Value Series PEL System
High Resolution
STAND-ALONE
Ink Jet Printer

User's Manual
Revision C

SYSTEM SPECIFICATIONS

CONTROLLER/INK DELIVERY SYSTEM

Microprocessor:	32-bit CMOS 68332
Input Device:	Value Series keypad or PC
Communication Ports:	Primary RS-232, Auxiliary RS-232/RS-485
Peripheral Ports:	Two product detect, two shaft encoder, external alarm
Software (stand alone):	Real time clock, Julian/Gregorian date, item count, pallet/batch count, expiration date, inverted printing
Message Storage (stand alone):	Battery-backed RAM
Multi-font:	5-dot to 32-dot high, upper/lower case, bold, condensed, slant
Cabinet:	Industrial-type enclosure
Diagnostics:	LED indicators for photocell signal, printhead voltages, input device, low ink
Field Upgrade:	Drop-in boards for on-site upgrades
Electrical:	110V-115V 3A max. or 220V-240V 1.5A max.
Temperature:	50°-95°F (10°-35°C)
Humidity:	10-90% RH (non-condensing)
Ink Capacity:	250 ML Bag in a Box
Distance from Printheads:	2' Maximum between the Controller and the printhead.
Options:	Variable-speed encoder; low ink beacon

VALUE SERIES PRINTHEAD

Print Speed:	Up to 250 fpm for text and graphics; Up to 150 fpm for bar codes
Print Resolution:	96, 192 or 256 dots per vertical inch with 32 addressable channels/pixels
Print Lines:	One to five lines (alphanumeric text) and/or one bar code with human-readable interpretation
Fonts/Styles:	1/8" to 2" (printhead dependent); 5-dot to 32-dot tall characters; Upper/lower case, bold condensed, slanted
Bar Codes:	Interleaved 2 of 5, Code 39, Code 128, EAN-13, UCC/EAN-128, SCC-14, SSCC-18, UPC-A, UPC-E
Printhead Mounting:	Mount printhead horizontally; vertically mounting requires a Modular PEL printhead
Ink Throw:	Up to 1/8" (62 mm) from substrate
Ink Type:	Glycol based for porous surfaces
Ink Colors:	Black, Blue, Red

TABLE OF CONTENTS

1 • INSTALLATION

INTRODUCTION

Using This Manual

This manual details the capabilities of the Value Series PEL System. Follow this manual from the beginning and you will learn how to install, setup, program, operate and properly maintain your Value Series PEL System.

INSTALLATION

Successful operation of the Diagraph Value Series PEL system depends on a successful installation. Read this section of the manual before beginning your installation. In addition, review the system drawing on the following page for installation of your Value Series PEL system.

Unpacking

- Controller
- Printhead/Ink Supply Assembly
- Power Cord
- User's Manual
- Controller Bracketry Kit
- Printhead/Ink System Assembly Bracketry Kit
- Photocell

Tools Needed

1/2" wrench	5/64" Allen wrench
5/32" Allen wrench	1/2" socket
1/8" Allen wrench	5/16" drill

Drill six 5/16" holes in the conveyor before installing the bracketry.

NOTE: Before mounting a printhead, review the internal cable connection drawing (Section 2, Figure 2-A).

The maximum distance between the Controller and the printhead is 2 feet.

4 PLACES
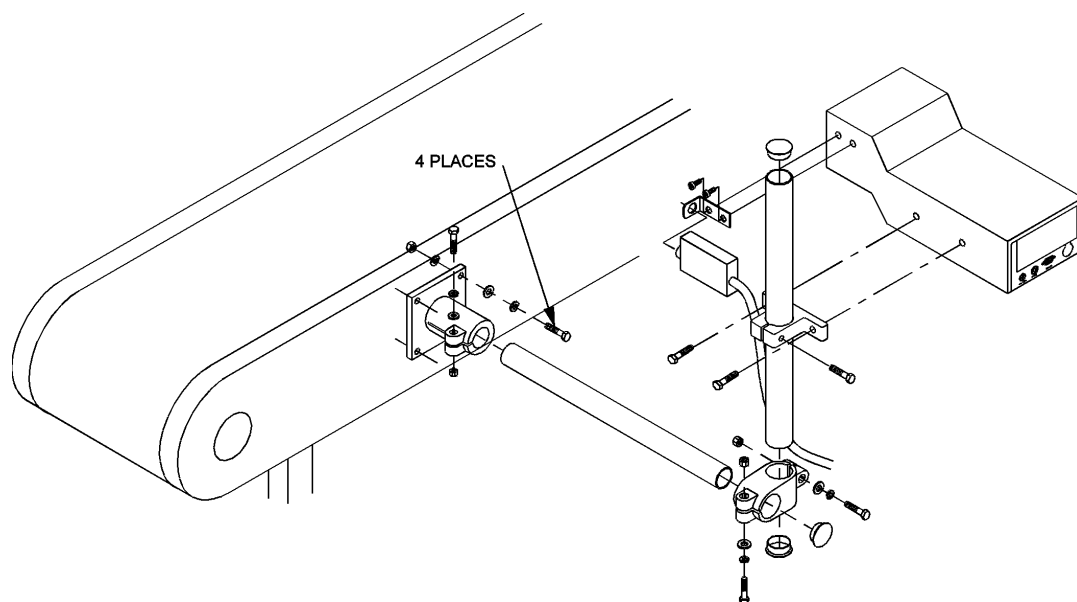
Figure 1-A Mounting of Printhead and Bracketry

4 PLACES
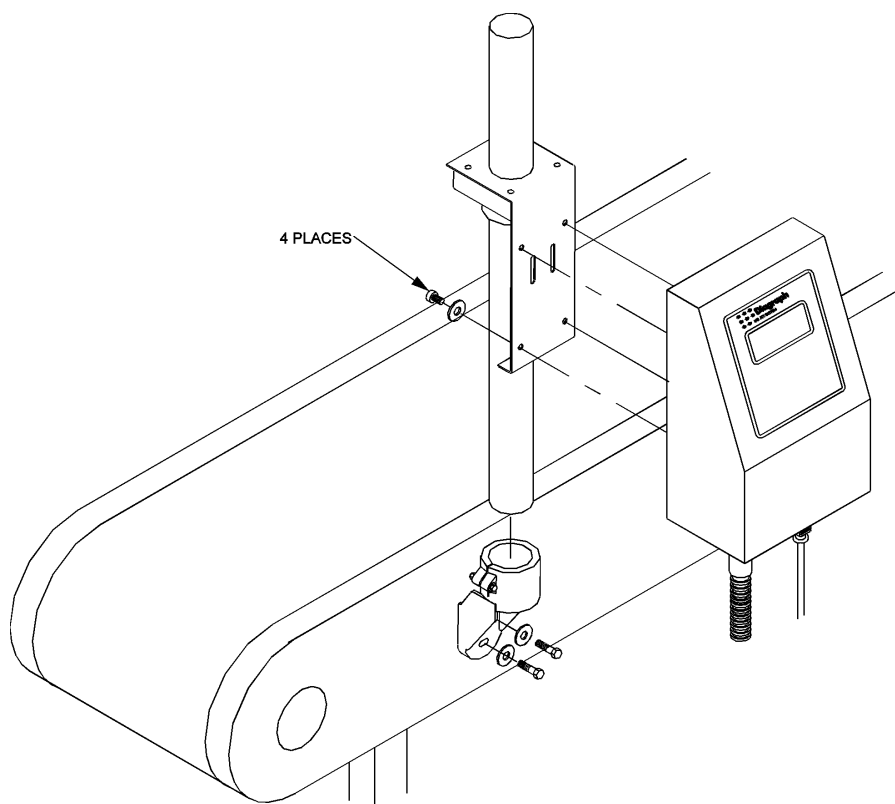
Figure 1-B Mounting of Controller Bracketry
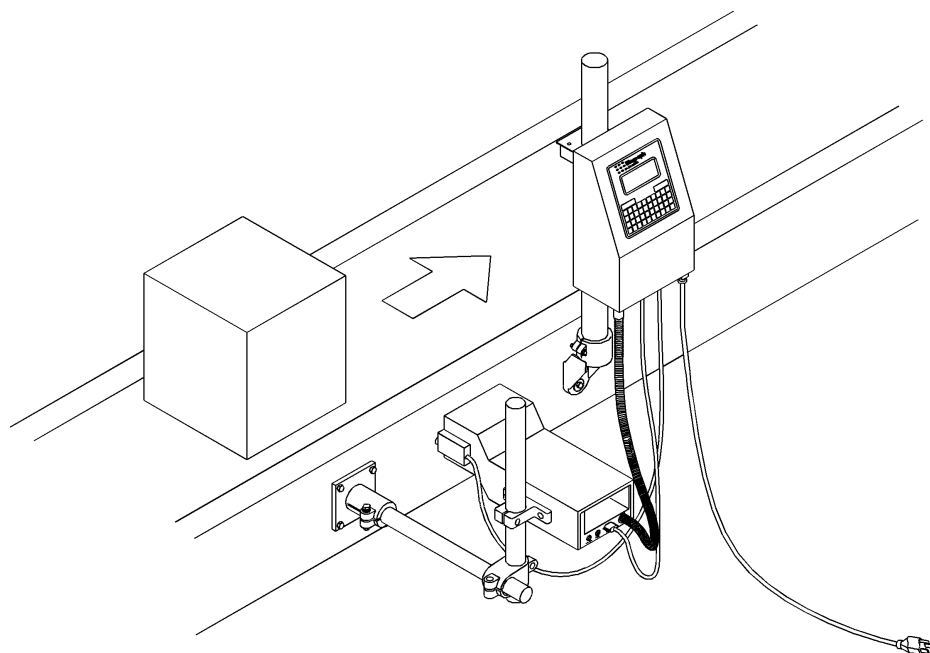
Figure 1-C Overall View of System

INK INLET
TUBE

NOZZLE
SHIPPING
CAP

VENT CAP

CHECK VALVE
FOR INK RESERVOIR
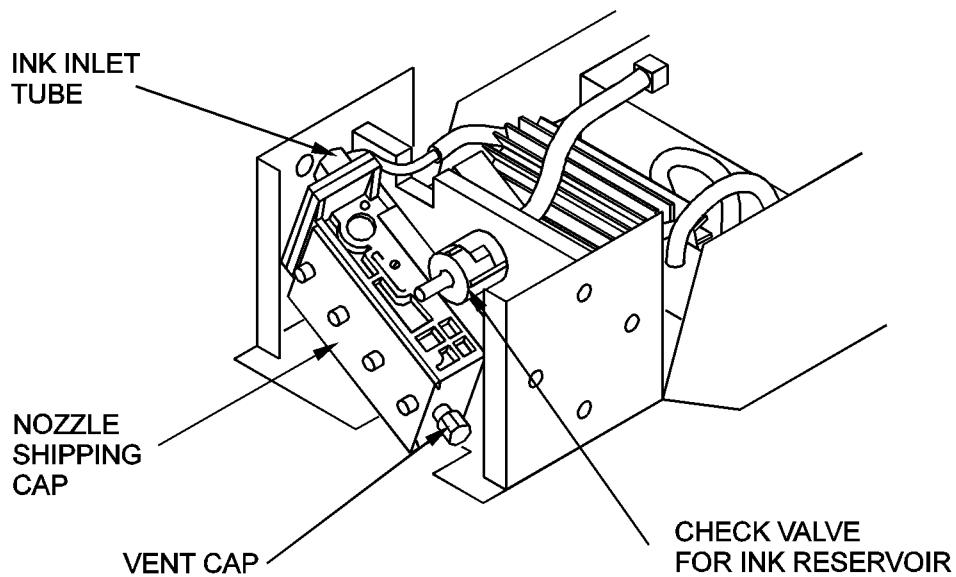
Figure 1-D Nozzle Shipping Cap

2 • CONNECTIONS

All external connections are made through ports located on the bottom panel of the Controller.
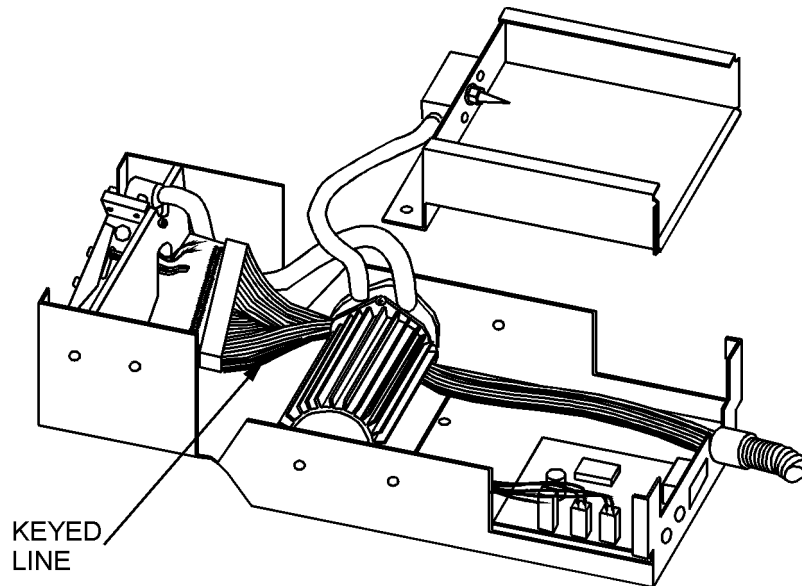
Figure 2-A   Internal Printhead Cable Connections

Carefully install the umbilical cable. Incorrect cable installation will result in damage to the equipment.

CONTROLLER CONNECTIONS
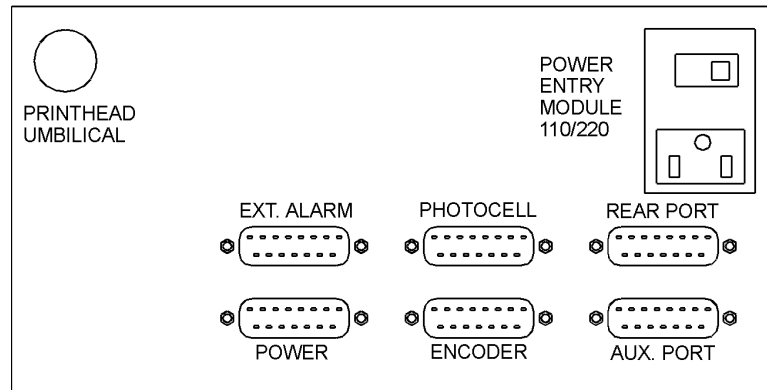
Figure 2-B Rear View of Controller

PRINTHEAD CONNECTIONS
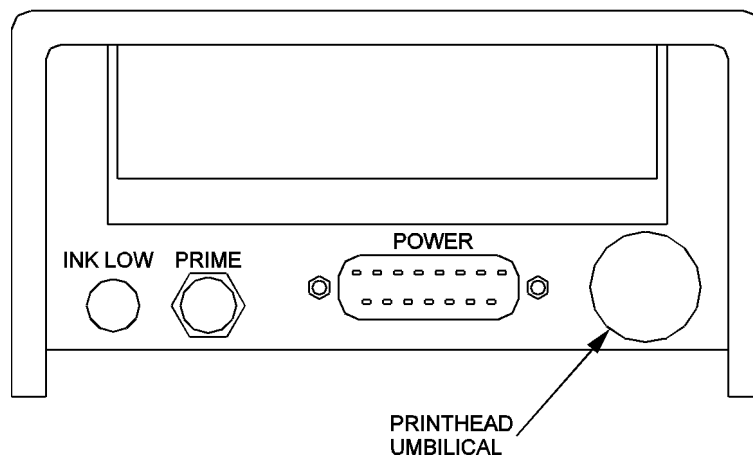
Figure 2-C Rear View of the Printhead

APPLICATION NOTES:

1. Refer to Appendix A for External Alarm and Encoder options.
2. Refer to Appendix C for Rear Port and Aux. Port functions.
3. Use a well-grounded, dedicated line with a 120 volt, or 220 volt outlet.

⚠ Before plugging in the power cord, make sure that the power switch, located on the Power Entry Module, is in the OFF position (Press the 0 on the ON/OFF switch).

THIS DISTANCE MUST NOT BE GREATER THAN 2 FEET.
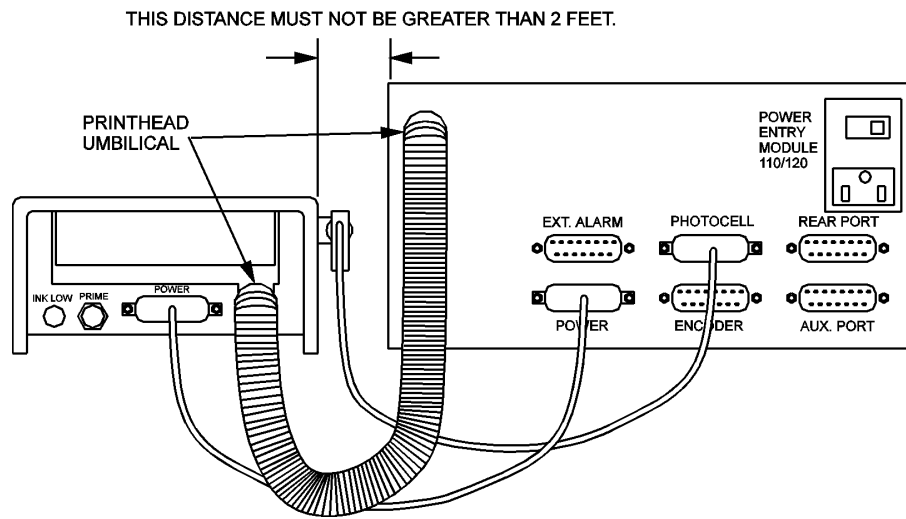
Figure 2-D External Cable Connections

APPLICATION NOTES:

1. Mount the photosensor to the same side of the printhead as the direction of product movement.

2. Both the Controller and printhead housings are industrially strong but not watertight. Mount the equipment away from wash-down areas and be sure to cover during wash-downs.

> ⚠ The integrated printhead only prints when mounted horizontally. Do not use in applications that require a straight up or straight down position of the printhead. Modular PEL printheads are the solution for applications that require vertical mounting.

3. The maximum printhead throw distance is 0.125, or 1/8 inch. For best printing, mount the printhead no farther than 1/16 inch from the product.

4. Position the printhead to avoid collisions with moving products. Product handling is very important to the successful operation of this equipment. Large amounts of shock or vibration can cause print deterioration, or even damage to the printhead.

3 • OPERATING PROCEDURES

Be sure to complete all connections before operating the system. Follow the procedures outlined below to start the system.

START-UP
PROCEDURES

First Time Start-up: Remove nozzle shipping cap (refer to Figure 1-C).

1. Turn the power switch ON.

2. Turn ON the Controller power and wait 2 to 3 minutes for the printhead to reach operating temperature. When the printhead reaches operating temperature, the letter "A" disappears under the heating status line. Check the keyboard display for the screen shown below.

3. The ink status line (INK LOW) will show an "A" between the asterisks if ink is low.

Printhead A Heating	INK LOW * * HEATING*A * COMMAND (A):
Printhead A at Temperature	INK LOW * * HEATING* * COMMAND (A):

Note: The printhead cannot print until it reaches operating temperature.
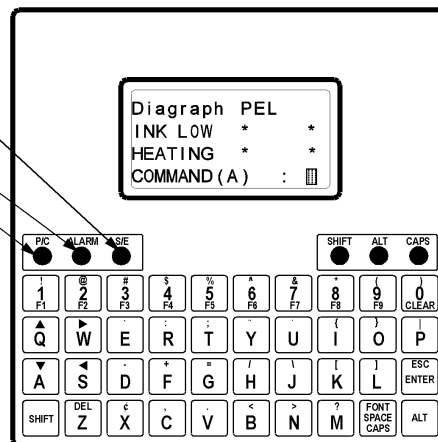
Figure 3-A Value Series Keyboard

4. Prime the printhead and use an absorbent cloth to clean the face plate (refer to Appendix E for priming procedures).

5. Type **TE**(ENTER) to run the Test command.

Pass a clean, light colored cloth, or paper, within a 1/4″ to a 1/2″ of the printhead to ensure that all 32 channels are operating. Prime the printhead until all 32 channels are printing. If this does not occur, refer to Section 6 Troubleshooting**.**

BE SURE TO PASS THE CARDBOARD
WITHIN 1/4" OF PRINTHEAD

COUNT 32 DOTS

PHOTOCELL LIGHT WILL
LIGHT WHEN IT SENSES
THE CARDBOARDS APPROACH
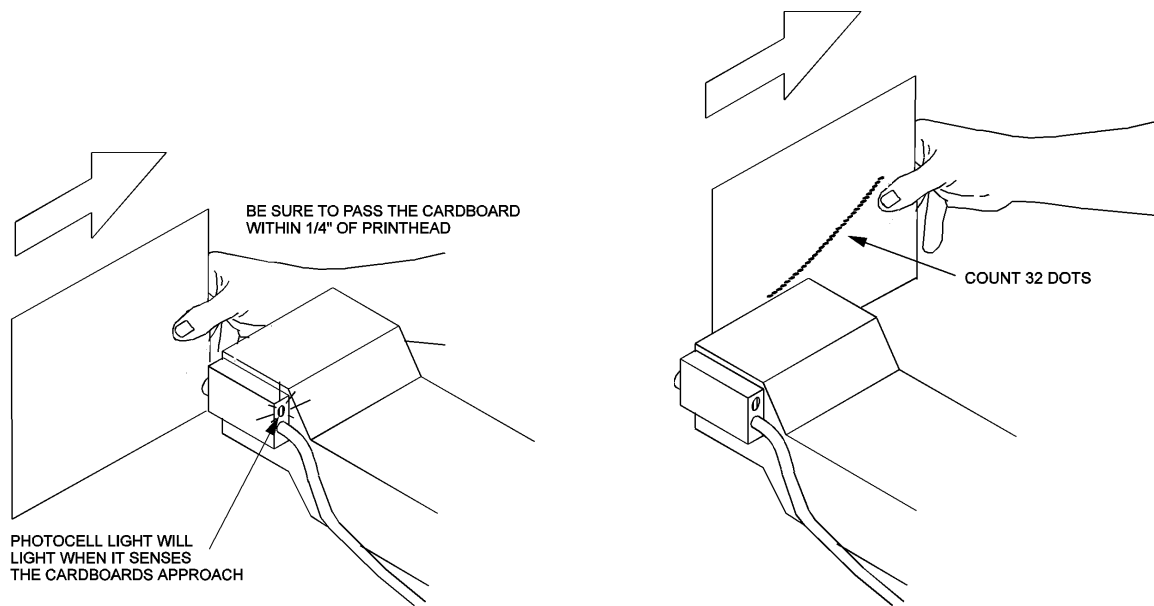
Figure 3-B Testing the Printhead

REPLACING THE INK CONTAINER

You can observe a low ink status via the host computer or the keyboard. Change the ink bottle or bag as soon you observe the low ink condition.

The illustration below shows the sharp-pointed cone inside the printhead that pierces the ink container and supplies ink to the printhead.
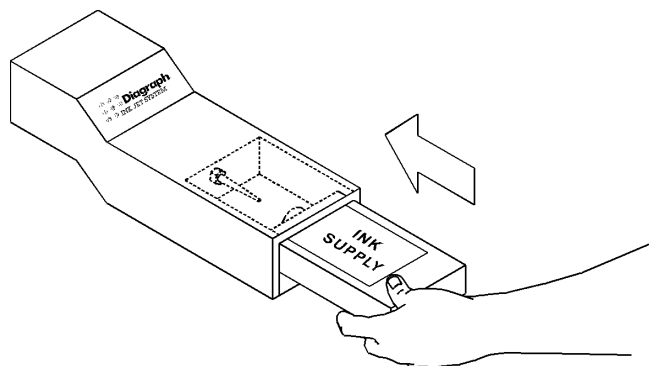
REPLACING THE INK FOR THE INTEGRATED PRINTHEAD

Wear suitable eye protection whenever handling ink.

1. Pull the ink box from the rear of the printhead enclosure. The supply end of the box might be wet with ink so take care in handling.

2. Dispose of the container in accordance with state and federal regulations regarding chemical waste products.

3. Slide in a new ink container with a smooth, firm motion. Insert the container with enough force to puncture the seal on the ink fitting but not so much pressure that you damage the box.

AVAILABLE INKS

PART NUMBER	DESCRIPTION	SIZE
5200-059	PEL Ink Black Porous	250 ML Bag
5200-062	PEL Ink Barcode Black Porous	250 ML Bag
5200-064	PEL Ink Blue Porous	250 ML Bag
5200-065	PEL Ink Red Porous	250 ML Bag

DAILY SHUT-DOWN PROCEDURE

1. Turn OFF the Controller power.

4 • CREATING A MESSAGE

In this section we will create a simple message to print.

1. At the Main Menu Command prompt type **ED** (ENTER). This command allows you to create and edit messages as well as select fonts.

2. Enter the message number and press (ENTER).

E	D	I	T		M	S	G			[	0	-	2	4	]
*	A	*										:		1	

___

M	S	G			0	1		L	1		F			5	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

- - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - -

> ? **Scroll down to display last two lines.**

3. Message 1 will print using Font 5.

4. To change the font, press <u>ALT</u> + <u>FONT</u> (ENTER).   The cursor moves to the top of the screen. Select the font number (see Appendix F for font samples). **NOTE:** Enter font number with a leading zero if the font is a single digit (for example, F05).
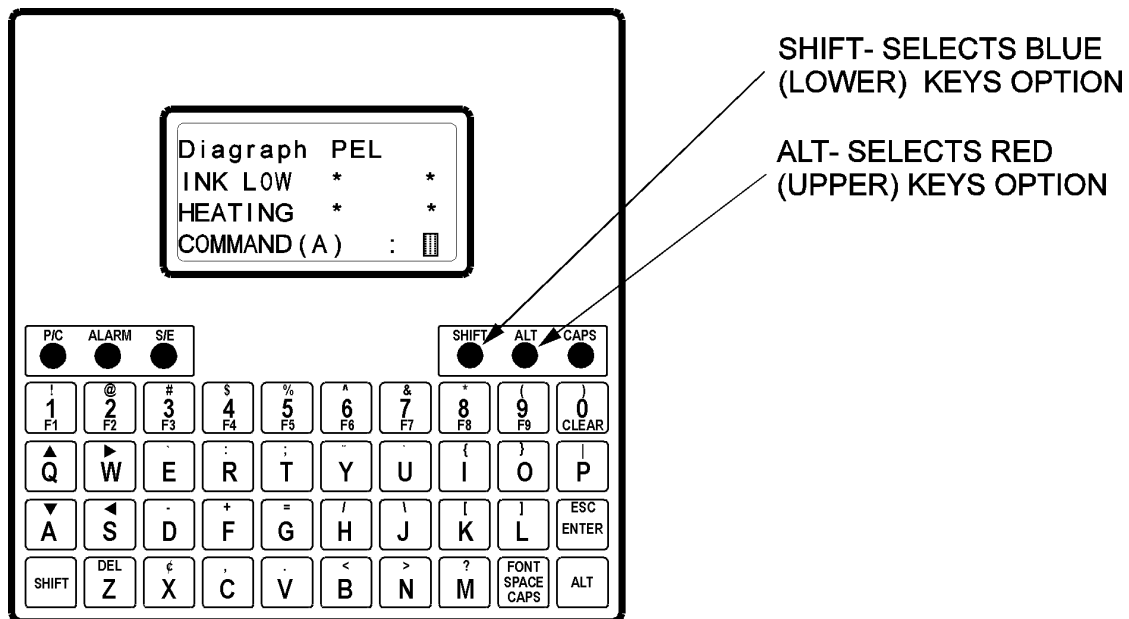
Figure 4-A Value Series Keyboard

5. Type your message. Use the <u>ALT</u> + down arrow to go to the next line.

M	S	G			0	1		L	1		F			5	
W	E	L	C	O	M	E		D	i	a	g	r	a	p	h
V	a	l	u	e		S	e	r	i	e	s				

- - - - - - - - - - - - - - -
- - - - - - - - - - - - - - -

6. After completing the message, press ⬭ENTER⬭. You will return to the Command/Status screen.

7. Type **SE** ⬭ENTER⬭ at the command prompt and select your message to print.

8. If your message does not print correctly, see Section 6, Troubleshooting.

Application Notes:

1. You can edit your message, or change fonts, while it is still printing.

2. Type **ED** (ENTER) and select the message number.

3. Make your changes at this time. Press (ENTER) when finished.

4. For example, to add a boldness level to the font, select Font and add a number from 1-9. The message below will now print using Font 5 with a boldness of 1.

M	S	G			0	1		L	1		F	1	0	5	
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

4.1 • CREATING A BAR CODE MESSAGE

1. At the Main Menu Command prompt type **ED** (ENTER).

2. Enter the message number and press (ENTER).

3. To select a bar code font, press ALT + FONT (ENTER). The cursor moves to the top of the screen. Select the bar code font number (see Appendix F for font samples).

4. Type your bar code data. It is important to be familiar with the parameters of the bar code symbology that you are using. For example, an I 2 of 5 bar code is numeric only. Use the ALT + down arrow to go to the next line.

5. Use the default values for the wide/narrow bar width and the wide/narrow space width. For special cases, see Appendix D for tables listing bar code symbology dimensions and magnifications.

6. After completing the message, press (ENTER). You will return to the Command/Status screen.

7. Type **SE** (ENTER) at the command prompt and select your message to print.

8. If your message does not print correctly, see Section 6, Troubleshooting.

M	S	G		0	2			L	1		F	2	9	2	
0	0	0	1	2	3	4	5	6	7	8	9	0			
7															
1															
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Wide Bar Width	k
Narrow Bar Width	k
Wide Space Width	k
Narrow Space Width	k

9. Message 2 will print an I 2 of 5 bar code with a boldness of 2 and the following parameters: wide bar width = 7, narrow bar width = 1, wide space width = 9 and the narrow space width = 4.

4.2 • CREATING A MESSAGE FOR A 2560 PRINTHEAD

Before printing with the 2560 printhead, there are specific system configuration requirements necessary:

- A 300 DPI encoder (part no. 6600-0603)
- Mount the 2560 printhead perpendicular to the motion of the substrate with the ink line going into the top of the printhead
- Mount the ink system 0.25" to 0.5" below the lowest printhead orifice.

After correctly configuring the hardware, several software parameter values must change. Below is a table of default settings for all printhead types.

PEL Controller Commands	2560 Printhead Parameters	1920/9600 Printhead Parameters
SLant	0	7
WIdth	1	2
OFfset	12	0
LEvel	Y	No Action Required
CUrve	34-13-18	No Action Required

NOTE: For the 2560 printhead, if the Slant value is not set to 0, the Offset value is ignored. Use the Offset command to adjust the print image to conform with the odd and even channels of the printhead.

4.2.1 • I 2 OF 5 BAR CODE SPECIFICATIONS FOR 2560 PRINTHEAD

The 2560 printhead can print various bar code magnifications but will default to a 62.5% magnification. For different magnifications, enter the default element widths after saving the message. The Bold setting in bar code messages only affects the human readable text.

Command	Magnification			
	62.5%	**70%**	**80%**	**100%**
Long Bar	20	22	24	32
Wide Bar	8	18	22	26
Narrow Bar	2	5	7	9
Wide Space	10	20	24	28
Narrow Space	4	8	10	11
Bold (human readable text only)	5	7	8	9

5 • PROGRAMMING

The Controller keyboard or, a host computer controls the Value Series PEL System Ink Jet Printer via the rear port. The Controller keyboard provides menus for setting up and installing the system and enables you to enter data.

The design of the rear communications port on the Controller allows speedy data transfer therefore, the control commands are concise with no prompts.

COMMAND SUMMARY

Below is a list of commands used by the Controller keyboard and the rear COM port. Enter each command with the first two letters of the command.

Command	Description	Command	Description
ACk	Acknowledgment	**BA**ud Rate	Selects the Baud Rate for the Rear Port
BOld	Sets the width of the printed characters	**CA**ll/**SA**ve	Both commands save specific command information to one file
CLear Map	Clears input and print buffers	**CO**unters	Indicates the number of print cycles
CUrve	Enabled only if Level=Y	**DA**te	Sets or displays the current date
DElay	Controls print location	**DI**splay	Display
DOwnload	Download logo	**ED**it	Allows message entry and control
ENcoder	Specifies the use of a variable-speed encoder	**EX**piration Date	Allows setup for expiration date
GAp	Sets the spacing between characters	**IN**vert	Turns message upside down
ID	Identification in a Network Application*	**LE**vel	Enables/disables CU command
Label **R**equest	Label request	**L**abel **S**ave	Saves label
LOng Bar	Sets the height of bar codes	**NE**twork	Selects the Network Mode*
NUmbers	Setup of product count routines	**OF**fset	Print timing of 1.9" Printhead
POsition	Adjusts vertical position of a message	**RE**verse	Reverses the message
ROllover	Allows setup of printing auto shift codes	**SE**lect	Selects the messages to print
SHift Set	Allows setup of three different auto shifts	**SI**gn in	Log on to system
SLant	Adjusts the angle of the printed message	**SM**all Bar	Sets height of the small bar of bar codes

Command	Description	Command	Description
Sign **O**ut	Log off the system	**ST**atus	Displays the status of the printer
TEst	Test prints all 32 channels	**TI**me	Sets or displays the current time
TRigger Edge	Polarity of the product detect signal	**VE**rify	Verify
VIbrate		**WI**dth	Controls the printing resolution
		ZAp	Resets all parameters to default settings

*Command used only in network configurations and not discussed in this section.

COMMAND STRUCTURE

The Value Series PEL System Ink Jet Controller has three sets of commands: configuration, editing and utility. The Configuration commands set-up the printer. It is important to enter the configuration data correctly because incorrect data can lead to serious application failures.

The Editing commands allow you to edit, store and select messages for printing, as well as change the appearance of the printed message.

The Utility commands consist of diagnostics, print feature adjustments and specialty tools for the advanced user.

Command Prompt

The Command Prompt is the first screen that appears on the terminal display and it shows the status of the printhead.

The Command Screen

```
INK LOW *      *
HEATING*       *
COMMAND (A):
```

Command Selection

At the COMMAND prompt, enter a command by typing the first two letters of the command name as shown in the table above.

Options

Wherever possible, the system will try to help you remember the expected input by displaying acceptable options in square brackets —[ ]. For example, if the system is expecting a Yes or No response, [Y/N] will appear.

Some messages allow the use of the left and right arrows to partially change the command. For example, with the date command, you can edit the month while leaving the year and day unchanged.

Saving Changes

After entering changes, you can save the new parameter or abort the changes. Press (ENTER) to save the changes or (ESC) to abort the changes.

Keyboard Functions

There are three sets of key options on the Value Series PEL System keyboard—black, blue and red.

Note: Press the (ALT) and (SHIFT) keys each time a function key is needed.
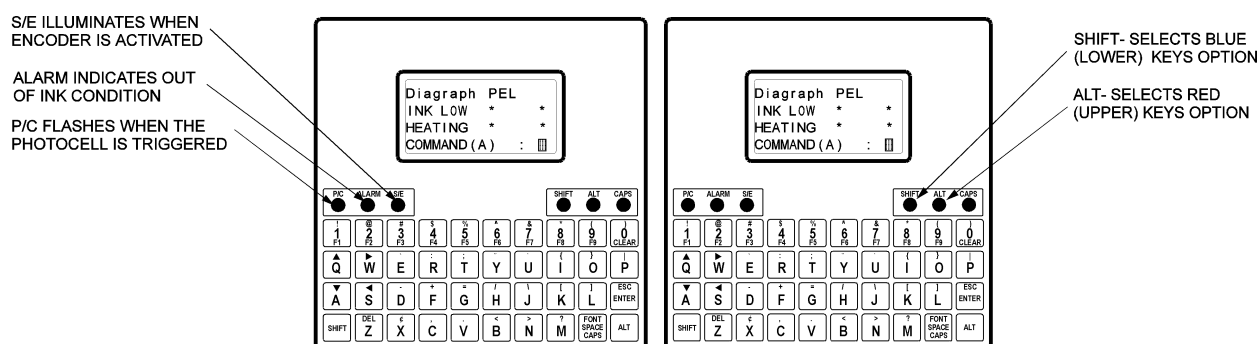
Figure 5-A Value Series Keyboard Function Keys

CONFIGURATION COMMANDS

This section contains several commands that allow you to configure the system for a particular application. Below is a list of all the configuration commands followed by a detailed description of each command.

BAud Rate	**LO**ng Bar	**SM**all Bar
DAte	**Of**fset	**Ti**me
Encoder	**Re**verse	**TR**igger Edge
EXpiration Date	**Sl**ant	**WI**dth
Invert		

Carefully set all of these commands at the beginning of the application. Setting commands incorrectly, can lead to long delays during the installation.

```
BAUD  RATE
USE  UP/DOWN
ARROW  KEYS
        :    9600
```

BA - Baud Rate

Purpose: Changes the baud rate for the rear communications port.

Keystrokes: BA(ENTER)

Range: 9600, 19.2K, 38.4K

Default: 9600

Guidelines: Use the arrow key to toggle between the variables 9600 baud and 19.2 or 38.4 kilobaud.

```
DATE     MM-DD-YY



*A     *   01-01-97
```

DA - Date

Purpose: Sets or displays the current date.

Keystrokes: DA*mmddyy*(ENTER)

Range: No range.

Default: No default.

Guidelines: Enter the new date with the numeric values for month, day and year:

mm = 2-digit month (01, 02, ..., 12)

dd = 2-digit day of the month (01, 02, ..., 31)

yy = 2-digit year (00, 01, ..., 99)

Use ← and → to change only part of the date.

Autocodes, listed with the EDIT command, allows a date entry into a message for printing.

```
DISPLAY    [1-4]



          : 3
```

DI - Display

Purpose: Selects the type of terminal.

Keystrokes: DI*n*(ENTER)

Range: 1-4

Default: Last terminal type in use.

Guidelines: n = type of terminal. Choices are 1 for VT100, 2 for Wyse, 3 for hand-held controller and 4 for ASCII.

EN - Encoder

```
ENCODER    [ Y / N ]


* A       *          : Y
```

Purpose:	Enables or disables the use of a variable-speed encoder.
Keystrokes:	EN*x*(ENTER)
Range:	Y/N
Default:	Last state used.
Guidelines:	x = Y / N; Y will enable an encoder and N will disable it.

EX - Expiration Date

```
EXP  DA  [ 0 - 9 9 9 9 ]


* A      *        :    0
```

Purpose:	Sets an expiration date.
Keystrokes:	EX*nnn*(ENTER)
Range:	0-9999
Default:	0
Guidelines:	This command will allow a special set of autocodes to alter the real time clock by the value that is entered into this command. An alteration of this clock has to be within 0 - 999 days.

Autocodes, listed with the EDIT command, allows an expiration date entry into a message for printing.

IN - Invert

```
INVERT     [ Y / N ]


* A       *          : N
```

Purpose:	Turns a printed message upside-down.
Keystrokes:	IN*x*(ENTER)
Range:	Y or N
Default:	N
Guidelines:	x = Y/N; Y inverts the message and N does not.

LO - Long Bar

```
LONG  BAR  [1-32]


*A      *        :32
```

Purpose: Determines the number of channels used to print the long bar on various bar codes. The more channels the taller the bar.

Keystrokes: LO*nn*(ENTER)

Range: 1-32

Default: 16

Guidelines: *nn* = height of bar codes (1-32). The values represent the 32 channels of the printhead. Entering the number 16 will allow 16 channels to print and create a long bar 16 channels high.

OF - Offset

```
OFFSET     [0-99]


*A      *        :  0
```

Purpose: Aligns the two printing channels of the 256/32 printhead (1.9").

Keystrokes: OF*nn*(ENTER)

Range: 0-99

Default: Last value used.

Guidelines: *nn* = a value from 0-99. The SLANT command must be set to zero before this command will work properly.

RE - Reverse

```
REVERSE    [Y/N]


*A      *        :N
```

Purpose: Reverses the direction of printing to allow for products to pass the printhead from left-to-right or right-to-left.

Keystrokes: RE*x*(ENTER)

Range: Y or N

Default: Last value used.

Guidelines: *x* = Y / N; Y reverses the message and N does not reverse the message.

SL - Slant

```
S L A N T        [ 0 - 3 1 ]


* A      *           :   7
```

Purpose: Adjusts the print angle to obtain a vertical image.

Keystrokes: SL*nn*(ENTER)

Range: 0-31

Default: 7

Guidelines: *nn* = Amount to slant print (0-31)

Different values of slant change the angle of the printed message. Three items have to be adjusted to achieve a vertical image: the SLANT command, the WIDTH command and the mounting angle of the printhead.

SM - Small Bar

```
S M A L L   B A R [ 1 - 3 2 ]


* A      *           :   8
```

Purpose: Determines the number of channels used to print the small bar on the Postnet bar code. The more channels, the taller the bar.

Keystrokes: SM*nn*(ENTER)

Range: 1-32

Default: 8

Guidelines: *nn* = height of small bars in Postnet bar codes (1-32). The new value for SMALL BAR is entered at this screen. The values represent the 32 channels of the printhead. Entering the number 16 will allow 16 channels to fire to create a small bar of 16 channels high.

```
 T I M E     H H : M M : S S


 * A       *   2 3 : 4 1 : 1
```

TI - Time

Purpose: Sets and displays the current time.

Keystrokes: TI*hhmmss*⟨ENTER⟩

Range: No Range.

Default: None.

Guidelines: Enter the new date with the numeric values for hour, minute, and second.

hh = 2-digit hour (00-23)

mm = 2-digit minute (00-59)

ss = 2-digit second (00-59)

Use ← and → to change only part of the time.

Autocodes, listed with the EDIT command, allows a time entry into a message for printing.

```
 T R I G   E D G E   [ R / F ]


 * A       *       : R I S E
```

TR - Trigger Edge

Purpose: Starts printing on the rising or falling edge of the photocell signal.

               Keystrokes: TR*x*⟨ENTER⟩

Range: R or F

Default: Last value used.

Guidelines: *x* = Trigger edge (R / F)

Select the rising or falling edge of the photocell.

R = rising edge. This setting will start the print cycle on the leading edge of the product.

F = falling edge. This setting will start the print cycle on the trailing edge of the product.

WI - Width

```
WIDTH      [ 1 - 2 5 5 ]


* A      *         :    1
```

Purpose: Adjusts the width of the printed message to fit correctly on the product.

Keystrokes: WI*nnn*(ENTER)

Range: 1-255

Default: 1

Guidelines: *nnn* = Width of message (0-255)

If using an encoder, the value entered into the width command is a divider for the encoder pulses—the higher the divider the wider the print.

For systems without an encoder, the value entered into the width command is a divider for the internal clock of the controller—the higher the divider the wider the print.

EDITING COMMANDS

There are five commands that enable you to edit, store, and select messages for printing, or change the appearance of the printed message:

Bold   **GA**p
Delay   **SE**lect
Edit

Note that the EDIT and SELECT commands work together to print a programmed message.

BO - Bold

```
B O L D          [ 0 - 9 ]


* A      *            : 0
```

Purpose: Sets the default boldness level. This is the number of times each pixel in a character repeats. The higher the bold level, the darker the characters print.

Keystrokes: BO*n*(ENTER)

Range: 0-9

Default: 5

Guidelines: *n* = dot multiplier or bold value

Entering a value between 0 and 9 multiplies the number of dots for each character.

0=1 1=2 2=3 3=4 etc.

For example, when a 5X5 character prints with a bold value of 2, the 5X5 character becomes a 5X15 character, 5 pixels high and 15 pixels wide.

DE - Delay

```
D E L A Y   [ 0 - 9 9 9 9 ]


* A      *        :  9 0 0
```

Purpose: Controls the delay between the product detection and the start of printing. It changes the position of the message on the product without having to adjust either the printhead or the photocell.

Keystrokes: DE*n*(ENTER)

Range: 0-9999

Default: 770

Guidelines: *n* = delay value

The delay value represents either internal oscillator pulses or the variable-speed encoder pulses divided by the value that is in the WIDTH command. Enter a numeric value.

```
EDIT  MSG  [0-24]


* A      *      :    12
```

ED - Edit

Purpose: Allows message editing, font selection and boldness setting. Since it has more than one function, this command is actually a sequence of multiple keystrokes.

Message creation consists of three steps:

1. Assigning a message number

2. Choosing a font and setting the boldness

3. Text entry of the message

Range: 0-24

Default: Last message edited

Step 1

Keystrokes: ED*nn*⌷ENTER⌷

Guidelines: *nn* = the message number. Type in the message number in the message area of the screen and press <u>ENTER</u>. If the desired message number is already on screen, move to step 2.

Step 2

Keystrokes: ⌷ALT⌷⌷FNT⌷

Guidelines: This key combination moves the cursor to the font area of the screen. Use the table below to choose the font for your message.

Font Chart

Font	Description	Text Output
1	Micro-Spacing, only allows spaces (no characters)	Spaces
5	5x5 Dot Matrix, Block Character	5 Lines
7	7x5 Dot Matrix, Block Character	4 Lines
9	9x7 Dot Matrix, Block Character	3 Lines
16	14x8 Dot Matrix, Block Character	2 Lines
31	32x20 Dot Matrix, Block Character	1 Lines
40	EAN 13 Bar Code	Bar code
41	EAN 8 Bar code	Bar code
42	Code 39 Bar code (w/HR)	Bar code
43	Code 128 Bar code (w/HR)	Bar code
44	UCC/EAN Code 128 Bar code	Bar code
90	Postnet Bar code	Bar code
92	Interleaved 2 of 5 Bar code	Bar code
93	Code 39 Bar code	Bar code
94	UPC Shipping Container Bar code 62.5% (w/HR)	Bar code
96	UPC Shipping Container Bar code 70% (w/HR)	Bar code
98	UPC A Bar code	Bar code
99	UPC E Bar code	Bar code

Note: If you select an unavailable font, the font number will default to the original font.

Setting the Bold Level

Adding a number to your font or logo selection will set the bold value. Logos are custom order items and will be inserted between fonts 50 and 75 on demand. Use the following chart to set the bold level for a font or a logo:

Bold Level	Add	Bold Level	Add
1	100	2	200
3	300	4	400
5	500	6	600
7	700	8	800
9	900		

Example 1: F307, Font 7 with a boldness of 3

Example 2: F816, Font 16 with a boldness of 8

Step 3

After selecting the font and adding a bold value, enter your message using text, numbers, and special characters.

Note: Boldness can be either Global or on a per message basis.

Editing Options

Nine keys can assist the editing process:

←	Moves the cursor left one character.
→	Moves the cursor right one character.
↑	Moves the cursor one line up.
↓	Moves the cursor one line down.
CLEAR	Deletes the entire message.
CAPS	Toggles between upper and lowercase characters.
DELETE	Deletes information via backspace.
ENTER	Quits the Edit command and saves all changes.
ESC	Quits the Edit command and aborts all changes

Entering Autocodes into a Message

The Edit command also inserts autocodes for time, date, expiration date, numbers, rollover dates and shift codes into your message. To enter autocodes into a message, enclose the correct variables in braces. For example, an entry of **{HO}** will insert the hour.

Autocodes for Date

{AD}	To insert the Alphabetic Day (Mon, Tues, etc.)
{AM}	To insert the Alphabetic Month (Aug, Sept, Oct, etc.)
{DA}	To insert the Day
{DT}	To insert Month:Day:Year
{JD}	To insert the Julian Day (1-365)
{MO}	To insert the Month
{YE}	To insert the Year
{YL}	To insert the Last digit of the Year (3, 4, 5)

Autocodes for Time

{HO}	To insert the Hour
{MI}	To insert the Minute
{SE}	To insert the Second
{TI}	To insert Hour:Minute:Second

Autocodes for Expiration Date

{EC}   To insert the Expiration Month:Day:Year
{ED}   To insert the Expiration Day
{EJ}   To insert the Expiration Julian Day
{EL}   To insert the Expiration last digit of the Year
{EM}   To insert the Expiration Month
{EW}   To insert the Expiration Day of Week
{EY}   To insert the Expiration Year

Autocodes for Rollover Date

{JR}   To insert the Rollover Julian day
{RC}   To insert the Rollover date (11/22/97)
{RD}   To insert the Rollover Day
{RL}   To insert the last digit of the Rollover year
{RM}   To insert the Rollover Month
{RY}   To insert the Rollover Year

Autocodes for Shift

{SH}   To insert the SHIFT code (A, B, C)

Miscellaneous Autocodes

{BB}   To print reversed images (alphanumerics and logos only)

Autocodes for Numbers

d = variable, counter digit to print.

{Ld}   Prints a specified digit of the counter in descending order.
{NL}   Prints the counter, all eight digits, in descending order.
{NU}   Prints the counter, all eight digits, in ascending order.
{Ud}   Prints a specified digit of the counter in ascending order.
{Vd}   Prints a specified digit of the counter in ascending order, unless it is a leading zero.
{Wd}   Prints a specified digit of the counter in descending order, unless it is a leading zero.

For example, **{V3V2U1}**, as an autocode for numbers, will increase and drop out the leading zeros.

Sample message using the Time and Date autocodes:

M	S	G			0	4		L	1		F			7	
C	U	R	R	E	N	T		T	I	M	E	:			
{	T	1	}												
C	U	R	R	E	N	T		D	A	T	E	:			

{   D   T   }

- - - - - - - - - - - - - - - -

VARIABLE BAR/SPACE CONTROL

Variable Bar/Space Control lets you control the bar widths and spaces of certain bar codes. Normally, a bar code will default to the Diagraph recommended values. If the application requires the bar code to differ from the standard, call Diagraph Technical Support for instructions.

GA - Gap

```
GAP          [0-99]



*A     *        :  5
```

Purpose:	Controls the spacing between characters.
Keystrokes	GAn(ENTER)
Range:	0-99
Default:	5
Guidelines:	*n* = character space
	Enter a numeric value (0-99).

SE - Select

```
SELECT      [0-24]
*A      *
MSGS :11-12-13
14-15-16-   -
```

Purpose:	Selects the messages for printing from the message library.
Keystrokes:	SE*n*(ENTER)
Range:	0-24
Default:	Last selected, or for initial selection, or after a ZAP
Guidelines:	*n* = message number
	Enter message characters here, whether it is a single message or a string of messages. You can enter a string of messages for printing one right after another. The messages will be stored in the following format: 0-9.

UTILITY COMMANDS

This section contains commands for diagnostics, printing adjustments, and specialty tools for the advanced user.

Acknowledge	**Nu**mber	**SH**ift Set
CAll/Save	**OF**fset	**TE**st
CLear Map	**PO**sition	**ZA**p
COunters	**RO**llover	

```
ACK  ENABLE[Y/N]


*A      *        :N
```

AC - Acknowledge

Purpose: Enables acknowledgment from the rear port of receipt-of-message to the print buffer.

Keystrokes ACx(ENTER)

Range: Y or N

Default: N

Guidelines: Y = return a character from the rear port; N = do not return a character from the rear port.

```
CALL  GRP  [0-31]


*A      *        :  0
```

Call/Save

These commands allow thirty-two different parameter groups to be called from storage, for printing.

At the command prompt use **CA** for CALL, to retrieve a group of messages, and **SA** for SAVE, to save a group of messages.

You can save a group to one of thirty-two different file locations. When a file is saved and then later edited, you must save the file again before exiting or the changes will be lost.

You can group the following message parameters:

BOLD	GAP	SELECT
DELAY	INVERT	SLANT
EXPIRATION DATE	REVERSE	WIDTH

For example, use the SE (select) command to choose multiple message numbers. The SA (save) command will then save this group of messages, and message parameters, as one file. Use the CA (call) command to later retrieve this group of messages.

```
CLEAR  MAP  [Y/N]


* A        *        : N
```

CL - CLear map

Purpose:	Clears the print buffers. Use this command when downloading messages from a PC. When a message becomes invalid, the PC can download the string to clear the buffers allowing the messages in the print buffers to be deleted. This prevents the messages from printing on a product or document.
Keystrokes:	CL*x*⏎ENTER
Range:	Y or N
Default:	N
Guidelines:	*x* = Y / N; Y clears the print buffers and N does not clear the print buffers.

```
COUNTERS  * A     *
UPPER  : 0 0 0 0 0 0 0 0
LOWER  : 0 0 0 0 0 0 0 0
REP : 9 9 9   INC : 9 9 9
```

CO - Counters

Purpose:	Shows on the display what is happening in the command NUMBERS.
Keystrokes:	CO⏎ENTER
Range:	See Defaults
Default:	Upper: 00000000
	Lower: 00000000
	Rep: 999
	Inc: 999
Guidelines:	Used for monitoring only.

```
N U M B E R S      * A    *
U P P E R  : 9 9 9 9 9 9 9 9
L O W E R  : 9 9 9 9 9 9 9 9
R E P : 9 9 9   I N C : 9 9 9
```

NU - Numbers

Purpose: This command enables both product and batch counting. The counter counts in either a positive or negative direction, increases by a multiplier, repeats by a multiplier, or can be a simple counting routine.

Keystrokes: NU*nnnn*ENTER

Range: See Defaults

Default: Upper: 99999999

Lower: 99999999

Rep: 999

Inc: 999

Guidelines: Use the arrows to move the cursor over the area that is to be changed and enter a new value:

UPPER = value that the count routine will attain.

LOWER = starting value of the counter.

REP = value determines how many times a count repeats.

INC = value by which the count sequence increases.

The screen below shows a count routine that will count from 1 to 100 by 5 and repeat each count 3 times.

```
NUMBERS *A     *
UPPER:   00000100
LOWER: 00000000
REP: 002   INC:  005:
```

You can print the above messages by using the autocodes listed under the EDIT command. For example, enter **{V3V2U1}** in the message line to print:

0,0,0 / 5,5,5 / 10,10,10 / 15,15,15 etc.

OF - Offset

```
OFFSET     [0-99]


*A     *        :   0
```

Purpose:	To provide print alignment when printing with the 1.9" printhead.
Keystrokes:	OF*nn*(ENTER)
Range:	0-99
Default:	0

PO - Position

```
POSITION  [0-32]


*A     *        :   0
```

Purpose:	Adjusts the vertical position of a printed message, within the span of the printhead image area.
Keystrokes:	PO*nn*(ENTER)
Range:	0-32
Default:	0
Guidelines:	*nn* = number of starting printhead channel
	Enter the new POSITION value at this screen. The values represent the 32 channels in one PEL printhead. Entering 16 will allow the printed message to start at channel 16. The message will scroll if it goes off of the screen. This is only useful when printing small fonts with very few lines to fine tune the printhead's position.

RO - Rollover

```
ROLLOVER    TIME


*A       00-00-00
```

Purpose:	Sets an altered real-time clock for printing past the normal hours of the day.
Keystrokes:	RO*hhmmss*(ENTER)
Range:	00:00:00 (midnight)
	23:59:59 (1 sec. before midnight)
Default:	00:00:00

Guidelines: Enter the altered time with values for hour, minute and seconds in the HH:MM:SS format.

hh = 2-digit hour (00-23)

mm = 2-digit minute (00-59)

ss = 2-digit second (00-59)

Acceptable entries range between 00:00:00 (midnight) to 23:59:59 (1 second before midnight).

Use ← and → to change only part of the time.

Use the autocodes listed in the EDIT command to embed this command into a printed message.

SA - Save

```
S A V E   G R P   [ 0 - 3 1 ]


* A       *           :   0
```

Purpose: To save a group (i.e., text, bar code and logo) as one unit. Assign a group number by using the CALL command.

Keystrokes: SAnn ENTER

Range: None

Default: None

SH - Shift Set

```
S H I F T   S E T   [ 1 - 3 ]


* A                   :   1
```

Purpose: Defines different printing codes for three different time shifts.

Keystrokes: SH*x* ENTER

Range: 1-3

Default: 1

Guidelines: *x* = A, B or C for shifts 1, 2 or 3

You can set-up three shifts by using a specific code (1-3). Use this command in conjunction with the autocodes listed in the EDIT command to embed a Shift Set into a printed message.

When a new shift begins, the counters are automatically reset. To prevent unwanted counter resets, set all shifts to begin and end at 00:00:00. This uniform time prevents automatic reset of the counters but does allow overlapping shifts. Overlapping is not recommended.

Note: CODE is only an alphabetic character. Numeric values are invalid.

Example:

SHIFT	CODE	START TIME	END TIME	MESSAGE
1	A	00:00:00	07:59:59	Prints Code A between midnight and 7:59 a.m.
2	B	08:00:00	15:59:59	Prints Code B between 8:00 a.m. and 3:59 p.m.
3	C	16:00:00	23:59:59	Prints Code C between 4:00 p.m. and 11:59 p.m.

TE - Test Pattern

```
T E S T      P A T T E R N


*  A       *
```

Purpose: Fires all 32 channels for diagnostics on the printhead.

Keystrokes: TE(ENTER)

Guidelines: To exit the test mode, press any key except the (SHIFT) or (ALT) keys.

ZA - Zap

```
Z A P           [ Y / N ]
* * * P O W E R  O F F * * *
* A F T E R  ' Y ' < C R > *
                      : N
```

Purpose: Resets all parameters and messages to factory defaults.

Keystrokes: ZA*x*(ENTER)

Guidelines: *x* = **Y** for Yes or **N** for No.

REAR COMMUNICATIONS PORT

The rear port allows data to be downloaded to the print buffers at high speed via a special high speed version of the editing command. Note that when using the edit command through the rear port, you cannot edit a message.

6 • TROUBLESHOOTING

Area	Symptom	Possible Cause	Actions
Controller	No Power (Diagnostic LEDs do not light)	No Power	Connect power cord to controller and to the correct electrical outlet.
Controller	No Power (diagnostic LEDs do not light)	Blown Power Fuse	Check the continuity of the power fuse(s) and replace if necessary.
Controller	No Power (Diagnostic LEDs do not light)	PSU Fuse Blown	Check continuity and replace if necessary.
Controller	No print	No Photocell signal	Observe diagnostic LED's for photocell. If there is no signal, check photocell connections.
Controller	No print	No encoder signal	Observe diagnostic LED for the encoder. If there is no signal, check shaft encoder connections.
Controller	No print	No data for printhead to print	Check connections to the printhead. Make sure there is a message in the edit command, have the correct message selected.
Ink Systems	No ink flow (but can hear motor run)	Kinked Ink Line	Check tubing to assure tubing is not kinked.
Ink Systems	No ink flow (but can hear motor run)	Ink Reservoir Empty	Replace Ink Supply
Ink Systems	No ink flow (but can hear motor run)	Vent Cap on Reservoir Closed	Open Vent Cap
Ink Systems	No ink flow (motor does not run)	No Power	Assure power cable is connected between Prime Module and Controller.
Printhead	Channels fire, but appear weak	Not enough voltage to the transducers	Check SW1 on the printhead driver board for correct switch position (refer to printhead driver board configuration for switch settings).
Printhead	No channels will fire	Printhead at room temperature. Air in all channels	Check thermal fuse for continuity and replace if necessary. Purge and observe the flow from orifices. If orifices flow well, then some or all channels should fire and the problem is not air-related.
Printhead	Several channels will not fire	Air in channels	Follow purge procedure. Wipe with cloth and maintenance spray solution. If unsuccessful, return printhead for repair.
Printhead	Top channels by vent will not fire	Air in internal printhead manifold behind channels	Follow flushing procedure listed under Maintenance.

6.1 POOR PRINT QUALITY

This section covers causes and actions to take when your PEL Value Series system's print lacks quality. If you need to contact Diagraph Service, **call 1-800-526-2531**.

Problem	Possible Cause	
Missing dots.	Air in channels or clogged channels.	Follow the purge procedure. If channels flow well, then some or all channels should fire and the problem is not air-related. If no channels fire, then purge again. If the printhead still does not print, repeat the process. If channels are still missing after repeated purges, contact Diagraph service

Problem	Possible Cause	
Top dots missing.	Air in internal printhead manifold behind channels	Follow purge procedure. If channels flow well, then some or all channels should fire and the problem is not air-related. If no channels fire, then purge. If it does not print, repeat the process. If channels are still missing after repeated purges, contact Diagraph service.

Problem	Possible Cause	Actions
Smeared or trailing bar code and/or message.	Ink supply height is too high.	Wipe the printhead and lower the ink reservoir until the printhead orifices stop leaking. When wiping, always wipe upward with a lint-free cloth. Cycle the printhead 3 to 5 times after height adjustment. Adjust height until you achieve a small ring of ink around each orifice that does not expand to connect to other ink rings.

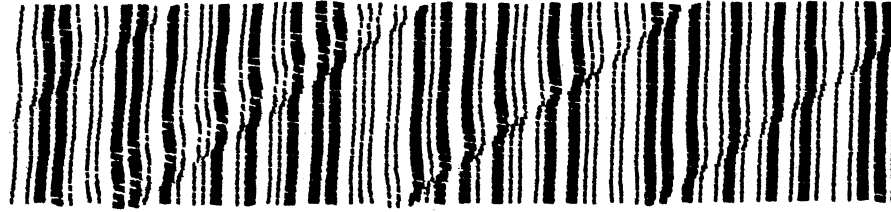| Problem	Possible Cause	Actions
Streaks in bar code or message	Depriming.	Ensure that orifices are not obstructed by priming. Wipe upward with lint-free wipe. Reduce length or boldness of messages. Increase product interval. Reduce line speed.

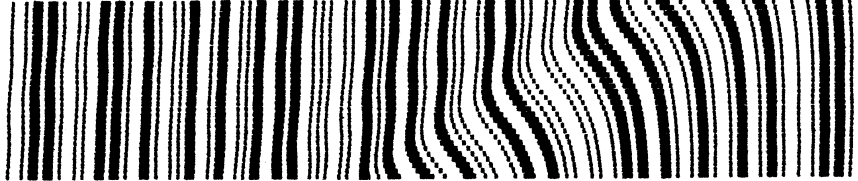| Problem	Possible Cause	Actions
Small gaps in the printing and/or trailing satellite dots. TEST	Debris in a channel typically blocking only one of the three orifices. Caused by paper dust, or on rare occasions, internal particulates that have broken free from within the printhead.	Try to wipe debris away or prime out. It is possible for the debris to move within the channel, allow printing then block the orifice again. If you can not remove the debris, return the printhead to Diagraph Service.

Problem	Possible Cause	Actions
Message or bar code is fuzzy. TEST	Distance from printhead to substrate is too big.	Move printhead to within 1/8" of product.

Problem	Possible Cause	Actions
Characters are unreadable.	Reverse set is wrong.	Change reverse (RE) direction in the software.

Problem	Possible Cause	Actions
Channels drop out while printing at high speed. TEST	Air in channels.	Reprime.

Problem	Possible Cause	Actions
Channels drop out while printing at high speed.	Ink supply height is too low.	Wipe the printhead and raise the ink reservoir until the printhead orifices start to leak. Slowly lower the reservoir until leaking stops. Wipe upward with a lint-free cloth. Cycle the printhead 3 to 5 times after height adjustment. Adjust height until you achieve a small ring of ink around each orifice that does not expand to connect to other ink rings.

Problem	Possible Cause
Diagonal lines in bar code or message.	Vibration in conveyor.

Actions	
Mount PEL Value Series system on conveyor that moves product smoothly, free from extraneous vibrations. Suitable conveyors require	1) belt with smooth splice or hidden laces; 2) flat table beneath belt (not rollers); 3) direct drive or timing belt; 4) free-standing without connection to packaging equipment; and 5) guide rails that move cartons to within 1/8" of PEL Value Series printheads while avoiding collision.

Problem	Possible Cause
Message or bar code with twisted elements.	Encoder installed incorrectly.

Actions
Mount encoder securely to conveyor so it can ride smoothly and maintain constant contact with the drive surface without slipping.

7 • PREVENTATIVE MAINTENANCE

PROCEDURES	Daily	Weekly	Quarterly
Clean and prime printhead	●		
Clean outside of ink reservoir (to prevent contaminant invasion)		●	
Clean outside of printhead thoroughly		●	
Clean photocell lens			●
Check that mounting hardware is secure			●
Check that all electrical connections are secure			●
Check that all ink tube fittings are secure			●

It is important that a Preventative Maintenance Program be followed for reliable operation of the Value Series PEL System.

CUSTOMER OR TECHNICAL SERVICES

The Operator Manual is the main source of information. If you require Technical Support, contact the Authorized Distributor from whom you purchased the system. They should be able to answer any questions concerning the use of this system. However, if there are questions that the Distributor cannot answer, Diagraph has a staff of Technical Specialists that are capable of helping. Before calling or writing, please do the following:

- Read the section of the manual that describes the procedure you are trying to perform.

- Then call the Technical Support Line at (800) 526-2531

APPENDIX A • OPTIONAL EQUIPMENT

### VARIABLE-SPEED ENCODER

(Diagraph part #6600-602)
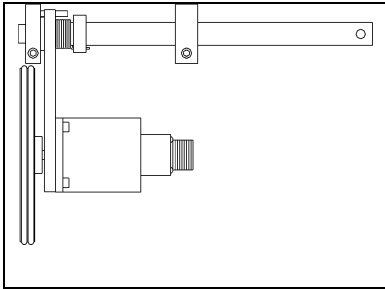
The variable-speed encoder in the Value Series system reads the line speed of the conveyor and reports to the controller for precise printing. It comes with a cable and a mounting bracket. The bracket attaches to the conveyor and presses the encoder wheel against the conveyor.

Route the cable from the encoder to the DB9 connector on the bottom of the controller identified as "Encoder."

LOW INK BEACON

(Diagraph part #5100-605)
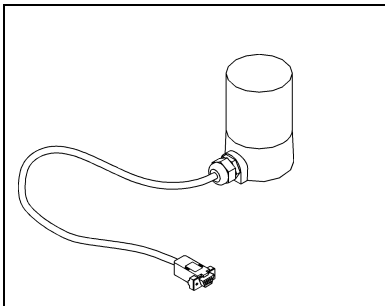
The External Alarm Beacon indicates an ink low situation and a system failure. The beacon can be mounted on top of the floor stand, or integrated into a conveyor system. The beacon has a DB9 connector that plugs directly into the Controller.

HOST COMPUTER

A host computer can control a PEL Value Series printing system. Applications that use a computer will need the Diagraph Value Series computer bundle which includes: a disk with Value Series software, the user's manual and a sentinel.

Communication between the computer and the Value Series controller occurs over a serial line, either RS-232 or RS-485. For successful data transfer over distances greater than 50 feet, the computer requires an RS-485 connector and the controller requires internal configuration changes. Details of those configuration changes appear in the next section.

APPENDIX B • HARDWARE CONFIGURATION

PRINTHEAD CONFIGURATION

The Value Series PEL System can control five different PEL printheads. The chart below shows the different models and their characteristics.
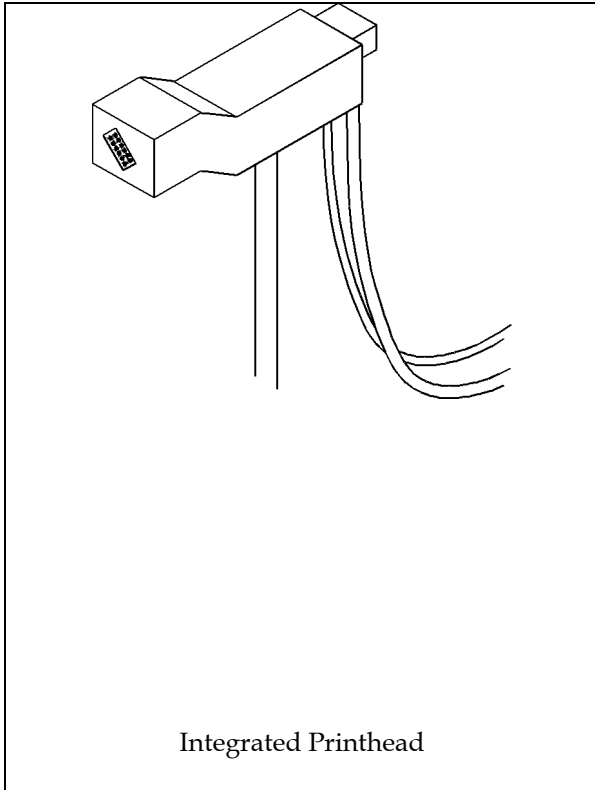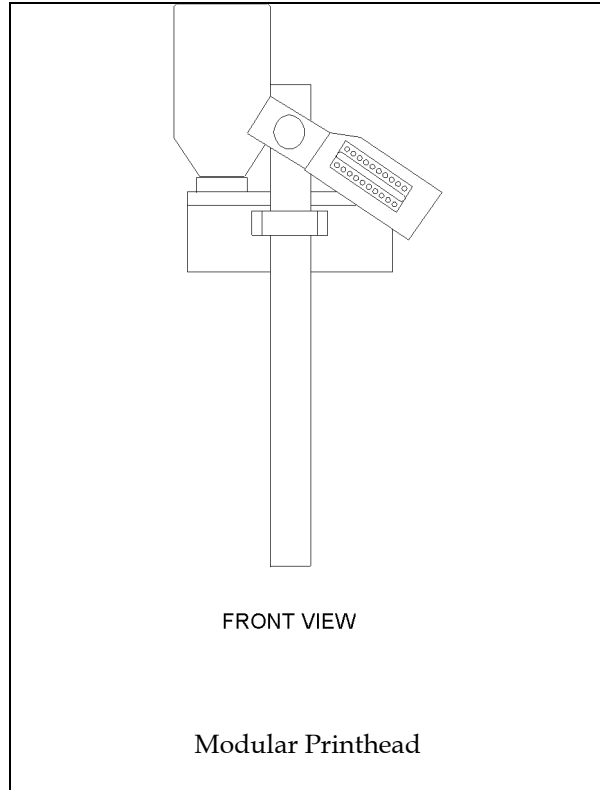

Integrated Printhead

Figure B-1

FRONT VIEW

Modular Printhead

Figure B-2

Type of Printhead	Printhead Description
9600 Integrated	1/2", 96 orifices, 32 channels
9600 Modular	1/2", 96 orifices, 32 channels
1920 Integrated	1", 192 orifices, 32 channels
1920 Modular	1", 192 orifices, 32 channels
2560 Modular	1.9", 256 orifices, 32 channels

1. Determine the printhead type.

2. Open the Controller by removing the lower four screws along the seams between the side panels and the back panel of the controller. Leave the top two screws in place but loosen each slightly so they can act as hinges.

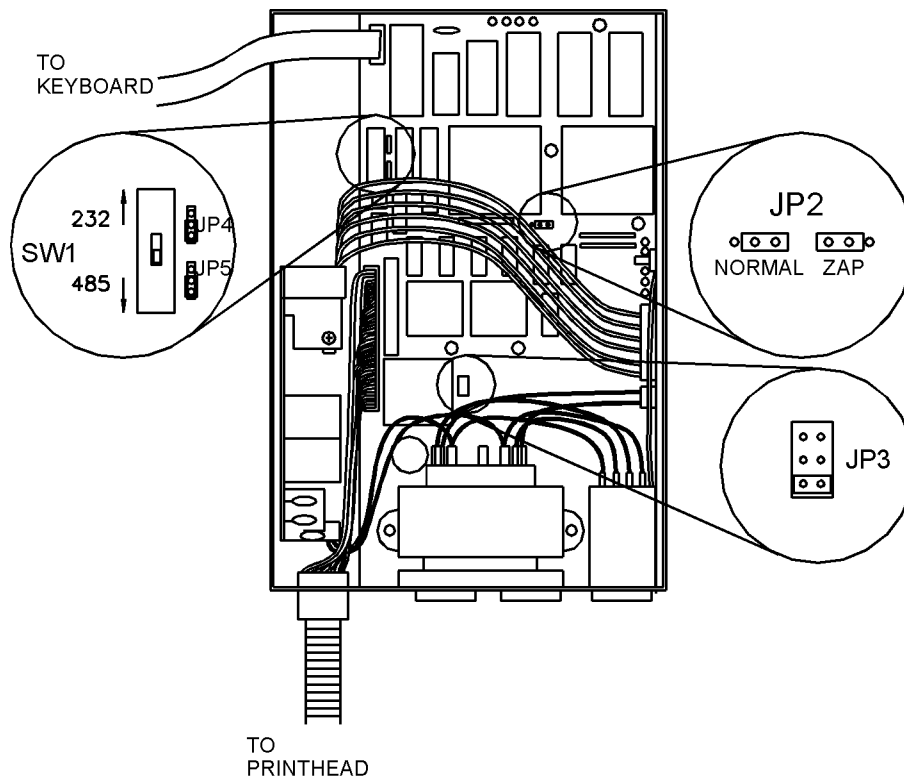3. Lift the front cover and swing it back so the top housing screws can function as hinges.

Figure B-3 Internal Controller Connections

4. Locate the jumper labeled JP3. This selects the correct printhead drive voltage.

5. For the 9600 series printhead, install the jumper over pins 2 and 5. For the 1920 and 2560 series, install the jumper over pins 3 and 4.

9600 Printhead   1920 & 2560 Printhead
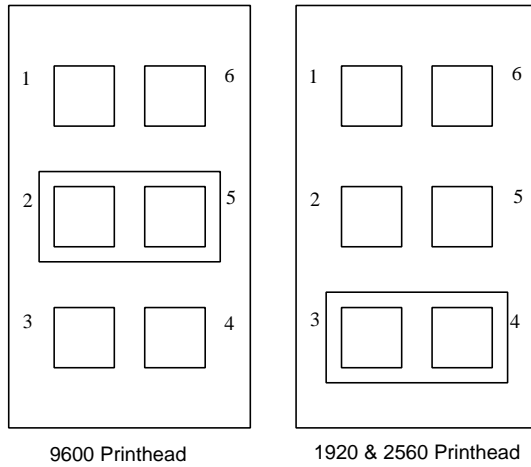
Figure B-4 Jumper 3 Set-up

Note: Each Value Series PEL System is pre-configured before shipment.

APPENDIX C • COMMUNICATION

You can communicate with the Value Series PEL System Ink Jet printing system with the controller keyboard or with a host computer. If you are using the controller keyboard, there are no adjustments to make. With a host computer, you will need to make two configuration changes: Switch to a baud rate other than 9600 and switch from RS-232 to RS-485

BAUD RATE CHANGE

The Value Series PEL System controller ships configured for 9600 baud. To change this setting, use the "Baud Rate" command in the Value Series software. The Value Series PEL System Controller supports 9600 baud, 19.2 and 38.4 kilobaud.

RS-232 to RS-485 or RS-485 to RS-232

Standard configurations use RS-232 serial communications for distances under 50 feet and RS-485 for distances greater than 50 feet. The limitation is 1000 feet from the controller.

The Value Series PEL System controller comes setup for RS-232. To change to RS-485, locate switch SW1 inside the controller.

SW1 Setup
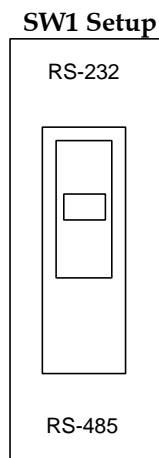
RS-232

RS-485

S-232 Setting
Push the switch up to the RS-232 notation.

RS-485 Setting
Push the switch down to the RS-485 notation.

Application Notes:

1. RS-232 is the default for serial communications.

2. RS-485 Serial Communications requires a RS-485 serial port on the Host Computer. Be sure that the host computer has an RS-485 serial connection before attempting to configure a Value Series system for host computer control over distances greater than 50 feet.

### Connecting the RS-232/RS-485 Rear Communications Port

The RS-232/RS-485 Rear Communications Port is for applications that require host computer control for high speed downloading applications. It is also used in applications that employ Diagraph's Value Series for Windows software.

The rear communications port utilizes a female DB9 connector. The type of communications, RS-485 or RS-232 will dictate how to wire the cabling. Please note that the pin-outs of this DB9 match the conventional standard for RS-232 and RS-485. A straight-through DB9 male/female cable is acceptable.

NETWORK SETTINGS

The Value Series Controller also communicates via RS-485, which allows the hook-up of thirty-two controllers to one host computer. A Token Ring network connects the Value Series controllers to the host computer. This type of network allows a controller to communicate with the host computer, or vise versa, by passing a token from one controller to the next.

The network cable is a standard Level 5 cable with the connections as shown:
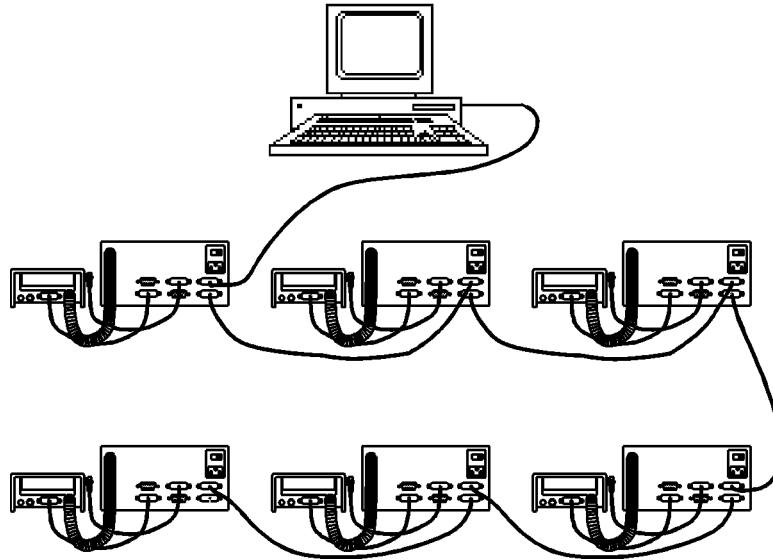
Value Series Network Configuration

These connections are made through the Rear Communication Port and the Auxiliary Communications Port. Insert the host computer cabling into the Rear Port of the first controller, then run a cable from the Auxiliary Port of the first controller to the Rear Port of the second controller. Continue until reaching the last controller on the network.

To set-up a Value Series Controller for network communications, do the following:

1. Set SW1 to RS-485 mode.
2. Place termination jumpers on JP4 and JP5 of the last Value Series controller. Open the controller and locate JP4 and JP5. Remove the jumper on each location and jumper the two pins together.
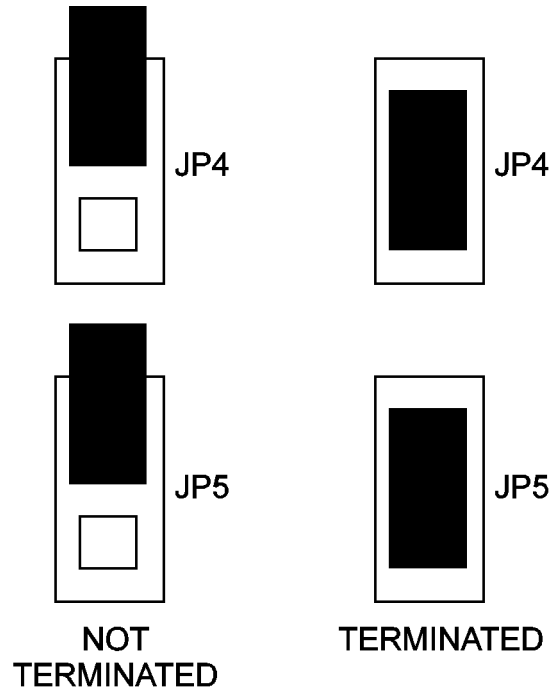
JP4 and JP5 Settings

3. Set appropriate network software commands, including Network and ID. Set Network = Yes. The ID command names the specific Value Series Controller (1-99) for access from the host computer. Each controller is given a specific identification for communication purposes.

CONNECTING THE RS-232/RS-485 REAR COMMUNICATION PORT

The RS-232/RS-485 Rear Communication Port is used primarily for applications that require host computer control for high speed downloading applications.

The Rear Communication Port uses a female DB9 connector. Wire the cable according to the type of communications, RS-232 or RS-485.

NOTE: The pin-outs for the DB9 connector match the conventional standard for RS-232 and RS-485. A straight through DB9 male/female type cable is acceptable.

Running cable for a network requires Network Level 5 cabling with a preference for the DB style connector.

	RS-232			**RS-485**	
Pin	Signal Name	Type	Pin	Signal Name	Type
2	RS-232 TX	Output1		RS-485 TX-	Output
3	RS-232 RX	Input	2	RS-485 RX+	Input
5	DC Ground	Ground	3	RS-485 RX-	Input
			5	DC Ground	Ground
			9	RS-485 TX+	Output
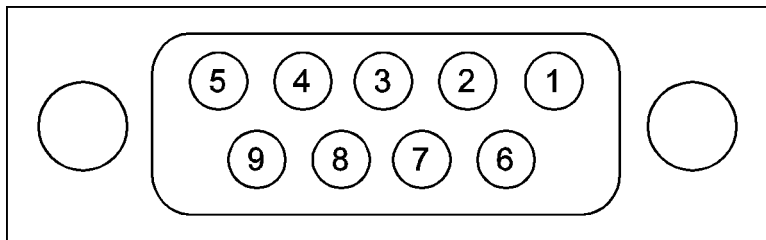
APPENDIX D • BAR CODE DIMENSIONS AND MAGNIFICATIONS

TOLERANCES FOR CODE 39 BAR CODE

Nominal Width of Narrow Bars and Spaces		Nominal Width of Wide Bars and Spaces		Nominal Ratio of Wide and Narrow Elements	Bar and Space Width Tolerance		Character Density Per Inch
IN	MM	IN	MM		IN	MM	
0.0200	0.50	0.0600	1.50	3.00	0.0069	0.18	3.00
0.0400	1.01	0.1000	2.51	2.50	0.0110	0.30	1.70
0.0800	2.01	0.2000	5.11	2.50	0.0220	0.61	0.85

TOLERANCES FOR I 2 OF 5 BAR CODE

| Magnification Factor		Narrow Bar or Space Width		Wide Bar or Space Width		Bar or Space Width Tolerance		Minimum Clear Area Width		Minimum Bar Height**	
IN	MM	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM
1.00	1.0	0.040	1.016	0.100	2.540	0.012	0.305	0.40	10.2	1.25	31.80
0.90	0.90	0.036	0.914	0.090	2.286	0.011	0.274	0.36	9.1	1.13	28.70
0.80	0.80	0.032	0.813	0.080	2.032	0.010	0.244	0.32	8.1	1.00	25.40
0.70	0.70	0.028	0.711	0.070	1.778	0.008*	0.203	0.28	7.1	0.88	22.35
0.625	0.625	0.025	0.635	0.063	1.588	0.005*	0.127	0.25	6.4	0.78	19.81

* All elements must be at least 0.020 inches wide.

** Minimum bar height for 14 digit symbols. For six digit symbols the minimum bar height is 0.78 inches

APPENDIX E • INK PURGING PROCEDURE

PRINTHEAD PURGING/FLUSHING PROCEDURES

Printhead
Access and
Location of
Vent Cap

INK INLET TUBE

NOZZLE SHIPPING CAP

VENT CAP

CHECK VALVE FOR INK RESERVOIR
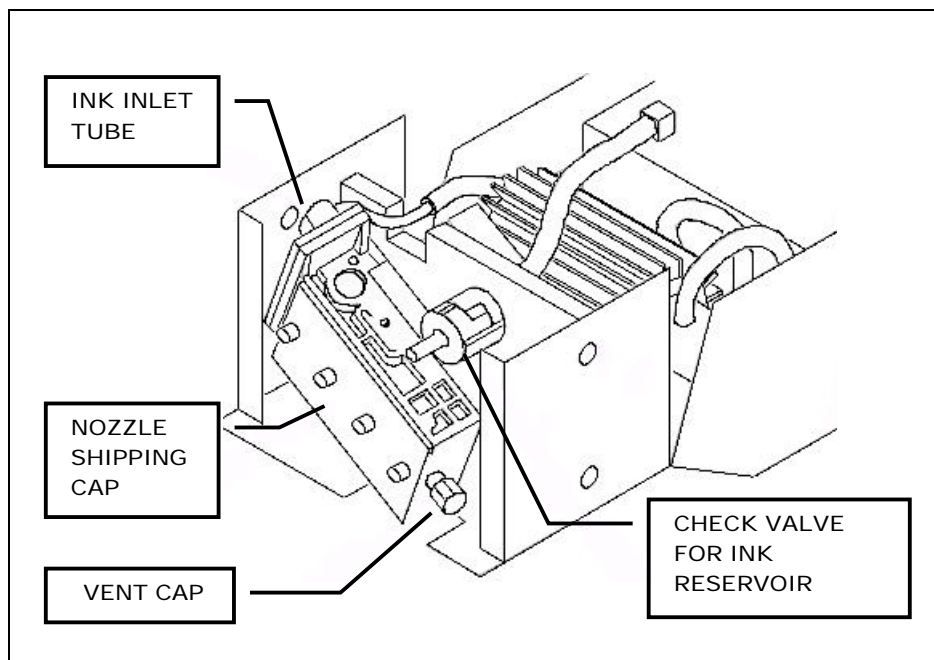
Flushing The Printhead

Flushing the printhead is necessary for the first time start-up and recommended as a last resort when attempting to fix a printhead with ingested air.

First Time Start-Up: The factory flushes and purges the PEL printhead before shipping. Since shock and vibration during shipment can introduce air into a printhead, it is good practice to flush and then purge in all new installations.

Last Resort after Purging: Purging should be a last resort procedure before requesting a service call. A flush should only be necessary if a printhead has sustained a hard blow or suffered mistreatment that will cause air ingestion. Otherwise, standard purging should be sufficient to eliminate air from the system.

In rare instances, large amounts of air can enter the ink channels and not dispel through the orifices during flushing. The air will remain in the chamber plate manifold and cause periodic depriming of channels. Ingestion of this amount of air can take place as the result of extreme shock to the printhead, or removal of the vent cap. Take the following steps to flush the system of excessive air:

Flushing

1. Allow the printhead to heat to its proper operating temperature.

2. Place an absorbent wipe by the vent tube and directly under— but not touching—the orifice plate.

INK INLET TUBE

NOZZLE SHIPPING CAP

VENT CAP

CHECK VALVE FOR INK RESERVOIR
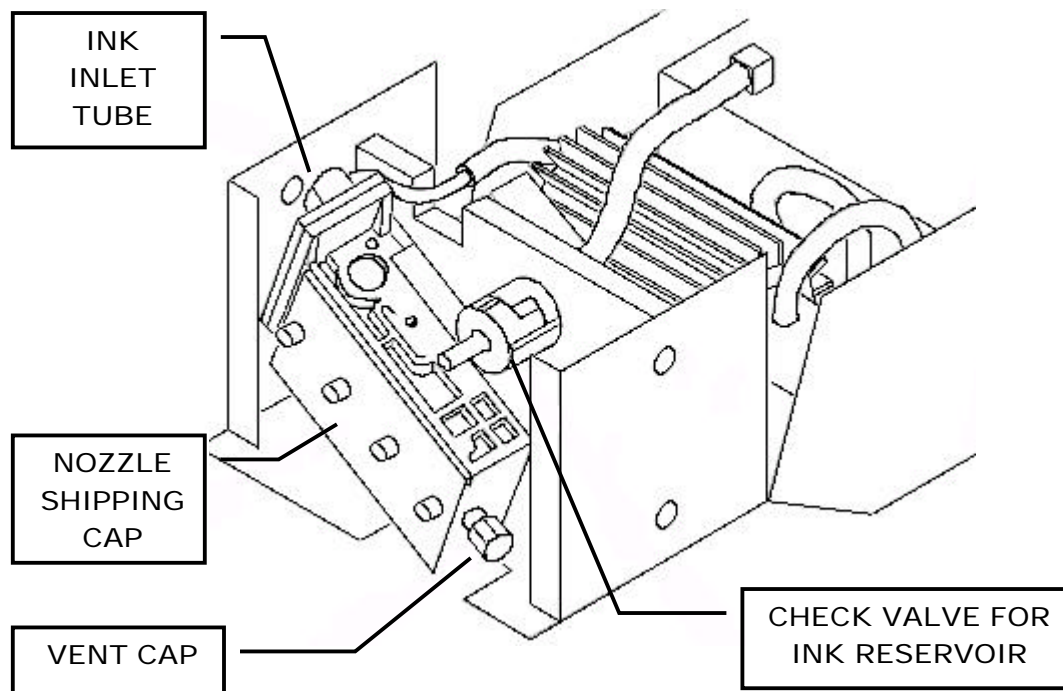
The material should be lint-free and not liable to contaminate surfaces near the fluid path.

⚠ **WARNING**: Do NOT touch under side wiring especially the hot heater resistor under the printhead.

3. Push the purging switch to apply pressure to the printhead. This pressure forces ink and air trapped in the manifold and in the fluid path out of the orifices. Maintain pressure until no more bubbles are seen coming out of the orifices. This will take approximately 10 seconds.

4. Remove the vent cap to eliminate bubbles trapped between the highest channel and the end of the vent tube. Maintain pressure until a good, steady flow of ink pours from the vent with no evident bubbles. This should take about 10 to 15 seconds.
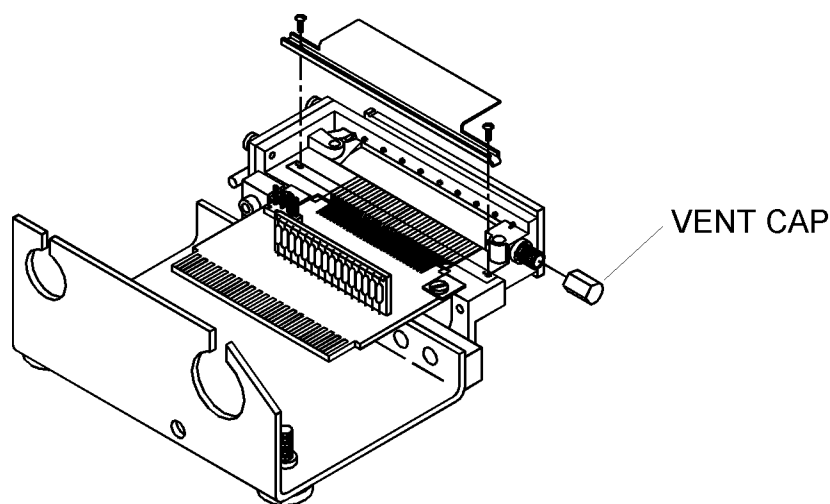
VENT CAP

5. While maintaining this flow, replace the vent cap. Maintaining the flow of ink is very important; otherwise, an air bubble will be left in the fluid path.

Hand-tighten the vent cap only.

Note: Do not overtighten or breakage may occur.

6. Carefully wipe off the outside of the printhead and the contacts at the base of the PC Board with an absorbent cloth. Be careful not to damage wires, then carefully wipe the orifice plate.

7. Check for prime by firing all channels. Any channels that do not fire <u>will not be recoverable</u> through the use of the purging procedure. If all channels do not fire, cover the printhead with the face plate and let heat for approximately 10 minutes. Repeat priming procedures. If all channels still do not fire, contact Diagraph Service.

PURGING THE PRINTHEAD

Purging eliminates air and debris that cause gaps in the printing. Purging after the first time start-up will eliminate tiny air bubbles that may be in a print channel.

On rare occasions, debris enters through an orifice or an air bubble may be ingested. Both circumstances produce a gap in the print but you can expel either by taking the following steps.

Wear suitable eye and skin protection whenever handling ink.

1. Place a wipe over the orifices to absorb the ink.

2. Push the Prime switch until ink is seen coming from the nozzles.

3. Gently wipe upward to absorb any ink on the surface. Repeat with a clean wipe.

APPENDIX F • FONT SAMPLES

Font Chart

Font	Description	Text Output
1	Micro-Spacing, only allows spaces (no characters)	Spaces
5	5x5 Dot Matrix, Block Character	5 Lines
7	7x5 Dot Matrix, Block Character	4 Lines
9	9x7 Dot Matrix, Block Character	3 Lines
16	14x8 Dot Matrix, Block Character	2 Lines
31	32x20 Dot Matrix, Block Character	1 Lines
40	EAN 13 Bar Code	Bar code
41	EAN 8 Bar code	Bar code
42	Code 39 Bar code (w/HR)	Bar code
43	Code 128 Bar code (w/HR)	Bar code
44	UCC/EAN Code 128 Bar code	Bar code
90	Postnet Bar code	Bar code
92	Interleaved 2 of 5 Bar code	Bar code
93	Code 39 Bar code	Bar code
94	UPC Shipping Container Bar code 62.5% (w/HR)	Bar code
96	UPC Shipping Container Bar code 70% (w/HR)	Bar code
98	UPC A Bar code	Bar code
99	UPC E Bar code	Bar code

Note: If you select a font that is not current, the font number will go back to the original.

Setting the Bold Level

When the font or logo is selected, the bold level can be set by the numeric value that is added to the font or logo value. Logos are custom order items and will be inserted between fonts 50 and 75 on demand. Use the following chart to set the bold level for a font or a logo:

Bold Level	Add	Bold Level	Add
1	100	2	200
3	300	4	400
5	500	6	600
7	700	8	800
9	900		

Example: Font 7 at a bold level of 3 - Enter 307.