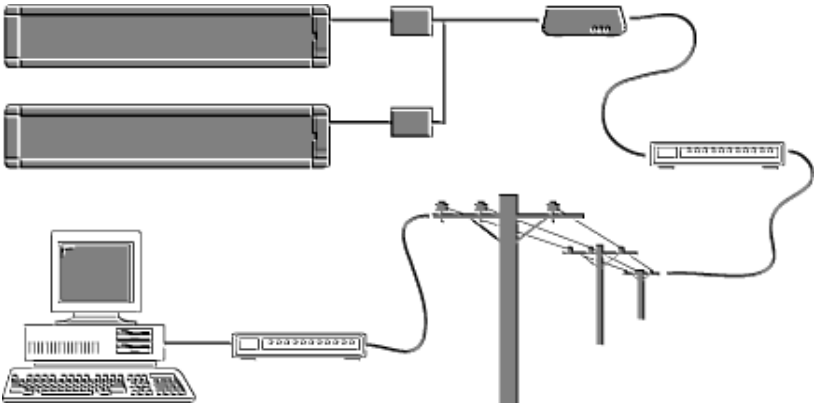
Network Configurations

2/27/98 update

Changes from the previous version are marked with margin change bars.



for use with
ALPHA™, ALPHA™ with Smart Alec option,
and ALPHAVISION™ signs

What's New in This Release:

- *Smart Alec information*
- *Print server networking*
- *PPD end-of-line termination*

ADAPTIVE

Form No. 9708-8046A
2/27/98

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

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Contents

Sign types 1
- Older Generation signs 1
- Second Generation signs 1

Network overview 2
- Cable network 2
- Modem network 3
- Wireless networks 4
- Local Area Network (LAN) 6

Connecting a *single* sign to a *cabled* PC network 7
- Single Second Generation sign 7
- Single Older Generation sign 8

Connecting *multiple* signs to a *cabled* PC network 9
- Multiple Second Generation signs 9
- Multiple Older Generation signs 11
- Multiple Older and Second Generation signs 12

Connecting signs using a *modem* PC network 13
- Single Second Generation sign 15
- Multiple Second Generation signs 16

Connecting signs with a *wireless* PC network 17

Connecting signs with a Local Area Network (LAN) 20
- AlphaNET *plus* for Windows 20
- Smart Alec 22

Connecting *multiple* signs *without* a PC 24

Connecting an ALPHA Serial Clock to a network 27

Appendix A: Modular Network Adapter and T-connector wiring 33
- Wiring a Modular Network Adapter to a Converter Box III 33
- Wiring a T-connector to a Converter Box III 34

Appendix B: Converter Box III 35

Appendix C: How to use an IR Message Loader 36

Appendix D: How to change a sign's address 39
- Changing a sign's address using a Remote Control 40
- Changing the address of an ALPHAVISION sign 41
- Changing a sign's address using an Address Plug (PN 1088-9001) 41

Appendix E: ALPHA Serial Clock 42

Appendix F: Message programming software 44

Appendix G: Sign network cabling 46

Appendix H: Cable wiring diagrams 50
- 10 foot, type "A9" RS232 cable (PN 1088-8634) 50
- 10 foot, type "B9" RS232 cable (PN 1088-8635) 50

Appendix I: Setting the RS232/RS485 jumper on signs 51

Appendix J: RS232 and RS485 sign pinouts 53

Appendix K: Back-to-back wiring of signs 55

Appendix L: End-of-line (EOL) termination 57

Glossary 61

Sign types

The phrases “Older Generation” and “Second Generation” are used throughout this manual to refer to the following types of signs:

Older Generation signs:

- ALPHA 210B
- ALPHA 221B
- ALPHA 221C
- ALPHA 430A
- ALPHA 440A
- ALPHA 460A
- ALPHA 480A
- ALPHA 710
- ALPHA 715
- ALPHA 790i

Second Generation signs:

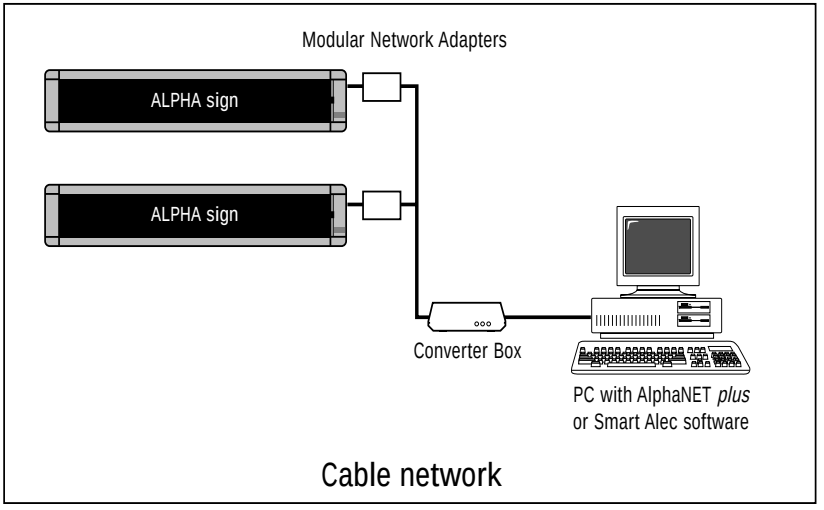
- ALPHA 200 Series
- ALPHA 300 Series
- ALPHA 4000 Series
- ALPHA 7000 Series
- ALPHAVISION
- ALPHA BIG DOT
- ALPHA Director
- ALPHA Solar
- Personal Priority Display

Network overview

Before getting into the details of networking, here's an overview of how signs can be connected or networked. Keep in mind that a network could be made up of a combination of the following configurations. For example, a group of signs could be in a cable network that is connected to a PC via a Modem network.

Cable network

In this type of network, one or more signs are connected with RS485 cabling to a PC:

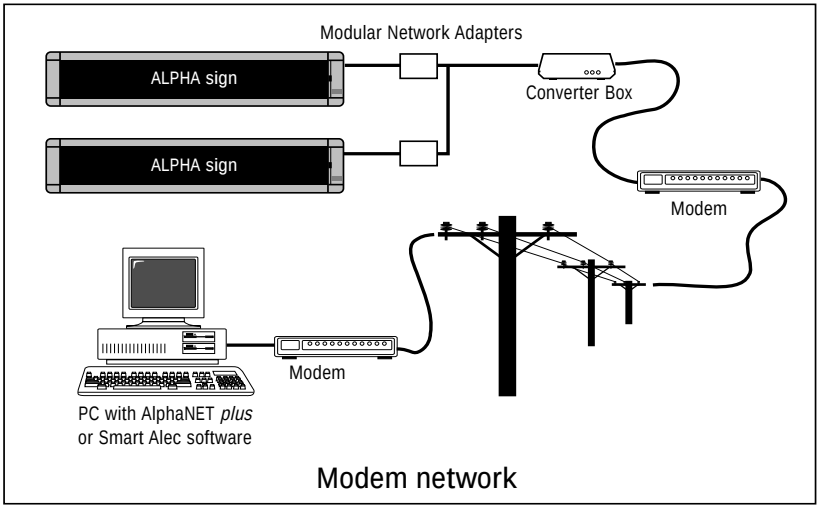


Cable network

- See Table 1 on page 7 to connect a *single* Second Generation sign.
- See Table 2 on page 8 to connect a *single* Older Generation sign.
- See Table 3 on page 9 or Table 4 on page 10 to connect *multiple* Second Generation signs.
- See Table 5 on page 11 to connect *multiple* Older Generation signs.
- See Table 6 on page 12 to connect *multiple* Older Generation and Second Generation signs.

Modem network

In this configuration, a modem is used to connect one or more signs to a PC.



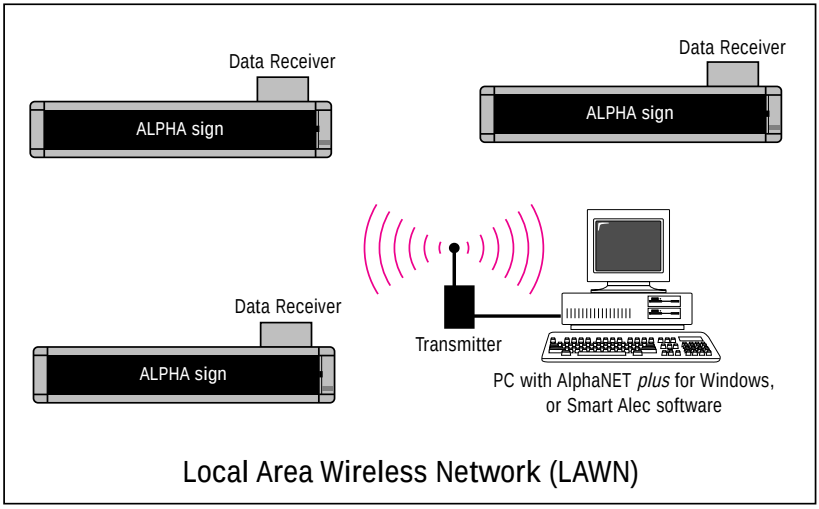
Modem network

- See Table 10 on page 15 for connecting a single Second Generation sign to a PC using a modem.
- See Table 11 on page 16 for connecting multiple Second Generation signs to a PC using a modem.

Wireless networks

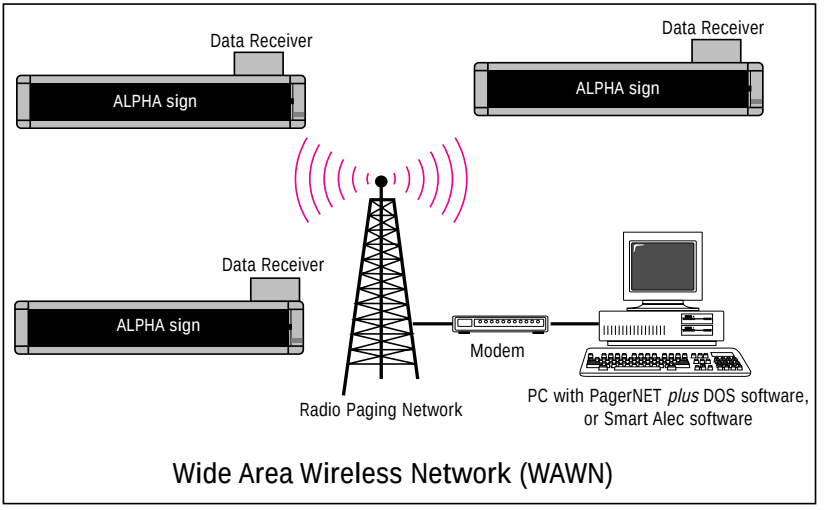
There are two types of wireless networks available: a Local Area Wireless Network (LAWN), also called an “on-site” wireless network, and a Wide Area Wireless Network (WAWN). Both types of wireless networks use a PC.

A LAWN operates by using a transmitter attached to a PC which broadcasts either text or graphics to one or more signs, each equipped with its own data receiver. The range of a LAWN is usually limited to a few miles.



Local Area Wireless Network (LAWN)

A WAWN operates very similar to a LAWN, except in a WAWN, only text can be transmitted to signs, however the range of a WAWN is only limited by the capacity of the paging service you sign up with.

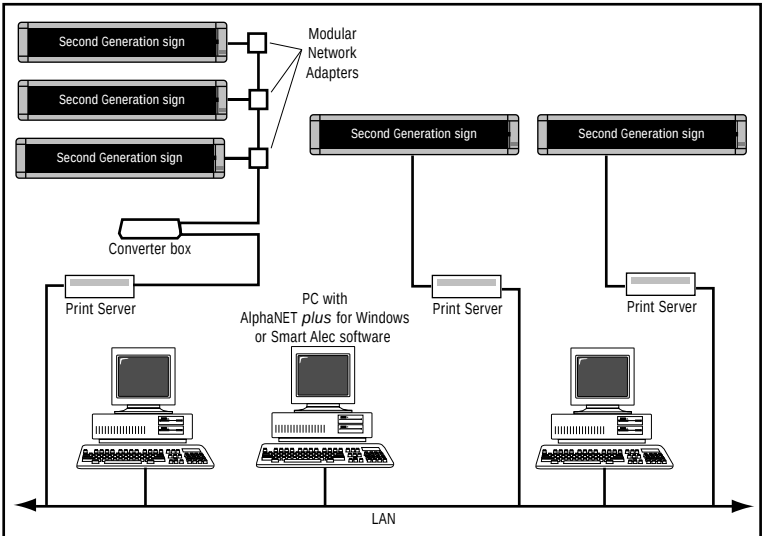


Wide Area Wireless Network (WAWN)

- See Table 12 on page 18 for a LAWN.
- See Table 13 on page 19 for a WAWN.

Local Area Network (LAN)

In this configuration, signs are connected to an existing network using one or more print servers as well as one or more PCs running messaging software (either AlphaNET *plus* for Windows or Smart Alec.)



Local Area Network (LAN) with AlphaNET *plus* for Windows or Smart Alec

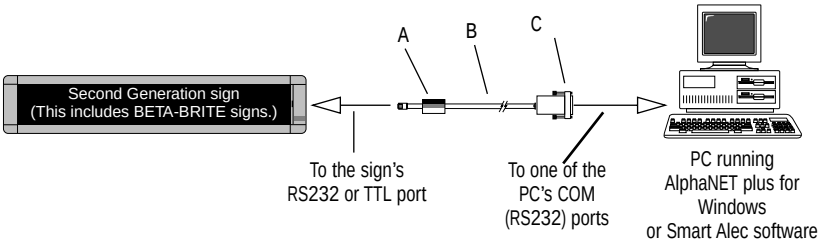
- See Table 14 on page 20 to connect a print server and signs with a LAN for AlphaNET *plus* for Windows.
- See Table 15 on page 22 to connect a print server and signs with a LAN for Smart Alec.
- See "Appendix F: Message programming software" on page 44 for information about messaging software.

Connecting a *single* sign to a cabled PC network

Single Second Generation sign

If you want to connect *one* Second Generation sign to your PC, then use this diagram:

Table 1: Connecting a single Second Generation sign to a PC



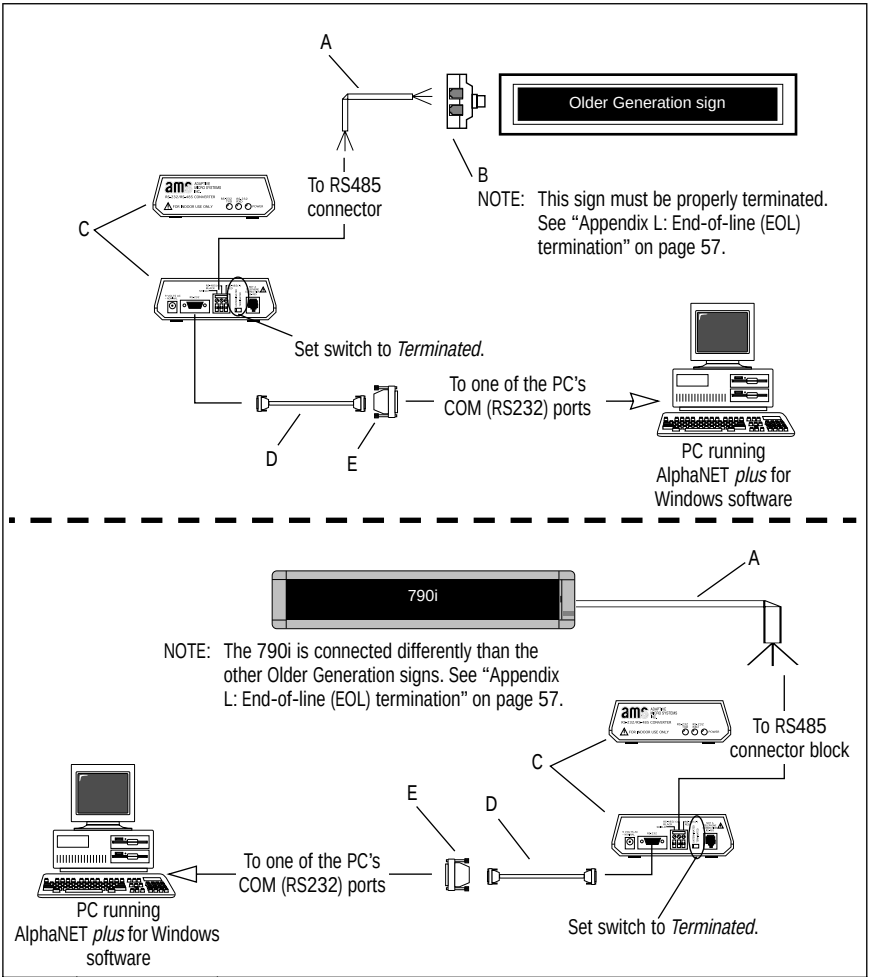
Item	Part #	Description
A	—	Ferrite (ferrite end towards sign)
B	1088-8625	25-foot 6-conductor RS232 data cable
	1088-8627	50-foot 6-conductor RS232 data cable
C	4370-0001C	25 pin sub-D/to 6 pos. RJ11 adapter
	1088-9108	9 pin sub-D/to 6 pos. RJ11 adapter

NOTE: The Series 4000, 7000, and ALPHA Director signs must have an internal jumper set to RS232. See "Appendix I: Setting the RS232/RS485 jumper on signs" on page 51.

Single Older Generation sign

If you want to connect *one* Older Generation sign to your PC, then use this diagram:

Table 2: Connecting a single Older Generation sign to a PC



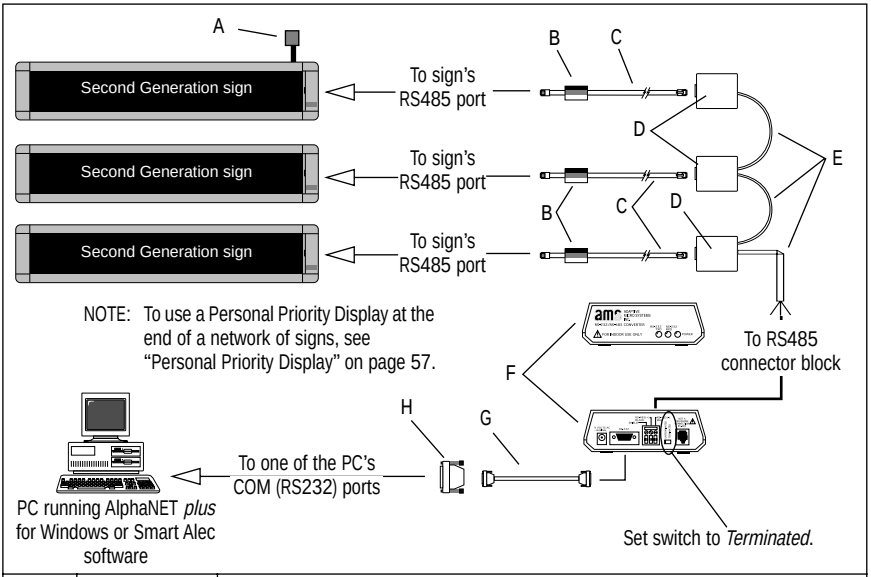
Item	Part #	Description
A	1088-8000	RS485 cable
B	1088-3004A	T-connector
C	1088-1111	Converter Box III
D	1088-8634	10 foot, 9 pin-to-9 pin, type "A9" RS232 cable
E	—	Serial port DB25-to-DB9 RS232 adapter (may be required by your computer)

Connecting *multiple* signs to a cabled PC network

Multiple Second Generation signs

If *each* of the signs you want to connect is a Second Generation sign, then set up your network according to either Table 3 on page 9 or Table 4 on page 10.

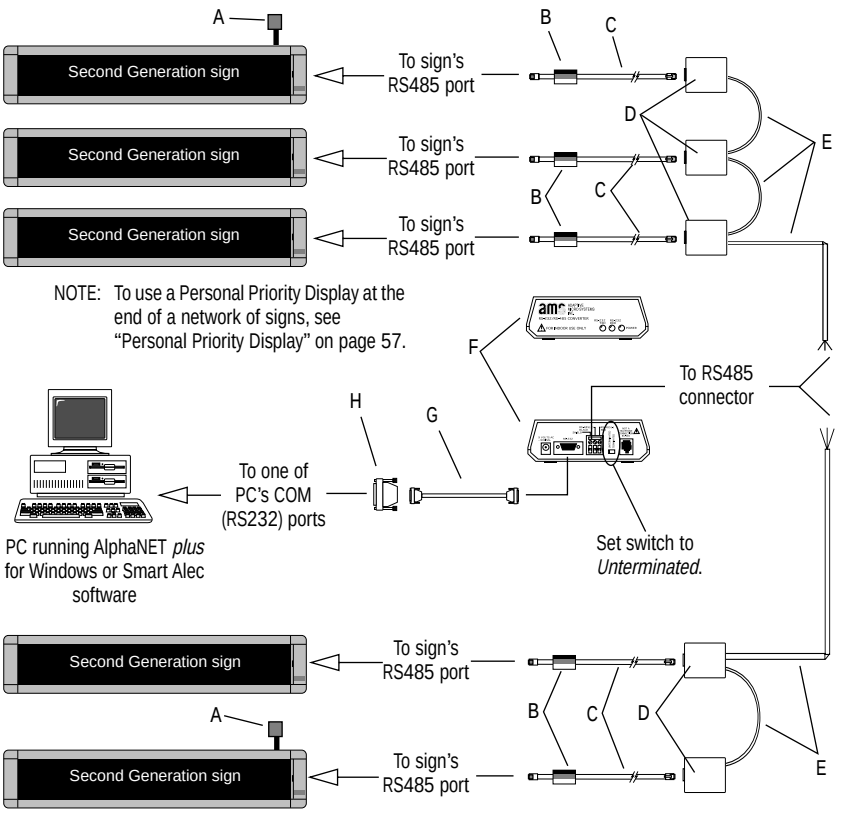
Table 3: Connecting multiple Second Generation signs to a PC
(Method 1 — Converter Box at the *end* of the network)



Item	Part #	Description
A	1088-9107	End-of-line (EOL) terminator (An EOL must be plugged into the *RS232* or *TTL* plug on the *last* sign.)
B	—	Ferrite (ferrite end towards sign)
C	1088-8624	8 foot, 4-conductor RS485 cable
	1088-8636	1 foot, 4-conductor RS485 cable
D	4331-0602	Modular Network Adapter
E	1088-8000	RS485 cable
F	1088-1111	Converter Box III
G	1088-8634	10 foot, 9 pin-to-9 pin, type "A9" RS232 cable
H	—	Serial port DB25-to-DB9 RS232 adapter (may be required by your computer)

NOTE: The Series 4000, 7000, and ALPHA Director signs must have an internal jumper set to RS485. See "Appendix I: Setting the RS232/RS485 jumper on signs" on page 51.

Table 4: Connecting multiple Second Generation signs to a PC
(Method 2 — Converter Box in the *middle* of the network)



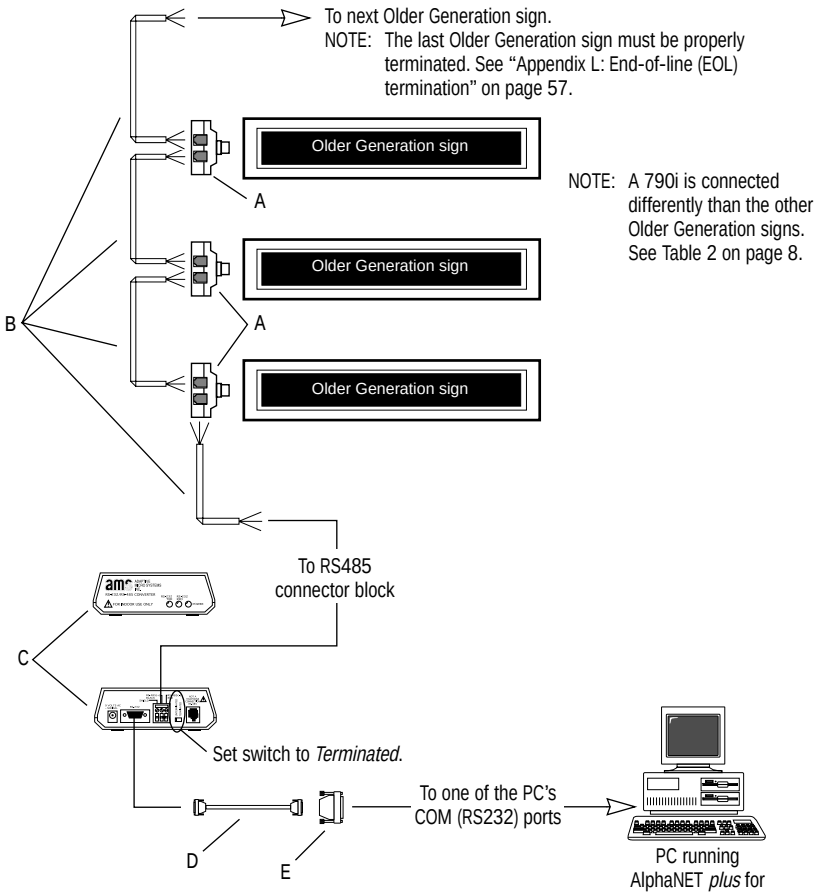
Item	Part #	Description
A	1088-9107	End-of-line (EOL) terminator (An EOL must be plugged into the *RS232* or *TTL* plug on the *last* sign.)
B	—	Ferrite (ferrite end towards sign)
C	1088-8624	8 foot, 4-conductor RS485 cable
	1088-8636	1 foot, 4-conductor RS485 cable
D	4331-0602	Modular Network Adapter
E	1088-8000	RS485 cable
F	1088-1111	Converter Box III
G	1088-8634	10 foot, 9 pin-to-9 pin, type "A9" RS232 cable
H	—	Serial port DB25-to-DB9 RS232 adapter (may be required by your computer)

NOTE: The Series 4000, 7000, and ALPHA Director signs must have an internal jumper set to RS485. See "Appendix I: Setting the RS232/RS485 jumper on signs" on page 51.

Multiple Older Generation signs

If *each* of the signs you want to connect is an Older Generation sign, then set up your network according to the following:

Table 5: Connecting multiple Older Generation signs to a PC

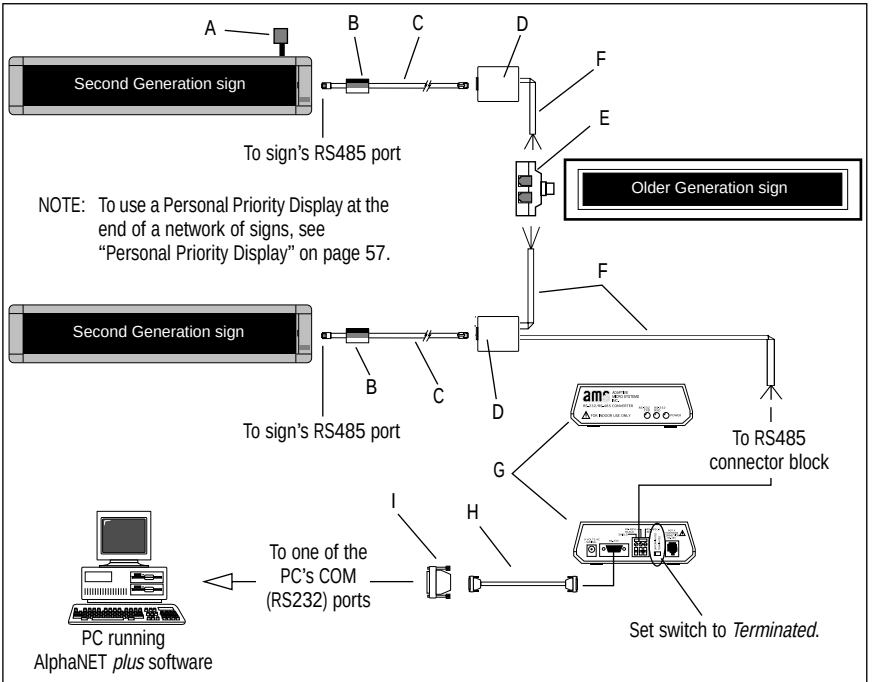


Item	Part #	Description
A	1088-3004A	T-connector
B	1088-8000	RS485 cable
C	1088-1111	Converter Box III
D	1088-8634	10 foot, 9 pin-to-9 pin, type "A9" RS232 cable
E	—	Serial port DB25-to-DB9 RS232 adapter (may be required by your computer)

Multiple Older and Second Generation signs

If you want to connect Second Generation with Older Generation signs, then follow this diagram:

Table 6: Connecting multiple Older Generation and Second Generation signs to a PC



Item	Part #	Description
A	1088-9107	End-of-line (EOL) terminator (In this case, an EOL must be plugged into the *RS232* or *TTL* plug on the *last* sign. If the last sign is an Older Generation sign, see "Appendix L: End-of-line (EOL) termination" on page 57.)
B	—	Ferrite (ferrite end towards sign)
C	1088-8624	8 foot, 4-conductor RS485 cable
	1088-8636	1 foot, 4-conductor RS485 cable
D	4331-0602	Modular Network Adapter
E	1088-3004A	T-connector
F	1088-8000	RS485 cable
G	1088-1111	Converter Box III
H	1088-8634	10 foot, 9 pin-to-9 pin, type "A9" RS232 cable
I	—	Serial port DB25-to-DB9 RS232 adapter (may be required by your computer)

NOTE: The Series 4000, 7000, and ALPHA Director signs must have an internal jumper set to RS485. See "Appendix I: Setting the RS232/RS485 jumper on signs" on page 51.

Connecting signs using a *modem* PC network

A Modem network is typically used when one or more signs are some distance away from a PC. For example, when you want to send messages to signs that are in a building across town or in a different city or state, modems provide the means to do this. Modems are used to connect one or more signs to a computer running message programming software. (See "Network overview" on page 2 or "Appendix F: Message programming software" on page 44.)

Messages are sent from the computer to a modem, called the transmitting modem, over telephone wires to another modem, called the receiving modem, and then to the signs. The transmitting modem can be set to a fast speed, but the receiving modem must be set to 9600 baud or less for transmitting to the signs. However, for Smart Alec applications, the receiving modem must be set to 9600 baud only.

If the receiving modem operates at a speed of 2400 baud or higher, it must be initialized before messages can be sent to ALPHA signs. The general process is:

1. Set transmitting and receiving data flow control to disabled.
2. Set the modem's serial port baud rate to be the same as the connection baud rate.
3. Set auto-answer mode on, using either commands or DIP switches, based on your modem.
4. Save these settings.

Since the commands necessary to change the modem's settings vary between modems, the modem's operations manual should always be consulted. However, a US Robotics Sportster 14400/28800 modem is typical and is used in the examples here.

Generally, these steps are done with commands sent to the modem from either the modem's software or from AlphaNET *plus* for Windows.[1] See Table 7, "Commands for initializing a modem," on page 14.

Some modems, for example, the US Robotics Sportster modems tested, use manual DIP switches to enable auto-answer mode. If this is the case for your modem, see Table 8, "DIP switch settings for auto-answer," on page 14.

1. In AlphaNET *plus* for Windows, open the Diagnostics window. Under the Options menu, select the Settings option. The section for "Modem Setup Utility" sends commands to initialize the modem.

Table 7: Commands for initializing a modem

Command	Command's function
AT&H0	Disable transmit data flow control.
AT&R1	Disable receive data flow control.
AT&B0	Set the modem's serial port baud rate to the connection rate.
AT&W0	Save the changes.
These setting commands were tested on: • US Robotics Sportster 14400 Fax Modem CCITT V.32 and V.42 bis • US Robotics Sportster 28800 Fax Modem CCITT V.34 and V.32 bis	

Table 8: DIP switch settings for auto-answer

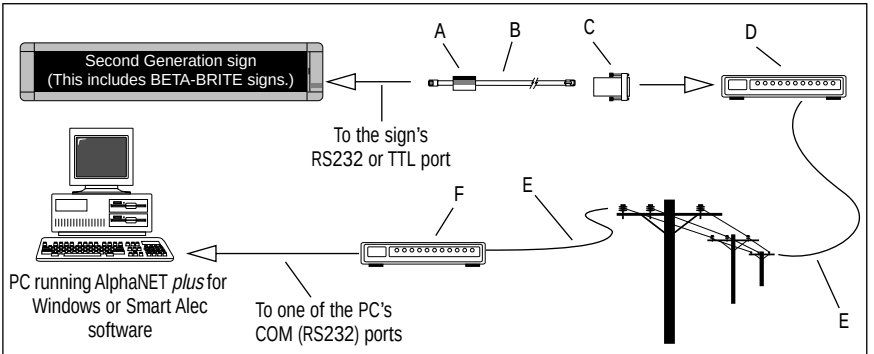
DIP switch setting	Command's function
Switch 1 = on	Modem ignores DTR.
Switch 5 = off	Modem answers on first ring, or higher if so specified.
These settings were tested on: • US Robotics Sportster 14400 Fax Modem CCITT V.32 and V.42 bis • US Robotics Sportster 28800 Fax Modem CCITT V.34 and V.32 bis	

Table 9: Commands for auto-answer

Command	Command's function
ATS0=1	Sets modem to answer on the first ring.
ATS0=4	Sets modem to answer on the fourth ring.
ATS0=0	Sets modem to never answer, i.e., auto-answer is off.
These settings are valid for most modems which use commands rather than DIP switches.	

Single Second Generation sign

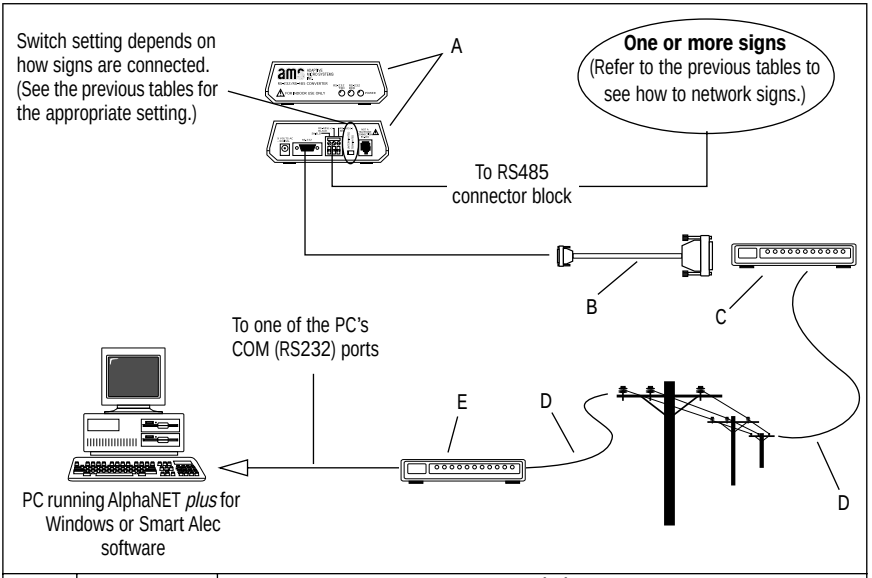
Table 10: Connecting a single Second Generation sign to a PC using a modem



Item	Part #	Description
A	—	Ferrite (ferrite end towards sign)
B	1088-8625	25-foot 6-conductor RS232 data cable
	1088-8627	50-foot 6-conductor RS232 data cable
C	—	25 pin sub-D/to 6 pos. RJ11 modem adapter (Pacesetter pn 2370-0002) This part is available through: Pacesetter Communications, Inc. 1020 Cedar Avenue St. Charles, IL 60104 630-377-8811 (phone), info@pace-setter.com (e-mail)
D	—	Receiving modem **NOTE:** If you are using a high-speed modem (14.4K and above) to receive messages, your modem may have to be told to "slow down" by sending it special commands. Though these commands vary from modem to modem, the following set of commands work for US Robotics Sportster modems: **AT&H0** (Disables transmit data flow control.) **AT&R1** (Disables receive data flow control.) **AT&BO** (Sets modem's serial port rate to connection rate.) **AT&W0** (Makes the above changes permanent.) Also, your modem should be set to ignore DTR and to answer on the first ring (DIP switches 1 and 5 on US Robotics Sportster modems, or **ATS0=1** for many other modems.)
E	—	Phone line
F	—	Transmitting modem (This can be an internal or external modem.)

Multiple Second Generation signs

Table 11: Connecting multiple Second Generation signs to a PC using a modem



Item	Part #	Description
A	1088-1111	Converter Box III
B	1088-8635	10 foot, 25 pin-to-9 pin, type "B9" RS232 cable
C	—	Receiving modem **NOTE:** If you are using a high-speed modem (14.4K and above) to receive messages, your modem may have to be told to "slow down" by sending it special commands. Though these commands vary from modem to modem, the following set of commands work for US Robotics Sportster modems: **AT&H0** (Disables transmit data flow control.) **AT&R1** (Disables receive data flow control.) **AT&BO** (Sets modem's serial port rate to connection rate.) **AT&W0** (Makes the above changes permanent.) Also, your modem should be set to ignore DTR and to answer on the first ring (DIP switches 1 and 5 on US Robotics Sportster modems, or **ATS0=1** for many other modems.)
D	—	Phone line
E	—	Transmitting modem (This can be an internal or external modem.)

Connecting signs with a *wireless* PC network

A Wireless network is an effective choice:

- where signs are located where network cabling is undesirable because the cost of cabling is prohibitive
- when signs may be moved often
- where signs are located at a distance greater than recommended for cabling (but less than two miles maximum or one mile recommended for a LAWN)

The major disadvantage is:

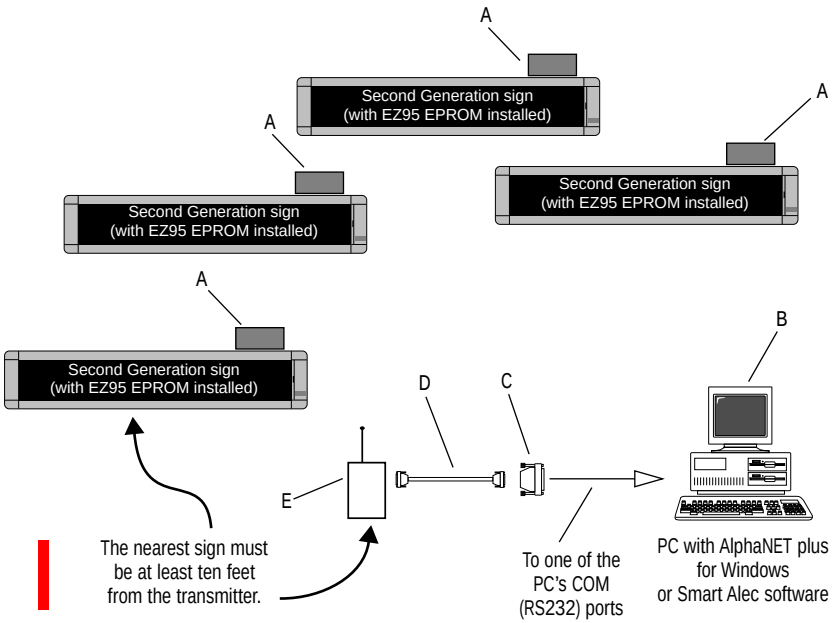
- Wireless networks are slow

There are two types of wireless networks: Local Area Wireless Network (LAWN) and Wide Area Wireless Network (WAWN.)

A LAWN uses transmitters. A transmitter is attached to a PC to broadcast to a sign equipped with a Data Receiver. Transmitters and the associated Data Receivers can be set to one of two common frequencies, 467.850MHz or 467.800 MHz, or can be set to a customized frequency.

In a WAWN, a modem attached to a PC sends a message by dialing a paging service. The paging service transmits the message to a sign equipped with a Data Receiver. The range of the WAWN is limited only by the range of the paging service. (AlphaNET *plus* for Windows is not able to send messages over a WAWN, however, both Smart Alec and a DOS program called PagerNET plus can. See “Appendix F: Message programming software” on page 44.)

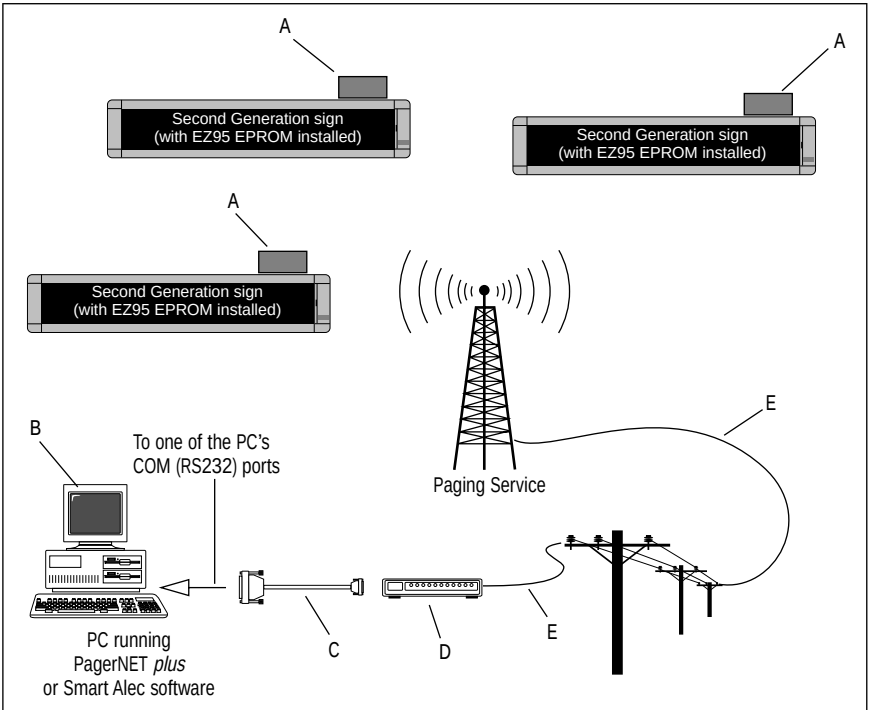
Table 12: Connecting signs to a PC with a Local Area Wireless Network (LAWN)



Item	Part #	Description
A	1088-1311	Standard data receiver (467.850 MHz)
	1088-1313	Alternate data receiver (467.800 MHz)
B	1092-7802	AlphaNET *plus* for Windows software
	1092-7808	Smart Alec software
C	—	Serial port DB25-to-DB9 RS232 adapter (may be required by your computer)
D	—	Cable (included with transmitter kit)
E	1088-1312	Standard transmitter kit (467.850 MHz)
	1088-1314	Alternate transmitter kit (467.800 MHz)

NOTE: For further information, see **ALPHA™ On-Site Wireless Data Receiver Installation Manual** (PN 9708-8080) and **Installation Instructions for the ALPHA™ On-Site Wireless Transmitter System** (PN 9708-8079).

Table 13: Connecting signs to a PC with a Wide Area Wireless Network (WAWN)



Item	Part #	Description
A	1088-1411	VHF (138 - 174 MHz) data receiver
	1088-1412	UHF (435 - 480 MHz) data receiver
	1088-1413	900 MHz (929 - 931 MHz) data receiver
B	1088-7812	PagerNET *plus* for DOS software
	1092-7808	Smart Alec software
C	—	Standard 25 pin-to-25 pin RS232 cable (usually supplied with the modem)
D	—	Modem
E	—	Phone line

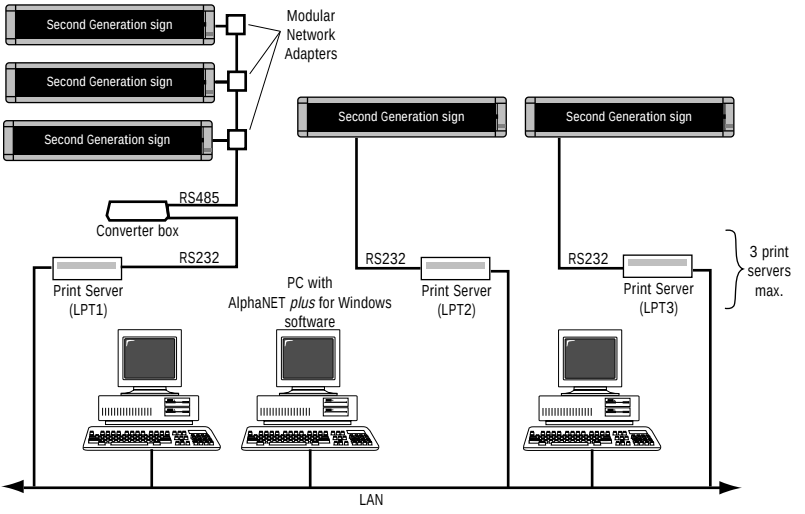
Connecting signs with a Local Area Network (LAN)

This method of connecting signs allows you to use existing LAN network software. In this environment, the sign appears to a computer as if it were a printer on the network. The main advantage of this method is that it uses an existing network, eliminating the need to set up a new network. The primary disadvantage is that set-up is complicated and network administration skills are needed.

Either AlphaNET *plus* for Windows or Smart Alec can be used for messaging, depending on the LAN network software and the operating system software.

AlphaNET plus for Windows

Table 14: Connecting signs to a PC using a LAN with AlphaNET *plus* for Windows software



Local Area Network (LAN) with AlphaNET *plus* for Windows

Any type of network which supports Windows 95 and shared print servers

For configurations of cabling to the signs, see “Connecting multiple signs to a cabled PC network” on page 9.

This method of connecting signs allows you to use any existing LAN network software that can support connecting LPT ports to a print server. Examples of this type of network software are Windows NT server, Windows 95 peer-to-peer, Novell, Banyan Vines, etc. However, on this network, each PC with AlphaNet *plus* for Windows can only be running Windows 95 operating system software. Windows NT is not supported on PCs with AlphaNet *plus* for Windows and print servers.

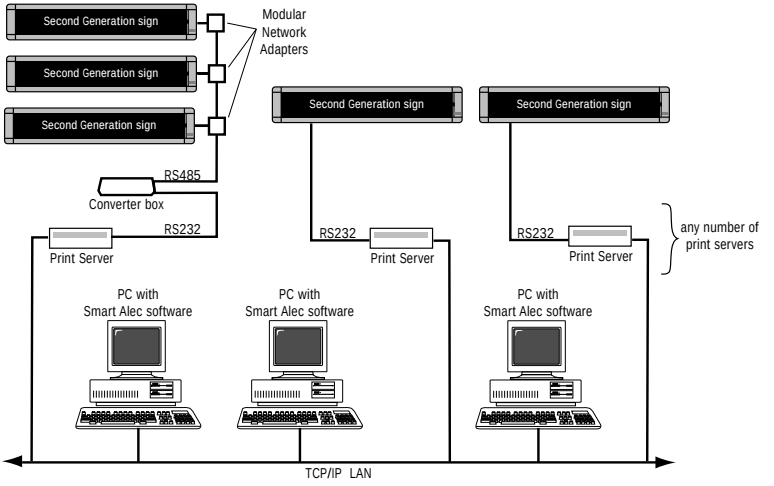
While AlphaNet *plus* for Windows can be installed on any of the computers in the network, the software is generally run on only one computer. The reason for having AlphaNet *plus* for Windows on only one computer is that AlphaNet *plus* for Windows is not designed to be networking software. So if two messages are sent from different computers to the same print server and sign, the second message sent deletes the first message. As a result, while it is possible to have AlphaNet *plus* for Windows on more than one computer, it is not recommended.

Please refer to the **AlphaNET *plus* for Windows User Manual** (pn 9708-8081) for more information about using AlphaNet *plus* for Windows software.

Please refer to the **Print Server Setup for ALPHA Sign Networks** (pn 9708-8092A) for more information about setting up a print server.

Smart Alec

Table 15: Connecting signs to a PC using a LAN with Smart Alec software



Local Area Network (LAN) with Smart Alec

Any type of network which supports
Windows 95 or Windows NT
and shared print servers

For configurations of cabling to the signs, see “Connecting multiple signs to a cabled PC network” on page 9.

This method of connecting signs allows you to use any existing LAN network software that can support TCP/IP. However, on this network, each PC with Smart Alec can only be running either Windows 95 or Windows NT operating system software. Smart Alec is designed to be networking software, so it can be installed on any number of computers in the network.

Any number of print servers can be set up on the network. Each print server device must be given an IP (Internet Protocol) address. Since IP addressing is unlimited, you can have any number of print servers on this LAN.

For messaging purposes, each print server is assigned an IP address when installed. Each sign in the network already has an internal address from zero to 255, different from the print servers’ IP address. (See “Appendix D: How to change a sign’s address” on page 39 for creating unique sign addresses.) Each sign (or group of signs) is a location in

Smart Alec, having both an IP address and a sign address. Once a location is created, Smart Alec can send messages to that location. A sent message goes through the print server and on to a specific sign (or group of signs.)

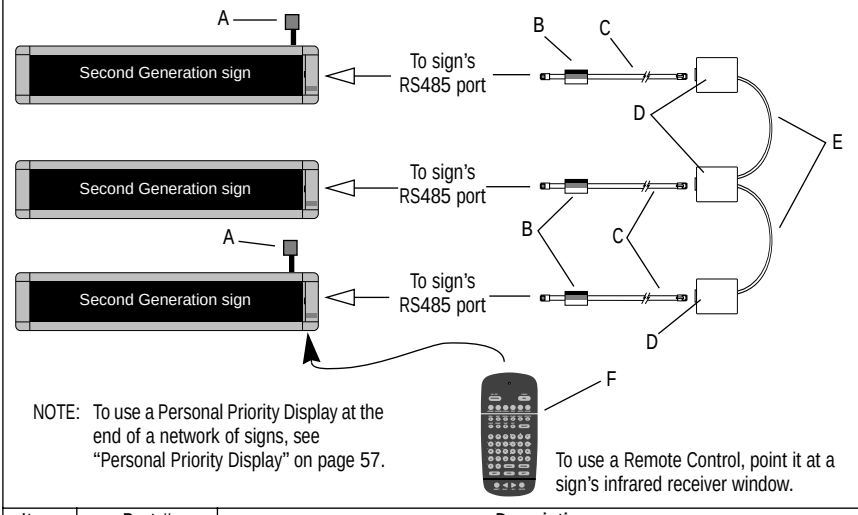
Please refer to the Smart Alec **Installation and Setup Manual** (pn 9709-2008) or the online Help for more information about using Smart Alec software.

Connecting *multiple* signs *without* a PC

This configuration allows you to network multiple Older Generation, Second Generation, or a mix of both types of signs. However, instead of connecting the signs to a PC and using this PC to send messages to the signs, an infrared Remote Control keyboard or an infrared Message Loader is used.

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.

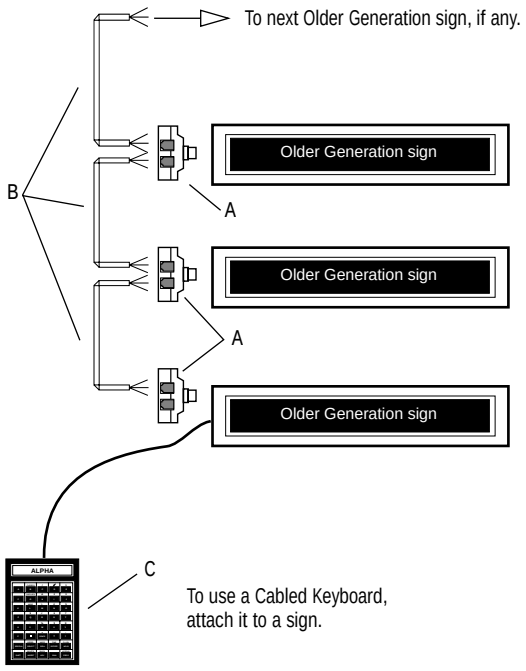
Table 16: Connecting multiple Second Generation signs without using a PC



Item	Part #	Description
A	1088-9107	End-of-line (EOL) terminator (An EOL 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, 4-conductor RS485 cable
	1088-8636	1 foot, 4-conductor RS485 cable
D	4331-0602	Modular Network Adapter
E	1088-8000	RS485 cable
F	1072-1111	Infrared Remote Control keyboard

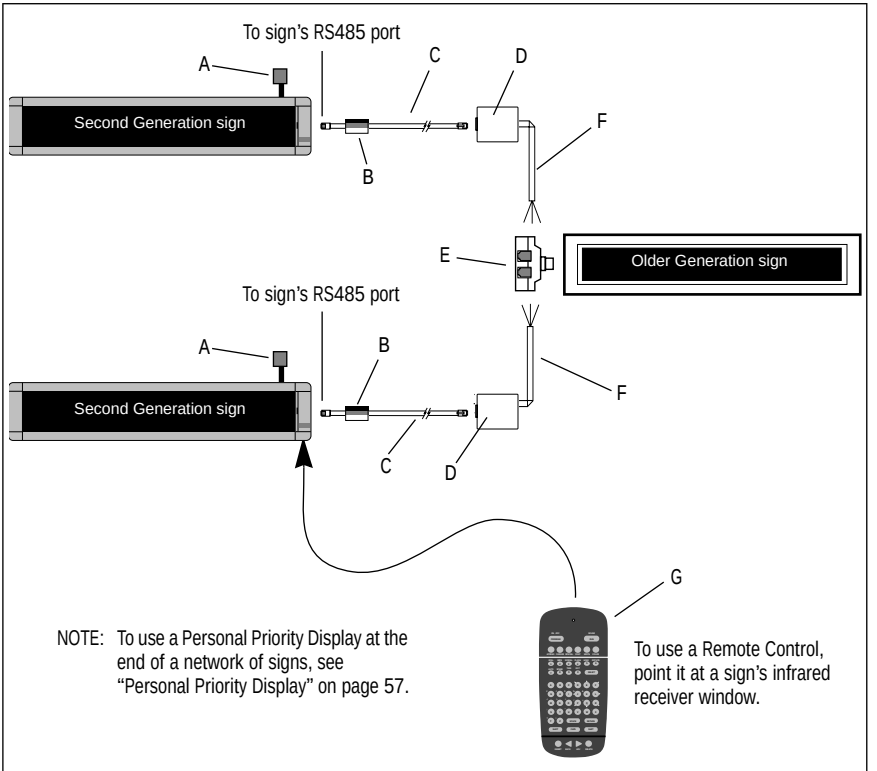
NOTE: The Series 4000, 7000, and ALPHA Director signs must have an internal jumper set to RS485. See "Appendix I: Setting the RS232/RS485 jumper on signs" on page 51.

Table 17: Connecting multiple Older Generation signs without using a PC



Item	Part #	Description
A	1088-3004A	T-connector
B	1088-8000	RS485 cable
C	1072-1041	Cabled Keyboard

Table 18: Connecting multiple Older Generation and Second Generation signs with no PC



Item	Part #	Description
A	1088-9107	End-of-line (EOL) terminator (An EOL must be plugged into the *RS232* or *TTL* plug on the *first* and *last* signs. If the *first* and/or *last* sign on the network is an Older Generation sign see "Appendix L: End-of-line (EOL) termination" on page 57.)
B	—	Ferrite (ferrite end towards sign)
C	1088-8624	8 foot, 4-conductor RS485 cable
	1088-8636	1 foot, 4-conductor RS485 cable
D	4331-0602	Modular Network Adapter
E	1088-3004A	T-connector
F	1088-8000	RS485 cable
G	1072-1111	Infrared Remote Control keyboard

NOTE: The Series 4000, 7000, and ALPHA Director signs must have an internal jumper set to RS485. See "Appendix I: Setting the RS232/RS485 jumper on signs" on page 51.

Connecting an ALPHA Serial Clock to a network

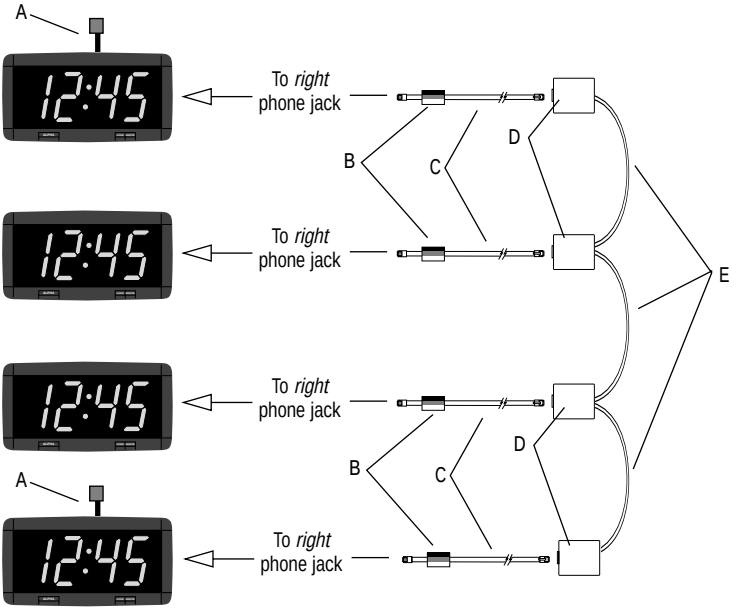
The ALPHA Serial Clock displays the time in either 12-hour or 24-hour mode using a 4-inch LED display. The clock can be used all by itself or it can be networked with other ALPHA clocks or ALPHA signs. In a network, one clock (or a PC attached to the network) is used to synchronize all the other clocks to the same time.

Used by itself, an ALPHA Serial Clock should be set to *master mode*. In an 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 ALPHA signs, all the clocks should be set to slave mode. For more information on using the ALPHA Serial clock, see the document **ALPHA Serial Clock for Networked & Synchronized Timing Applications** (PN 9703-3006).

In network applications, ALPHA Serial Clocks behave like ALPHA signs. For example, ALPHA Serial Clocks can be connected together with each other or in a mix of ALPHA signs. Also, just like an ALPHA sign, an ALPHA Serial Clock must be terminated when it is the last device on a network.

Table 19: Networking ALPHA Serial Clocks
(Example 1 — A network of all clocks)

In this example all-clock network, one of the clocks must be set to master mode. All the other clocks on the network must be set to slave mode. Also, the *first* and *last* clocks on the network must be terminated.

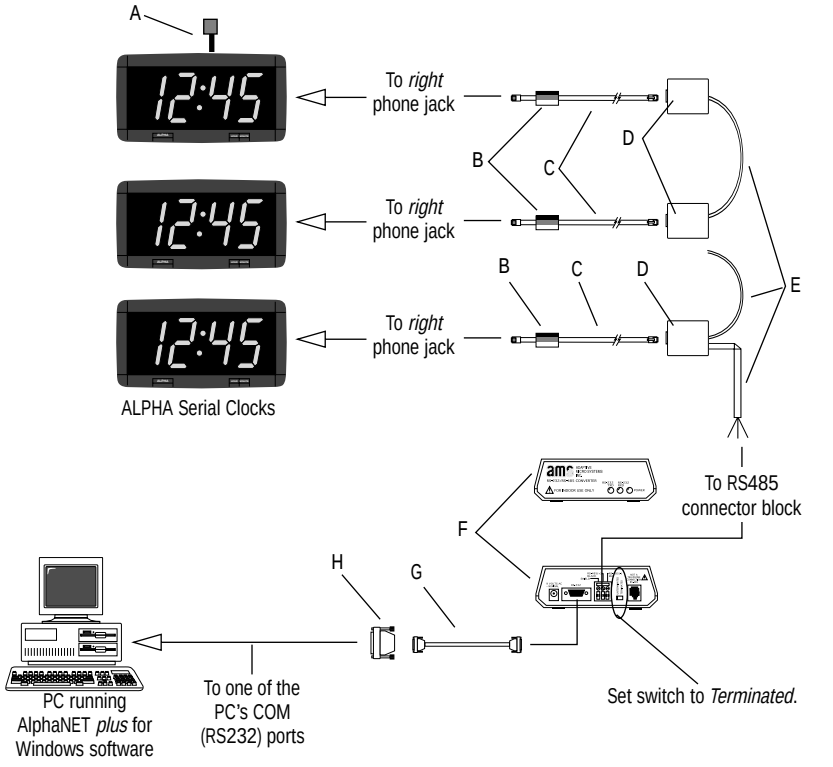


ALPHA Serial Clocks

Item	Part #	Description
A	1088-9107	End-of-line (EOL) terminator. (An EOL must be plugged into the *left*—as you face the back of the clock—RJ11 phone jack.)
B	—	Ferrite (ferrite end towards sign)
C	1088-8624	8 foot, 4-conductor RS485 cable
	1088-8636	1 foot, 4-conductor RS485 cable
D	4331-0602	Modular Network Adapter
E	1088-8000	RS485 cable

Table 20: Networking ALPHA Serial Clocks
(Example 2 — A network of clocks attached to a PC)

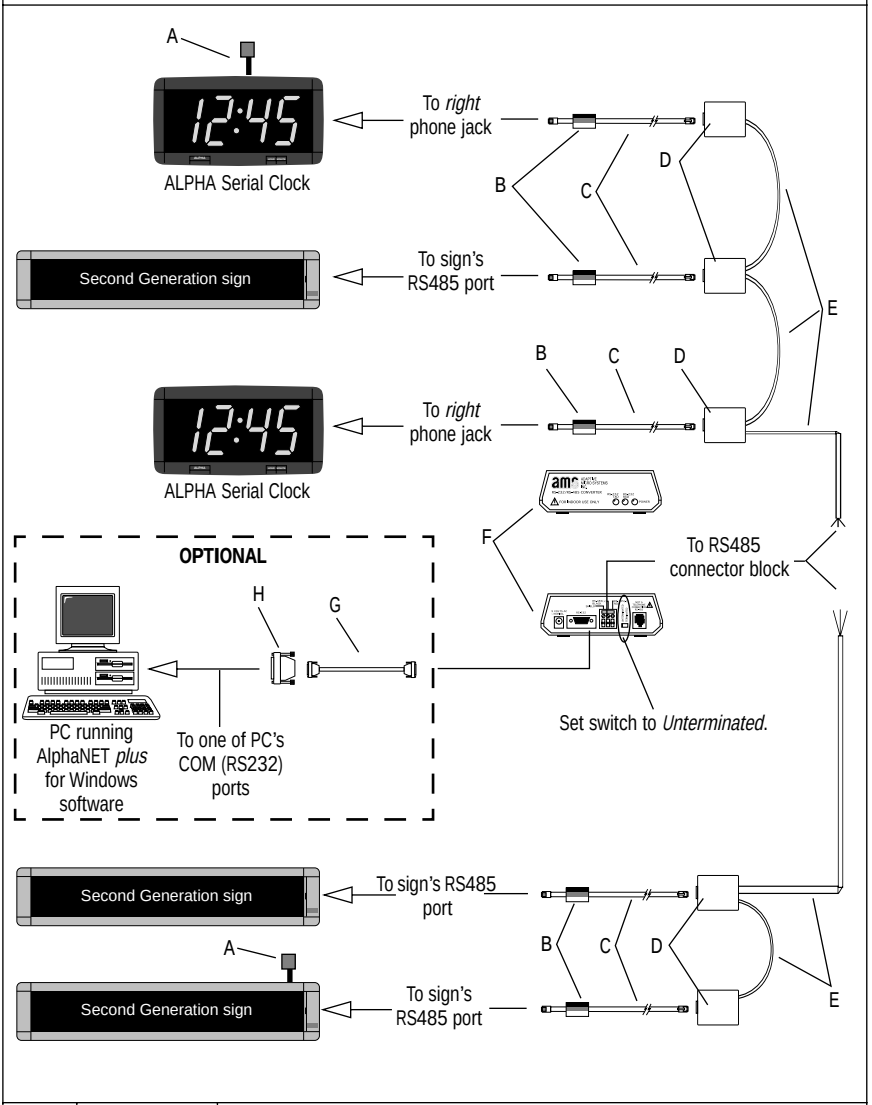
Unlike the previous all-clock network, in this example, a PC is connected to the network. All the clocks on the network must be set to slave mode. Also, the *last* clock on the network must be terminated. Note: a clock network could be set up like the one shown in "Connecting multiple Second Generation signs to a PC (Method 2 — Converter Box in the middle of the network)" on page 10. In this case, the *first* and the *last* clocks would have to be terminated.



Item	Part #	Description
A	1088-9107	End-of-line (EOL) terminator. (An EOL must be plugged into the *left*—as you face the back of the clock—RJ11 phone jack.)
B	—	Ferrite (ferrite end towards sign)
C	1088-8624	8 foot, 4-conductor RS485 cable
	1088-8636	1 foot, 4-conductor RS485 cable
D	4331-0602	Modular Network Adapter
E	1088-8000	RS485 cable
F	1088-1111	Converter Box III
G	1088-8634	10 foot, 9 pin-to-9 pin, type "A9" RS232 cable
H	—	Serial port DB25-to-DB9 RS232 adapter (may be required by your computer)

Table 21: Networking ALPHA Serial Clocks
(Example 3 — A network of clocks and signs)

In this example, clock and signs are intermixed on a network. A PC (optional) is also shown on the network.



Item	Part #	Description
A	1088-9107	End-of-line (EOL) terminator. (An EOL must be plugged into the *left*—as you face the back of the clock—RJ11 phone jack.)
B	—	Ferrite (ferrite end towards sign)

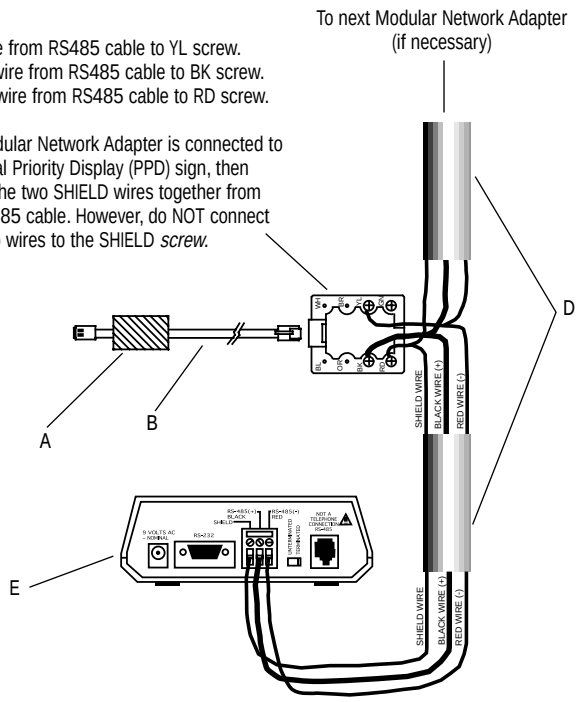
Table 21: Networking ALPHA Serial Clocks
(Example 3 — A network of clocks and signs)

C	1088-8624	8 foot, 4-conductor RS485 cable
	1088-8636	1 foot, 4-conductor RS485 cable
D	4331-0602	Modular Network Adapter
E	1088-8000	RS485 cable
F	1088-1111	Converter Box III
G	1088-8634	10 foot, 9 pin-to-9 pin, type “A9” RS232 cable
H	—	Serial port DB25-to-DB9 RS232 adapter (may be required by your computer)
NOTE: The Series 4000, 7000, and ALPHA Director signs must have an internal jumper set to RS485. See “Appendix I: Setting the RS232/RS485 jumper on signs” on page 51.		

Appendix A: Modular Network Adapter and T-connector wiring

Wiring a Modular Network Adapter to a Converter Box III

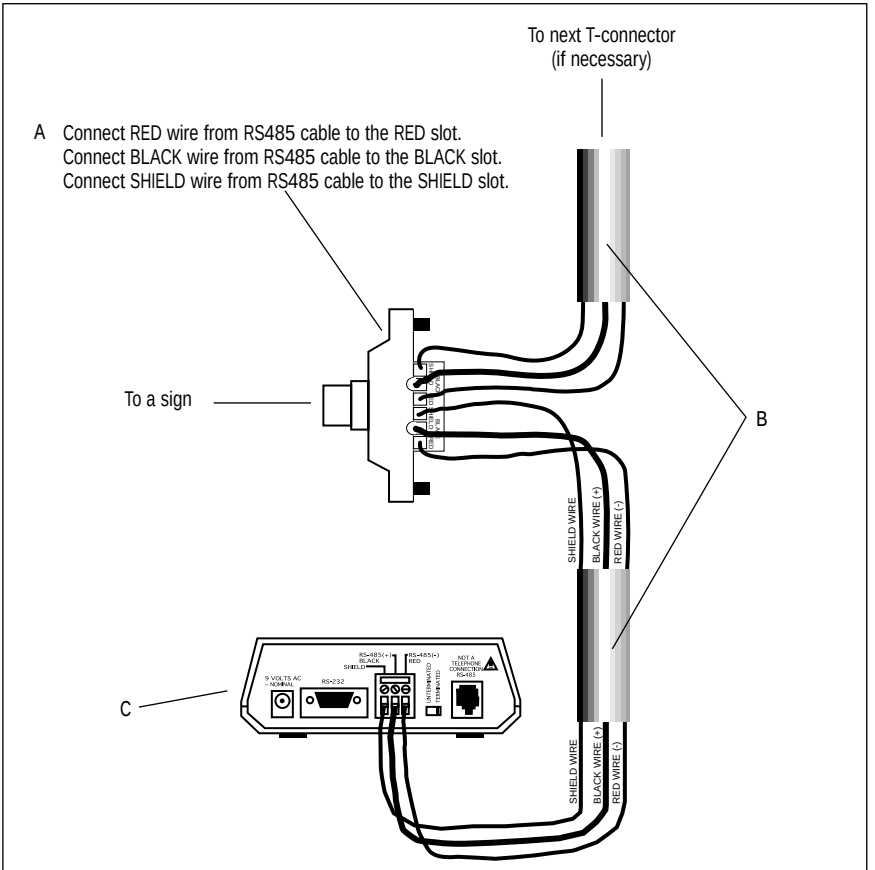
Table 20: Modular Network Adapter wiring diagram



Item	Part #	Description
A	—	Ferrite (ferrite end towards sign)
B	1088-8624	8-foot, 4-conductor RS485 cable
	1088-8636	1-foot, 4-conductor RS485 cable
C	4331-0602	Modular Network Adapter
D	1088-8000	RS485 cable
E	1088-1111	Converter Box III

Wiring a T-connector to a Converter Box III

Table 21: T-connector wiring diagram

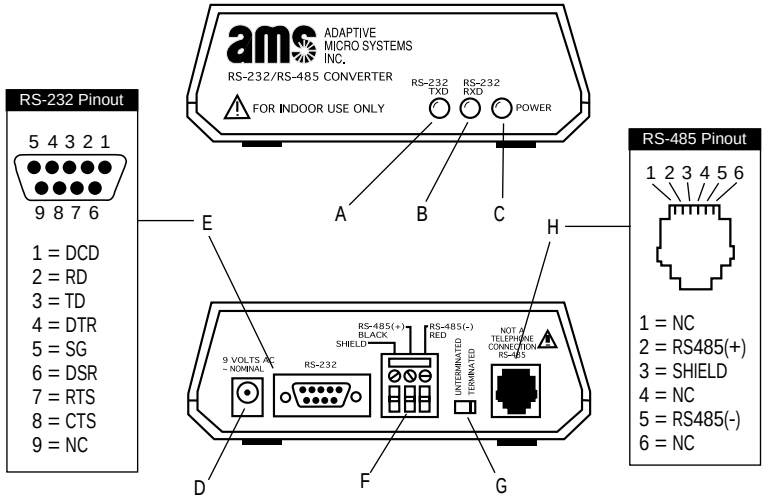


Item	Part #	Description
A	1088-3004A	T-connector
B	1088-8000	RS485 cable
C	1088-1111	Converter Box III

Appendix B: Converter Box III

The RS232-to-RS485 Converter Box III makes communication possible between a PC and signs. The Converter Box III converts standard RS232 from a PC's serial port into RS485 signals for use in networks of signs.

Table 22: Converter Box III (PN 1088-1111)



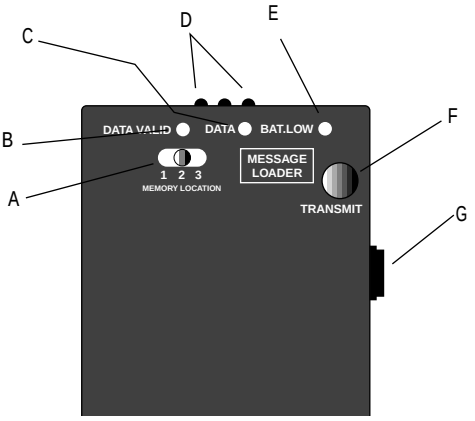
Item	Name	Description
A	RS-232 TXD indicator	When lit, indicates that the Converter Box III is *transmitting* data through its RS-232 connector and receiving data through its RS-485 connector.
B	RS-232 RXD indicator	When lit, indicates that the Converter Box III is *receiving* data through its RS-232 connector and transmitting data through its RS-485 connector.
C	POWER indicator	When lit, indicates that the Converter Box III has power applied to it.
D	power plug	The 9-volt power source for the Converter Box III connects here.
E	RS-232 connector	Connects to a PC's (or a print server's) RS-232 serial port.
F	RS-485 connector block	Connects to an ALPHA sign network.
G	termination selector	Set to *Terminated* or *Unterminated* depending on the configuration of the sign network. (See the previous network tables for the appropriate settings.)
H	RS-485 plug connector	Connects to an ALPHA sign network. However, use the **RS-485 connector block** for network connections. This is not a telephone connector.

Appendix C:
How to use an IR Message Loader

The IR Message Loader is used to get messages from one sign and copy them to other signs. The IR Message Loader can also be attached to a PC running AlphaNET *plus* for Windows software, and the software can send and store messages in the Loader.

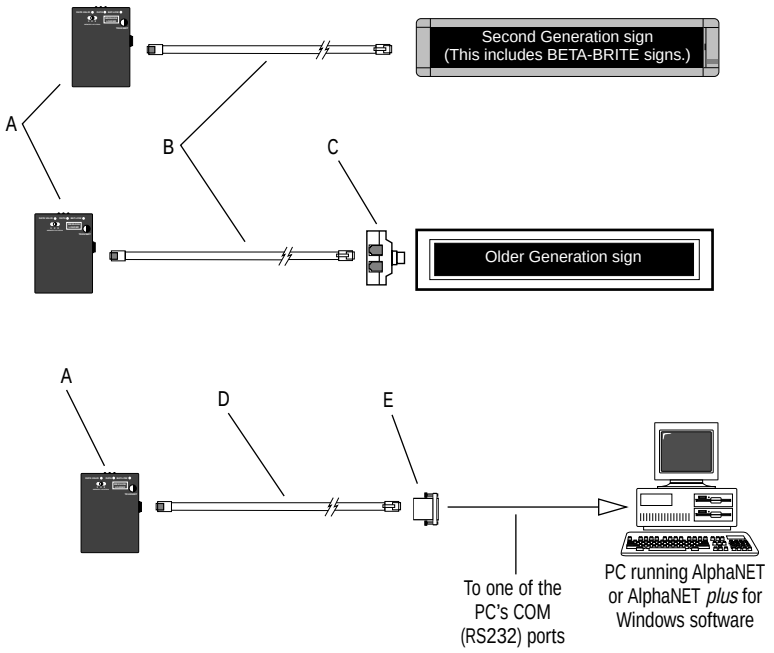
A special cable is necessary to get messages from a sign or a PC *into the IR Message Loader*. However, no cable is needed to copy messages from the Loader *into signs.*

Table 23: IR Message Loader (PN 1071-1113)



Item	Name	Description
A	MEMORY LOCATION switch	Allows selection of one of the three 10,000 byte memory partitions
B	DATA VALID indicator	Indicates valid data in the memory location currently selected
C	DATA indicator	This indicator comes on whenever data is being sent or received via the serial port or the infrared transmitters.
D	infrared transmitters	Used to transmit messages stored in the MEMORY LOCATIONs to signs
E	BAT.LOW indicator	When lit, indicates that the battery should be replaced.
F	TRANSMIT button	When transferring a message from a sign or PC *into the IR Message Loader*, pressing this button stores the message in the selected MEMORY LOCATION. When transferring a message from the IR Message Loader into a sign, pressing this button sends the message in the currently selected MESSAGE LOCATION to a sign.
G	serial port	An RJ11 jack that contains a bidirectional RS485 port and an RS232 receive port.

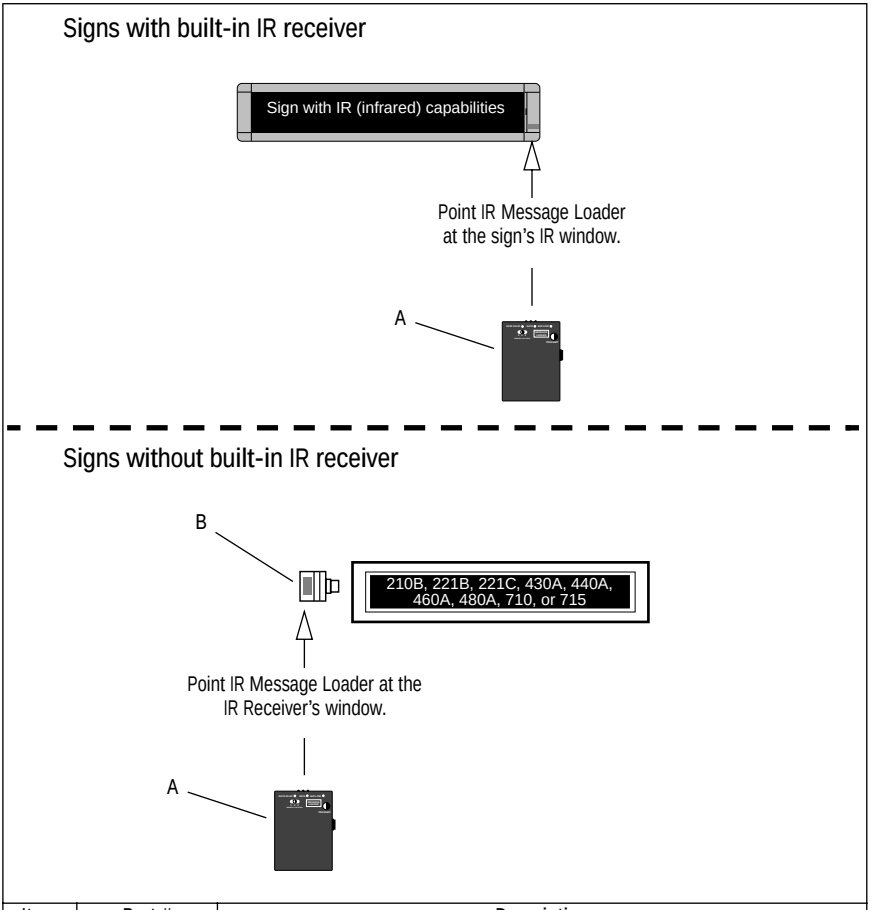
Table 24: Transferring messages from a sign or a PC into an IR Message Loader



Item	Part #	Description
A	1071-1113	IR Message Loader
B	1088-8621	3-foot 6-conductor IR Message Loader cable for ALPHA signs
	1088-8628	3-foot 6-conductor IR Message Loader cable for BETA-BRITE signs
C	1088-3004A	T-connector
D	1088-8621	3-foot 6-conductor IR Message Loader cable for ALPHA signs
E	4370-0001C	25 pin sub-D/to 6 pos. RJ11 adapter

NOTE: The Series 4000, 7000, and ALPHA Director signs must have an internal jumper set to RS232. See "Appendix I: Setting the RS232/RS485 jumper on signs" on page 51.

Table 25: Transferring messages from an IR Message Loader to a sign



Item	Part #	Description
A	1071-1113	IR Message Loader
B	1071-3111	IR Receiver

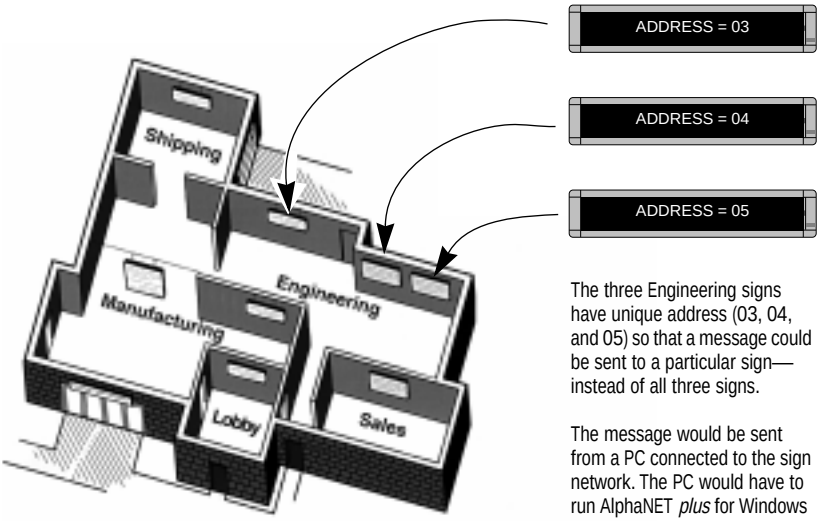
Appendix D:
How to change a sign's address

An ALPHA sign has a feature which allows a unique number or "address" to be assigned to it. This address permits you to send messages to an individual sign on a network.

All ALPHA signs leave the factory with a default address of 00. However, another address—like 01, 02, 03, etc.—can be given to a sign.

NOTE: ALPHA signs with Smart Alec option have similar addressing numbers. However, the numbers have three digits, such as 000, 001, 002, etc. The instructions in this appendix are written using address numbers for ALPHA signs, but the instructions still apply for ALPHA signs with Smart Alec option. Simply substitute the three-digit numbers.

Imagine you had a company with several signs networked as shown in the example below:



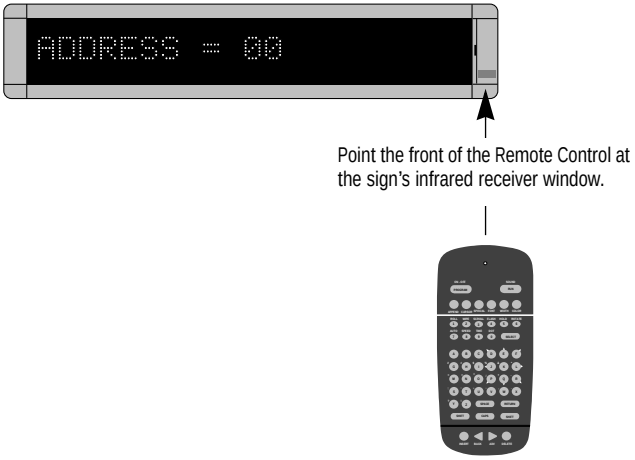
The three Engineering signs have unique address (03, 04, and 05) so that a message could be sent to a particular sign—instead of all three signs.

The message would be sent from a PC connected to the sign network. The PC would have to run AlphaNET *plus* for Windows software.

Changing a sign's address using a Remote Control

To change the address of an ALPHAVISION sign, see "Changing the address of a sign using internal DIP switches" on page 41.

1. To change the address of a particular sign, first make sure that the sign is connected to a power supply and is functioning.
2. Point the front of the Remote Control at the sign's infrared receiver window as shown:



3. Press the PROGRAM button on the Remote Control. The words PROG TEXT FILE A will appear on the sign.
4. Next, press the BACK button until SET ADDRESS appears.
5. Press the ADV button until SET ADDRESS = 00 (or some other number) appears.
6. Set the sign's address by pressing any of the numbered keys. For example, to enter the address *15*, press the 1 button and then the 5 button.
7. Finally, press the PROGRAM button **two** times to set the sign's address.

Changing the address of a sign using internal DIP switches

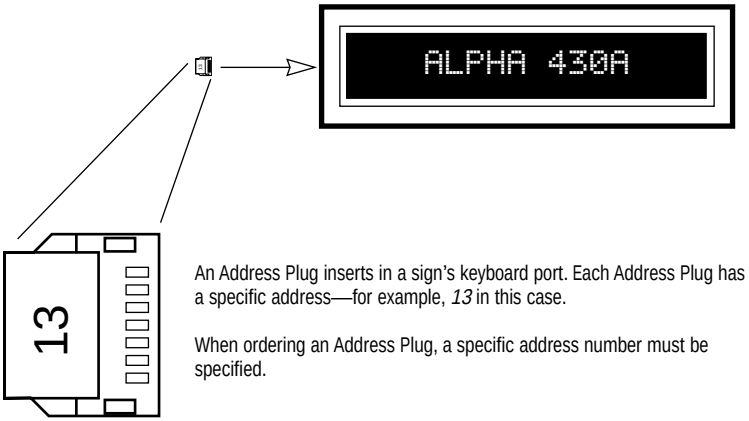
The following signs can have their serial address set by changing an internal DIP switch:

- ALPHAVISION — see the **ALPHAVISION Full Matrix and Character Matrix Sign Installation Instructions** (9702-0009).
- ALPHA Solar — see the **ALPHA Solar Installation and Operation Manual** (9705-1002).
- ALPHA NEMA 2, 2.1" character matrix — see the **ALPHA NEMA 2 Series Sign Installation Instructions** (9707-7004).
- ALPHA 300 series — see **How to Change the Serial Address on an ALPHA 300 using DIP Switches** (9704-3005).
- ALPHA Director — see the **ALPHA Director User Manual** (9704-3006).
- ALPHA Director with Smart Alec option— see the **User Manual for ALPHA Director with Smart Alec Option** (9705-1008).

Changing a sign's address using an Address Plug (PN 1088-9001)

An Address Plug is a way of assigning an address to a sign without using a Remote Control. An Address Plug is inserted into a sign's keyboard port. Since each Address Plug has a specific address, the address is read from the plug when the sign is powered up and retained by the sign until the sign is turned off.

Address plugs are for use on these older ALPHA signs: 210B, 221B, 221C, 430A, 440A, 460, 480, 710, and 715.



An Address Plug inserts in a sign's keyboard port. Each Address Plug has a specific address—for example, *13* in this case.

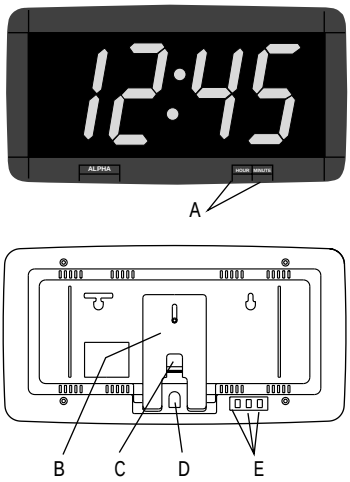
When ordering an Address Plug, a specific address number must be specified.

Appendix E: ALPHA Serial Clock

The ALPHA Serial Clock displays the time in either 12-hour or 24-hour mode using a 4-inch LED display. The clock can be used all by itself or it can be networked with other ALPHA clocks or ALPHA signs. The time is regulated with AlphaNET TimeNET software. See "Appendix F: Message programming software" on page 44 for more information.

For detailed information on the ALPHA Serial Clock, see ALPHA Serial Clock manual (9703-3006).

Table 26: ALPHA Serial Clock (PN 1033-1113)



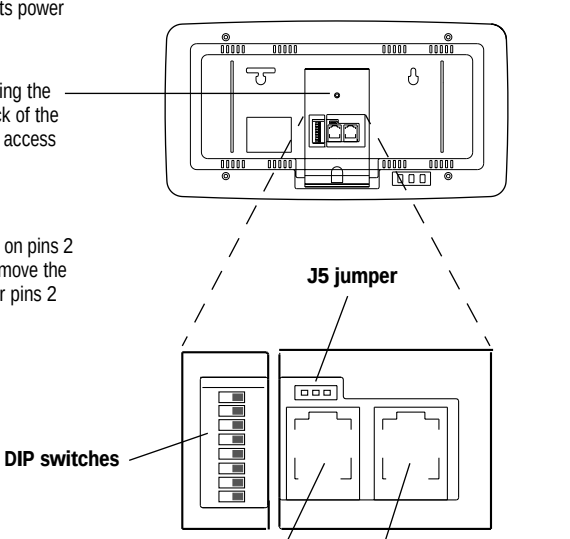
Item	Name	Description
A	HOUR and MINUTE buttons	Use these two buttons to set the time on the clock. (Clocks on a network which is connected to a PC running AlphaNET *plus* for Windows software receive the time from the PC. The clocks on the network will receive the time whenever the PC sends a message to a sign on the network.
B	access panel	Remove this panel to access both RJ11 phone jacks and the DIP switch.
C	EOL phone plug	If the clock is at the end of a network, then an EOL terminator (PN 1088-9107) must be put in this plug. Otherwise, the clock may be connected to a network using this plug. (See "How to use an EOL terminator on an ALPHA Serial Clock" on page 43 for more information.)
D	power adapter plug	The clock's power adapter connects here.
E	Master/Slave switch	See "Connecting an ALPHA Serial Clock to a network" on page 27.
	12/24-hour switch	Use this to set 12-hour or 24-hour mode.
	Bright/Dim switch	Use this to set the LED intensity level of the clock.

Table 27: How to use an EOL terminator on an ALPHA Serial Clock

1. Unplug the clock from its power supply.

2. Remove the screw holding the access panel to the back of the clock. Then take off the access panel.

3. If the **J5 jumper** is not on pins 2 and 3, then carefully remove the jumper and place it over pins 2 and 3.



4. Plug the EOL terminator here.

5. Use this plug to connect the clock to the network. Re-attach the clock's access panel and then re-connect the clock's power adapter.

Appendix F: Message programming software

DOS programs

PagerNET plus

A sign message editor that includes sign addressing, cable and modem networking, Wide Area Wireless Network (WAWN) transmission control, DOTS graphic programming, and diagnostics. PagerNET *plus* works with WAWN wireless networks and with both Older and Second Generation standard ALPHA signs. PagerNET *plus* runs in DOS environments.

Windows programs

PrintPak

A cost-effective software add-on feature that works with Windows word processing programs like Microsoft Word, WordPerfect, etc. PrintPak allows messages from these word processing programs to include modes and other options. The messages are sent to standard Second Generation ALPHA signs through the word processing print function. An ALPHA sign must be connected directly to a PC's serial port. By using a Converter Box between the PC and the first sign, multiple ALPHA signs can be connected (daisy-chained) together. If multiple signs are connected, any PrintPak messages go to all signs. See "Connecting a single sign to a cabled PC network" on page 7 or "Connecting multiple signs to a cabled PC network" on page 9 for networking information.

AlphaNET TimeNET

This simple and cost-effective software synchronizes the time on a network of signs and ALPHA Serial Clocks by using the time on a PC. This software is packed with Accuset, software that sets a PC's clock to the time at the National Institute of Standards. Works with standard ALPHA signs on a modem network through the com port.

AlphaNET *plus* for Windows

A full-featured software program to control text and graphics on standard ALPHA signs. The program includes a Message Editor, Site Editor, and Message Emulator. A graphics editor is not included but Windows BMP files can be created and edited with Windows paint

programs and used as sign graphics or “flicks” (animations). AlphaNET *plus* for Windows works with cable, modem, LAN, and LAWN, *but* ***not*** *WAWN*, wireless networks. Works with both Older and Second Generation standard ALPHA signs. Multiple signs can be connected to the computer or LAN, and AlphaNET *plus* for Windows can send messages to any individual sign or groups of signs.

Smart Alec

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, email systems, and alphanumeric pagers. The program includes a Message Editor, Variable Manager, Message Emulator, Administrator, and system start-up utility. Smart Alec works with all types of networks and with all Second Generation ALPHA signs with Smart Alec option. Smart Alec runs in TCP/IP network environments on PCs running either the Windows 95 or Windows NT operating system. Multiple signs can be connected to the computer or LAN, and Smart Alec can send messages to any individual sign or groups of signs.

Appendix G: Sign network cabling

Care must be exercised when networking signs, especially as the length or complexity of the network increases. All cables should be kept as short as possible to reduce interference.

RS232 cable can be used to connect one sign directly to one computer, with a limitation of 50 feet. This one-to-one correlation eliminates the need for a Converter Box, Modular Network Adapter, and EOL terminator.

RS485 cable can be used to connect one or more signs to a computer. With this network, a Converter Box, a Modular Network Adapter, and an EOL terminator are all needed. RS485 cable can transmit over a longer distance than RS232 cable. As shown in Table 28, “Maximum length of RS485 cable, per network” below, as the distance of the network decreases, the baud rate of transmission can be increased. This is because there is less corruption to the data with slower baud rates or with shorter distances. The use of an RS485 repeater box is recommended if exceeding one of the listed lengths at the designated baud rate.

Table 28: Maximum length of RS485 cable, per network

Baud rate	Maximum feet
9600	4,000
4800	8,000
2400	10,000
1200	10,000

NOTE: ALPHA signs with Smart Alec option are only available at 9600 baud.

The maximum number of taps off a network (“network drops”) is 32. Network drops include computers, signs, print servers, etc. from a single network. If a greater number of drops is required, an RS485 repeater box must be used. Each repeater box and each Converter Box counts as one of the 32 drops.

So when either the length (in feet) or complexity (number of drops) in the network increases, a repeater box is recommended. See Figure 1: “Maximum network drops and cable length” on page 47. One source for

purchasing an RS485 repeater box is Black Box, at 412-746-5500.

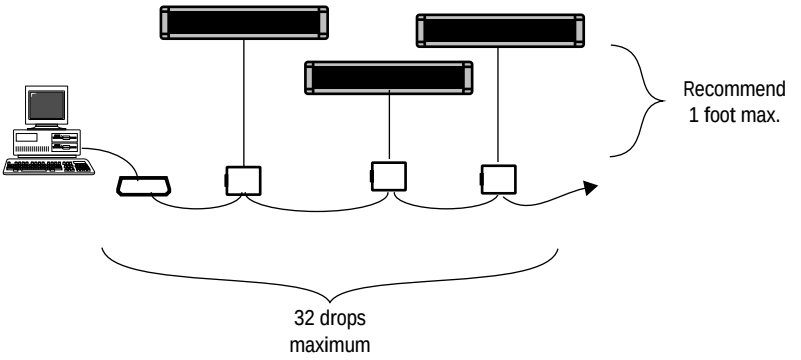


Figure 1: Maximum network drops and cable length

Signs should be connected to Modular Network Adapters with a maximum cable drop length of 1 foot. The 1-foot length is recommended for optimum reliability of the interface hardware and integrity of data transmissions. (The 8-foot length will work for most installations and can still be used if needed.)

On some signs, a jumper must be set depending on whether the sign is using RS232 or RS485 cabling. (See “Appendix I: Setting the RS232 / RS485 jumper on signs” on page 51.)

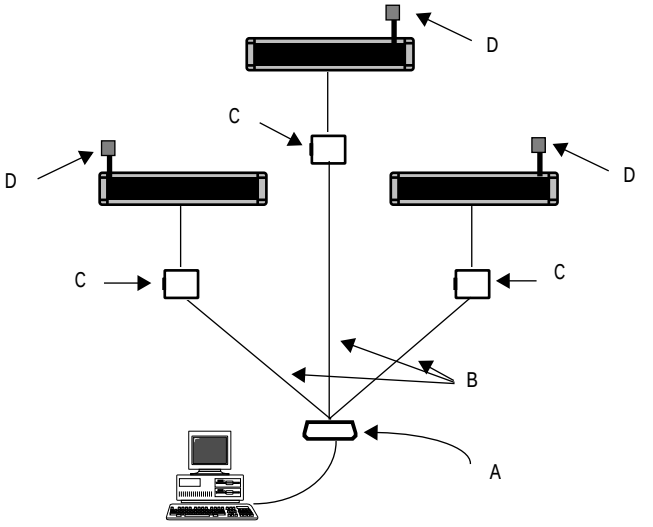
Plenum cable will not create toxic fumes if there is a fire. Plenum cable should be used anytime where there is either any potential for a fire, or where cabling is run near common ventilation, such as in the ceiling, near cold air returns, or as local electrical codes require. Do *not* use standard cable in these cases.

Cabled network designs

There are two basic ways to connect ALPHA signs at a Converter Box: the wrong way and the right way.

The wrong way to connect ALPHA signs at a Converter Box has more than two sign cables coming directly out of the Converter Box. This is wrong because there is too much electrical load at the Converter Box. Note that the use of a terminal block at a Converter Box to avoid the electrical problem does not work well, may not work consistently, and is not recommended.

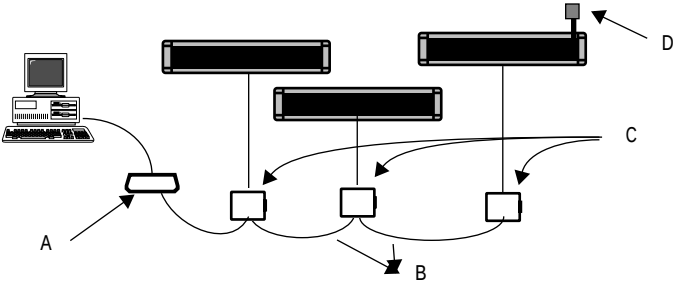
Table 29: The wrong way to connect ALPHA signs at a Converter Box



Item	Part #	Description
A	1088-1111	Converter Box III, set to “terminated”
B	1088-8000	RS485 cable
C	4331-0602	Modular Network Adapter
D	1088-9107	End-of-line (EOL) terminator

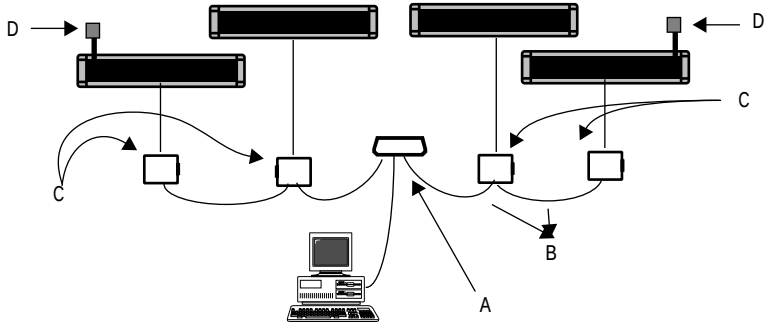
The right way to connect ALPHA signs at a Converter Box has only one or two sign cables coming out of the Converter Box. This works well because the signs are "daisy-chained" so the electrical load at the Converter Box is minimized.

Table 30: The right way to connect ALPHA signs at a Converter Box with *only one* sign cable



Item	Part #	Description
A	1088-1111	Converter Box III, set to "terminated"
B	1088-8000	RS485 cable
C	4331-0602	Modular Network Adapter
D	1088-9107	End-of-line (EOL) terminator

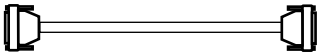
Table 31: The right way to connect ALPHA signs at a Converter Box with *two* sign cables



Item	Part #	Description
A	1088-1111	Converter Box III, set to "unterminated"
B	1088-8000	RS485 cable
C	4331-0602	Modular Network Adapter
D	1088-9107	End-of-line (EOL) terminator

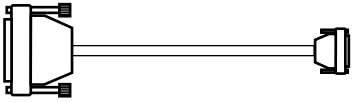
Appendix H:
Cable wiring diagrams

10 foot, 9 pin-to-9 pin, type "A9" RS232 cable (1088-8634)



PIN (female end)	SIGNAL	PIN (male end)
SHIELD	GND	SHIELD
3	TXD →	3
2	← RXD	2
7	RTS →	7
8	← CTS	8
6	← DSR	6
1	← DCD	1
4	DTR →	4
5	SIGNAL GROUND	5
9	← RI	9

10 foot, 25 pin-to-9 pin, type "B9" RS232 cable (1088-8635)



PIN (female end)	SIGNAL	PIN (male end)
SHIELD	GND	SHIELD
2	← RXD	2
3	TXD →	3
7	SIGNAL GROUND	5
8	DCD →	1
20	← DTR	4

Appendix I: Setting the RS232/RS485 jumper on signs

Typically, if a *single* sign is only going to be connected to a computer, then the sign would be set in RS232 mode.

When networking *multiple* signs, set each sign in RS485 mode.

Signs leave the factory set to RS485 mode.

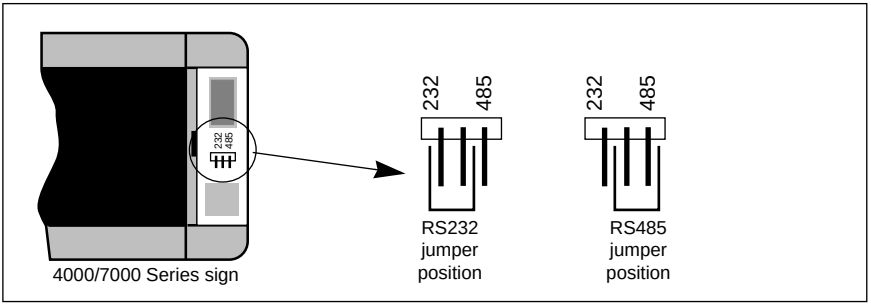
NOTE: **Before** changing the position of the RS232 / RS485 jumper in a sign, make sure that *power to the sign is off*.

⚠WARNING

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

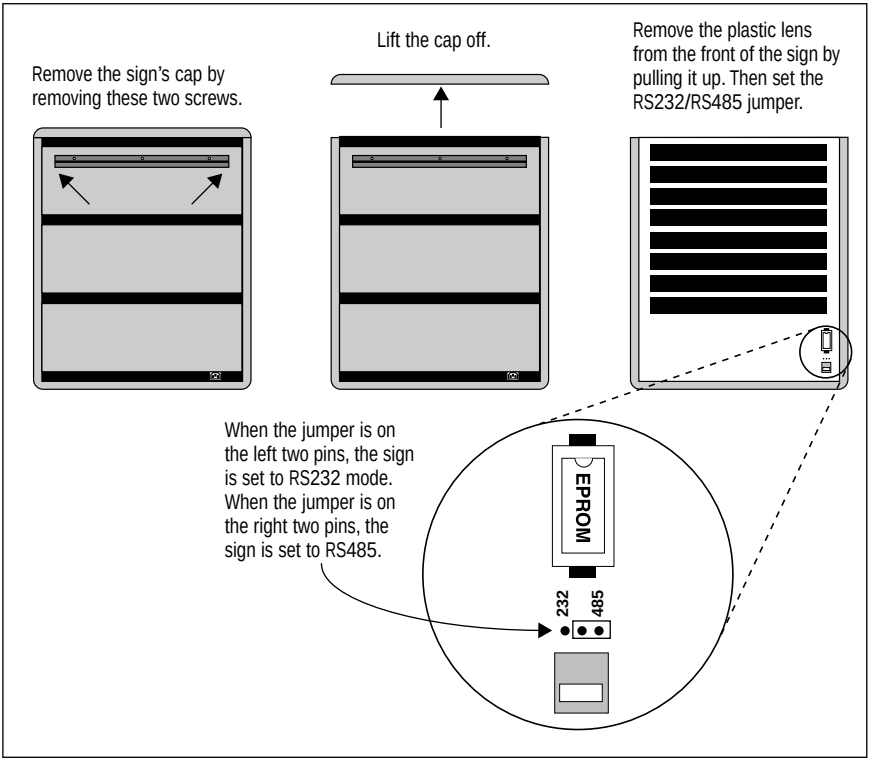
Setting the jumper on a Series 4000 or 7000 sign

Table 32: Series 4000/7000 RS232/RS485 jumper



Setting the jumper on an ALPHA Director sign

Table 33: ALPHA Director RS232/RS485 jumper

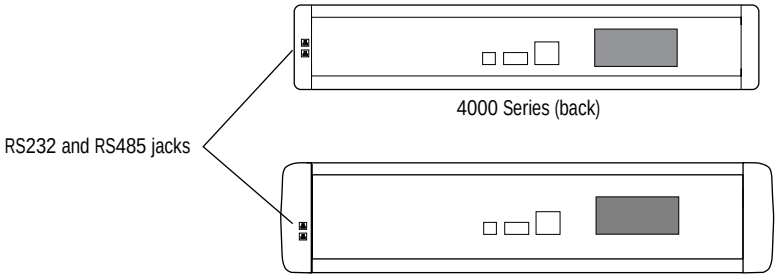


Appendix J:
RS232 and RS485 sign pinouts

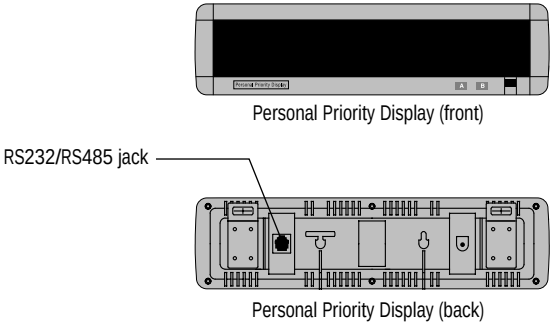
Location of RS232 and RS485 jacks

All Second Generation signs (except the ALPHA Solar and Personal Priority Display) have two telephone-type jacks that are used to connect the signs into a network.

The ALPHA BIG DOT, 200 series, 300 Series, 4000 Series, and 7000 Series signs have a RS232 and a RS485 jack on the *back*. (On the ALPHA BIG DOT, and 200 series, the two jacks are located under an access cover.)



Personal Priority Display signs have a single RS232 / RS485 jack on the *back*:

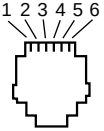


ALPHAVISION signs have a RS232 and a RS485 jack on the *top*.

The ALPHA Solar has an *internal* connector block.

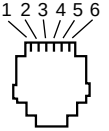
Pinouts of RS232 and RS485 jacks

RS232/RS485 Pinout



1 = GND
2 = RS485 (+)
3 = RXD
4 = TXD
5 = RS485 (-)
6 = +5V (200 mA max.)

RS485 Pinout

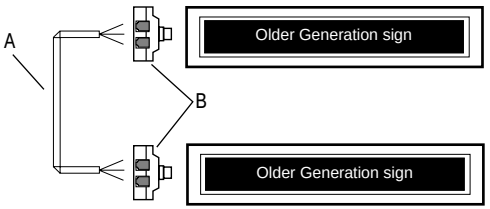


1 = NC
2 = RS485 (+)
3 = NC (This is SHIELD on Series 4000 and 7000 signs)
4 = NC
5 = RS485 (-)
6 = NC

Appendix K: Back-to-back wiring of signs

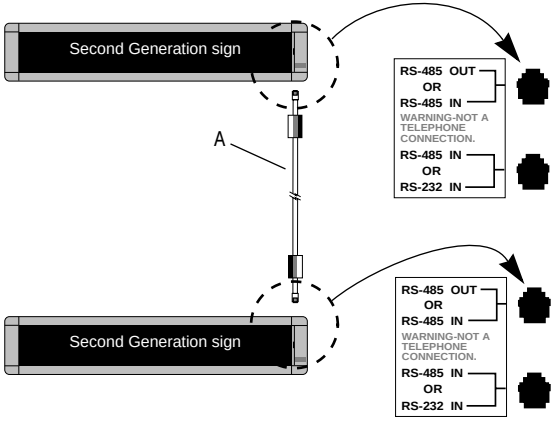
Back-to-back wiring is the easiest way to network two signs together.

Table 34: Back-to-back wiring of two Older Generation signs



Item	Part #	Description
A	1088-8000	RS485 cable
B	1088-3004A	T-connector

Table 35: Back-to-back wiring of two Second Generation signs

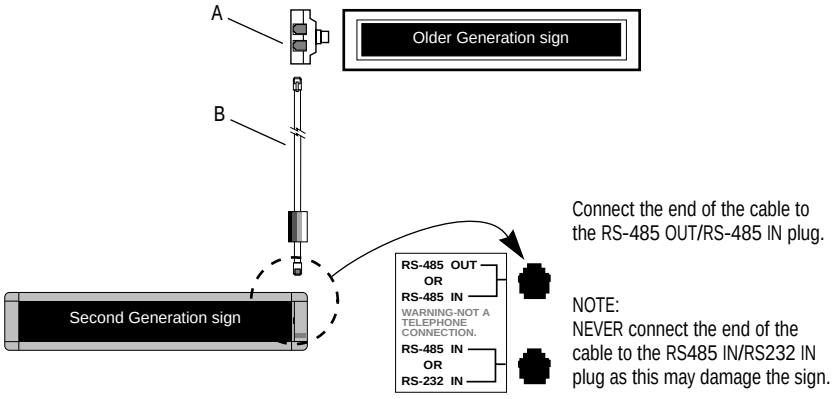


Connect each end of the cable to the RS-485 OUT/RS-485 IN plug on each sign.

NOTE:
NEVER connect each end of the cable to the RS485 IN/RS232 IN plugs on each sign as this may damage the signs.

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

Table 36: Back-to-back wiring of an Older Generation and a Second Generation sign



Item	Part #	Description
A	1088-3004A	T-connector
B	1088-8624	8-foot, 4-conductor RS485 cable

Appendix L: End-of-line (EOL) termination

To communicate properly, signs connected into networks should have appropriate end-of-line (EOL) termination.

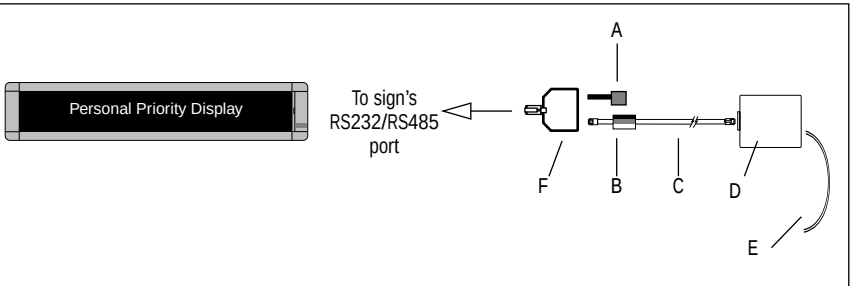
Second Generation signs

When a Second Generation sign is at the *end* of a network, it requires a special EOL terminator (pn 1088-9107). An EOL terminator plugs into the RS232/TTL port of the sign. Detailed use of these EOL terminators is shown in the preceding diagrams, such as in "Connecting multiple Second Generation signs to a PC (Method 1 — Converter Box at the end of the network)" on page 9.

Personal Priority Display

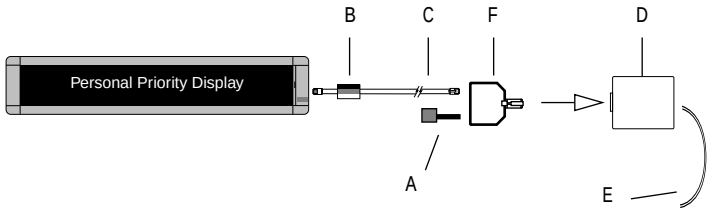
When a Personal Priority Display Second Generation sign is at the end of a network, it requires a duplex adapter (pn 4351-0011) to accommodate both EOL termination and networking functions. The way to terminate a wall-mounted PPD is just the opposite of the way to terminate a stand-alone PPD.

Table 37: Terminating a stand-alone PPD)



Item	Part #	Description
A	1088-9107	End-of-line (EOL) terminator
B	—	Ferrite (ferrite end towards sign)
C	1088-8624	8 foot, 4-conductor RS485 cable
	1088-8636	1 foot, 4-conductor RS485 cable
D	4331-0602	Modular Network Adapter
E	1088-8000	RS485 cable to network
F	4351-0011	Duplex Adapter

Table 38: Terminating a wall-mounted PPD



Item	Part #	Description
A	1088-9107	End-of-line (EOL) terminator
B	—	Ferrite (ferrite end towards sign)
C	1088-8624	3 foot, 6-conductor RS232 cable
D	4331-0602	Modular Network Adapter
E	1088-8000	RS485 cable to network
F	4351-0011	Duplex Adapter

Older Generation signs

When used with a Converter Box III, Older Generation signs at the *end* of a network require a 120-ohm, 1/4 watt resistor as a terminator. (See Figure 2: "Terminating an Older Generation sign" below.)

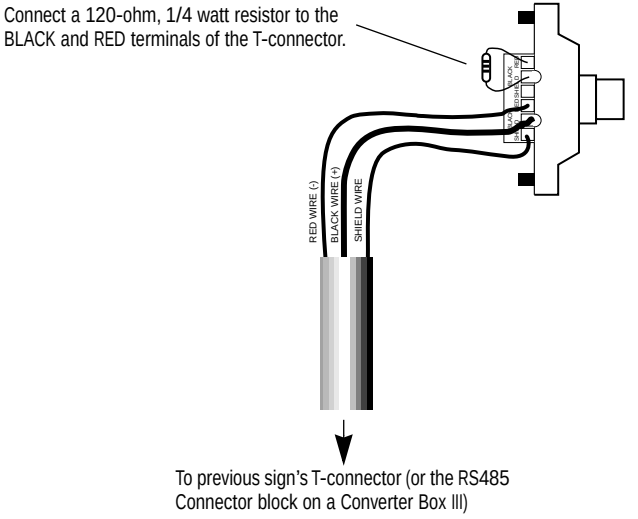


Figure 2: Terminating an Older Generation sign

790i outdoor sign

Terminating a 790i outdoor sign is almost identical to terminating an Older Generation sign. (See Figure 3: “Terminating a 790i outdoor sign”.)

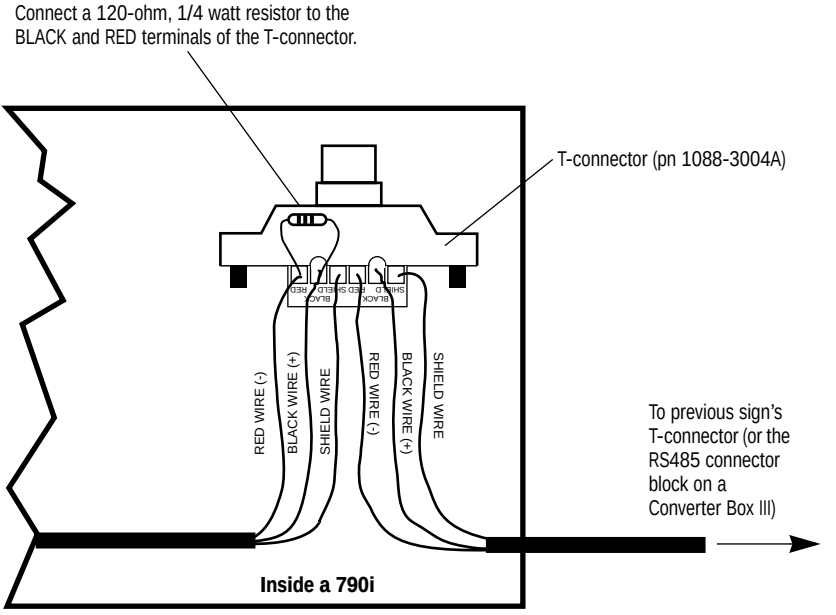
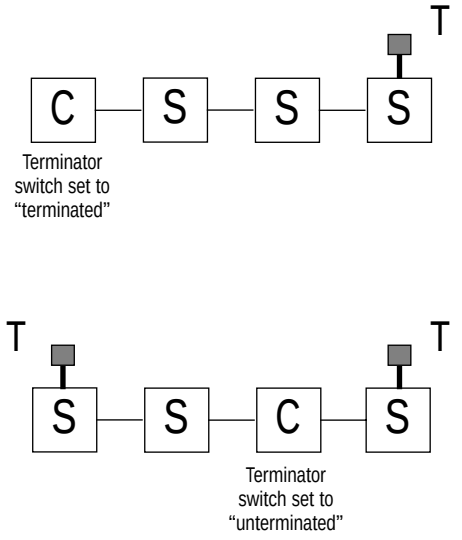


Figure 3: Terminating a 790i outdoor sign

Converter Box termination settings

If a Converter Box is at one end of a string of signs, it must act as one of two terminators, so it must be set to “terminated.” However, if the Converter Box is in the middle of a string of signs, the two end signs must have the terminators, so the Converter Box must be set to “unterminated.” See Figure 4: “End-of-line termination” on page 60.

NOTE: When a Converter Box is in the middle of a string of signs, at least one of the two end signs must be a Second Generation sign, and both end signs may be Second Generation.



S = sign
C = Converter Box
T = Network
terminator

Figure 4: End-of-line termination

Glossary

There are many potential network components other than signs and computers. Not all of these components are used in all networks.

Cabling

The wiring that strings all other pieces of the network together. RS232 and RS485 are typical types. (See “Appendix G: Sign network cabling” on page 46.)

- RS232 cable (serial communication) can be used to connect a sign directly to a computer. It is simple to connect and to use, but it is limited to a total distance of 50 feet and can connect only one sign to one computer.
- RS485 cable (parallel communication) can be used to connect one or more signs to a computer. Using RS485 cabling is more complex in that it requires a Converter Box. However, it can transmit over a longer distance than RS232 cable, it can connect multiple signs in a network, and it can be used in environments where there is external electrical interference. Whenever RS485 cable is needed, use AMS-supplied shielded cable, pn 1088-8000 (1000-foot spool,) or pn 7122-0282 (cable cut to length,) or equivalent.

Converter Box

Changes RS232 signals into RS485 signals. RS232 signals come from a computer, print server, modem, etc. RS485 signals can be transmitted a longer distance than RS232 signals.

Duplex Adapter

Converts a single jack into a dual jack to enable connection of two accessories at the same time.

End-of-line (EOL) terminator

Used to define the start and end of a network. Helps control electrical interference on the network and provide stable communication across an RS485 network, thus improving reliability and data integrity. EOL termination is required in RS485 network installations. (See “Appendix L: End-of-line (EOL) termination” on page 57.)

Modem

Translates digital signals to analog and back again, for transmission via telephone wires, wireless transmitters, or wireless paging services. (See “Network overview” on page 2 and “Connecting signs using a modem PC network” on page 13.)

Modular Network Adapter

Allows a cable connection to be made to the main network cabling.

Paging data receiver

Receives a message from an RF transmitter and pass it on to a modem in the network.

Print server

Allows a computer to communicate with signs over existing computer network cabling.

Repeater box

Used to boost the electrical signal along very long networks.

RF (radio frequency) transmitter

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

RS232/RS485 jumper

A set of three small prongs inside some signs with a plug which covers only two of the three prong. The way the plug is set determines whether the sign is using RS232 or RS485 cabling. (See “Appendix I: Setting the RS232/RS485 jumper on signs” on page 51.)