

THE ECONOLINE SERIES

MODEL 2800 Series

*4 INCH LED-GIBLE BRAND
ALPHANUMERIC DISPLAY*



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1.0 Description

The EL-2800 series LED alpha-numeric display, is a 4 inch unit designed for low cost applications. It is designed to display alphabetic and numeric characters, either in 1 line of 4 inch text, or 2 lines of 2 inch text, stationary or scrolling messages.

The EL-2800 series display is enclosed in a NEMA 12 enclosure constructed from 14 gauge steel. The display window is constructed from 1/4" red or smoked Plexiglas and is gasketed with foam tape meeting NEMA 12 specifications. The enclosure is designed to be mounted via 5/8" eye bolts. The enclosure is suitable for use in most industrial and factory environments and can optionally be upgraded to NEMA 4 specifications by changing the window gasket and increasing the number of door latches. Optional stainless steel enclosures are also available.

The EL-2800 series has built in provisions for RS-232, RS-422, RS-485 communications. Parallel input, and Remote I/O communications can optionally be installed.

Electrical power required for the EL-2800 series is 120 VAC at less than 5 Amps. A screw terminated barrier strip is provided within the enclosure for connection of power and all communication signals.

For systems that are being used to recall previously stored messages, PC based utility software is available from American LED-gible Inc. See the section on PC Utility software.

2.0 General Specifications

ENCLOSURE ----- 14 GAUGE NEMA 12
PAINTED STEEL (GRAY)
5/8" EYE BOLTS
OPTIONAL NEMA 4
OPTIONAL STAINLESS STEEL

POWER REQUIREMENTS ----- 120 VAC @ 5 AMPS

COMMUNICATIONS----- RS-232
RS-422
RS-485
OPTIONAL PARALLEL
OPTIONAL REMOTE I/O
(ANY ONE)

FONT----- 4" Proportional
2" Mono Spaced

MEMORY ----- 242 MESSAGES 32 BYTES LONG
9 INSERT DATA LOCATIONS

QUEUE CAPACITY ----- 32 MESSAGES

3.0 Initial Inspection

Every EL-2800 series display is carefully inspected, both mechanically and electrically, before shipment. Inspect the display for damage which may have occurred in transit. If there is evidence of damage or the display fails to operate, file a claim with the transportation company and notify American LED-gible Inc.

In any case where the damage occurs in transit, American LED-gible obligations under warranty are dependent upon the customer's immediate notification of the carrier, so that an inspection can be made and a claim filed.

Note: Save the shipping materials for inspection.

4.0 Installation and wiring

The EL-2800 series display can be purchased in many different formats and with several options that affect installation of the unit. Please check each installation section.

4.1 Mechanical Installation

The EL-2800 series displays are designed to be installed using 5/8" eye bolts and chain.

The EL-2800 series display should be moved to its operating position and suspended by cable or chain using the eye bolts on the top of the enclosure.

EL-2800 series displays are shipped without external connections or holes in the enclosure. ALI has provided two knock outs for 3/4" rigid conduit. It is up to the customer to remove a knock out, or punch a hole in the enclosure for whatever conduit or connectors are appropriate. A screw terminated barrier strip is provided within the enclosure for all electrical connections.

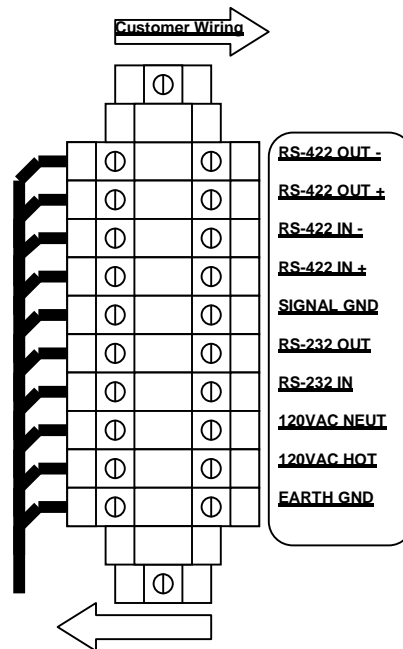
Note: The NEMA-1 version of the EL-2800 does not provide eye bolts for mounting, nor screw terminals for electrical connections. See section 4.2 and 4.3 for details.

4.2 Electrical Power Installation

Bring the power and communications wiring to the display ***separately*** through conduit, to avoid noise problems, and connect them to the terminal strip inside the enclosure. Power wires should be AWG #16 with 600 volt insulation rating.

Note: The NEMA-1 version of the EL-2800 provides a standard 6 foot line cord for 120VAC power instead of industrial screw terminals.

A copy of the connection label is shown below.



4.3 Serial Communications Installation

Connect the power and communications wiring to the display separately through conduit, to avoid noise problems, and connect them to the terminal strip inside the enclosure. Signal wires should be AWG #22 with 600 volt insulation rating.

The device being used to control the EL-2800 must be configured to use eight data bits, no parity, and one stop bit. The sign and the controlling device must be configured to use the same baud rate. To change the baud rate of the sign, see the section on configuring the sign.

Note: the NEMA-1 version of the EL-2800 provides connections for serial communications on a DB-25 connector mounted on the rear of the enclosure. Due to the connector combining both RS-232 and RS-422 connections, it's pin out is non-standard. Custom cables must be produced to use this connector. The pin out for the DB-25 is shown below.

DB-25 Pin Number	Signal
14	RS-232 IN
15	RS-232 OUT
17	RS-422 IN +
18	RS-422 IN -
19	RS-422 OUT +
20	RS-422 OUT -
21	GROUND
22	GROUND
23	GROUND

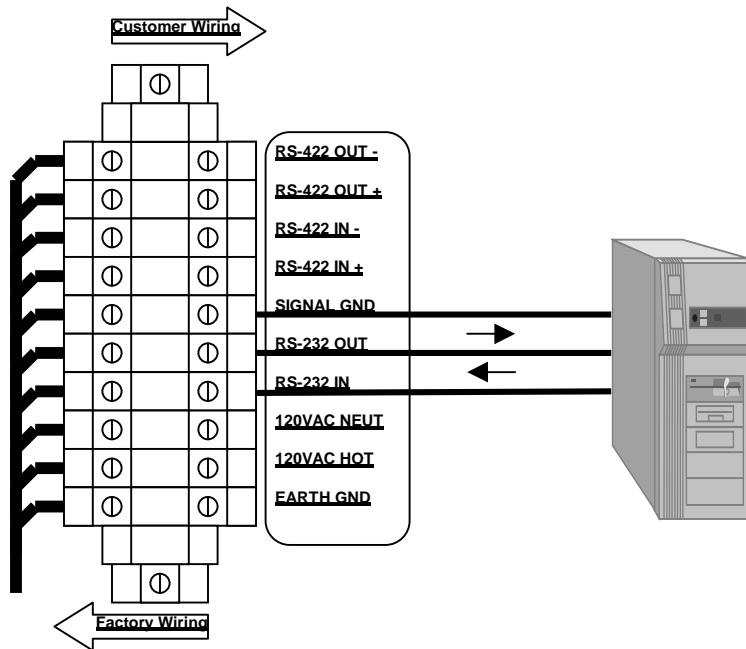
4.3.1 RS-232 Full Duplex Wiring

With a RS-232 Full Duplex set-up the EL-2800 will "echo" each character that it receives. This mode of operation is useful because the controlling device can be aware that the characters transmitted to the EL-2800 have been received. The use of Full Duplex operation will be required if using computer programs such as Magic Message Generator II to retrieve information from the sign.

The EL-2800 may be operated in the Half Duplex mode if the "echoed" characters are not desired. To operate the EL-2800 in the Half Duplex mode, omit installation of the wire that carries the return RS-232 signals from the EL-2800 back to the controlling device.

RS-232 communications should only be used if the cable between the devices is 50 feet or less in length. For cables longer than 50 feet, RS-422 or RS-485 should be considered.

To use the EL-2800 series display with a RS-232 Full Duplex device, connect the RS-232 controlling device to the terminals of the EL-2800 input barrier as shown below.

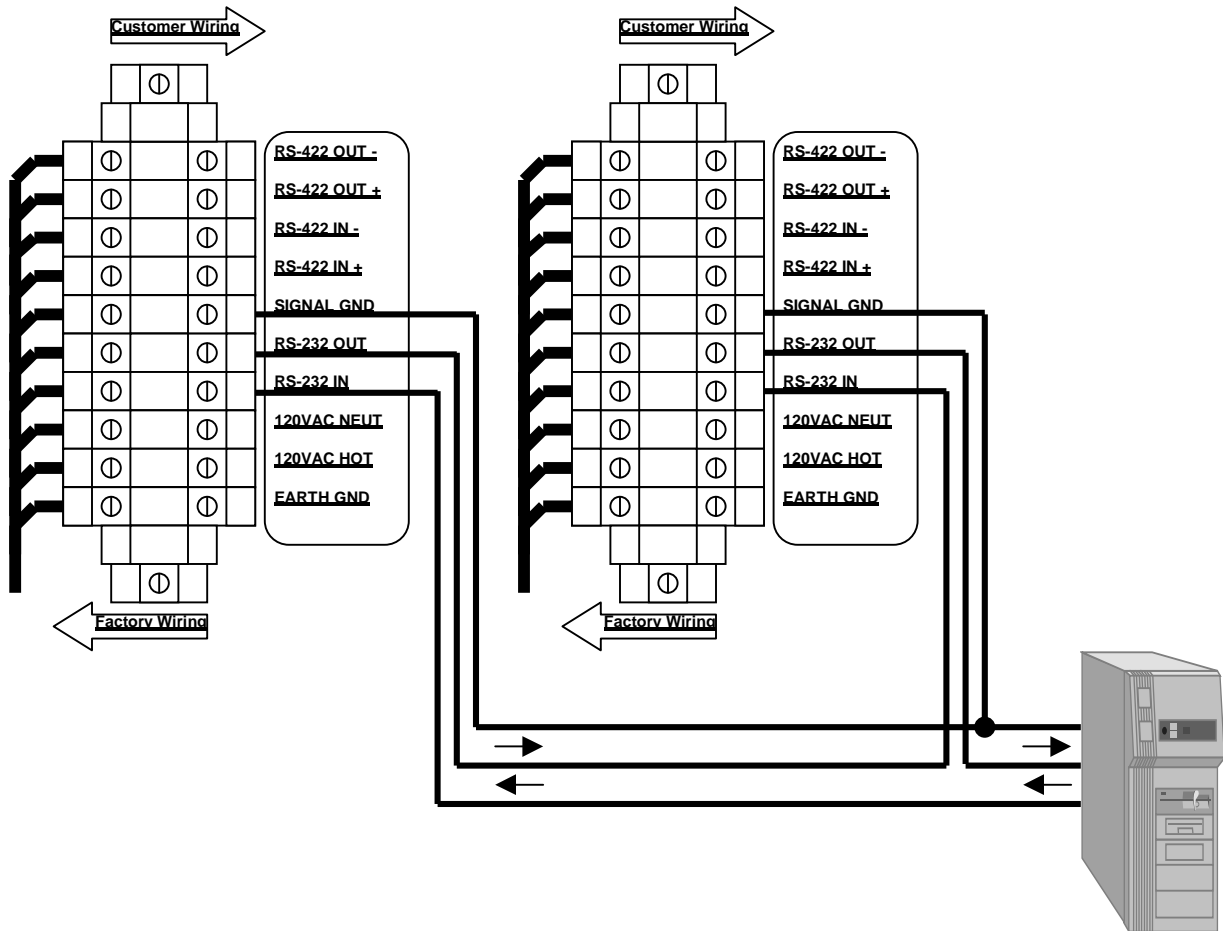


4.3.2 RS-232 Daisy Chain Wiring

The EL-2800 may be operated in the Daisy Chain mode. In this mode, the "echo" return line is not wired directly back to the transmitting device. Instead, it is wired to the input of another EL-2800. This may be repeated with multiple EL-2800's. Finally, the last sign in the string is wired back to the controlling device for full duplex operation. Wiring back to the controlling device may be omitted for half duplex operation. All EL-2800's and the RS-232 controlling device should be set up in an identical manner.

RS-232 communications should only be used if the cable between devices is 50 feet or less in length. For cables longer than 50 feet, RS-422 or RS-485 should be considered.

To use EL-2800 displays in the RS-232 Daisy Chain mode, connect the signs and the RS-232 controlling device as shown below.

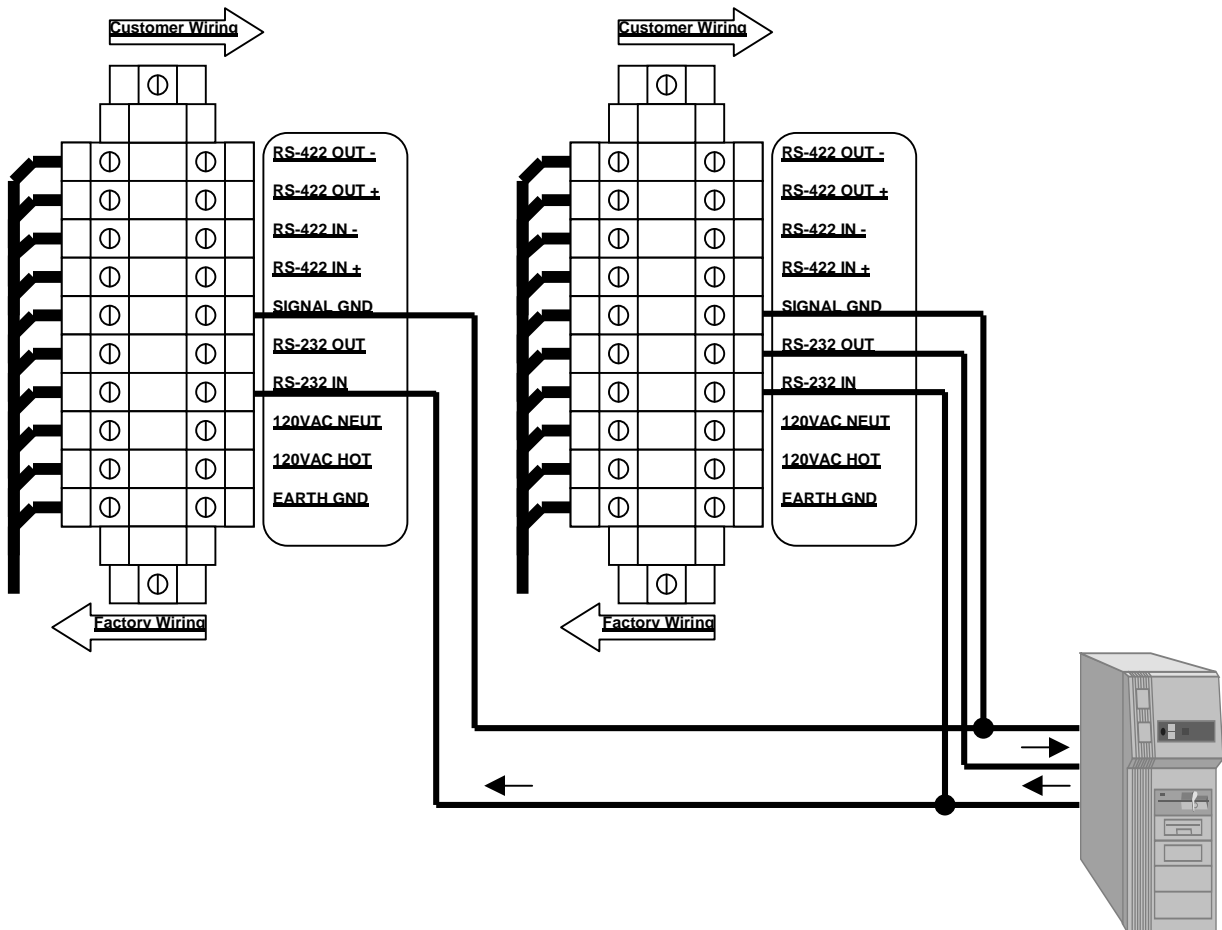


4.3.3 RS-232 Multi-Drop Wiring

The EL-2800 may be operated in the multi-drop mode. In this mode, the displays inputs are wired in parallel and connected to the RS-232 output signal of the controlling device. The return signal for the "echoed" characters are wired to the controlling device from only one of the signs. All EL-2800's and the RS-232 controlling device should be set up in an identical manner.

RS-232 communication should only be used if the cable between devices is 50 feet or less in length. For cables longer than 50 feet, RS-422 or RS-485 should be considered.

To use EL-2800 displays in the RS-232 multi-drop mode, connect the signs and the RS-232 controlling device as shown below.



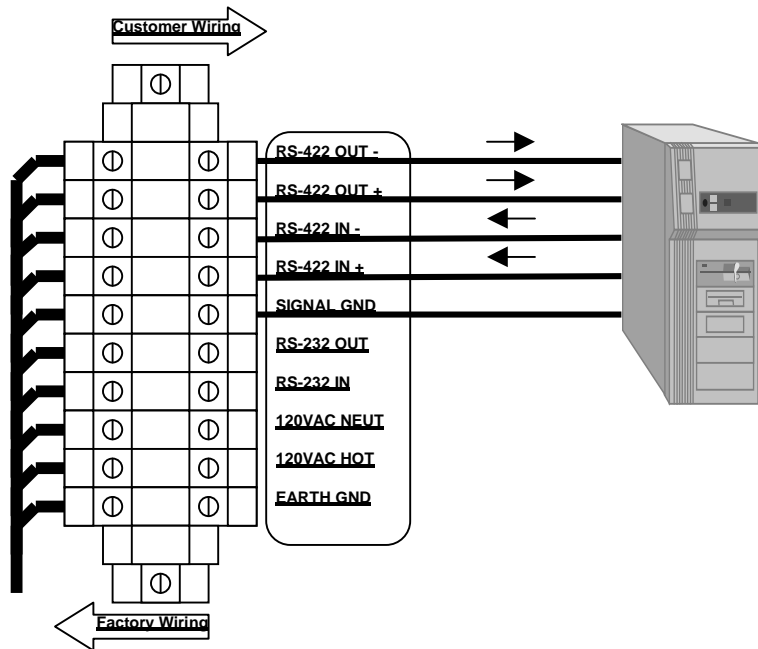
4.3.4 RS-422 Full Duplex Wiring

With a RS-422 Full Duplex set-up the EL-2800 will "echo" each character that it receives. This mode of operation is useful because the controlling device can be aware that the characters transmitted to the EL-2800 have been received. The use of Full Duplex operation will be required if using computer programs such as Magic Message Generator II to retrieve information from the sign.

The EL-2800 may be operated in the Half Duplex mode if the "echoed" characters are not desired. To operate the EL-2800 in the Half Duplex mode, omit installation of the wires that carry the return RS-422 signals from the EL-2800 back to the controlling device.

RS-422 communications should only be used if the cable between devices is 4000 feet or less in length. For cables longer than 4000 feet, modems should be considered.

To use the EL-2800 series display with a RS-422 Full Duplex device, connect the RS-422 controlling device to the terminals of the EL-2800 input barrier as shown below.

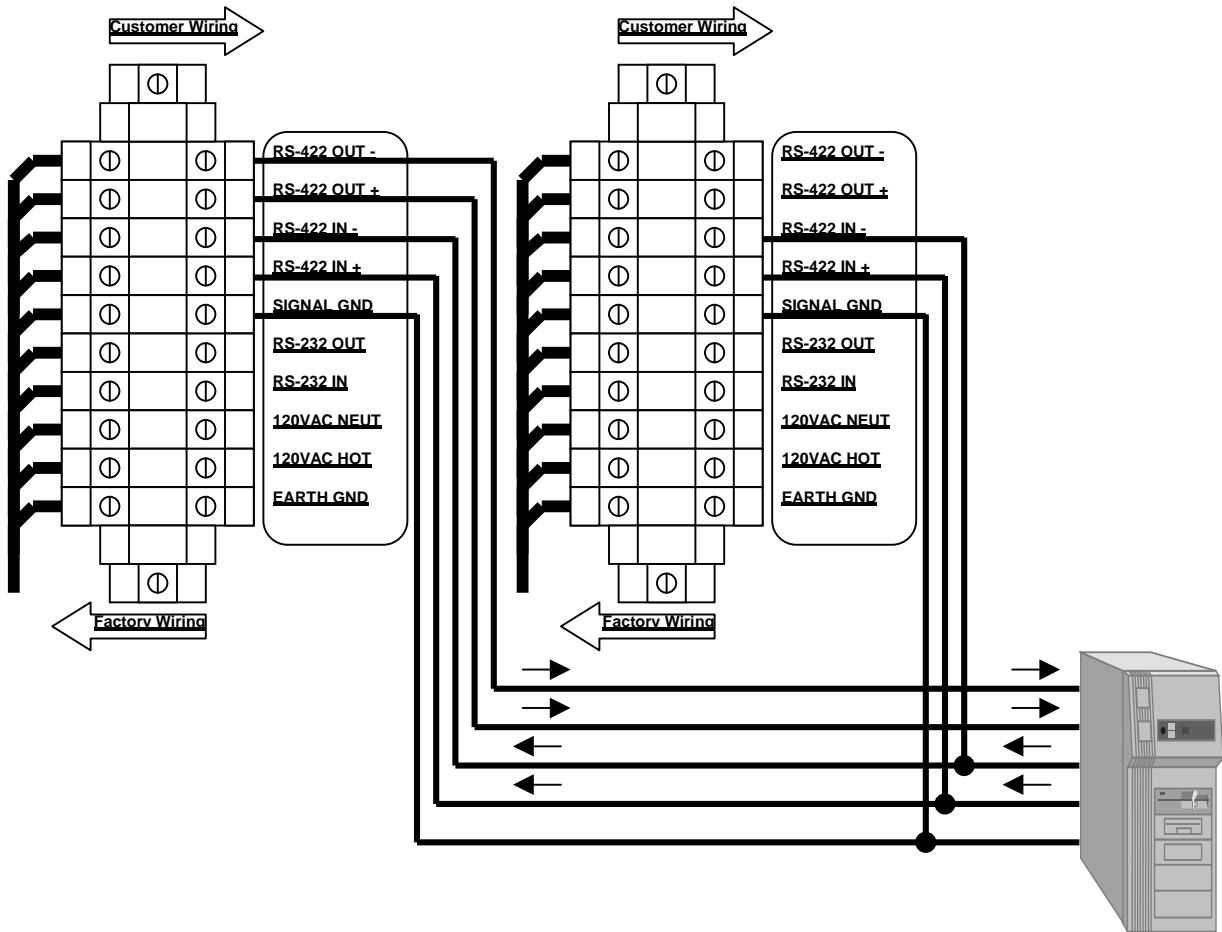


4.3.6 RS-422 Multi-Drop Wiring

The EL-2800 may be operated in the multi-drop mode. In this mode, the display's inputs are wired in parallel and connected to the RS-422 output signal of the controlling device. The return signals for the "echoed" characters are wired to the controlling device from only one of the signs. All EL-2800's and the RS-422 controlling device should be set up in an identical manner.

RS-422 communication should only be used if the cable between devices is 4000 feet or less in length. For cables longer than 4000 feet, a modem should be considered.

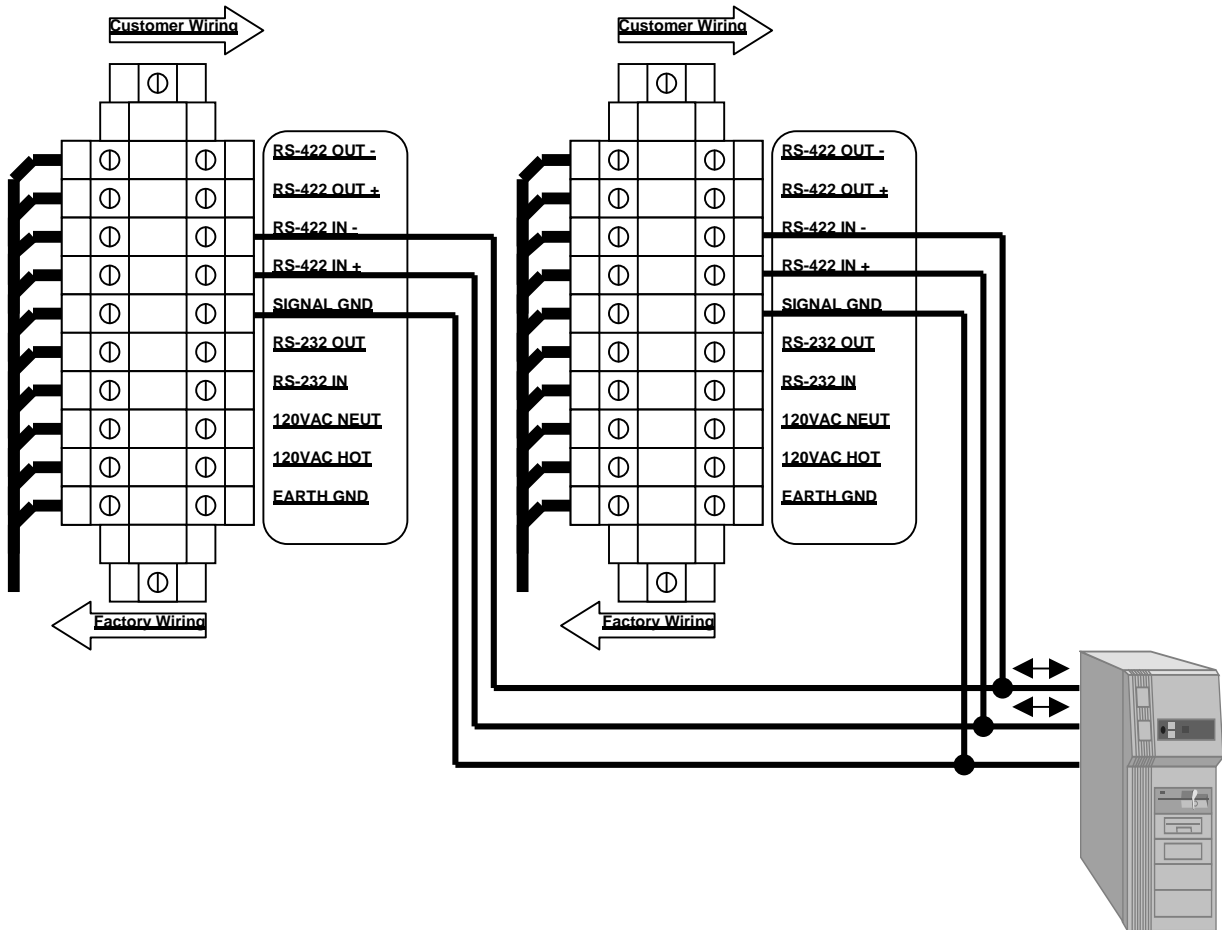
To use EL-2800 displays in the RS-422 multi-drop mode, connect the signs and the RS-422 controlling device as shown below.



4.3.7 RS-485 Wiring

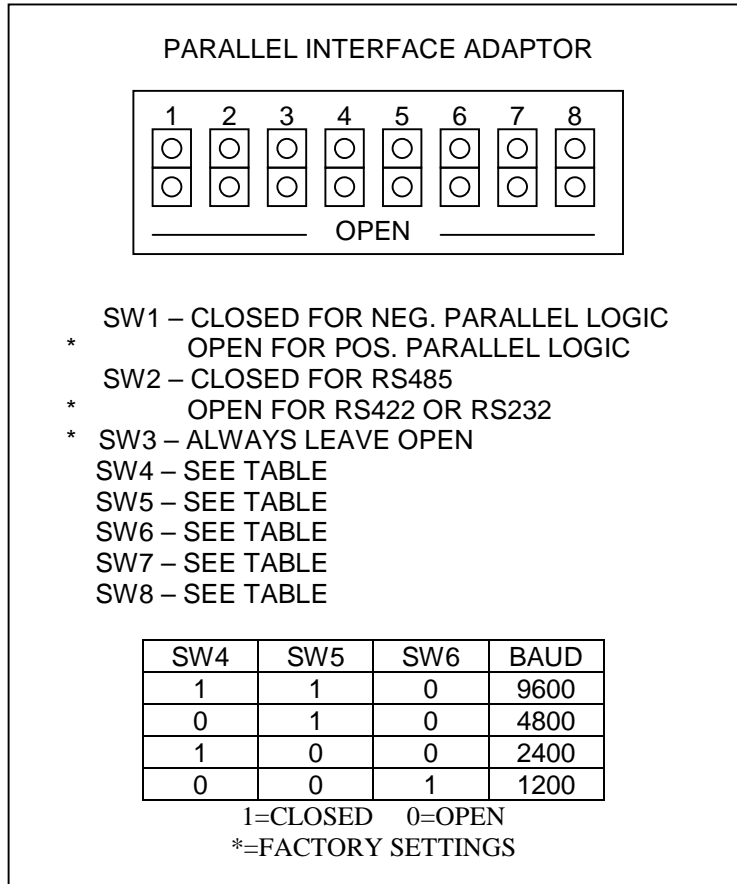
The EL-2800 may be operated in the RS-485 mode from a RS-485 controlling device. In this mode, transmissions of characters in two directions is accomplished with a single pair of wires. The EL-2800 sends back to the controlling device an ACK character if a valid command was received, or a NAK character if an invalid command was received.

Note: In this mode the EL-2800 does not echo received characters. The wiring connections are shown below.

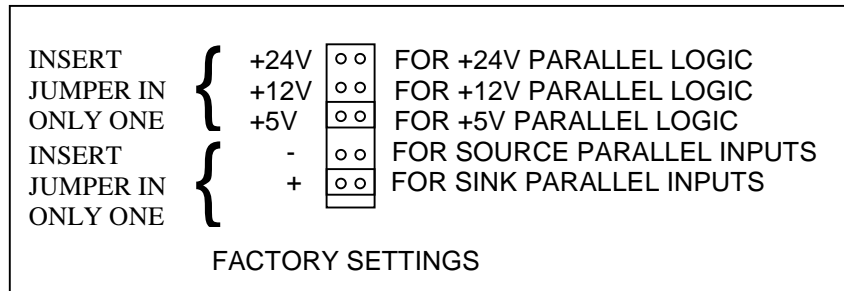


4.4 Parallel Communications Installation

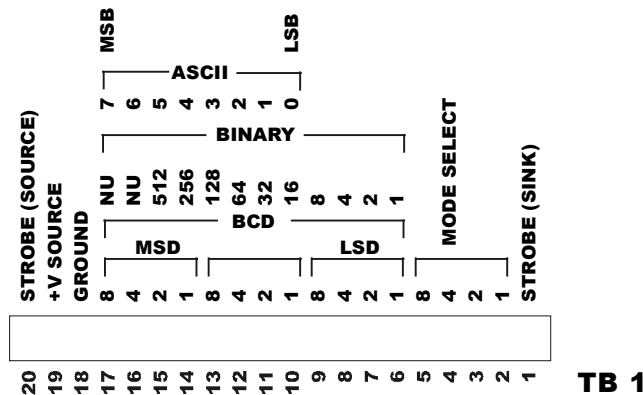
The EL-2800 may be operated from a Parallel Data Port. There are three primary ways to operate the EL-2800 from a Parallel Data Port, the BCD MESSAGE RECALL, the BINARY MESSAGE RECALL, or the STROBED ASCII MODE. Electrical installation for Parallel Data Port operation include setting the dip-switches on the parallel interface adapter for positive or negative logic. The dip-switch label is shown below.



The jumpers on the parallel interface adapter must also be set for the voltage that is being used for the parallel logic signals, +24 VDC, +12 VDC, or +5 VDC. The interface adapter supplies these voltages from the +V SOURCE terminal of TB1 to the sending device such as a programmable controller output card. The jumper for matching the parallel output device characteristics must also be installed in the position for SOURCE PARALLEL INPUTS or for SINK PARALLEL INPUTS. A copy of the jumper label is shown below.



The wiring for the Parallel Data Port is connected to the terminal strip connector TB1 on the parallel interface adapter. TB1 is in two mating halves so the part that the wiring connects to can be removed to connect the wiring and then reinstalled. A copy of the label is shown below.



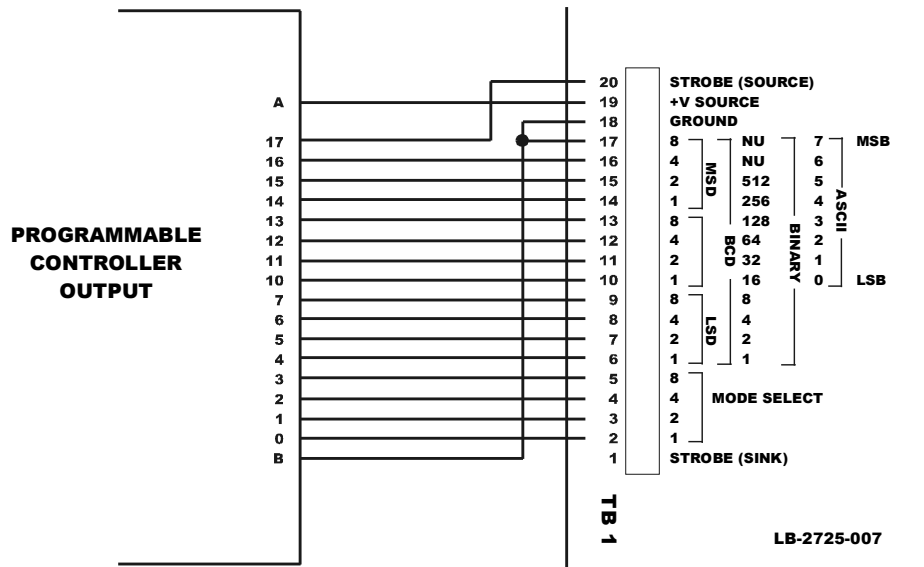
There are four connections required for the MODE SELECT BITS, twelve connections for the BCD or BINARY data bits, or eight connections if the mode is going to be strobed ASCII, and one strobe connection.

The +V SOURCE connection sources the voltage selected by the jumper setting, +24VDC, +12VDC, or +5VDC. This voltage is supplied from the interface adapter to supply the output circuits of programmable controller cards. This voltage and current should be sufficient to supply the parallel data input signals as an input to the parallel port, but should not be used for other purposes. The GROUND pin is for the return of the +V SOURCE supply.

The STROBE (SOURCE) and STROBE (SINK) inputs are the strobe lines for current sourcing and current sinking logic respectively. Only one strobe input should be used at a time, The STROBE input chosen must match the output logic of the sending device.

In most applications, operation of the EL-2800 by the parallel input port will be accomplished with 16 or less data inputs, including strobe.

A typical wiring diagram for parallel data input is shown below below. This will provide for recalling messages 001 through 242 via BCD operation, or BINARY operation (maximum message capacity of the EL-2800), or operation by strobed ASCII character input, using a single 16 bit programmable controller output card. This example is set up using a current sourcing output at the programmable controller and positive logic. For negative logic, connect pin 17 to +V SOURCE.



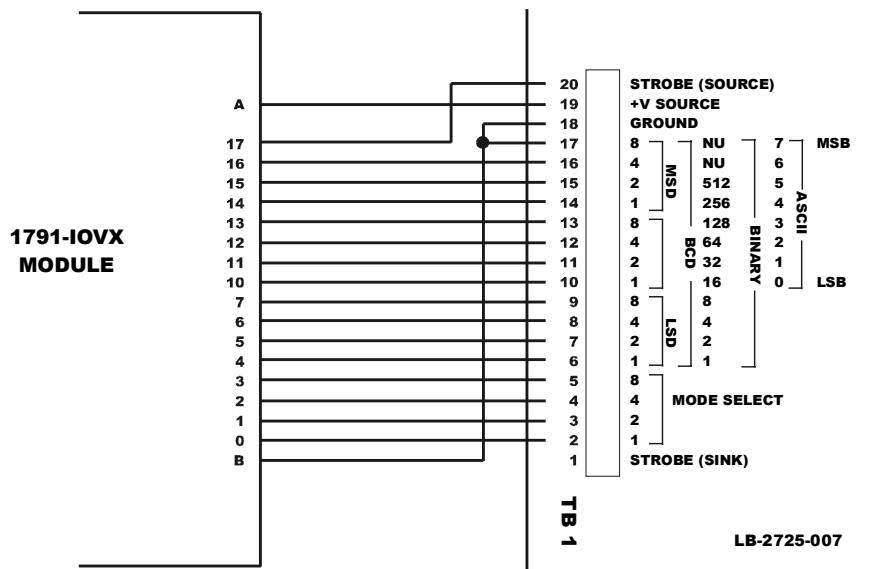
With the above setup, the MODE SELECT bits can be controlled and the mode can be changed as desired. The full range of modes and their functions are shown below. Some modes require a strobe and some do not, as indicated.

B4	B3	B2	B1	STROBE	FUNCTION-STANDARD LOGIC
0	0	0	0	YES	RECALL MESSAGE IN BINARY
0	0	0	1	YES	RECALL MESSAGE IN BCD
0	0	1	0	YES	READ SUCCESSIVE ASCII CODES
0	0	1	1	NO*	BCD MESSAGE RECALL
0	1	0	0	NO*	BINARY MESSAGE RECALL
0	1	0	1	YES	INSERT VARIABLE DATA-BINARY
0	1	1	0	YES	INSERT VARIABLE DATA-BCD
0	1	1	1	YES	INSERT VARIABLE DATA-ASCII
1	0	0	0	YES	END OF VARIABLE DATA STRING
1	0	0	1	NO*	ENABLE QUEUING MODE
1	0	1	0	NO*	DISABLE QUEUING MODE
1	0	1	1	NO*	CLEAR DISPLAY
1	1	0	0	NO*	NOT USED
1	1	0	1	NO*	NOT USED
1	1	1	0	NO*	NOT USED
1	1	1	1	NO*	NOT USED

* REQUIRES MODE SELECT & DATA BITS STABLE FOR 500ms

4.5 Remote I/O Communications Installation

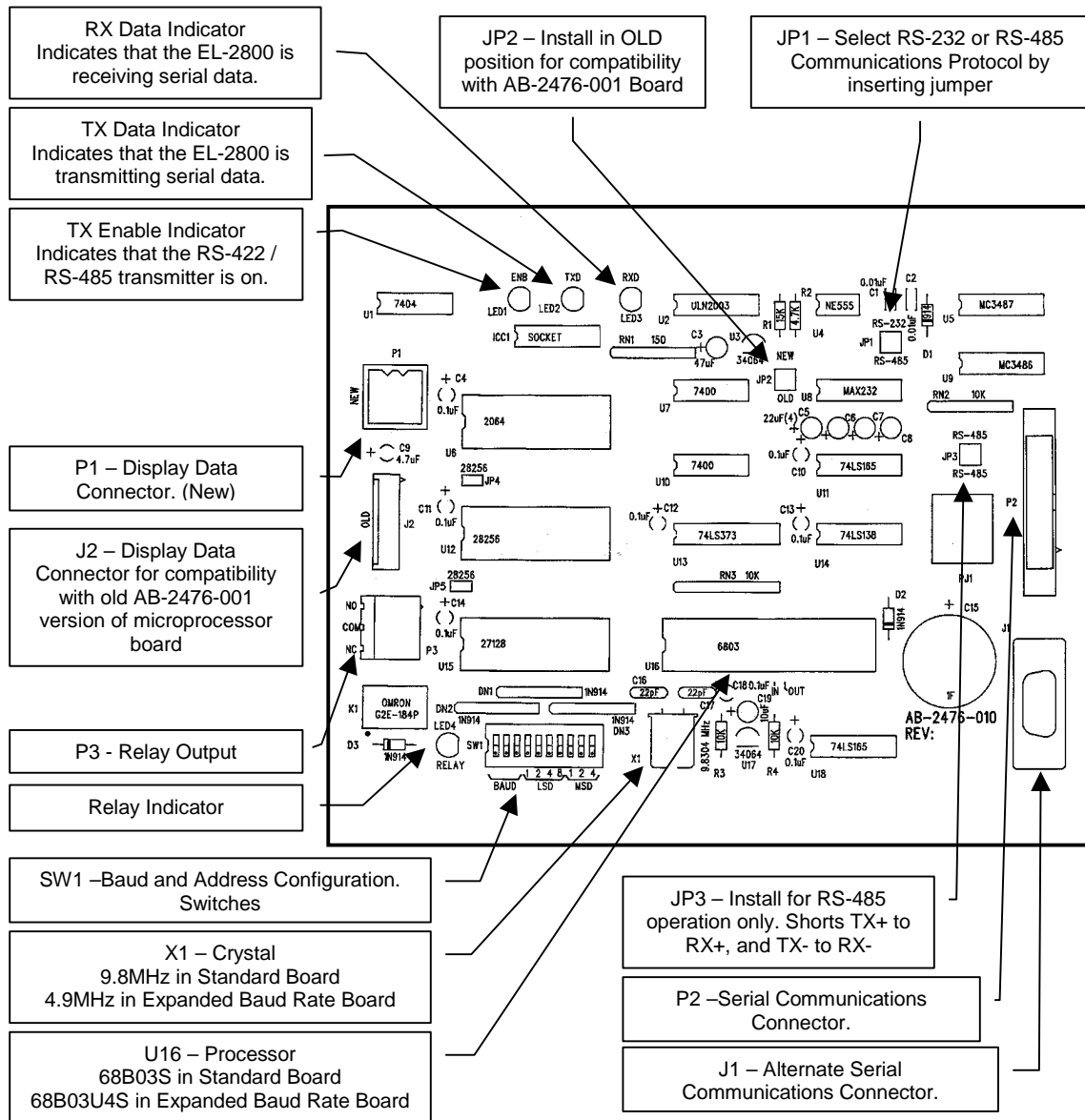
The EL-2800 may be operated via Remote I/O with the addition of a Block I/O Module (1791-IOVX) installed and configured at the factory. The Block I/O Module is connected to a parallel interface adaptor, allowing the sign to be controlled from the Remote I/O network. See the section on operation via parallel port. Future versions of the EL-2800 may support direct connection to a Remote I/O network. A connection diagram for the Block I/O Module is shown below.



5.0 Configuration

Operation of the EL-2800 is dependent on the electrical installation that was previously made. Power-up of the EL-2800 is described in section 5.1. Setting the sign address is described in section 5.2. Setting the displays baud rates is described in section 5.3.

A diagram of the AB-2476-010 microprocessor board for EL-2800 displays is provided below. This diagram will be referenced throughout section 5 of this manual.



5.1 Power on messages

After the electrical power has been connected in accordance with the instruction in the installation section, apply the 120 VAC power to the EL-2800. The EL-2800 will go through a short power up sequence.

- 1) Power on self test. The LED display will remain blank.
- 2) Display basic model number **EL-2800**
- 3) Display software number **PP-2111-127**
- 4) Display software revision **Rev. F**
- 5) Display baud rate **19200 BAUD**
- 6) Display sign address **NO ADDRESS**
- 7) Display mode: **RS-232/RS-422 MODE**
- 8) Display ready status **OFF LINE**

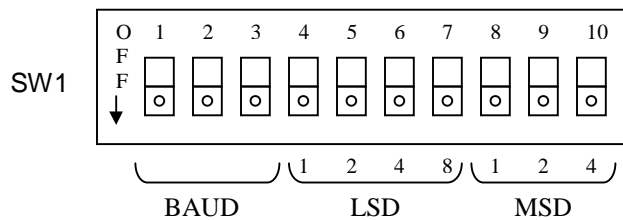
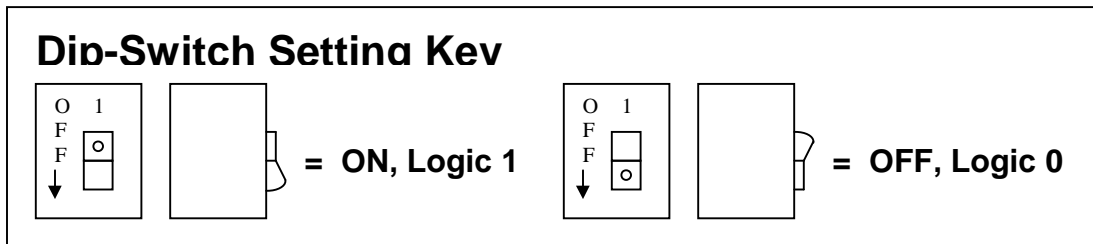
The "OFF LINE" message will remain on the display until it receives a character through the serial port, then the sign will go blank. This is to differentiate between an idle working sign, and a powered off or malfunctioning sign.

5.2 Configuring the Sign Address

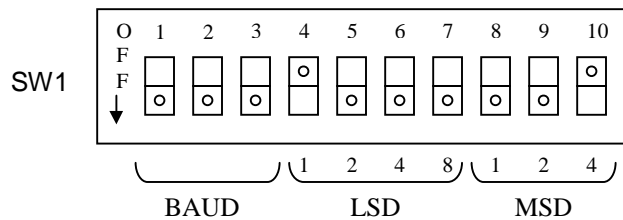
Addressing is an important aspect of operation of the EL-2800. It is important to understand addressing before operating the EL-2800. Addressing is a method where more than one EL-2800 can be connected to a serial data transmission line and commands can be directed to a particular EL-2800 (or a group of EL-2800's) for action.

Addressing is accomplished by assigning an ASCII character address to each display. ASCII characters space (20h) through "~" (7Eh) are valid for addressing. The address of a sign is set by switches SW1.4 through SW1.10 on the microprocessor board. Switch SW1.4 sets the least significant bit of the address character, and SW1.10 sets the most significant bit of the address character. Setting the address character to NULL (00H) disables the addressing feature of the EL-2800. The ASCII character DEL (7FH) is used as a wild card address.

To disable the addressing feature of the EL-2800 (Address = NULL (00h)), set switches SW1.4 through SW1.10 to the off position as shown below.



To assign an address of "A" (41h) to the EL=2800, turn on SW1.10 and SW1.4, and leave SW1.5 through SW1.9 in the off position as shown below.



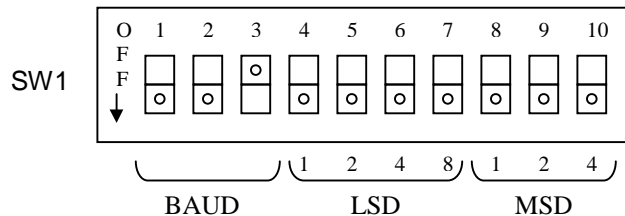
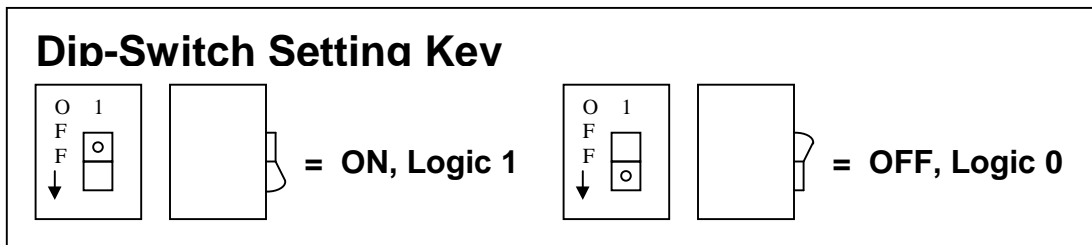
5.3 Configuring the Sign Baud Rate

The standard model EL-2800 supports 600, 2400, or 19200 baud operation. An optional expanded baud rate version of the EL-2800 supports the standard 600, 2400, and 19200 baud operation, and additionally supports operation at 300, 1200, 4800, and 9600 baud.

The expanded baud rate version can be identified by the installation a 68B03U4S microprocessor, and a 4.9MHz crystal on the microprocessor board. The operating baud rate is selected by switches SW1.1 through SW1.3. as indicated in the table below.

SW1.1	SW1.2	SW1.3	Standard Version 68B03S, 9.8MHz	Expanded Version 68B03U4S, 4.9MHz
OFF	OFF	OFF	2400	1200
OFF	OFF	ON	19200	9600
OFF	ON	OFF	600	300
OFF	ON	ON	Not Used	2400
ON	OFF	OFF	Not Used	4800
ON	OFF	ON	Not Used	600
ON	ON	OFF	Not Used	19200
ON	ON	ON	Not Used	Not Used

To select 19200 Baud on the Standard Version of the microprocessor board, turn SW1.3 on, and leave SW1.1 and SW1.2 in the off position as shown below.



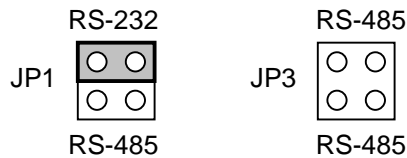
5.4 Selecting 232, 422, or 485 Communications

The standard model EL-2800 supports operation via RS-232, RS-422 or RS-485 serial communications. RS-232 and RS-422 used the same communications driver however, RS-485 uses a modified communications driver due to the requirement to control the RS-422 / 485 transmitter, and detect RS-485 buss conflicts in real time.

RS-485 communications uses standard RS-422 transceivers, with all of the RS-422 receivers and transmitters on the buss connected in a parallel wiring scheme. Only one RS-422 transmitter on the buss may be active at any time, and all other transmitters must be in the tri-state condition. If more than one device attempts to transmit data on the RS-485 buss at the same time, the data on the buss will be corrupt, this is known as a buss conflict.

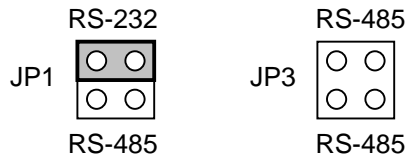
5.4.1 Selecting RS-232 Communications

To operate the EL-2800 via RS-232 communications, first select an address as described in section 5.1, and a baud rate as described in section 5.2. Next select the RS-232 / 422 communications driver by installing a jumper in JP1 in the RS-232 position. There should not be any jumpers installed in JP3. JP1 and JP3 are diagramed bellow.



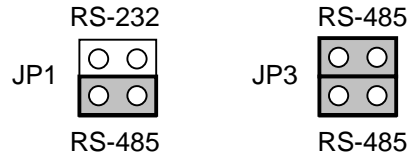
5.4.2 Selecting RS-422 Communications

To operate the EL-2800 via RS-422 communications, first select an address as described in section 5.1, and a baud rate as described in section 5.2. Next select the RS-232 / 422 communications driver by installing a jumper in JP1 in the RS-232 position. There should not be any jumpers installed in JP3. See section 5.4.4 for a special note about using the AB-2476-010 board as a replacement part for the AB-2476-001 or AB-2476-002 boards. JP1 and JP3 are diagramed bellow.



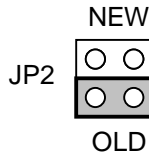
5.4.3 Selecting RS-485 Communications

To operate the EL-2800 via RS-485 communications, first select an address as described in section 5.1, and a baud rate as described in section 5.2. Next select the RS-485 communications driver by installing a jumper in JP1 in the RS-485 position. Both jumper positions in JP3 should be installed unless the AB-2476-010 is being used as a replacement part for AB-2476-001 or AB-2476-002, see section 5.4.4. JP1 and JP3 are diagrammed below.



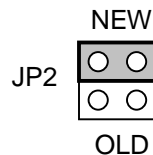
5.4.4 Using AB-2476-010 as a Replacement Part

The RS-422 communications circuitry was upgraded when the AB-2476-003 was designed, and the display data connector was changed. The AB-2476-010 microprocessor board was designed to be useable as a replacement part for AB-2467-001 through AB-2476-004. To use the AB-2476-010 board as a replacement part for AB-2476-001 or AB-2476-002 a jumper must be inserted in JP2, in the OLD position as shown below.



When the AB-2476-010 board is used as a replacement part for the old AB-2476-001 or AB-2476-002 designs, JP3 can not be used to jumper RS-422 TX pins to the RS-422 RX pins for RS-485 communications. The jumping of 422 TX to 422 RX must be done using external wiring on connector P2 or at the customer wiring barrier.

For all other applications using the AB-2476-010 microprocessor board, a jumper must be installed in JP2, in the NEW position as shown below.



6.0 Operation Via Serial Communications

The EL-2800 can accept commands from three types of serial data input: RS-232, RS-422, or RS-485. Only one of these communication types can be used in a given installation. The action that the EL-2800 performs in response to a command will be identical regardless of the communication method used except that RS-485 will respond with an ACK or NAK response instead of echoing back each character when using RS-232 or RS-422.

Each command will be shown, and the display action will be described. Examples will be shown to illustrate the command sequence and the action of the display. The commands consist of a sequence of ASCII control characters and printable characters. In the examples of commands that follow, the command sequences will be shown twice, once for an addressable sign, and once for a non-addressable sign. Unless otherwise specified we will use sign address "A", message number "001" and insert data location number "1" for examples.

6.1 Non-Escaped Commands

Serial commands are separated into escaped commands and non-escaped commands. Escaped commands are used exclusively for message handling and insert data handling. Non-escaped commands are used for other sign operations.

6.1.1 Abort [^A][Y]

The Abort command is used when it is desirable to bring the EL-2800 back to the same condition as a EL-2800 that has just been powered-up. When this command is received by the EL-2800 it will go through the same routine that it does on power-up and then be ready to receive the next command. To Abort a non-addressable EL-2800, send the following:

CTRL A	Y
01h	59h

To Abort an addressable EL-2800 with address A, send the following:

CTRL B	A	CTRL A	Y
02h	41h	01h	59h

6.1.2 Queue Dump [^B]

This command is used if it is desired that the EL-2800 transmit over the serial data port a list of the messages that are currently recalled into the display queue. When the command is executed the EL-2800 will transmit the three digit message numbers over the serial port in the form XXX XXX XXX CR LF, where XXX are the message numbers and CR LF are Carriage Return and Line Feed characters respectively. To command a non-addressable EL-2800 to send a list of recalled messages, send the following:

CTRL B
02h

To command an addressable EL-2800 with address A to send a list of recalled messages, send the following:

CTRL B	A	CTRL B
02h	41h	02h

6.1.3 Display Buffer [^D]

This command is used to display the text input buffer after an invisible entry command. To display the text input buffer on a non-addressable EL-2800, send the following:

CTRL D
04h

To display the text input buffer on an EL-2800 with address A, send the following:

CTRL B	A	CTRL D
02h	41h	04h

6.1.4 Flash Toggle [^F]

This command is used to toggle the flash flag on and off. If the flash flag is on, the display will flash whatever text is on the display. To toggle the flash flag on a non-addressable EL-2800, send the following:

CTRL F
06h

To toggle the flash flag on an EL-2800 with address A, send the following:

CTRL B	A	CTRL F
02h	41h	06h

6.1.5 Get Message Text [^G]

This command is used to make the EL-2800 dump it's message memory out the serial port. It is used to allow ALI's utility software such as Magic to retrieve message memory contents from the sign. To dump the message memory on a non-addressable EL-2800, send the following:

CTRL G
07h

To dump the message memory on an EL-2800 with address A, send the following:

CTRL B	A	CTRL G
02h	41h	07h

6.1.6 Invisible Entry [^I]

This command is used in conjunction with the Message Entry Command when it is desirable to enter text without the text actually appearing on the display. This is a "one time only" command which does not affect the settings of the EL-2800. The command must be repeated each time it is desired to enter text invisibly. To set invisible text entry for the next entry only on a non-addressable EL-2800, send the following:

CTRL I
09h

To set invisible text entry for the next entry only on an EL-2800 with an address of A, send the following:

CTRL B	A	CTRL I
02h	41h	09h

6.1.7 Display Time of Day Clock [^J]

This command is used to display the time of day clock. Note: The Time of Day clock in the EL-2800 is a software only clock. It is accurate to about +/- 10 minutes per day, and is not retained during a power outage. If accurate time is required, the controlling system should update the EL-2800's clock once each hour. To display the clock on a non-addressable EL-2800, send the following:

CTRL J
0Ah

To display the clock on an EL-2800 with address A, send the following:

CTRL B	A	CTRL J
02h	41h	0Ah

6.1.8 Lamp Test [^K]

This command is used to lamp test the display. To lamp test a non-addressable EL-2800, send the following:

CTRL
K
0Bh

To lamp test an EL-2800 with address A, send the following:

CTRL		CTRL
B	A	K
02h	41h	0Bh

6.1.9 Load Mode [^L]

This command is used to make the EL-2800 prepare itself for rapid programming. It is used to allow ALI's utility software such as Magic to program EL-2800's rapidly. A [^R] will clear load mode. To set load mode on a non-addressable EL-2800, send the following:

CTRL
L
0Ch

To set load mode on an EL-2800 with address A, send the following:

CTRL		CTRL
B	A	L
02h	41h	0Ch

6.1.10 Queuing Disable [^O]

This command is used to set up the EL-2800 in such a way that when a stored message is recalled and then another message is recalled, the second message replaces the first message on the display. This command is retained by the EL-2800 until it is revoked by the Queuing Enable Command.

To set a non-addressable EL-2800 so that message queues are disabled, send:

CTRL O
0Fh

To set an addressable EL-2800 with address A, so that message queues are disabled, send:

CTRL B	A	CTRL O
02h	41h	0Fh

6.1.11 Set Pause Time [^P][n]

The Set Pause Time Command is used to change the time that the recalled messages stay on the display before they are replaced by the next message in the queue. A pause setting of 9 is the shortest. A pause setting of 1 is the longest.

To change the pause time of a non-addressable EL-2800 to the shortest setting, send the following:

CTRL P	9
10h	39h

To change the pause time of an addressable EL-2800 with address A to the longest setting, send the following:

CTRL B	A	CTRL P	1
02h	41h	10h	31h

6.1.12 Reset Queue [^R]

The Reset Queue Command is used to remove all the messages from the message queue with one command instead of removing the messages from the queue one at a time with the Message Clear Queue Command. This command will return an EL-2800 to the idle state. To Reset the Message Queue, on a EL-2800 display in non-addressable mode, send the following:

CTRL
R
12h

To Reset the Message Queue, on a EL-2800 display with an address of A, send the following:

CTRL	A	CTRL
B		R
02h	41h	12h

6.1.13 Activate Relay [^S][n]

The Activate Relay command is used to energize or de-energize the optional relay on the EL-2800 microprocessor board. The relay is commonly used to operate alarm annunciation devices such as blinking lights or audible alarms. The number 0 de-energizes the relay, and the number 1 energizes the relay. To energize the relay on a non-addressable EL-2800, send the following:

CTRL	
S	1
13h	31h

To de-energize the relay on an addressable EL-2800 with an address of A, send the following:

CTRL	A	CTRL	
B		S	0
02h	41h	13h	30h

6.1.14 Set Clock [^T][hh:mm][^E]

The Time of Day clock in the EL-2800 is a software only 12 hour clock. It is accurate to about +/- 10 minutes per day, and is not retained during a power outage. If accurate time is required, the controlling system should update the EL-2800's clock once each hour. Valid time entries range from 01:00 to 12:59. To set the internal time of day clock on a EL-2800 display in non-addressable mode to 12:34, send the following:

CTRL T	1	2	:	3	4	CTRL E
14h	31h	32h	3Ah	33h	34h	30h

To set the internal time of day clock on a EL-2800 display with an address of A to 4:49, send the following:

CTRL B	A	CTRL T	0	4	:	4	9	CTRL E
02h	41h	14h	30h	34h	3Ah	34h	39h	30h

Note: Wild card addressing can be very useful with this command.

6.1.15 Set Display Width [^U][Y][n]

This command is used to configure the EL-2800 processor for 1 display board, or 2 display boards of width. This command is typically only used by the factory, but is presented here for completeness. To set the display width of a EL-2800 display in non-addressable mode to 1 display board wide, send the following:

CTRL U	Y	1
15h	59h	31h

To set the display width of an EL-2800 with an address of A to 2 display boards wide, send the following:

CTRL B	A	CTRL U	Y	2
02h	41h	15h	59h	32h

6.1.16 Set Scroll Speed [^V][n]

The Set Scroll Speed Command is used to change the rate that a scrolling message moves across the display. The number 1 sets the scroll speed to the slowest speed, and the number 9 sets the scroll speed to the fastest speed. To set the scroll speed of a non-addressable EL-2800 to 5, send the following:

CTRL V	5
16h	35h

To change the scroll speed of an addressable EL-2800 with an address of A to 9, send the following:

CTRL B	A	CTRL V	9
02h	41h	16h	39h

6.1.17 Erase Ram [^X][Y]

This command is used when it is desired to erase the messages that have been stored in the EL-2800 message memory. It is expected that this will be a rarely used command because, messages can be stored in the EL-2800 over the old messages without erasing the message memory.

To erase the stored messages in a non-addressable EL-2800, send the following:

CTRL X	Y
18h	59h

To erase the stored messages on an addressable EL-2800 with an address of A, send the following:

CTRL B	A	CTRL X	Y
02h	41h	18h	59h

6.1.18 Queuing Enable [^Y]

This command is used to set up the EL-2800 in such a way that when a stored message is recalled and a second message is recalled, the second message is placed into a display queue with the first. Up to 32 messages may be added to the display queue. The EL-2800 will cycle between the messages leaving each message on the display for one pause time. This command is retained by the EL-2800 until it is revoked by the Queuing Disable Command.

To setup a non-addressable EL-2800 so that message queues are enabled, send the following:

CTRL Y
19h

To setup an addressable EL-2800 with address A so that message queues are enabled, send the following:

CTRL B	A	CTRL Y
02h	41h	19h

6.2 Escaped Commands

Serial commands are separated into escaped commands and non-escaped commands. Escaped commands are used exclusively for message and Insert Data handling. Non-escaped command are used for other sign operations.

6.2.1 Text Entry [ESC][text][^E]

The Text Entry Command is used to enter text into the EL-2800. When entering text with this command, the backspace key of a terminal is active and can be used to remove the last character that was entered from the display.

The text that is entered will appear in the display queue if no messages are recalled, and the text will also be entered into the Input Buffer of the EL-2800 as a preliminary operation to storing the text into message memory or an insert data location.

Note: If an Invisible Entry command has been previously sent to the sign, the entered text will only be placed in the Input Buffer, it will not be placed into the display queue.

To enter the word "TEXT " on a non-addressable EL-2800, send the following:

ESC	T	E	X	T	CTRL E
1Bh	54h	45h	58h	54h	05h

To enter the word "TEXT" on to an addressable EL-2800 with an address of A, send the following:

CTRL B	A	ESC	T	E	X	T	CTRL E
02h	41h	1Bh	54h	45h	58h	54h	05h

6.2.2 Message Store [ESC][^N][nnn][^A][^E]

The Message Store Command is used to store the content of the Input Buffer into a message buffer. Messages that are stored into the message memory of the EL-2800 are stored by number so that they may be recalled by number for display at a later time. There is a maximum capacity of 242 messages that can be stored in the EL-2800. Each message has a maximum capacity of 32 characters. Note: Longer messages may be entered and saved but they will consume multiple message buffers.

The text of a message to be stored in the message memory of the EL-2800 must have been entered with the Text Entry Command. To store a message in the message memory space assigned to number 001 in a non-addressable EL-2800, use the Text Entry Command to enter and display the text and then send the following:

ESC	CTRL N	0	0	1	CTRL A	CTRL E
1Bh	0Eh	30h	30h	31h	01h	05h

To store the same message in an addressable EL-2800 with address A, use the Text Entry Command to enter and display the text, and then send the following:

CTRL B	A	ESC	CTRL N	0	0	1	CTRL A	CTRL E
02h	41h	1Bh	0Eh	30h	30h	31h	01h	05h

This will store the message in the EL-2800 for recall at a later time.

6.2.3 Message Recall [ESC][^N][nnn][^B][^E]

The Message Recall Command is used to recall and display messages that have previously been stored by the Message Store Command.

When the EL-2800 is in the QUEUE DISABLED mode, a message that has been recalled, replaces the message that is currently on the display. When the EL-2800 is in the QUEUE ENABLED mode, a message that is recalled will queue up behind other messages that have been recalled and the messages will be displayed in order of recall. Up to 32 messages may be in the recall queue at any time.

To recall message number 001 on a non-addressable EL-2800, send the following:

ESC	CTRL N	0	0	1	CTRL B	CTRL E
1Bh	0Eh	30h	30h	31h	02h	05h

To recall message number 001 on an addressable EL-2800 with address A, send the following:

CTRL B	A	ESC	CTRL N	0	0	1	CTRL B	CTRL E
02h	41h	1Bh	0Eh	30h	30h	31h	02h	05h

6.2.4 Message Clear [ESC][^N][nnn][^C][^E]

The Message Clear Command is used to remove a message from the display queue. This command is normally used only in the QUEUE ENABLED mode.

When the EL-2800 is in the QUEUE DISABLED mode, a message that has been recalled replaces the message that is currently on the display. When the EL-2800 is in the QUEUE ENABLED mode, a message that is recalled will queue up behind other messages that have been recalled and the messages will be displayed in message number order.

To remove message number 001 from the queue on a non-addressable EL-2800, send the following:

ESC	CTRL N	0	0	1	CTRL C	CTRL E
1Bh	0Eh	30h	30h	31h	03h	05h

To remove message number 001 from the display queue on an addressable EL-2800 with address A, send the following:

CTRL B	A	ESC	CTRL N	0	0	1	CTRL C	CTRL E
02h	41h	1Bh	0Eh	30h	30h	31h	03h	05h

6.2.5 Insert Data Set [ESC][^N][nnn][^D][^E]

This command is used to store data into insert data locations. It must first be preceded by an Text Entry Command. There is a maximum of 16 characters allowed in a given insert data location.

There are only 9 locations for inserted data storage, 001 through 009. To store text into inserted data location 003 of a non-addressable EL-2800, first enter the text using the Text Entry Command, then send the following:

ESC	CTRL N	0	0	3	CTRL D	CTRL E
1Bh	0Eh	30h	30h	33h	04h	05h

To store text into inserted data location 007 of an addressable EL-2800 with address A, first enter the text using the Text Entry Command, and then send the following:

CTRL B	A	ESC	CTRL N	0	0	7	CTRL D	CTRL E
02h	41h	1Bh	0Eh	30h	30h	37h	04h	05h

6.3 Message Text Enhancements

The EL-2800 supports many text enhancements including inserting variable data into a message, flashing text to emphasize importance, and mixing small and large fonts in a single message. Each enhancement is achieved by embedding control commands within the text of a message. Only the text of each example message will be shown. See the Message Store Command for more information on how to store message text in a message buffer.

6.3.1 Insert Data [^D][n]

Use this text enhancement to embed variable data in a message. Suppose you wanted a message that said "Qty: xxx", where xxx is replaced with a real time production count. To achieve this, designate one of the nine insert data locations for holding today's production quantity. We will choose insert data location 3. The actual production count must be kept up to date via the Insert Data Set Command. The text of the message would be:

Q	t	y	:	space	CTRL D	3
51h	74h	79h	3Ah	20h	04h	33h

6.3.2 Flash Toggle [^F]

Use this text enhancement to make the text of a message flash. To make "Flash" flash, use the following syntax:

CTRL F	F	l	a	s	h
06h	46h	6Ch	61h	73h	68h

6.3.3 Graphic Character [^G][nn]

Use this text enhancement to insert pre-programmed graphic characters into the text of a message. Each special graphic character is selected by its two digit numeric code. To make a message that displays the word "Call" followed by a "Ringing Telephone" character, use the following syntax:

C	a	l	l	CTRL G	1	0
43h	61h	6Ch	6Ch	07h	31h	30h

Graphic Character	Code
Half space	00
Right arrow	01
Left arrow	02
Up arrow	03
Down arrow	04
Omega symbol	05
Not equal sign	06
Notes 1	07
Notes 2	08
Telephone	09
Ringing telephone	10
Club	11
Spade	12
Heart	13
Diamond	14
Goblet	15
Bottle	16
Flag 1 st ½	17
Flag 2 nd ½	18
Christmas tree	19
No smoking sign	20
Army tank	21
Pistol	22
Light bulb off	23
Light bulb on	24
Fish	25
Robot	26
Car 1 st ½	27
Car 2 nd ½	28
Truck 1 st ½	29
Truck 2 nd ½	30
Key	31
Check mark	32
TNT explosion frame 1	33
TNT explosion frame 2	34
TNT explosion frame 3	35
Airplane 1	36
Airplane 2	37
Tractor 1 st ½	38
Tractor 2 nd ½	39
Soccer	40
Volleyball	41
Running	42
Hockey	43

Graphic Character	Code
Swimming	44
Golf	45
Skating	46
Boxing	47
Weight lifting	48
Handicapped symbol	49
Lamp	50
Medical	51
Computer	52
Coffee mug	53
Basketball	54
Football	55
Flower	56
Baseball	57
Birth day cake	58
Block "O"	59
Train engine 1 st ½	60
Train engine 2 nd ½	61
Train car 1 st ½	62
Train car 2 nd ½	63
Man	64
Woman	65
Alpha	66
Beta	67
Gamma	68
Delta	69
Epsilon	70
Zeta	71
Theta	72
Kappa	73
Lambda	74
Pi	75
Sigma	76
Tau	77
Upsilon	78
Phi	79
Chi	80
Psi	81
Xi	82
Iota	83
Eta	84
Omicron	85

6.3.5 Double Width Text Toggle [^L]

The EL-2800 display supports double width text in messages. The Double Width Toggle enhancement can be used to toggle into and out of double width text mode within a message. To display the word “LARGE” in double width characters, use the flowing syntax:

CTRL L	L	A	R	G	E
0Ch	4Ch	41h	52h	47h	45h

6.3.6 Scroll Off [^M]

Use this text enhancement in scrolling messages to make the last character of a message scroll clear off of the display. Note: this enhancement should only be used in messages that are long enough to make the display scroll. To make the text “Scroll” scroll off of the display, use the following syntax:

S	c	r	o	l	l	CTRL M
53h	63h	72h	6Fh	6Ch	6Ch	0Dh

6.3.7 Scroll Pause [^P][n]

Use this text enhancement to pause the scrolling of a scrolling message.. A Pause Option of “1” is the longest, and a Pause Option of “9” is the shortest. To make the text “Scroll” pause for a short time, use the following syntax:

S	c	r	o	l	l	CTRL P	9
53h	63h	72h	6Fh	6Ch	6Ch	10h	39h

6.3.8 Random On / Off [^R][n]

Use this text enhancement to make the text of a message appear or disappear using a random column algorithm. A Random Option of “1” makes the message text randomly appear, and a Random Option of “0” makes the message text randomly disappear. To make the text “Random” randomly appear on the display, use the following syntax:

CTRL R	1	R	a	n	d	o	l
12h	31h	52h	61h	6Eh	64h	6Fh	6Dh

6.3.9 Wipe Off [^W]

Use this text enhancement to make the text of a message disappear using a vertical wiping algorithm. To make the text “Wipe” wipe off of the display, use the following syntax:

CTRL W	W	i	p	e
17h	57h	69h	71h	65h

6.3.10 Line Control [^Z][n]

The EL-2800 display supports one line of large font, and two lines of small font. A line control option of “0” selects the default large font, a line control option of “1” selects the top small font line, and a line control option of “2” selects the bottom small font line. To display the letter “A” in the large font, the letter “B” on the small font top line, and the letter “C” on the bottom small font line, use the following syntax:

CTRL Z	0	A	CTRL Z	1	B	CTRL Z	2	C
1Ah	30h	41h	1Ah	31h	42h	1Ah	32	43h

7.0 Operation Via Parallel Communications

The wiring connections for the parallel port are at TB1 on the Parallel Interface Adapter. (KT-2686-005) There are four terminals on TB1 for MODE SELECT. The condition of the MODE SELECT bits determines the command that is to be executed. There are 16 commands that can be executed from the parallel port of the EL-2800. Some of the commands require a strobe pulse on one of the STROBE inputs and some commands do not require a strobe pulse. Some of the commands require that data be on the data pins of TB1 and some commands do not require data in order for the command to be carried out. The following table shows the bit pattern combinations of the MODE SELECT bits, the name of the command, and whether a strobe is required or not.

B4	B3	B2	B1	STROBE	FUNCTION-STANDARD LOGIC
0	0	0	0	YES	RECALL MESSAGE IN BINARY
0	0	0	1	YES	RECALL MESSAGE IN BCD
0	0	1	0	YES	READ SUCCESSIVE ASCII CODES
0	0	1	1	NO*	BCD MESSAGE RECALL
0	1	0	0	NO*	BINARY MESSAGE RECALL
0	1	0	1	YES	INSERT VARIABLE DATA-BINARY
0	1	1	0	YES	INSERT VARIABLE DATA-BCD
0	1	1	1	YES	INSERT VARIABLE DATA-ASCII
1	0	0	0	YES	END OF VARIABLE DATA STRING
1	0	0	1	NO*	ENABLE QUEUING MODE
1	0	1	0	NO*	DISABLE QUEUING MODE
1	0	1	1	NO*	CLEAR DISPLAY
1	1	0	0	NO*	NOT USED
1	1	0	1	NO*	NOT USED
1	1	1	0	NO*	NOT USED
1	1	1	1	NO*	NOT USED

* REQUIRES MODE SELECT & DATA BITS STABLE FOR 500ms

There are twelve terminals on TB1 for DATA input to the parallel port. These 12 bits are grouped together in various ways depending on the nature of the command that is being generated by the MODE SELECT bits. If the command being generated requires BCD data, then the 12 DATA bits represent the 3 BCD digits for the command. If the command being generated requires binary data, then only 10 bits are used and they represent the binary number required. If the command being generated requires ASCII characters, then only 8 bits are required and they represent an ASCII character. The wiring label on the EL-2800 indicates the three data representations. Before attempting to operate the EL-

2800 from the parallel port, it is important that the set-up as described in SECTION 4.5 be followed and that the operator have a thorough understanding of the commands for the parallel port operation.

First, determine if the logic of the device that is sending the parallel information is POSITIVE LOGIC or NEGATIVE LOGIC. POSITIVE LOGIC means that a logic 1 is a Voltage Input and a logic 0 is Ground. NEGATIVE LOGIC means that a logic 1 is Ground and a logic 0 is a Voltage Input. Set switch 1 of the dip-switch to the appropriate position as shown on the label inside the EL-2800.

Second, determine if the device that is sending the parallel information will be sending +24 VDC, +12 VDC, or +5 VDC parallel signals. The EL-2800 can supply any of these voltages to the transmitting device, but there is a limitation of 1 AMP of current, so the application of this supply voltage must be limited to sending parallel data to the EL-2800 only. Set the jumper for the correct voltage.

Third, determine if the device that is sending the parallel information is a CURRENT SOURCING device or a CURRENT SINKING device. A CURRENT SOURCING device is one which switches a voltage ON at each output point and causes current to flow through the device to be operated to a common ground point for the system. A CURRENT SINKING device is one which switches the ground connection of each device ON. Set the jumper for the SOURCE INPUTS or SINK INPUTS to the correct position for the output device.

Each of the commands are discussed in the sections that follow. The first group of commands to be described are those that require a strobe input. The second group of commands to be described are those that don't require a strobe input.

For the commands which require no strobe, the user must insure that no strobe occurs on a strobe line from the time that this command is initiated until the 0.5 second time period has elapsed. During this time, the EL-2800 detects that a change has been made in the configuration of the MODE SELECT bits and determines that this is a valid command. If a strobe appears during this time, the command will be ignored.

The EL-2800 can be operated completely from the parallel port in a manner identical to the way it is operated by the serial data port. This requires that the MODE SELECT bits be put in the READ SUCCESSIVE ASCII CODES mode for each character that is sent to the EL-2800, and that each character be strobed. In this mode, text may be entered, messages stored, messages recalled, etc.

7.1 Strobed Commands

All of the commands in section 7.1 require a strobe input. If the strobe input of the parallel port is not connected to an output device, these commands can not be executed.

7.1.1 Recall Message in Binary [0000]

This command requires the MODE SELECT bits, the DATA bits, and a strobe pulse. The strobe is a normally high signal and should be brought low for 100ms then brought high again to create one strobe pulse. The parallel data that is being strobed in should be applied to the inputs first, then pulse the strobe input.

To Recall a Message (Example: Message Number 129) in BINARY from the parallel port, change the four MODE SELECT bits and the twelve DATA bits simultaneously to the following configuration and then apply a strobe pulse:

Data Bits												Mode Select Bits			
B16	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
N/A	N/A	512	256	128	64	32	16	8	4	2	1	8	4	2	1
0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0

7.1.2 Recall Message in BCD [0001]

This command requires the MODE SELECT bits, the DATA bits, and a strobe pulse. The strobe input is a normally high signal and should be brought low for 100ms then brought high again to create one strobe pulse. The parallel data that is being strobed in should be applied to the inputs first, then pulse the strobe input.

To Recall a Message (Example: Message Number 129) in BCD from the parallel port, change the four MODE SELECT bits and the twelve DATA bits simultaneously to the following configuration and then apply a strobe pulse:

Data Bits												Mode Select Bits			
B16	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
800	400	200	100	80	40	20	10	8	4	2	1	8	4	2	1
0	0	0	1	0	0	1	0	1	0	0	1	0	0	0	1

7.1.3 Read Successive ASCII [0010]

This command requires the MODE SELECT bits, the 8 DATA bits, and a strobe pulse. The strobe input is a normally high signal and should be brought low for 100ms then brought high again to create one strobe pulse. The parallel data that is being strobed in should be applied to the inputs first, then pulse the strobe input.

This Mode simply reads parallel ASCII characters one after the other. Apply the ASCII code and the mode of two and strobe the data in. This is a parallel way of communicating to the EL-2800 just as described in the serial data commands in the previous part of this manual. An example of strobing in a character 'Z' is shown below.

Data Bits												Mode Select Bits			
B16	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
128	64	32	16	8	4	2	1	N/A	N/A	N/A	N/A	8	4	2	1
0	1	0	1	1	0	1	0	0	0	0	0	0	0	1	0

7.1.4 Insert Variable Data Binary [0101]

This command requires the MODE SELECT bits, the DATA bits, and a strobe pulse. This command is used to fill insert data locations. This command requires four steps, each of which are strobed separately. First, strobe in the mode 5 with the BINARY data that is to be inserted within the message. The example below will store '456' into data location 009.

Data Bits												Mode Select Bits			
B16	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
N/A	N/A	512	256	128	64	32	16	8	4	2	1	8	4	2	1
0	0	0	1	1	1	0	0	1	0	0	0	0	1	0	1

The above step can be repeated up to 5 times which gives three digits with each strobe. The RAM variable data fields are 16 characters wide. One strobe will give three digits; 012 will be displayed in just that way. After all of the data has been strobed in, the next step is to indicate that the data is finished. This is done by sending the End of Variable Data String command with no data, see below.

Data Bits												Mode Select Bits			
B16	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
N/A	N/A	512	256	128	64	32	16	8	4	2	1	8	4	2	1
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

The next step is to strobe in the RAM data location in which to store the data. In BINARY, apply the location number and the Insert Variable Data BCD mode.

Data Bits												Mode Select Bits			
B16	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
N/A	N/A	512	256	128	64	32	16	8	4	2	1	8	4	2	1
0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	1

The final step is to strobe in an End of Variable Data String command, just as in the second step. This concludes the store sequence.

Data Bits												Mode Select Bits			
B16	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
N/A	N/A	512	256	128	64	32	16	8	4	2	1	8	4	2	1
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

7.1.5 Insert Variable Data BCD [0110]

This command requires the MODE SELECT bits, the DATA bits, and a strobe pulse. This command is used to fill insert data locations. This command requires four steps, each of which are strobed separately. First, strobe in the mode 6 with the BCD data that is to be inserted within the message. The example below will store '123' into data location 005.

Data Bits												Mode Select Bits			
B16	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
800	400	200	100	80	40	20	10	8	4	2	1	8	4	2	1
0	0	0	1	0	0	1	0	0	0	1	1	0	1	1	0

The above step can be repeated up to 5 times which gives three BCD digits with each strobe. The RAM variable data fields are 16 characters wide. One strobe will give three digits; BCD 012 will be displayed in just that way. After all of the data has been strobed in, the next step is to indicate that the data is finished. This is done by sending the End of Variable Data String command with no data, see below.

Data Bits												Mode Select Bits			
B16	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
800	400	200	100	80	40	20	10	8	4	2	1	8	4	2	1
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

The next step is to strobe in the RAM data location in which to store the data. In BCD, apply the location number and the Insert Variable Data BCD mode.

Data Bits												Mode Select Bits			
B16	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
800	400	200	100	80	40	20	10	8	4	2	1	8	4	2	1
0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0

The final step is to strobe in an End of Variable Data String command, just as in the second step. This concludes the store sequence.

Data Bits												Mode Select Bits			
B16	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
800	400	200	100	80	40	20	10	8	4	2	1	8	4	2	1
0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0

7.1.6 Insert Variable Data ASCII [0111]

This command requires the MODE SELECT bits, the DATA bits, and a strobe pulse. This command is used to fill insert data locations. This command requires four steps, each of which are strobed separately. First, strobe in the mode 7 with the ASCII data that is to be inserted within the message. The example below will store 'A' into data location 002.

Data Bits												Mode Select Bits			
B16	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
128	64	32	16	8	4	2	1	N/A	N/A	N/A	N/A	8	4	2	1
0	1	0	0	0	0	0	1	0	0	0	0	0	1	1	1

The above step can be repeated up to 16 times which gives one character with each strobe. The RAM variable data fields are 16 characters wide. After all of the data has been strobed in, the next step is to indicate that the data is finished. This is done by sending the End of Variable Data String command with no data, see below.

Data Bits												Mode Select Bits			
B16	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
128	64	32	16	8	4	2	1	N/A	N/A	N/A	N/A	8	4	2	1
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

The next step is to strobe in the RAM data location in which to store the data. In ASCII, apply the location number and the Insert Variable Data ASCII mode. Since the location numbers are always three digits, this step must be repeated three times (once per number) to give a three digit number.

Data Bits												Mode Select Bits			
B16	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
128	64	32	16	8	4	2	1	N/A	N/A	N/A	N/A	8	4	2	1
0	0	1	1	0	0	0	0	0	0	0	0	0	1	1	1

Data Bits												Mode Select Bits			
B16	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
128	64	32	16	8	4	2	1	N/A	N/A	N/A	N/A	8	4	2	1
0	0	1	1	0	0	0	0	0	0	0	0	0	1	1	1

Data Bits												Mode Select Bits			
B16	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
128	64	32	16	8	4	2	1	N/A	N/A	N/A	N/A	8	4	2	1
0	0	1	1	0	0	1	0	0	0	0	0	0	1	1	1

The final step is to strobe in an End of Variable Data String command, just as in the second step. This concludes the store sequence.

Data Bits												Mode Select Bits			
B16	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
128	64	32	16	8	4	2	1	N/A	N/A	N/A	N/A	8	4	2	1
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

7.2 Non-Strobed Commands

All of the commands in section 7.2 do not require a strobe input. These command may be use in all installations.

7.2.1 Recall Message in BCD [0011]

This command requires both the MODE SELECT bits and DATA bits, but no strobe. The user must insure that no strobe occurs on a strobe input from the time that this command is initiated until the 0.5 second time period has elapsed. During this time, the EL-2800 detects that a change has been made in the configuration of the MODE SELECT bits and determines that this is a valid command. If a strobe appears during this time, the command will be ignored.

To Recall a Message (Example: Message Number 129) in BCD from the parallel port, change the four MODE SELECT bits and the twelve DATA bits simultaneously to the following configuration and retain this setting for 0.5 seconds without a strobe:

Data Bits												Mode Select Bits			
B16	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
800	400	200	100	80	40	20	10	8	4	2	1	8	4	2	1
0	0	0	1	0	0	1	0	1	0	0	1	0	0	1	1

7.2.2 Recall Message in Binary [0100]

This command requires both the MODE SELECT bits and DATA bits, but no strobe. The user must insure that no strobe occurs until the 0.5 second time period has elapsed. During this time, the EL-2800 detects that a change has been made in the configuration of the MODE SELECT bits and determines that this is a valid command. If a strobe appears during this time, the command will be ignored.

To Recall a Message (Example: Message Number 129) in BINARY from the parallel port, change the four MODE SELECT bits and the twelve DATA bits simultaneously to the following configuration and retain this setting for 0.5 seconds without a strobe:

Data Bits												Mode Select Bits			
B16	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
N/A	N/A	512	256	128	64	32	16	8	4	2	1	8	4	2	1
0	0	0	0	1	0	0	0	0	0	0	1	0	1	0	0

7.2.3 Enable Queuing Mode [1001]

This command only requires the MODE SELECT bits of the parallel port. The data bits are ignored. The user must insure that no strobe occurs until the 0.5 second time period has elapsed. During this time, the EL-2800 detects that a change has been made in the configuration of the MODE SELECT bits and determines that this is a valid command. If a strobe appears during this time, the command will be ignored.

To Enable the Queue from the parallel port, change the four MODE SELECT bits simultaneously to the following configuration and retain this setting for 0.5 seconds without a strobe:

Data Bits												Mode Select Bits			
B16	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8	4	2	1
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1

7.2.4 Disable Queuing Mode [1010]

This command only requires the MODE SELECT bits of the parallel port. The data bits are ignored. The user must insure that no strobe occurs until the 0.5 second time period has elapsed. During this time, the EL-2800 detects that a change has been made in the configuration of the MODE SELECT bits and determines that this is a valid command. If a strobe appears during this time, the command will be ignored.

To Disable the Queue from the parallel port, change the four MODE SELECT bits simultaneously to the following configuration and retain this setting for 0.5 seconds without a strobe:

Data Bits												Mode Select Bits			
B16	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8	4	2	1
0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0

7.2.5 Clear Display [1011]

This command only requires the MODE SELECT bits of the parallel port. The data bits are ignored. The user must insure that no strobe occurs until the 0.5 second time period has elapsed. During this time, the EL-2800 detects that a change has been made in the configuration of the MODE SELECT bits and determines that this is a valid command. If a strobe appears during this time, the command will be ignored.

To Clear the Display and Message Queue from the parallel port, change the four MODE SELECT bits simultaneously to the following configuration and retain this setting for 0.5 seconds without a strobe:

Data Bits												Mode Select Bits			
B16	B15	B14	B13	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8	4	2	1
0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1

8.0 PC Utility Software

Utility software for setting up and managing ALI signs is available from American LED-gible by mail or download from our Web Site at:

<http://users.aol.com/ledgible/www/main.htm>.

Most of the ALI utility software is considered public domain, and can be freely copied and distributed throughout your company.

8.1 Magic Message Generator II

The Magic Message Generator program has been the standard utility software for managing ALI signs for over eight years. It is heavily used in house at ALI and supports every standard sign ALI has produced in that time period.

The current version of Magic features user friendly features such as:

- 1) Pull down menus with a description on screen.
- 2) Connection to signs via Data Highway network.
- 3) Video Support --> MDA through VGA.
- 4) New Message Editor. (Inserting in the middle is now supported)

Magic Message Generator II, Rev. J, can be downloaded from our Web site, or give us a call, and we will mail it to you absolutely free.

9.0 Problem Solving

Before contacting ALI for technical support, please verify the following:

- 1) BAUD RATE, The baud of the sign must be identical to the controlling device.
- 2) ADDRESS, The correct address is embedded in the serial ASCII string.
- 3) SELF TEST, The power on test performed properly.
- 4) WIRING, Review the sections on electrical installation.

9.1 Getting Technical Support by Phone or Fax

If you need technical assistance, contact us by phone or fax and please have the following information available:

- 1) Customer Name, Address, Phone, Fax.
- 2) Model number.
- 3) Serial number.
- 4) Description of the problem.

The serial number and model number of the display can be located on the right hand side of the marquee. It is imprinted on a SILVER ID TAG.

American LED-gible Inc. (614) 851-1100	
PRODUCT	July 11, 1998
MODEL NO.	EL-2800-322
SERIAL NO.	SO-4498-001

American LED-gible technical support may be reach at:

Phone: (614) 851-1100

Fax: (614) 851-1121

10.0 Spare Parts

AB-2466-001	LED Display Board, Normal Brightness Red LED's
AB-2476-010	Standard Microprocessor Board
PS-2596-105	Standard 5VDC 8Amp Switching Power Supply

11.0 Limited Warranty

We warrant to you that your AMERICAN LED-gible BRAND DISPLAY, when purchased by you, will be free from defects in material and workmanship, under normal use, for one year from date of delivery. If your LED-GIBLE BRAND DISPLAY should prove to be defective within the warranty period, we will repair it (or, if we think necessary, replace it) without charge to you.

To obtain service, please call our Customer Service Department at 1-614-851-1100 or write to:

AMERICAN LED-gible Inc.
1776 LONE EAGLE STREET
COLUMBUS, OHIO 43228

We will furnish you with complete packing and shipping instructions. This warranty covers merchandise returned to American LED-gible for repair, not in plant repairs. Should you need an in plant repair at your facility, American LED-gible will schedule a trip. Rates are \$500 per day, plus travel expenses.

ALI shall have the right of final determination as to the existence and cause of the defect. This warranty expressly excludes any defects or damages caused by accessories, replacement parts, or repair service, other than those which have been authorized by ALI. This warranty does not cover any damage caused by accident, misuse, shipment, or other than ordinary use.

This warranty excludes all incidental or consequential damages. Some states do not allow the exclusion of, or limitation of, incidental or consequential damages, so the foregoing exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state. This warranty is in lieu of any other warranty, express, written, implied, or statutory, and no agreement extending or modifying it will be binding upon ALI, unless in writing and signed by duly authorized officer.

If your AMERICAN LED-gible DISPLAY is outside the warranty period, please call our Customer Service Department as above. After you return the unit to American LED-gible, we will estimate the repair charges, and contact you so a purchase order can be issued. Again, should you require in-house repair of your displays, ALI charges \$500 per day, plus travel expenses. Please make sure to call, so a trip can be scheduled if this option is preferred.

LIMITATION OF LIABILITY:

If this product is not in good working order as warranted above, your sole remedy shall be repair or replacement as provided above. In no event will ALI be liable for special, indirect, or consequential damages, or any damages whatsoever resulting from loss of use, data, or profits arising out of, or in connection with this contract or the use or performance of ALI products, whether in an action of contract or tort, including negligence. ALI's liability for damage to property shall be limited to the cost of the product sold to the buyer.