed in step 9.

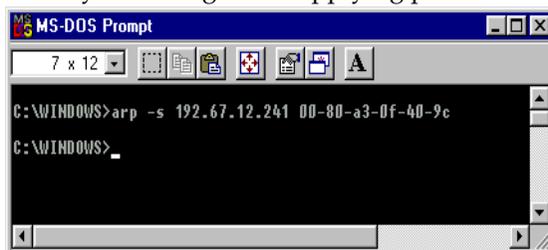
APPLYING POWER TO THE SERIAL SERVER AND TO THE SIGN

7. Connect the appropriate power supply to the serial server. For an Alpha® Ethernet Adapter, this will be the sign with its power cable plugged into an outlet. For a Lantronix serial server, this will be its own power cable.
8. Wait 30 seconds or until the activity light turns off and on only every two seconds. Both the sign and the serial server are now powered up and connected to the network.

ASSIGNING THE IP ADDRESS

9. Press *Enter* at the DOS window with the “arp -s n.n.n.n 00-80-a3-x-x-x” command to actually assign the IP address.

NOTE: Once the serial server is initially powered up, you have only two minutes to assign it an IP address. After two minutes, either an alternate method must be used or the serial server must be rebooted by removing and reapplying power to it.

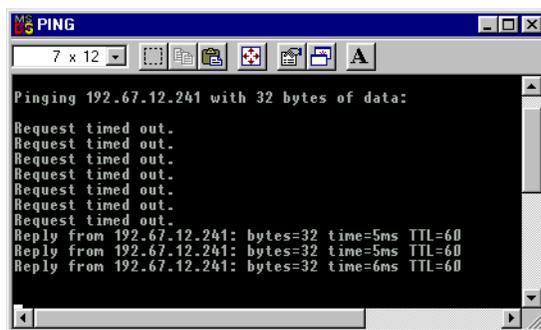


```

MS-DOS Prompt
7 x 12
C:\WINDOWS>arp -s 192.67.12.241 00-80-a3-0f-40-9e
C:\WINDOWS>

```

10. Watch the DOS window with the ping command to determine when communication has been established. A “Reply from” response will appear in the window when this happens.

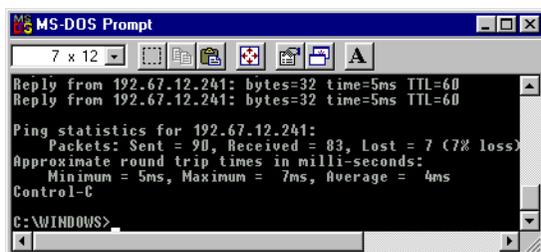


```

PING
7 x 12
Pinging 192.67.12.241 with 32 bytes of data:
Request timed out.
Reply from 192.67.12.241: bytes=32 time=5ms TTL=60
Reply from 192.67.12.241: bytes=32 time=5ms TTL=60
Reply from 192.67.12.241: bytes=32 time=6ms TTL=60

```

11. In the DOS window with the ping command, stop the ping command by pressing *Ctrl+C*.



```

MS-DOS Prompt
7 x 12
Reply from 192.67.12.241: bytes=32 time=5ms TTL=60
Reply from 192.67.12.241: bytes=32 time=5ms TTL=60
Ping statistics for 192.67.12.241:
    Packets: Sent = 90, Received = 83, Lost = 7 (7% loss)
    Approximate round trip times in milli-seconds:
        Minimum = 5ms, Maximum = 7ms, Average = 4ms
Control-C
C:\WINDOWS>

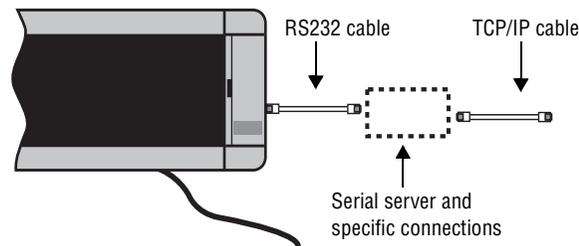
```

NOTE: The serial server will not save the learned IP address permanently. The time it is saved may vary depending on how your network is set up. This arp and ping procedure is intended as a temporary measure to allow EZWebCon to communicate with the serial server, or allow an administrator to Telnet into the serial server. Once logged in, the administrator can enter the “Change IP address” command to make the address permanent. See also “Reserving an IP address” on page 67 for instructions on determining and reserving an IP address.

Method 3: Telnet

Telnet is used to program a hardware device for parameters such as baud rate, stop bits, parity, and particularly IP address. Telnet can be used to reassign an IP address directly when it has already been assigned an address by other means.

CONNECTING THE SERIAL SERVER TO THE SIGN AND THE NETWORK



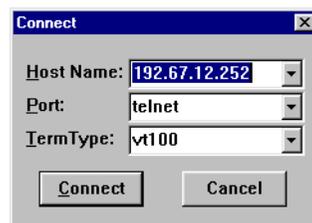
1. Connect the serial server according to the information for your specific adapter in the sign-to-sign interfaces section starting on page 22.
2. Connect the appropriate power supply to the serial server. For an Alpha® Ethernet Adapter, this will be the sign. For a Lantronix serial server, this will be its own power cable.
3. Check the LED lights on the serial server:
 - The power light should be solid green, indicating it is properly powered.
 - The link light should be solid green, indicating a valid network connection.
 - The activity light should be blinking green, indicating normal operation.

STARTING TELNET

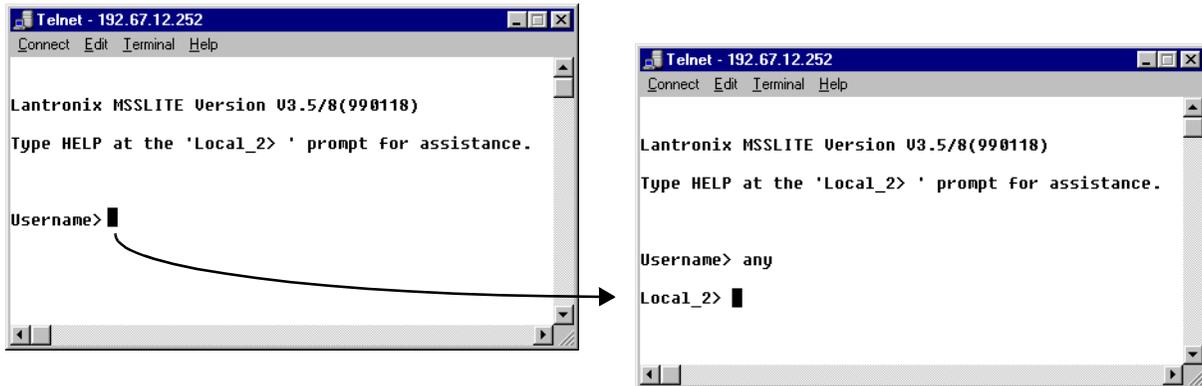
Telnet is fully functional on all PCs. To use Telnet, click *Start > Run*, and type "Telnet." A generic window for Telnet will appear. You can also open a Telnet window for a specific serial server by clicking *Start > Run* and typing "Telnet n.n.n.n" (where n.n.n.n is the currently-assigned IP address of the serial server).

CHANGING AN IP ADDRESS

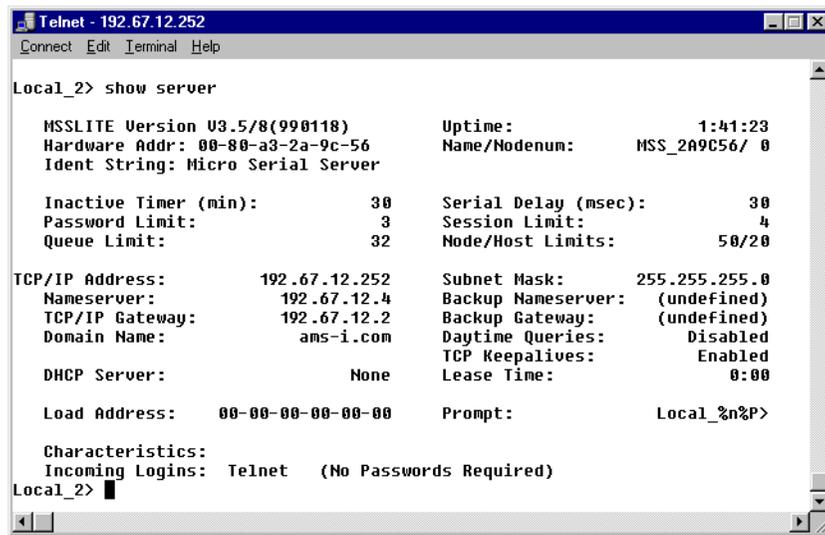
4. (Note: Skip this step if you opened a Telnet window for a specific serial server.) From the *Connect* menu, select *Remote System* and then, in the *Connect* window, type the IP address of the serial server in the *Host Name* line. Use "telnet" for the *Port* and "vt100" for the *TermType*.



- Type a user name and press *Enter*. It doesn't matter what you type here, except that it must be different from that used by any other Telnet user on the network.



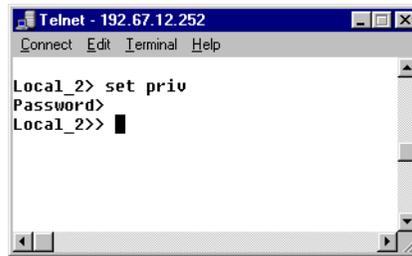
- The "show server" command can provide confirmation that you've accessed the correct serial server and also provide statistics about that serial server.



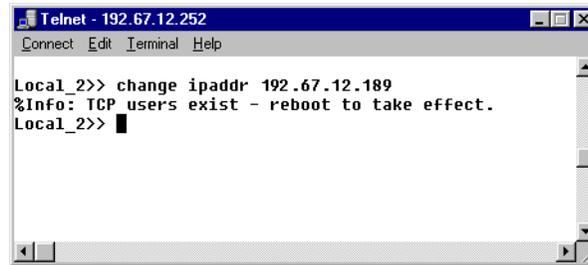
- Type "set priv". Press *Enter* and then type the password. Press *Enter* again. The default password is "system."



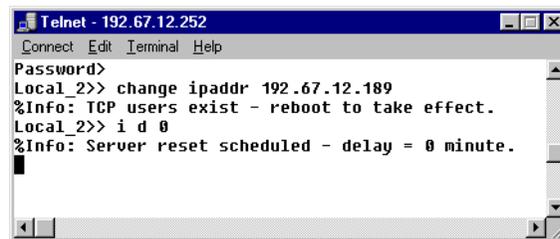
- You now have access to the Super User level of authority. This is required to set the IP address.



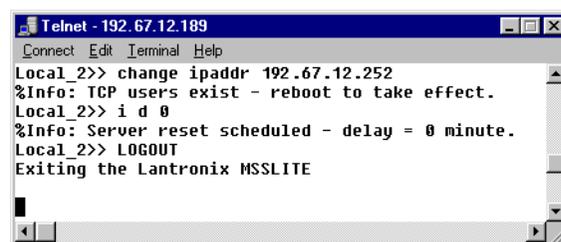
- To assign a new IP address, type “change ipaddr n.n.n.n” (where n.n.n.n is the new IP address).



- Reboot the serial server by typing “i d 0” with spaces between the characters. (The last character is a zero.)



- Because the serial server will no longer be at the same address as when you connected to it using Telnet, Telnet officially logs you out of that connection.



- You then get this notification.



- After clicking OK, and after the serial server completes the reboot, you can connect to the server. You can also exit Telnet and send messages.

Method 4: DHCP

Dynamic Host Configuration Protocol (DHCP) allows a device to use a dynamic IP address assigned at boot time from an available pool of addresses. With this method, you do not need to set the IP address in the hardware itself.

The serial server is shipped with DHCP disabled. However, if DHCP ever becomes enabled (such as after resetting the server) and if your network uses Dynamic Host Configuration Protocol (DHCP), then when the serial server is re-connected to the network and powered up, DHCP will automatically assign a dynamic IP address to the serial server. If you want to accept this assigned IP address and don't need to reassign another chosen address, you will still need to review the instructions below to determine and reserve an IP address.

RESERVING AN IP ADDRESS

To allow you to send messages to the correct IP address, a system/network administrator must use the DHCP Manager (or similar) application to locate the serial server by its hardware address. The dynamic IP address is associated with the hardware address. This identification process can be involved on large networks.

A system/network administrator can use the system/networking DHCP Manager application to set the dynamically-assigned address to a permanent lease. This will reserve the IP address as a static address for the particular hardware address. If you do not reserve the IP address, periodically DHCP will automatically reassign a new dynamic—and typically different—IP address to the serial server. The result is that messages will not be delivered to the serial server.

RESETTING DHCP TO DISABLED

1. Follow steps 1 through 8 in Method 3: Telnet to start Telnet.
2. Type “change dhcp disabled” to disable DHCP.
3. Select *Exit* from the *Connect* menu to exit Telnet.

Method 5: HyperTerminal

HyperTerminal may be used when you cannot access the serial server from the network. In this case, you will need to program the device directly using HyperTerminal and a null DB25F- or DB9F-to-DB25F serial cable (not supplied) from the PC to the server. (For an Alpha® Ethernet Adapter, however, you will need to split out two wires to connect the MSS device to an external power supply.) You will also need to use communication settings of 9600 baud, 8N1, and flow control set to either XON/XOFF or HARDWARE. For assistance, call Technical Support at Adaptive™ Micro Systems.

NOTE: HyperTerminal is fully functional on all PCs, but you may need to install it with the Add/Remove Programs icon in the Control Panel.

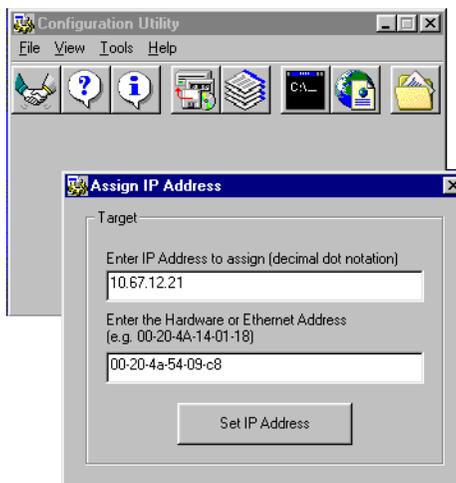
Method 6: Setting an AlphaPremiere™ 9000 Series sign IP address

Before you begin using an AlphaPremiere® sign on an Ethernet network, you must assign it a unique TCP/IP address. The Alpha® Ethernet option inside the sign is shipped with a default address of 010.11.11.1. The following instructions use version 2.0 of the DST configuration utility, which may differ from the version you have.

1. Write down the 6-digit Ethernet address found on the Ethernet option label on the back of the sign.



2. Using the Configuration Utility software supplied with the sign, select *Tools > Assign IP:*



3. Enter a unique IP address in the *Enter IP address to assign* line.
4. Enter the 6-digit Ethernet address you wrote down in step 1 in the *Enter the Hardware or Ethernet Address* line and click *Set IP Address*.
5. Select *Tools>Ping Device*. Re-enter the sign's IP address in the *Enter IP Address* line and click *Ping* to verify the IP address you just assigned works. If a reply from the sign is not received, repeat steps 1–4.

Resetting a serial server

There may be times when you need to reset the serial server to its default factory settings. These default settings include setting DHCP to enabled.

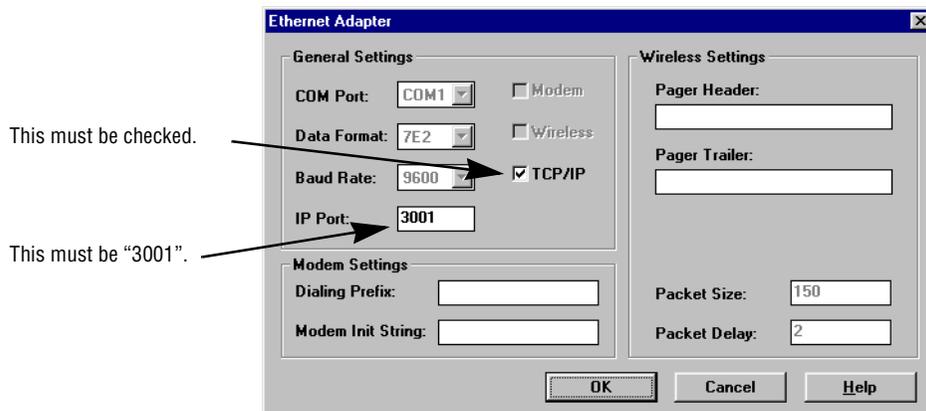
1. Remove power from the adapter, either the cable to the sign (Alpha® Ethernet Adapter) or its power cable (MSS100 or MSS485).
2. Using the point of a pen or a similar object, press and hold the reset button on the serial server and then reapply power to the sign. Continue to hold the reset button for 20 seconds after reapplying power.

Appendix I—Setting up messaging software for TCP/IP networking

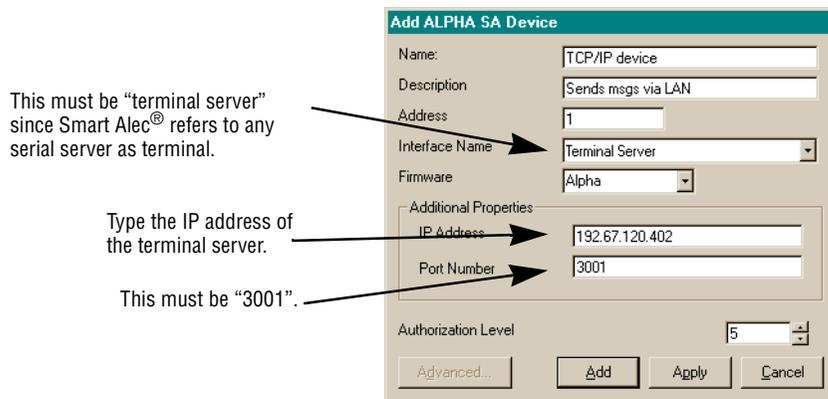
A serial server receives a message from one PC over a network and sends it on to a sign. This is in conjunction with any software that can use the TCP/IP protocol. AlphaNET plus for Windows (version 1.3 or later), AlphaNET 2.0 for Windows, and Smart Alec® (version 3.0 or later) are TCP/IP-compatible.

Creating the device in the software

You must create a device that will use a serial server and TCP/IP and set the port number to 3001. The AlphaNET 2.0 screen for TCP/IP will look like this:



For Smart Alec® 3.0, the screen looks like this:



After setting up a TCP/IP device and a sign using that device, you can send messages to this sign as you normally would.

Installing and selecting Redirector settings

Lantronix Redirector software is needed for sending messages with Alpha® Messaging Software or BetaBrite® Messaging Software over a TCP/IP network to one or more signs.

Lantronix Redirector software is used to redirect messages normally sent through a PC COM port to a sign. Redirector associates the PC COM port with a network IP address for a serial server. The serial server, in turn, is connected to the sign and sends the message on to the sign. In other words, Redirector intercepts messages going to the COM port and sends them over the network to the serial server's serial port and to the sign.

NOTE: The COM port you choose cannot be in use by any other device. For example, an internal modem. To determine which ports are in use, click *Start > Settings > Control Panel* and select *System*. Click the *Device Manager* tab. In the *Ports* directory, determine the COM ports currently in use. Redirector allows up to 40 logical COM ports to be redirected. You can redirect any except those currently in use. However, Alpha® Messaging Software and BetaBrite® Messaging software only recognize COM ports 1 through 4.

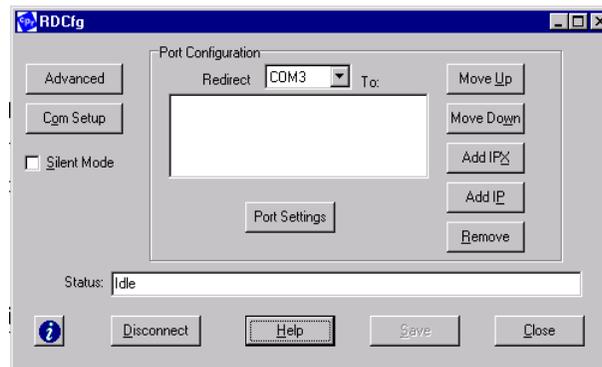
The following instructions use version 2.1/1 of the Redirector software, which may differ from the version you have.

INSTALLING REDIRECTOR

You can get the latest version of Redirector for your network platform from either the Alpha® Ethernet Adapter CD or the Lantronix CD, or from the Lantronix Internet site (www.lantronix.com). Just download it to an empty folder on your PC.

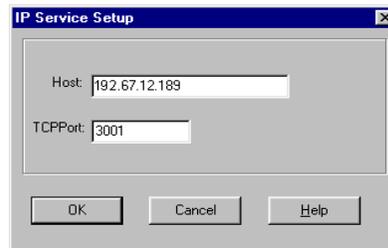
DIRECTING A COM PORT TO A SERIAL SERVER WITH REDIRECTOR SOFTWARE

1. Open the Redirector software. The main window appears:



2. Select the COM port that you want to redirect from the *Redirect To* drop-down menu.

3. Click *Add IP*. In the *IP Service Setup* window, enter the IP address of the serial server that EZWebCon detected in the *Host* line. In the *TCP/Port* line, enter “3001,” a valid number used for any serial server. Click *OK*.



4. Click *Save* from Redirector’s main window.
5. When the *Config Info* window appears, click *OK* and then close Redirector.



6. If prompted, reboot the computer. You should now be able to access the sign using Alpha® Messaging Software or BetaBrite® Messaging Software via the network.

Setting serial servers for Gateway Messaging Software

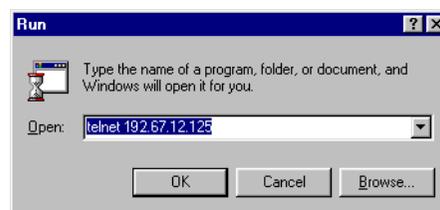
To use Gateway Messaging Software to send messages over a TCP/IP network, you must use an MSS485 as a local/host serial server to send messages all at once to one or more signs, each with a remote serial server attached.

In this mode, you set one MSS485 as the local/host device. When setting up the MSS485, you assign it a fixed list of up to 12 IP addresses of serial servers. You set up each receiving serial server as a remote device. Then you can use the local/host device to send messages at one time to all the remote devices in the fixed list.

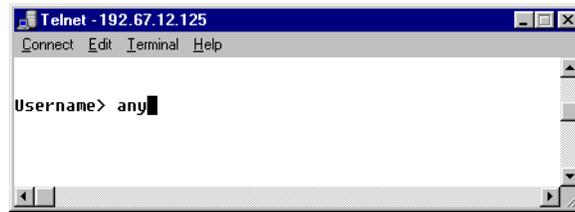
Setting up the MSS485 to act as a local device

You must program the MSS485 devices with IP addresses before setting them up. The firmware version of the MSS485 must be B3.5/905 (dated 990518) or higher.

1. Select *Start > Run*. Type “Telnet *n.n.n.n*” where *n.n.n.n* is the assigned IP address for the MSS485. Click *OK*.



2. Type a user name and press *Enter*. It doesn't matter what you type here, except that it must be different from that used by any other Telnet user on the network.



```
Telnet - 192.67.12.125
Connect Edit Terminal Help

Username> any
```

3. Type "set priv." Press *Enter*. Then type the password. Press *Enter* again. The default password is "system."



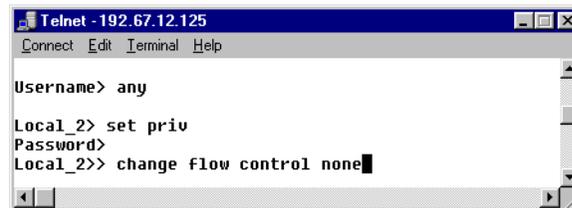
```
Telnet - 192.67.12.125
Connect Edit Terminal Help

Username> any
Local_2> set priv

Telnet - 192.67.12.125
Connect Edit Terminal Help

Username> any
Local_2> set priv
Password>
Local_2>>
```

4. Type "change flow control none." Press *Enter*.

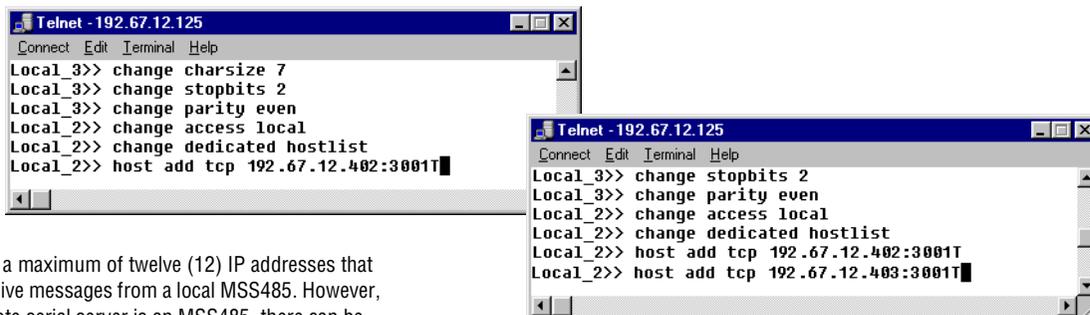


```
Telnet - 192.67.12.125
Connect Edit Terminal Help

Username> any
Local_2> set priv
Password>
Local_2>> change flow control none
```

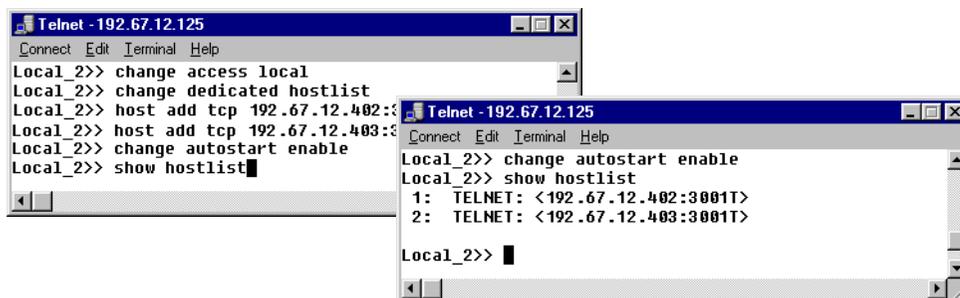
5. Type "change charsize 7." Press *Enter*.
6. Type "change stopbits 2." Press *Enter*.
7. Type "change parity even." Press *Enter*.
8. Type "change access local." Press *Enter*.
9. Type "change dedicated hostlist." Press *Enter*.

- Type "host add tcp n.n.n.n:3001T" where n.n.n.n is the IP address of a serial server to be used in remote mode. Press *Enter*. Do this for each remote serial server to receive messages from the local MSS485.

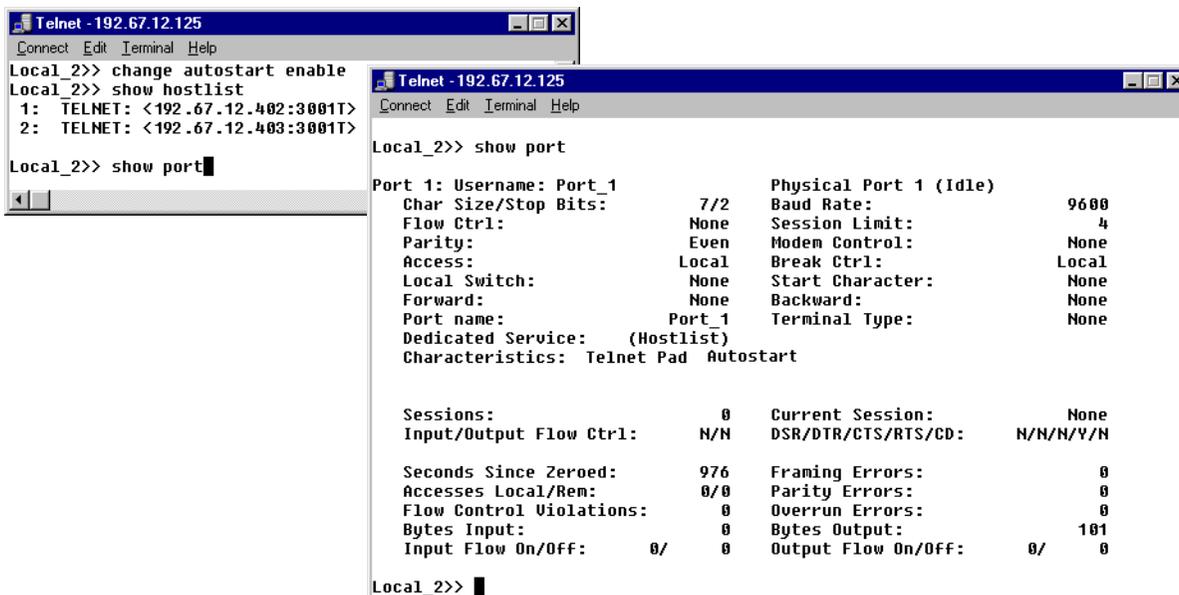


There is a maximum of twelve (12) IP addresses that can receive messages from a local MSS485. However, if a remote serial server is an MSS485, there can be multiple signs receiving messages through that serial server.

- Type "change autostart enable." Press *Enter*.
- Type "show hostlist." Press *Enter*. This will show the list of the remote serial server IP addresses you entered.



- Type "show port." Press *Enter*. This will show the current settings of the port.



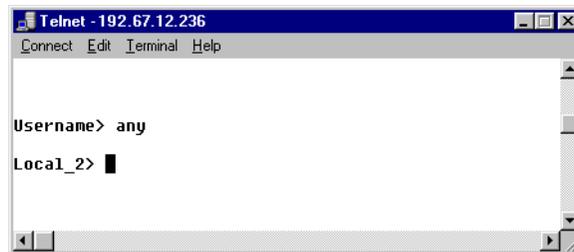
SETTING UP SERIAL SERVERS TO ACT AS REMOTE DEVICES

You must program all serial servers with IP addresses before setting them up in remote mode. The firmware version of any serial server must be B3.5/905 (dated 990518) or higher.

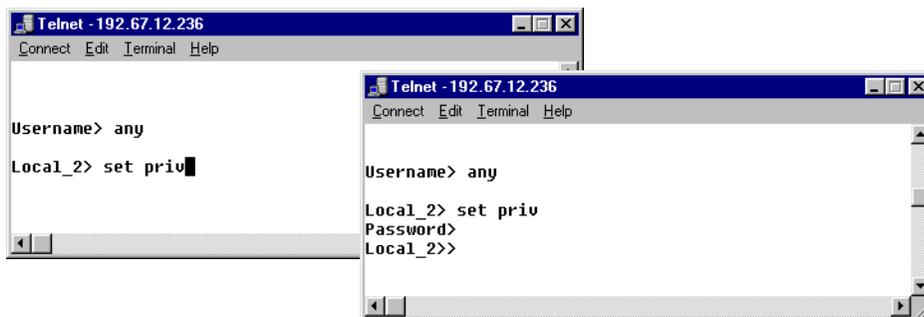
1. Select *Start > Run*. Type “Telnet *n.n.n.n*” where *n.n.n.n* is the assigned IP address for a remote serial server. Click *OK*.



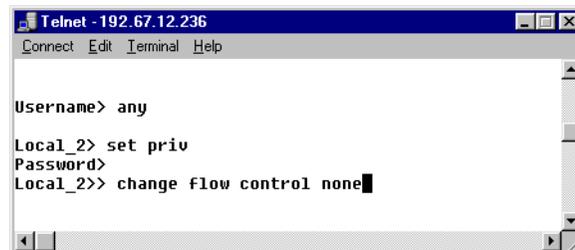
2. Type a user name and press *Enter*. It doesn't matter what you type here, except that it must be different from that used by any other Telnet user on the network.



3. Type “set priv.” Press *Enter*. Then type the password. Press *Enter* again. The default password is “system.”

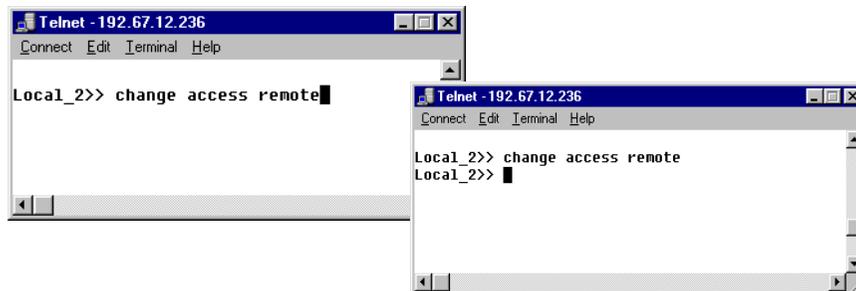


4. Type “change flow control none.” Press *Enter*.

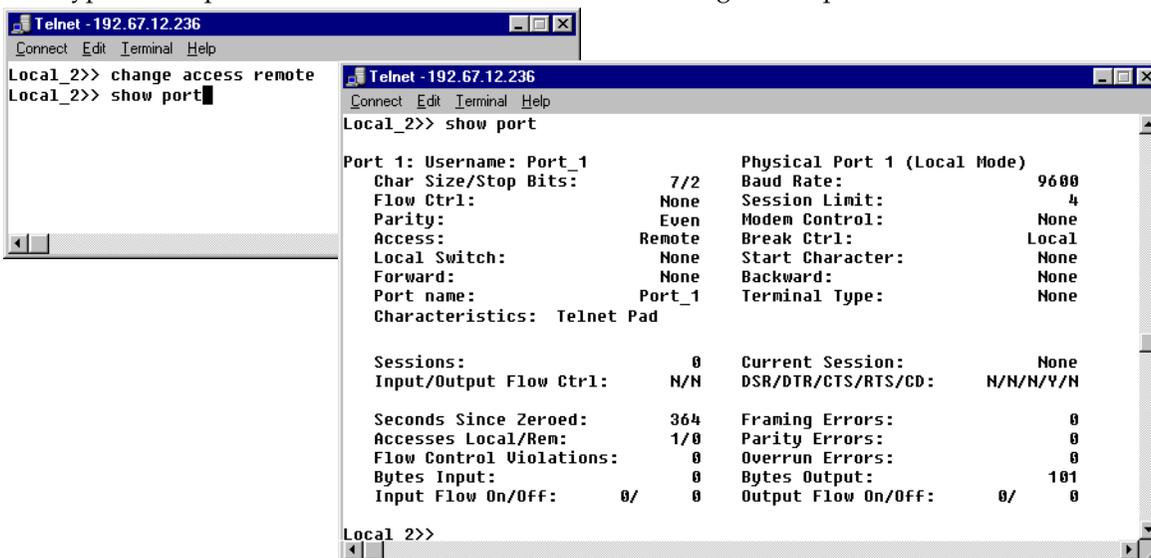


5. Type “change charsize 7.” Press *Enter*.

6. Type "change stopbits 2." Press *Enter*.
7. Type "change parity even." Press *Enter*.
8. Type "change access remote." Press *Enter*.



9. Type "show port." Press *Enter* to show the current settings of the port.



10. Repeat step 1 through 9 for all serial servers to be used in remote mode.

RESETTING AND CHECKING ALL DEVICES

1. Remove power from all the remote serial servers and re-apply power.
2. Remove power from all the local MSS485 devices and re-apply power.
3. Select *Start > Run*. Type "Telnet *n.n.n.n*" where *n.n.n.n* is the assigned IP address for the local MSS485 devices. Click *OK*.
4. Enter a user name and password.

5. Type "show port." Press *Enter*. This will show the current settings of the port. The *Sessions* number indicates how many remote serial servers you set up for the local MSS485 to send messages.

The image shows two screenshots of a Telnet terminal window. The first screenshot shows the user entering the command 'show port' after setting the privilege level to 'any'. The second screenshot shows the output of the 'show port' command, displaying various port settings and statistics.

```

Telnet - 192.67.12.125
Connect Edit Terminal Help
Username> any
Local_2> set priv
Password>
Local_2>> show port

Telnet - 192.67.12.125
Connect Edit Terminal Help
Local_2> show port
Port 1: Username: Port_1          Physical Port 1 (Local Mode)
Char Size/Stop Bits:          7/2   Baud Rate:                9600
Flow Ctrl:                     None  Session Limit:             4
Parity:                         Even  Modem Control:            None
Access:                         Local Break Ctrl:               Local
Local Switch:                   None  Start Character:          None
Forward:                       None  Backward:                 None
Port name:                      Port_1 Terminal Type:            None
Dedicated Service:             (Hostlist)
Characteristics: Telnet Pad Autostart

Sessions:                       2   Current Session:          None
Input/Output Flow Ctrl:        N/H  DSR/DTR/CTS/RTS/CD:      N/N/N/Y/N

Seconds Since Zeroed:          17   Framing Errors:           0
Accesses Local/Rem:            1/0  Parity Errors:            0
Flow Control Violations:       0    Overrun Errors:           0
Bytes Input:                    0    Bytes Output:             101
Input Flow On/Off:              0/   0  Output Flow On/Off:       0/   0

Local_2>

```

Glossary

AC

Alternating Current. An electronic current that reverses direction in a circuit at regular intervals, usually used for higher voltages.

ACK

Acknowledgment. An ASCII or EBCDIC code indicating that a message has been received correctly.

ActiveX

Alpha® Marquee ActiveX® control is a development tool designed to ease communication with an Alpha® Marquee display. Product of Adaptive®.

adapter

A piece of hardware installed on a computer or electrical component connecting it to other hardware. Converts one format to another, either physical (type of plug), electrical (configuration of wiring), or electronic (computer/monitor interface).

address

An identifier assigned to networks, stations, and other devices so that each device can be separately designed to receive and reply to messages. See also *serial address*.

administrator

The person who sets up a server, creates user login accounts and passwords, creates groups, sets security, and maintains the server.

Alpha® protocol

The proprietary internal instruction language used by Alpha®, AlphaVision™, BetaBrite®, AlphaEclipse™, and Solar™ signs. Also known as "EZ95."

AMS

Adaptive Micro Systems, Inc.

AMS(E)

Adaptive Micro Systems, Europe.

AMS(I)

Adaptive Micro Systems, International. (Refers to Milwaukee location.)

AMS(M)

Adaptive Micro Systems, Malaysia.

animation

A sequence of graphics designed to be shown together to give the illusion of motion, such as a walking shoe, a moving boat, or a light turning off and on.

ANSI

American National Standards Institute. A nonprofit organization in the United States that defines standards in many industries. For example, how safety symbols appear in documentation. It is supported by over 1,000 trade organizations, professional societies, and companies, and affiliated with the Consultative Committee for International Telegraphy and Telephony (CCITT) and the International Standards Organization (ISO).

apparatus

A complex device or machine consisting of the enclosure, the enclosed equipment, and the protruding accessories, designed for a specific purpose.

AppleTalk

The Apple Computer suite of protocols that allows the hardware and software on an AppleTalk network to interact and route data.

AppleTalk network

A collection of connected, individually controlled computers, printers, and other devices, together with the hardware and AppleTalk software used to link them.

application

A software program with which a user can create, authorize, or change data. Can generally be accessed from a menu or toolbar.

AR

Access Rate. Actual data access rate measured in bits per second.

ASCII

American Standard Code for Information Interchange. A set of characters using an 8-bit code for data transfer adopted by ANSI to ensure compatibility among data devices.

back end

A device (such as a server or software program) that provides services to a front end (a software application). See also front end.

baseband

Characteristic of a network technology where only one carrier frequency is used, like Ethernet.

battery backup

Battery-backed up memory. If a sign is turned off, unplugged, or power is inadvertently lost, the messages, graphics, and time settings stored in the sign's memory are not lost. When the sign is plugged in again, the messages, graphics, and time that were in memory are still available. Some signs use a battery; some use a capacitor.

baud

The speed at which data bits are transmitted and received, usually measured in bits per second. For example, 9600 baud is equal to 9600 bits per second.

binary

A numbering system comprised of bits, strings of ones and zeros. See also bit.

bit

Binary digit used in the binary numbering system. Can be 0 or 1.

boot

To plug in, turn on, or otherwise start a computer, sign or machine.

boot code

Firmware used for power-up on a display sign's controller board.

bridge

A device that connects two or more physical networks, forwarding frames between networks based on information in the datalink header. Because a bridge operates at the datalink layer, it is transparent to the network layer protocols.

brightness

The output intensity of an LED measured in millicandela (mcd). The higher the number, the brighter the intensity. See also *luminance* and *wavelength*.

broadcast

A transmission method by which all devices/nodes on a network receive a copy of any message that is designed for broadcast. For example, when a message is broadcast, each sign on that network displays the message.

browser

A GUI-based software application used to access hypertext documents and other services on the World Wide Web or Internet. See also GUI.

buffer

Stores chunks of data in transit until they can be processed.

byte

Made up of 8 bits. See also bit.

cable connectivity

A cable connection between the serial port of a computer and a sign. This is the simplest type of connection. Also referred to as a wired or serial connection.

cabling

The wiring that connects pieces of a network together. RS232 and RS485 are types of cabling used with Adaptive® displays.

CE

Compliance European. The agency that sets the standards LED signs must meet if they are to be sold in Europe. International only.

center-to-center spacing

The distance from the center of one pixel to the center of the next adjacent pixel. Useful in determining character height. Also known as pitch.

character

Any letter, number, punctuation mark, or other symbol used in text. A typical character is 7 pixels high by 5 pixels wide, plus the spaces between characters and lines.

character height

LED character height usually expressed in pixels. For example, 8-high.

character height-to-pitch relationship

Character height (rows) times the pitch equals the height of the characters. For example, for an Alpha® 215 sign, 7 rows times 0.3 inches is equal to 2.1 inches.

characters per line

Determined by the number of pixels across the sign and by the size of the character. A normal character is 5 pixels wide with one pixel space separating characters. Thus, an 80 column sign can display 13 characters ($80/6= 13.3$).

TIP: As you plan your sign requirements, write down the messages you intend to display on the sign. Count the characters in the words that you use most often. How many words you want to see at once determines the number of characters per line required by your application. If a word will not fit on the line, the word displays one character at a time or it starts a new line, depending on the display mode being used.

checksum

A numeric computation using the bits of a transmitted message, and the resulting value. The value is transmitted with the message, and the receiving device recalculates the checksum, then compares it to the received value to detect transmission errors.

chip

A small device found on the microboard of an LED sign. Contains a program (RAM or EPROM, for example) that runs the sign.

circuit

Any path that can carry an electrical current.

client

Software program or node that requests services from a server.

clusters

Multiple LEDs assembled in groups that together form one bright pixel point when lit. The LEDs are connected to a molded cup which is then filled with clear epoxy to hold the LED in place. Clusters may contain one color LED or, in a multi-color application, a combination of different colors.

CM

Character Matrix. Displays characters only (not graphics) in discrete blocks of LEDs.

coaxial cable

A type of cable that uses two conductors: a central, solid wire core surrounded by insulation and, surrounding that, a braided wire conductor sheath.

code

Specific firmware or software containing instructions for a computer or sign.

color

Adds interest and contrast over a monochrome, red-only sign. For simple informational signs, red is often sufficient. The green and amber colors are considered softer colors and may be more appropriate for some environments. Color signs can be 3 color, (red, amber, and green), 9 color, (additional shades of red, amber, and green), 256 color (usually RGB or CMYK), 262,000, or 4,000,000 for full color displays. Some signs allow you to set the color of the background or the foreground. In a red-only sign model, this would allow red text on a black background or black text on a red background. In a multi color sign, you could have a variety of text colors and a variety of background colors.

Note: Certain colors and color combinations are more readable and visible than others. The elaborate combinations generally work better at night. In bright sunlight, bright colors on a black background are the easiest to read.

COM port

An abbreviation for communications port. A data pathway, generally referred to as a serial port, that connects to a communication device.

controller board

The circuit board in an LED sign that controls the entire sign, such as which dots turn on. Sends information to the driver boards. Also known as micro board or micro controller board.

converter box

Changes RS232 signals into RS485 signals.

CPU

Central Processing Unit. The brains of a computer designed to run a group of instructions, such as adding numbers together, gathering information from memory, and so on.

CSA

Canadian Standards Association. The agency that tests LED signs, among other things, to make sure they are safe for use. An LED sign cannot be shipped to Canada without a CSA label.

data block module

An LED mounted on a circuit board and epoxied into a block module that contains a specific number of rows and columns of pixels.

datagram

Logical grouping of information sent as a network layer. The primary bits of information on the Internet.

data rate

The speed at which data bits are transmitted and received, usually measured in bits per second. See also *baud*.

date of manufacture

The month, day, and year the sign is made. Adaptive Micro Systems uses a date code of YYMM, where April 2001 would read 0104.

DC

Direct Current. A current that flows in one direction only, like that of a battery.

DDE

Dynamic Data Exchange. A form of communication in OS/2 and Windows® software, not as advanced as OLE. When two or more programs are supporting DDE and running simultaneously, they can exchange information and commands.

density

Defined by the pixel diameter and center-to-center spacing of the character displayed. The closer the pixels are to each other, the higher the resolution of the character. Low resolution characters are designed for distance viewing. Also known as resolution.

destination address

Address of a network device that is receiving data. For example, the address in a message packet identifying which sign is to receive it.

destination node

In the Open Systems Interconnection (OSI) model, the nodes that represent the host computers at each end of a connection. In a packet-switching network, the node attached to the device that is receiving the data.

device

Any hardware component attached to a computer system.

device driver

The software or firmware that translates operating system requests into a format that is recognizable by specific hardware, such as an adapter.

DHCP

Dynamic Host Configuration Protocol. A method of automatically assigning a TCP/IP address to a client.

digital display

An electronic sign that combines text and graphics to convey a fixed or changeable, moving or unmoving advertising or locational message. See also *electronic display*.

digital sign

An electronic sign that combines text and graphics to convey a fixed or changeable, moving or unmoving advertising or locational message. See also *electronic display*.

DIP switches

Switches are housed in a rectangular box on a circuit board and control specific features to whichever device they belong. The switches are binary, either on or off, and are often used in place of groups of jumpers.

display

An electronic sign that combines text and graphics to convey a fixed or changeable, moving or unmoving advertising or locational message. See also *electronic display*.

display array

Rows and columns. The number of dots or pixels vertically and horizontally in a sign. For example, 16 x 80 means that the sign has 16 dots vertically and 80 dots horizontally, for a total of 1280. The characters and graphics of a message are formed by turning on or activating specific patterns of pixels within the display array.

DLL

Dynamic Link Library. An OS/2 and Windows® software feature that allows executable code modules to be loaded on demand and linked to run time.

driver board

A circuit board in an LED sign that takes information from the micro board and uses it to turn an LED on or off. Display cubes are mounted, socketed, or soldered on a driver board.

drop test

A test done on each new product to determine whether its packaging material is sufficient for shipping. ETL is an example of a company that performs the test.

duplex adapter

Converts a single jack into a dual jack to allow two accessories to be connected at the same time.

EEPROM

Electronic Erasable Programmable Read Only Memory. A small device usually found inside the access door of an LED sign containing a program (firmware) that runs the sign, which can be written to over and over again.

electrical information

Input voltage, frequency, amperage, and watts.

electronic display

An electronic sign that combines text and graphics to convey a fixed or changeable, moving or unmoving advertising or locational message. The following terms are used interchangeably: ACD display, alphanumeric display, auditorium marquee, banner, banner board, communication center, communicator, digital display, digital sign, directional marquee, display, display board, electronic banner, electronic display, EMC (electronic message center), electronic sign, graphic display, hall marquee, LED display, LED sign, light board, marquee, message board, message center, message display, moving message display, moving message sign, news ticker, price changer, programmable sign, reader board, salescaster, scanvertiser, sign, silent radio, silent salesman, stock ticker, ticker, ticket marquee, time-temperature display, and zipper.

electronic sign

An electronic sign that combines text and graphics to convey a fixed or changeable, moving or unmoving advertising or locational message. See also *electronic display*.

EMC

Electronic Message Center. An electronic sign that combines text and graphics to convey a fixed or changeable, moving or unmoving advertising or locational message. See also *electronic display*.

enclosure

A case that provides protection to someone against contact with the enclosed equipment, and to protect the enclosed equipment from the elements. NEMA standards allow for many different types of enclosures, indoor and outdoor.

end node

The machine or unit (node) that serves as an originator or final destination of network traffic, but does not relay traffic originated by other nodes.

end-of-line terminator

Used to define the start and end of a network. Helps control electrical interference on the network and provide stable communication across a network.

EPROM

Erasable Programmable Read Only Memory. A small device usually found inside the access door of an LED sign containing a program (firmware) that runs the sign.

ERP

Enterprise Resource Planning. A billion dollar sales industry, of which Oracle is its largest company, for systems designed to coordinate database management for sales forecasts, order management, purchasing, product scheduling, inventory management, and other functions required to complete the manufacturing of a product.

ESD

Electrostatic Discharge. Discharge of stored static electricity that can damage electronic equipment and impair electrical circuitry, resulting in complete or intermittent failures.

Ethernet

Links devices (such as a group of display signs) on a network. Baseband LAN specification invented by Xerox Corporation and developed jointly by Xerox, Intel, and Digital Equipment Corporation. Ethernet networks use CSMA/CD and run over a variety of cable types at 10 Mbps (megabits per second). Newer versions of Ethernet, such as Fast Ethernet and Gigabit Ethernet, support data transfer rates of 100 Mbps and 1 gigabit (1,000 megabits) per second, respectively.

Ethernet adapter

Device used to convert TCP/IP protocol to RS232/485.

Ethernet connectivity

An ethernet connection between a computer and a company's local area network, supported by TCP/IP.

ETL

Edison Testing Laboratories. An agency that tests and certifies conformity to both domestic and international electrical standards. A product tested for safety by ETL has an ETL label.

FCC

Federal Communications Commission. Regulates radio frequency emissions from an interaction between electrical and communication devices. Domestic only.

field

One item of information about something, such as a name, action, or destination for a command.

firmware

Name used to describe the program stored on a chip. May be referred to as the operating system, but the terms are not always synonymous.

flash

A method of updating a fixed EPROM by sending the new firmware program from a PC to the EPROM. Eliminates the need to physically replace firmware chips.

flick

Multiple bitmapped images displayed one after another to give the illusion of movement.

flush mounting

A construction that has a minimal front projection when set into a recessed opening and secured to a flat surface.

Frame Relay

A method of communication that can go from ISDN speed to T1 speed in increments. It has a flat rate billing instead of a per time usage. It connects by using the telephone company's network. See also *ISDN* and *T1*.

front end

A software application that requests services from a device (such as a server or software program). See also back end.

FM

Full Matrix. Displays characters and graphics with no empty spaces between blocks of LEDs.

FUTS

First Unit to Ship.

Gateway

Product name for an Adaptive® interface from a PLC to a sign.

graphic

On a sign, a picture consisting of a pattern of pixels often displayed in one position, such as a company logo or an identifiable product (for example, a car, light, or shoe). Displays a single bitmapped image.

Group

One or more sites in AlphaNet plus™ for Windows® or Smart Alec software.

GUI

Graphical User Interface. A program interface that takes advantage of the computer's graphics capabilities to make the program easier to use.

hazardous locations

Locations that contain enough hazardous materials to create an explosion, according to National Electrical Manufacturer's Association (NEMA) standard.

indoor character size

2" and 4" high characters are commonly used in most interior applications. In warehouses or manufacturing environments where signs are to be viewed from greater distances, 4" or 7" characters work best.

indoor locations

Areas protected from exposure to the elements. Viewing distances are generally shorter.

industry automation

Any type of machine process in which a controller (PLC) contains data that will be used on an EMC or electronic display.

infrared

A form of radiation with a wavelength between 750 and 100,000 nanometers, which is above that of visible light and below that of microwaves. Infrared sensors are used in night-vision goggles and sensors. Infrared light can be used to send signals wirelessly back and forth between computing devices.

integrated circuit

A small device that performs various electronic tasks. Also known as a chip.

Internet

The collection of networks and gateways that use the TCP/IP suite of protocols. Written in lowercase, it is an abbreviation for *internetwork*.

Internet address

A 32-bit address assigned to hosts using TCP/IP.

IP

Internet Protocol. A TCP/IP protocol that provides datagram delivery of messages.

IP address

A 32-bit address assigned to hosts using TCP/IP.

ISA

Industry Standard Architecture. Expansion slots and the associated circuits. Transfers 16 bits of data at a time between the add-in board plugged into the slot and the computer.

ISDN

Integrated Services Digital Network. An international communications standard for sending voice, video, and data over digital telephone lines or normal telephone wires at 64 Kbps (64,000 bits per second) per line.

ISO

International Standards Organization. An international organization that establishes global standards for communication and information exchange, as well as for many other fields of commercial activity.

jumper

An electrical switch consisting of a number of pins and a connector that can be attached to the pins in a variety of ways. Different circuits are created by attaching the connector to different pins. Can also be a wire.

knockout

A portion of the wall of an enclosure that can be removed by a hammer, screwdriver, or pliers at the time of installation in order to provide a hole for the attachment of an auxiliary device, cable, or fitting.

LAN

Local Area Network. A group of computers and other devices connected by a communications link that allows a device to interact with any other device on that network. The devices are in close proximity, hence the word *local*.

LAN connectivity

A LAN connection in which one or more displays signs are linked by Alpha® Ethernet Adapters or serial servers.

LAWN

Local Area Wireless Network. A group of computers and other devices connected by a wireless communications link that allows a device to interact with any other device on that network. A transmitter attached to a PC broadcasts data to devices equipped with a data receiver. Transmission range is usually limited to a mile, hence the word local.

LED

Light Emitting Diode. A tiny chip of silicon made to produce light in a variety of colors, including red, green, yellow, and blue. A semiconductor diode that converts applied voltage to light as is used in digital displays.

LED display

An electronic sign that combines text and graphics to convey a fixed or changeable, moving or unmoving advertising or locational message. See also *electronic display*.

LED sign

An electronic sign that combines text and graphics to convey a fixed or changeable, moving or unmoving advertising or locational message. See also *electronic display*.

line position

Where a message appears on a sign. Includes top, bottom, middle, and fill.

loopback

A diagnostic test in which a signal is transmitted across a medium while the sending device waits for its return.

luminance

A measure of brightness in millicandela (mcd). See also brightness and wavelength.

marquee

An electronic sign that combines text and graphics to convey a fixed or changeable, moving or unmoving advertising or locational message. See also *electronic display*.

medium

Physical environments through which transmission signals pass.

MES

Manufacturing Execution Systems. The software that sits between ERP systems and the machines on the factory floor. It tracks and pulls together information in real time about the key areas of production: materials, equipment, personnel, work instructions/specifications, and facility conditions. It is the software that feeds the databases used to make decisions in the ERP systems.

message

A unique, unified set of information that can be saved or sent to a sign. Includes text, graphics, formatting, animation, time, date, temperature, and so on.

message center

An electronic sign that combines text and graphics to convey a fixed or changeable, moving or unmoving advertising or locational message. See also *electronic display*.

message display

An electronic sign that combines text and graphics to convey a fixed or changeable, moving or unmoving advertising or locational message. See also *electronic display*.

micro board

The circuit board in an LED sign that controls the events in a sign, such as which dots turn on. Sends information to the driver boards. Also known as controller board or micro controller board.

model number

Type of sign, size, and color capability.

modem

Translates digital signals to analog and back again for transmission through telephone wires, wireless transmitters, wireless paging services, or fiber optic cables. A contraction of **mod**ulate and **dem**odulate.

modem connectivity

A modem connection between the modem on a sending computer and a modem in or near a sign. When a message is sent, the software automatically dials the phone number of the modem in the sign. The telephone line can be a line provided by the phone company or an extension on an internal phone system. A modem connection is generally used when it is easier to get a phone line to the sign location than it is to pull a serial cable. Modem connectivity is also used when programming needs to be done remotely.

modes

Special effects that change the way text appears on a sign. For example, messages can move left or right, or the top line remains fixed while the bottom line moves.

modular network adapter

Used at Adaptive® to connect a sign to an RS485 network.

modules

Subassemblies produced to contain a specific number of rows and columns of pixels to simplify the assembly of larger signs and to permit more flexibility in the design and construction of signs.

moving message display

An electronic sign that combines text and graphics to convey a fixed or changeable, moving or unmoving advertising or locational message. See also *electronic display*.

moving message sign

An electronic sign that combines text and graphics to convey a fixed or changeable, moving or unmoving advertising or locational message. See also *electronic display*.

multiplexing

The most common technique used in indoor displays to get the greatest range of brightness. A scheme that allows multiple signals to be transmitted at the same time across one physical channel.

NAK

Negative Acknowledgment. An ASCII or EBCDIC code indicating that a message has not been received correctly.

NEMA

National Electrical Manufacturing Association. Creates standards for enclosures for electrical devices. Domestic only. For Adaptive® users, NEMA standards for enclosures protect displays from dirt, dust, and oil in a factory setting.

network

A collection of interconnected, individually controlled devices, together with the hardware and software used to connect them.

network address

A unique network layer number that refers to a device residing on a network.

node

An addressable entity on a network. The node acquires a unique 8-bit node number dynamically when it connects to the network. It tries that address and node number again when it next connects to the network. If the previous number is already in use, it tries again until a unique node address is found.

node address

A number acquired dynamically by each node when it connects to a network. A device's node address is combined with the network number to form its unique network address.

non-ventilated

Provides no intentional circulation of external air through the enclosure.

octet

A group of 8 binary digits operated on as a unit. Also called a byte or a character.

ODBC

Open Database Connectivity. A Microsoft® standard that allows databases created by various relational and non-relational database programs (such as dBase, Access, FoxPro, and Oracle) to be accessed by a common interface.

oil-resistant gaskets

Gaskets made of material that is resistant to oil or oil fumes.

OLE

Object Linking and Embedding. The interface that embeds an object created by one application into a document created by another, performs drag-and-drop transfers within or between applications, and so on. Any changes to the original object are automatically reflected in the document where it is embedded.

outdoor locations

Areas exposed to the elements. Viewing distances are generally longer.

PCB

Printed Circuit Board. The card type material of which micro boards and driver boards are made.

PING

Packet Internet Grouper. A program used to test the reachability of destinations by sending an Internet Control Message Protocol (ICMP) echo request and waiting for a reply.

pitch

The distance from the center of one pixel to the center of the next adjacent pixel. Also known as center-to-center spacing.

pixel

Picture element. The smallest element or spot that a screen or sign can display.

pixel diameter

Determines the size of a pixel. A pixel can be as small as a single .1" diameter LED.

PLC

Programmable Logic Controller. Used in industrial environments to continually turn off various devices without fail using programmed logic (for example, traffic lights).

PN

Part Number. A unique number assigned to each product, document, brochure, and so on, and to many components.

polling

Any procedure that sequentially and periodically contacts terminals in a network.

port

a) The hardware that allows a component to communicate with a peripheral, such as a parallel port. b) The logical point of contact between a LAN driver and a protocol that is bound to it. c) A unique server input/output address assigned to a local area network driver in NetWare software.

programming

The process of composing messages and graphics, and specifying the display modes, fonts, colors, and location of text and graphics on the display screen.

protocol

A set of rules for transmitting data within a network or internetwork. Specifies the format, timing, and sequence in which the network transmits data. Common protocols include AFP, ALAP, RTMP, NCP, IPX.

reader board

An electronic sign that combines text and graphics to convey a fixed or changeable, moving or unmoving advertising or locational message. See also *electronic display*.

record

A collection of related fields, such as all the information about one display command.

repeater

Used to boost the electrical signal along very long networks.

resolution

The quality and clarity of text and graphics, defined by the pixel diameter and center-to-center spacing of the character displayed. The closer the pixels are to each other, the higher the resolution of the character. Low resolution characters are designed for distance viewing. Also known as density.

rev

Revision.

RF transmitter

Radio frequency transmitter. Wireless device which sends a message from a network computer and modem to a data receiver.

routing

The transmission of a datagram from one node to another on the same or a different network. Refers to the paths that are chosen to transmit an IP datagram from its origin to its destination, based on the IP addresses contained in the datagram.

RS232

Uses serial communication, specifically RS232 protocol. Connects a sign directly to a computer. Limited to a distance of 50 feet and connects only one sign to one computer.

RS232/RS485 jumper

A set of three small prongs inside some signs with a connector that covers only two of the three prongs (jumper). Determines whether the sign is using RS232 or RS485 communication.

RS485

Uses parallel communication, specifically RS485 protocol. Connects multiple signs directly to a computer for distance longer than 50 feet. Requires a converter box.

RTC

Real-time Clock. A memory chip that allows a sign to retain accurate time while not powered. Runs from a battery.

serial

An RS232, RS485, or USB connection between a PC and one or more computers in a network.

serial address

An identifier assigned to networks, stations, and other devices so that each device can be separately designed to receive and reply to messages. See also address.

serial number

Unique identification number for each sign or other product. Usually a consecutive sequence within a given model line.

server

A combination of controller software and mass storage devices that allows computer users to share common files and applications on a network.

sign

An electronic sign that combines text and graphics to convey a fixed or changeable, moving or unmoving advertising or locational message. See also *electronic display*.

Site

A collection of one or more signs in AlphaNet plus™ for Windows® software.

Smart Alec

Intelligent messaging system that delivers messages and real-time data from a variety of information systems to a variety of communication devices.

snippet

A block of text that is saved for repeated use in AlphaNet plus™ for Windows® software.

storage capacity

Ranges from 7,000 to 1,000,000 characters and more for message storage capacity (graphics require more), depending on the sign and the application.

string file

A sequence of data values, usually bytes, that represent variables. These variables may be updated independently of the rest of the message without affecting the rest of what is being displayed on the sign.

surface mounting

Secured to and projected from a flat surface. Describes how components are mounted (soldered) to a PCB (printed circuit board).

T1

A dedicated phone connection supporting data rates of 1.544 Mbps (bits per second). A T1 line actually consists of 24 individual channels, each of which supports 64 Kbps. Each 64 Kbps channel can be configured to carry voice or data traffic.

TCP

Transmission Control Protocol. The major transport protocol in the Internet suite of protocols, providing reliable, connection-oriented, full duplex streams. Uses IP for delivery.

TCP/IP

Transmission Control Protocol/Internet Protocol. A set of rules originally developed by the Department of Defense to link dissimilar computers across many kinds of networks.

Telnet

A protocol in the TCP/IP suite that governs character-oriented terminal traffic.

through hole

Hole in the casing of a sign through which wiring is brought to connect a device.

ticker

An electronic sign that combines text and graphics to convey a fixed or changeable, moving or unmoving advertising or locational message. Primarily used to display financial data. See also *electronic display*.

topology

The physical design or layout of network components (cables, stations, gateways, and hubs). Three basic interconnection topologies are star, ring, and bus networks. The flow of data differs in each topology.

transparent

A description of a function that operates without being evident to the user or software application.

tri-color

Capable of red, green, and amber colors.

trigger

Cause or initiate an action.

tune file

Pre-programmed sounds file that can be attached to a message and sent to a sign equipped with speakers in AlphaNet plus™ for Windows® software.

UL

Underwriters Laboratory. Creates testing standards for safety (electrical, shock, fire hazards, and so on). Domestic and International. A product tested for safety by UL has a UL label.

update

Change to new values.

UPS

Uninterruptible Power Supply. A device that contains a battery and some circuitry to supply a computer with power for a limited time if there is an interruption in the outlet power.

variable

Represents real-time data that can change, such as temperature or interest rates. Variables can be embedded in messages and refreshed when the value changes, and can also be used to trigger commands for certain events to start or stop.

ventilated

Provides circulation of external air through the enclosure to remove excess heat, fumes, and vapors.

viewing distance

For 20/20 vision, 1" of character height can be read at 50 feet. For 20/40 vision, 1" of character height can be read at 40 feet.

WAN

Wide Area Network. Computers that are networked together over a wide geographic area, sharing information over telephone lines and radio waves.

wavelength

A measure of color saturation in nanometers. See also brightness and luminance.

WAWN

Wide Area Wireless Network. A group of computers that are connected wirelessly over a wide geographic area. A transmitter attached to a PC broadcasts data to devices equipped with a data receiver.

wireless connectivity

A wireless connection in which a transmitter is attached to a PC, and each sign is equipped with a wireless receiver. This allows text and graphics to be sent wirelessly to the sign.

workstation

A computer node through which a user can access a server or other nodes.