User's Manual

PEL Centralized Ink Jet Single Enclosure Printing System (CIDS/SE)

2470-500
Revision D

Diagraph®
An ITW Company

1 Missouri Research Park Dr. • St. Charles, MO 63304 • **1-800-521-3047**, *ServiceLine* **1-800-526-2531**

Diagraph
PEL Centralized Ink Jet
Single Enclosure
Printing System
(CIDS/SE)

2470-500

User's Manual

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System Components

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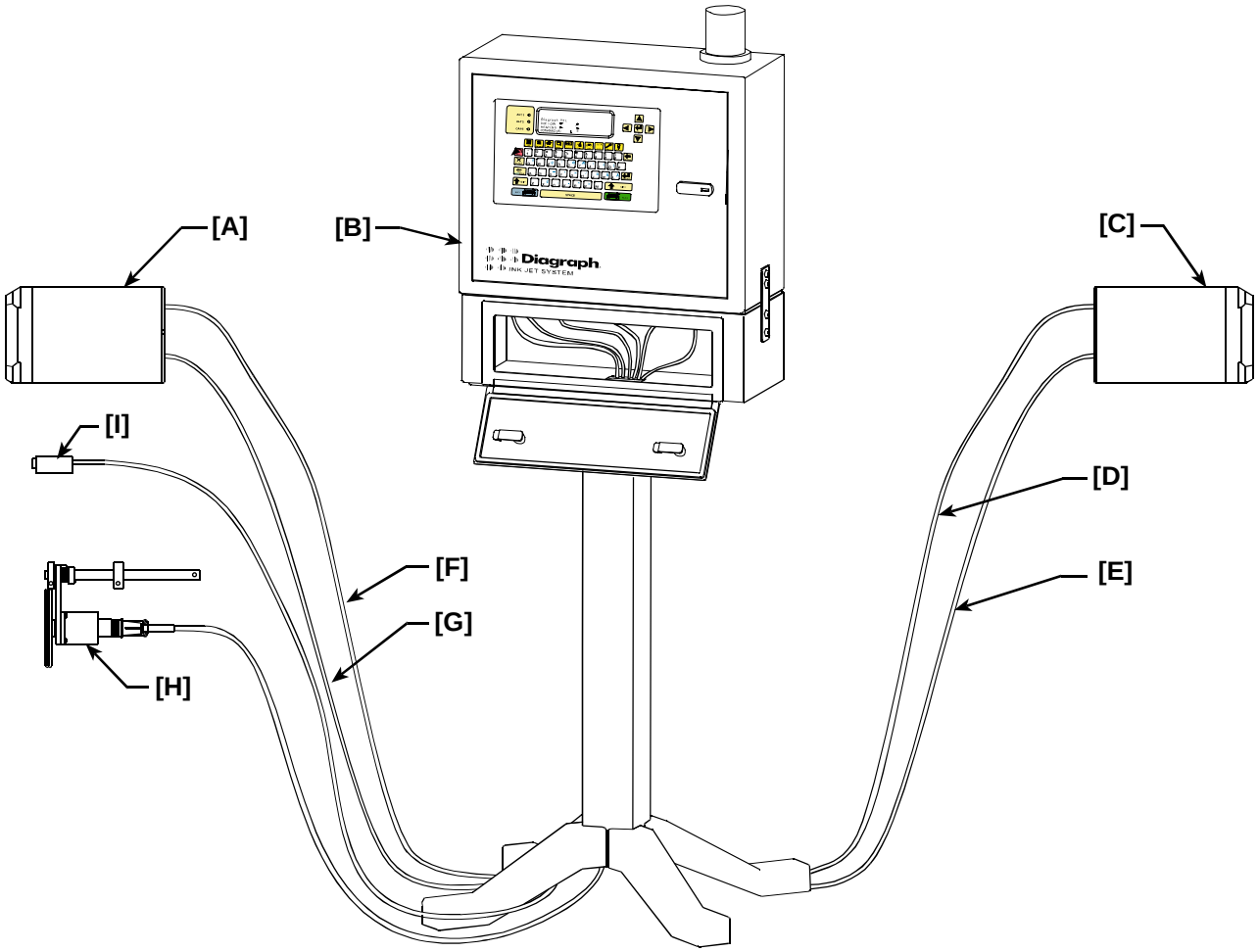
System specifications

Controller/Ink Delivery System

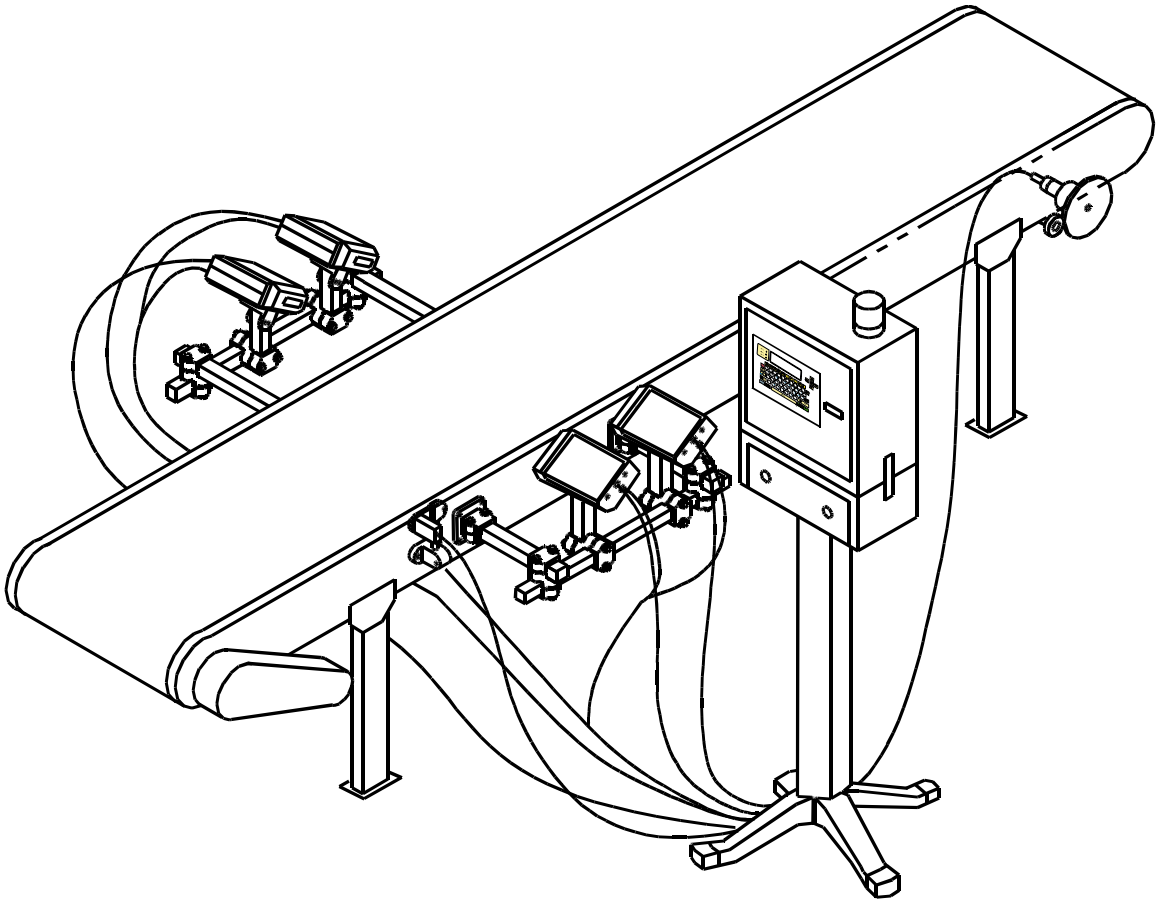
Microprocessor:	32-bit CMOS 68332
Input Device:	Keypad terminal or PC
Communication Ports:	Primary RS-232, Auxiliary RS-232/RS-485
Peripheral Ports:	Two product detect, two shaft encoder, external alarm
Software (stand alone):	Real time clock, Julian/Gregorian date, item count, pallet/batch count, expiration date, inverted printing
Message Storage (stand alone):	Battery-backed RAM—stores 100 messages, up to 99 characters per line
Multi-tasking:	Maximum two production lines with two printheads per line
Multi-printhead:	Up to four printheads (up to 20 lines of print)
Multi-font:	5-dot to 32-dot high, upper/lower case, bold, condensed, slant
Cabinet:	Industrial-type enclosure with security lock
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)
Weight:	46 pounds (20.87 kg)
Ink Capacity:	500 ML and 1 Liter Bottle
Distance from Printheads:	40 ft (12.2 m) maximum ink line length, with 20 ft (6.09 m) maximum vertical separation
Dimensions:	16 in. H, 8 in. W, 20 in. L (406 mm H, 203 mm W, 51 mm L)

PEL centralized printhead

Print Speed:	Up to 300 fpm (91 mpm) for text and graphics; Up to 250 fpm (77 mpm) for bar codes
Print Resolution:	96, 192 or 352 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 in ((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
Ink Throw:	Up to 1/8 in. (3.2 mm) from substrate
Ink Type:	Glycol based for porous surfaces
Ink Colors:	Black, Blue, Red
Dimensions:	2.75 in. H, 5 in. W, 8.25 in. L (70 mm H, 127 mm W, 635 mm L)

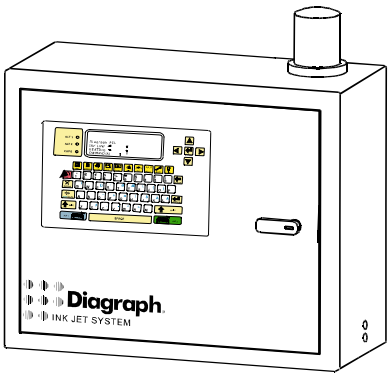


[A] CIDS Printhead A
[B] CIDS / SE Controller
[C] CIDS Printhead B
[D] Ink Line
[E] Printhead Cable
[F] Inkline
[G] Printhead Cable
[H] Shaft Encoder
[I] Photosensor



Four printhead system configured to print on both sides of a conveyor.

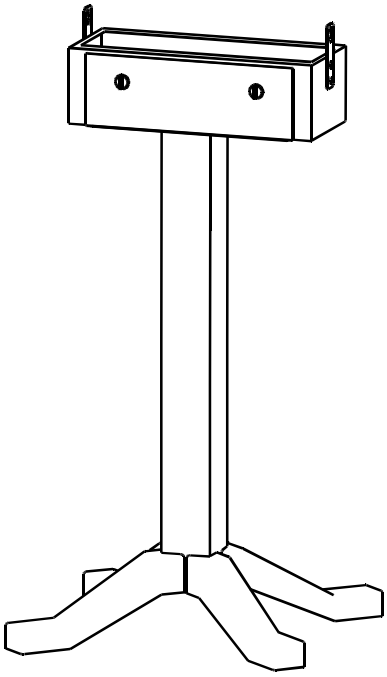
PEL Controller/IDS



The SE Controller is available in eight models divided into two groups: two printhead and four printhead. Within each group, there are variations of enclosure finish and the availability of remote I/O communication. All models listed following ship with black ink. If you have requirements for ink colors other than black, contact your Diagraph sales representative.

	Dual head controllers	**Diagraph P/N**
1	Black Enclosure, Standard Unit	2470-202
OR	Stainless Steel Enclosure	2470-202SS

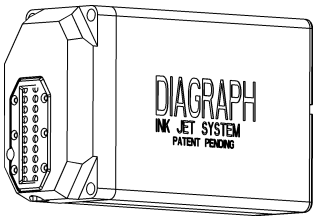
	Quad head controllers	
1	Black Enclosure, Standard Unit	2470-204
OR	Stainless Steel Enclosure	2470-204SS



	Controller ink delivery system floor stand assembly	
1	Four Head System Painted Black Consists of Floor Stand and Interface Housing	2470-634
1	Four Head System Stainless Steel Consists of Floor Stand and Interface Housing	2470-634SS

	Ink tubing kits	
	Ink Tubing Kit for 2 Printheads	2460-400
	Ink Tubing Kit for 4 Printheads	2460-401

Centralized PEL printhead

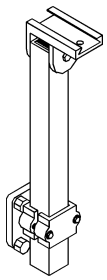


1	96/32 Printhead, 3/4" solid character 32 channels,96 orifices	2460-796
OR	192/32 Printhead, 1" solid character 32 channels, 192 orifices	2460-792
OR	352/32 Printhead, 2" solid character 32 channels, 352 orifices	2460-700

	Printhead to controller shielded cable assemblies	
	20' Cable, Shielded	2460-351
	40' Cable, Shielded	2460-352

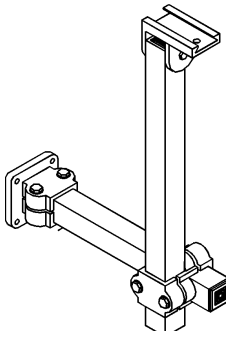
	Inks	
	Ink, PEL Barcode Black Porous 500 ml	5200-061
	Ink, PEL Barcode Black Porous 1 liter	2460-450

Printhead bracketry

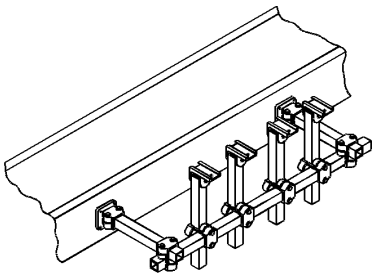


Diagraph provides printhead bracketry in different configurations that mix and match for multiple configurations. Check your Applications Analysis report to match the bracketry kits following with your particular system specifications.

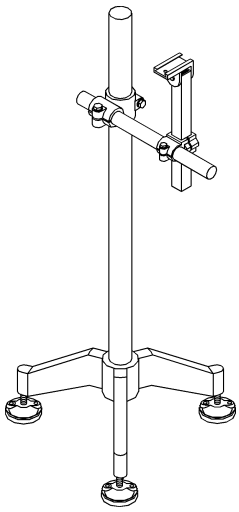
	Single head/single bar	2460-170
1	Flange mount clamp	2460-140
1	Printhead mounting pole with dovetail bracket	2460-154



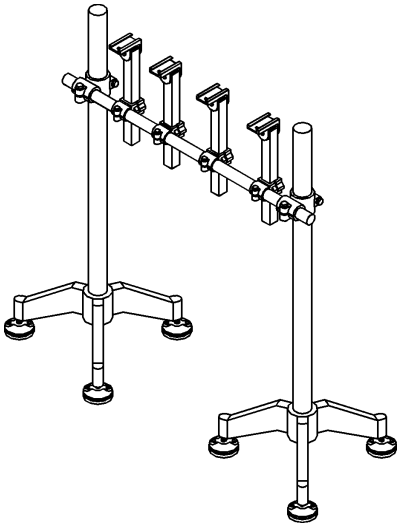
	Single head/double bar	**2460-171**
1	Vertical base clamp	2460-139
1	Standoff square tube bar	2460-155
1	Cross clamp	2460-137
1	Printhead mounting pole with dovetail bracket	2460-154



	Multi-head/conveyor mounts	
1	2 Head Conveyor Mount includes	2460-172 (not shown)
1	3 Head Conveyor Mount	2460-173 (not shown)
1	4 Head Conveyor Mount INCLUDES	24670-174
2	Vertical base clamps	2460-139
2	Standoff square tube bars (16 in. [406 mm])	2460-155
1	Crossbar square tube (24 in [610 mm])	2460-156
4	Cross clamps	2460-137
4	Printhead mounting pole with dovetail bracket	2460-154

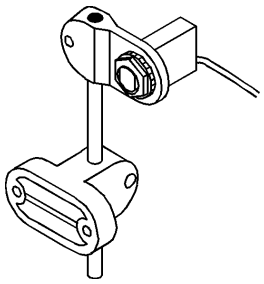


	Single head floor mount	**2460-181**
1	2’ Vertical Pole	5700-640
1	1¼ in.(32 mm) x 2 in. (51 mm) round cross clamp	2460-161
1	Tripod Base	2460-162
1	1¼ in.(32 mm) round x 16 in. (406 mm) tubing	5700-020
1	1¼ in.(32 mm) square to round cross clamp	2460-138
1	Printhead mount pole with dove bracket	2460-154



	Multi-head floor mounts	
1	2 Head Floor Mount (not shown)	2460-182
1	3 Head Floor Mount (not shown)	2460-183
1	4 Head Floor Mount includes	2460-184
2	Vertical base clamp	5700-640
2	Vertical square tube - 5 feet (1.5 meter)	2460-161
2	Cross clamp	2460-162
1	Horizontal square - 2 feet (0.6 meter)	5700-018
4	Dovetail printhead bracket	2460-138
4	Base Plates	2460-154

Photosensor

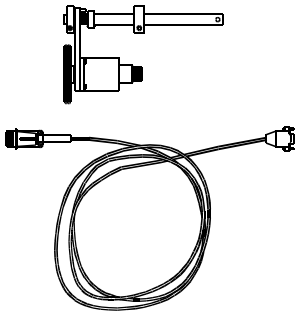


1	Proximity photosensor	5100-600
1	Photocell mounting bracket	2460-180

Optional photosensor

1	Retroreflective & mounting bracket	5100-601 (not shown):

Encoder



1	Encoder (142/213 dpi) with bracket and cable	2460-710

Service parts kits

1	Beacon Assembly	2470-157
1	CIDS Bulb & Fuses	2470-141
1	CPU Board	2470-152
1	Dual Printhead Driver Board	2470-153
1	Firmware Board	2470-155
1	Firmware PMC U4	2460-610 v303
1	IDS Controller Board	2470-158
1	IDS Power Supply	2460-605
1	Interface Board	2470-167
1	Main Power Supply	2470-150
1	Power Entry Module	2470-156
1	Printhead Cover	2460-606
1	Printhead Float Control Board	2460-608
1	Printhead IDS Ink Pump	2460-602
1	Printhead Prime Switch	2460-607
1	Printhead Reservoir Fitting	2460-603
1	Printhead Solenoid & Manifold	2460-601
1	Printhead Thermal Fuses	2460-609
1	Printhead 192/32 & 96/32 Tubing Kit	2460-610
1	Printhead 352/32 Tubing Kit	2460-611
1	Transformer	2470-151
1	Keypad Assembly	2470-638

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Overview and Installation

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Successful operation of the CIDS/SE system depends on successful installation and a disciplined maintenance schedule.

Overview

The Diagraph Centralized PEL in a single enclosure is a high-resolution ink jet printing system that prints bar codes, custom logos and alphanumeric messages on porous and semi-porous products carried on a conveyor. It is unique in that it both controls and provides ink to multiple printheads from a single, independent source.

The system consists of a controller/ink delivery system in a single enclosure (CIDS/SE), piezoelectric printheads and associated bracketry. All requisite cables, tubing and fittings are included.

The CIDS/SE printheads propel tiny drops of ink at equal velocity to form alphanumeric characters, bar codes and graphic images. The energy to eject the ink comes from piezoelectric crystals that convert electrical signals into pressure. Through microprocessors, control signals change rapidly and alter printed messages almost instantaneously.

The printheads receive ink through solenoid valves into internal reservoirs. Control boards inside the printheads monitor ink levels in these reservoirs and communicate with the CIDS/SE pump to send more ink when levels are low.

The controller and ink delivery system (IDS) are housed in a single, dust-tight industrial enclosure, which has a hinged door with a security lock.

The IDS can supply ink for up to four printheads. It consists of a large ink supply bottle (500 ml or 1 liter), reservoir, pump and controller board. A ink low beacon sits on top and lights when the level detect inside the IDS signals that the ink bottle needs to be replaced. Ink replacement can be done while the system continues to run without missing any products or forcing a conveyor to stop.

The controller for this system employs a 32-bit CMOS microprocessor to receive commands and data from a hand-held terminal or an external computer, translate the entries and send high-speed messages to the printheads for product coding. All input/output signals have associated LEDs and the encoder and photosensor signals are opto-isolated. The controller communicates to the printheads through a flexible umbilical cable.

For domestic U.S. users of Allen-Bradley programmable controllers (PLCs), the CIDS/SE system can communicate through a Remote I/O interface (RIO) developed by Diagraph under license from Allen-Bradley. The RIO represents a quarter rack to the PLC and supports block transfers.

Bracketry for the CIDS/SE system consists of modular printhead mounts and an industrial-grade pedestal floorstand. Printheads mount to the conveyor with square tubing and dovetail mounting brackets that allow both linear and angular adjustment.

Unpacking

The CIDS/SE printing system consists of a controller ink delivery system, printheads, bracketry, beacon, photosensor, encoder and necessary cables and tubing. Optional components include a hand-held terminal or a personal computer. Carefully remove the contents of each shipping carton and identify the components with the checklists in this section.

CIDS/SE Controller Ink Delivery System

CIDS/SE Systems are available in eight models. By application analysis, Diagraph has designed a system for your unique requirements. Application variables include enclosure finish, ink color and remote I/O capabilities. All domestic U.S. models ship with power cords and hand-held terminal brackets.

Installation notes

CIDS/SE system installation employs eight steps:

1) Attaching printhead brackets to conveyors
2) Mounting printheads on brackets
3) Mounting the photosensor and encoder
4) Assembling the stand
5) Mounting the interface housing
6) Mounting the controller ink delivery system
7) Wiring the system
8) Plumbing the system

The easiest way to achieve a successful installation is to read this section completely before starting. Along the way, note the sequence of operations and pay close attention to the cautions on electrical and chemical safety.

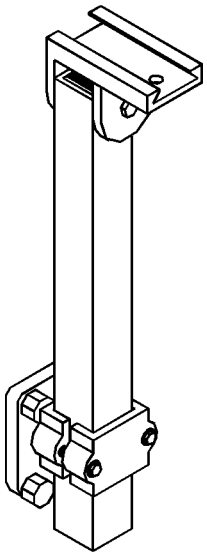
Wear suitable eye protection and use appropriate safety equipment during installation.

Conveyor requirements

Successful installation and operation of a CIDS/SE printhead system depends on a conveyor that moves product smoothly and is isolated from extraneous vibrations. There are five requirements for a suitable conveyor:

Belt	Seamless splice or hidden laces;
Frame	Flat table beneath belt (not rollers);
Drive	Direct or timing belt;
Free-Standing	The print station conveyor should not be connected to infeed or outfeed conveyors to isolate it from the vibrations produced by packaging equipment.
Guide Rails	Positioned to guide cartons within 1/8 in. (3 mm) or less of a printhead and to protect the printhead from any direct contact with the carton.

Mounting printhead brackets to conveyors

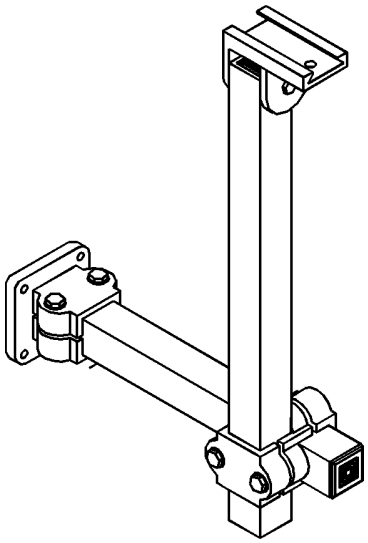


■ Mounting the single head/single bar bracket

The Single Head / Single Bar bracket holds one printhead on a conveyor. Its dovetail printhead mount allows both linear and angular adjustments for optimal positioning of the printhead.

Tools: 1/2 inch socket wrench 5/16 Drill bit
13 mm wrench

1. Determine the best place(s) on the conveyor for mounting the flange mount clamp(s). Arrange for plant maintenance to drill four 5/16 mm holes for each clamp.
2. Secure the clamps to the conveyor with 5/16 bolts and nuts.
3. Slide the printhead mounting pole with dovetail bracket into the flange mount clamp and tighten in place with the socket wrench.
4. Repeat procedure for each printhead on a single head / single bar mount.



■ Mounting the single head/double bar bracket

The Single Head / Double Bar bracket holds one printhead on a conveyor and provides that printhead with greater linear adjustment. It is effective in situations where products travel close to or extend beyond the edge of a conveyor. It has the same dovetail mount for the printhead as the other bracketry.

Tools: 1/2 inch socket wrench 5/16 Drill bit
13 mm wrench

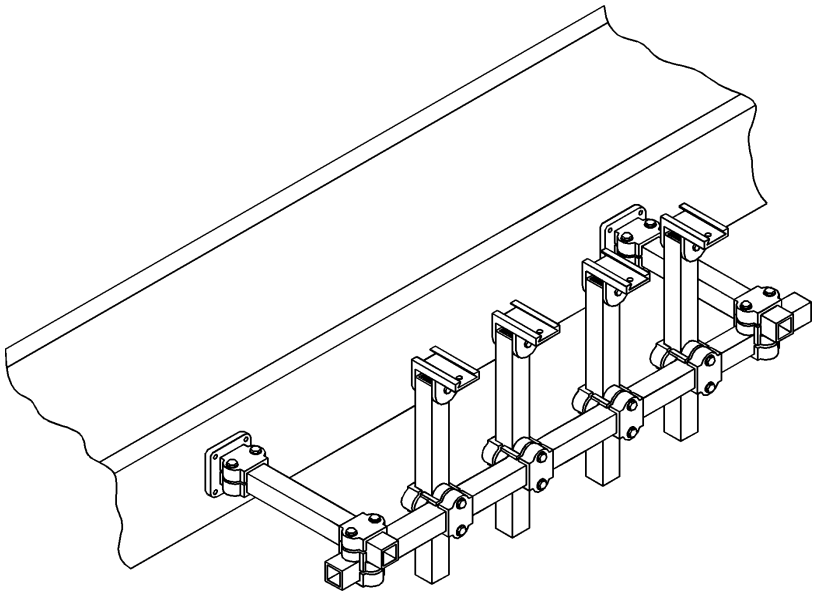
1. Determine the best place(s) on the conveyor for mounting the flange mount clamp(s). Arrange for plant maintenance to drill four 5/16 mm holes for each clamp.
2. Secure the clamps to the conveyor with 5/16 bolts and nuts.
3. Slide the standoff bar into the clamp and tighten in place with the socket wrench.
4. Slide the cross clamp onto to the standoff bar and tighten in place with the socket wrench.
5. Insert the printhead-mounting dove with dovetail bracket into the cross clamp and tighten in place.
6. Repeat procedure for each printhead on a single head / double bar mount.

   Tighten with 13 mm wrench.

■ Mounting the multi-head/conveyor mount

The Multi-Head/Conveyor Mount holds up to four printheads on a square crossbar parallel to the side of a conveyor. It is effective when you need to place two or more printheads next to each other on the same side of the conveyor.

Tools: 1/2 inch socket wrench
13 mm wrench
5/16 Drill bit



1. Determine the best placement of the vertical base clamps and arrange for plant maintenance to drill the 5/16 mm holes in the sides of the conveyor.
2. Make sure that the clamps line up and are no farther apart than the length of the crossbar.
3. Secure the clamps the conveyor with 5/16 bolts and nuts. Tighten with a 13 mm wrench.
4. Slide the standoff bars into the clamps and tighten in place with the socket wrench.
5. Slide the cross clamps onto to the standoff bars. Do not tighten.
6. Slide all cross clamps for printbars onto the crossbar.
7. Insert each end of the crossbar into the cross clamps on the standoff bars.
8. Tighten the cross clamps that hold the ends of the crossbar to the standoff bars.
9. Insert the printhead-mounting pole with dovetail bracket into the cross clamps and tighten in place.

Mounting printheads on brackets

Printheads for the CIDS/SE system fit into dovetail brackets that allow for precise positioning which is necessary to maintain the optimum throw distance of .125 inch (3 mm).

Guide rails that constrain product movement on the conveyor are necessary to maintain maximum print quality and prevent printhead damage. If the printheads rub against boxes, their orifices clog and missing lines appear in the printed message.

Product handling is very important to the successful operation of this equipment. Severe shocks or vibrations can damage a printhead and cause it to leak ink. Position the printhead to avoid collisions with moving products.

The printhead is enclosed in an industrial housing but is not watertight. Avoid placing it in areas that are frequently washed. If this is unavoidable, cover it during washing.

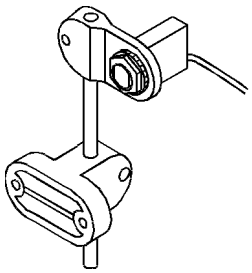
Tools: 1/4 inch hex key
1/2 inch socket wrench
Line level

1. Carefully remove the CIDS/SE printhead from its shipping container. Be sure to leave the front cover plate in place.
2. Loosen the hex socket shoulder screw in the dovetail bracket to allow the printhead to slide in freely.
3. Slide the male dovetail fixture on the base into the dovetail bracket and tighten in place with the hex socket screw.
4. Approximate the printing angle of the printhead and tighten in place with the hex cap screw in the dovetail bracket. Final angle adjustments can not be made until the system can print.

Printheads MUST be level from the front to back. Place a line level on the top edge of the extruded housing and shim the conveyer-mounting clamp as required to level the printhead. If not level, the printheads can leak and deprime.

Mounting the photosensor and encoder

The CIDS/SE System employs a photosensor and a variable-speed encoder. This section details the installation of these peripherals.

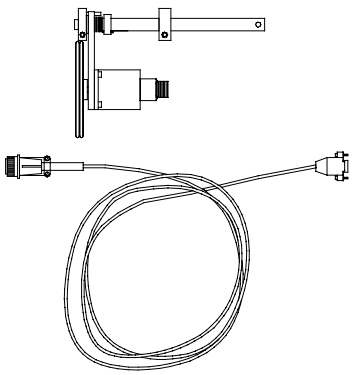


Photosensor

The CIDS/SE System comes with a proximity photosensor that detects the product as it approaches the printing station for coding so it must be mounted upstream of the printhead.

Tools: 5/32 inch Allen Wrench

1. Mount the photosensor to the left of the printhead when the product travels left-to-right and on the right side for right-to-left travel.
2. Place the photosensor on the side and within an inch of the printhead. Keep it close to the printhead to eliminate image area restrictions and line speed limitations.



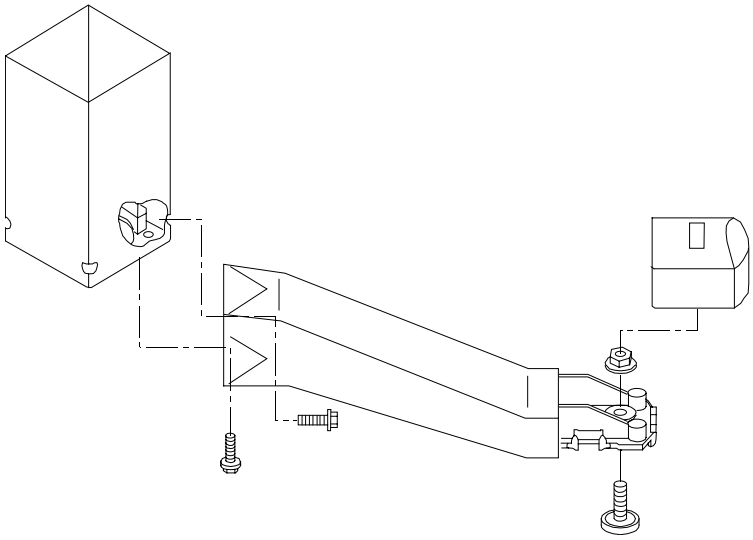
When it is time to cable, start at the interface housing and route the photosensor cable down through the stand column and out to the photosensor. Connect the DB9 connector on the controller end to “Photocell 1.”

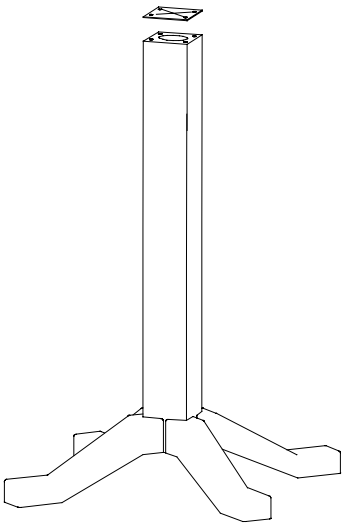
Variable-speed encoder

The variable-speed encoder in the 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.

When it’s time to cable, start at the interface housing and route the encoder cable down through the stand column and out to the encoder. Connect the DB9 connector on the controller end to “Encoder 1.”

Assembling the CIDS/SE floor stand





Assemble the floor stand and mount the interface housing and controller before attempting any cabling or plumbing.

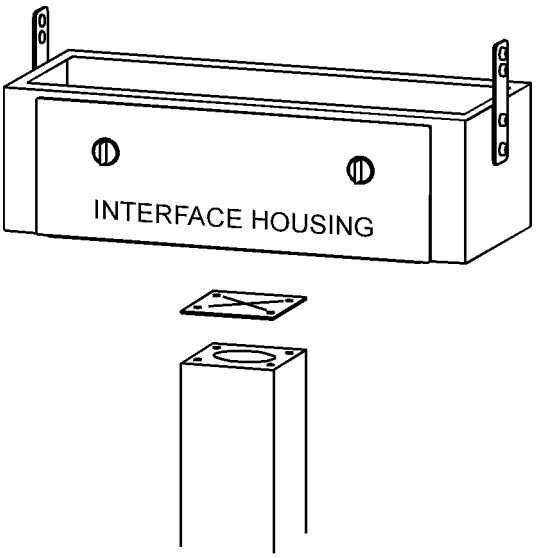
Tools: Ratchet wrench
10 mm socket & 15 mm socket
Utility knife

Stand kit consists of:

1 column
4 legs with fasteners
4 base levelers
4 leg covers
1 adhesive-backed column gasket

1. Connect the legs to the stand column with the provided screws, and fasteners. Tighten in place with a ratchet wrench and a 10 mm socket.
2. Attach the leg levers and tighten in place with a ratchet wrench and a 15 mm socket.
3. Snap the plastic covers onto the leg ends. These covers can be removed later to level the controller when the entire system is assembled and cabled.
4. Remove the backing from the column gasket, line up the holes in the gasket with the four pre-drilled holes in the top of the column and press the gasket into place.
5. Cut an “X” in the gasket to allow the passage of cables and tubing.

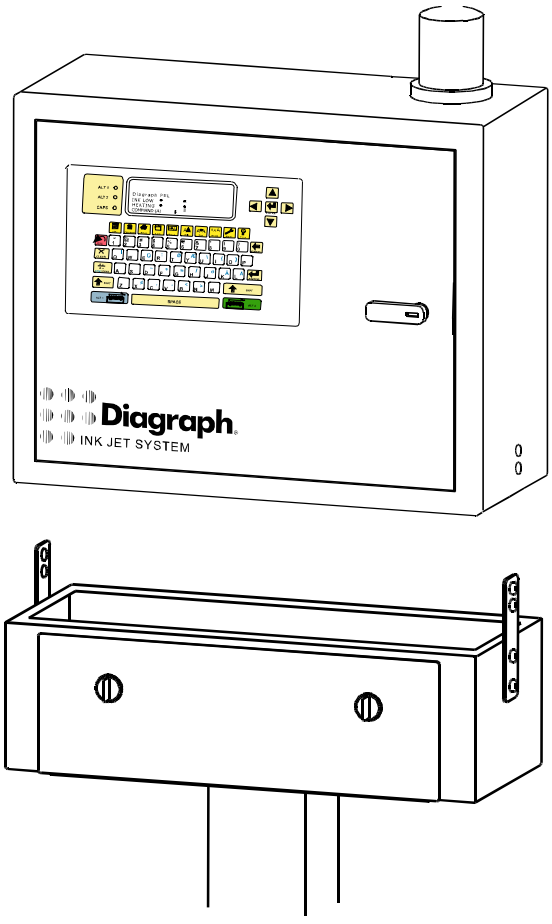
Mounting the interface housing



Tools: Ratchet wrench with 10 mm socket

Attach the interface housing to the stand column with the screws provided with the floor stand. Tighten in place with the ratchet wrench.

Mounting the controller/IDS



Tools: Phillips screwdriver

Match the holes in the controller with the plates on the sides of the interface housing.

Attach the controller the interface housing with the four 1/4—20 fasteners provided in the interface housing kit.

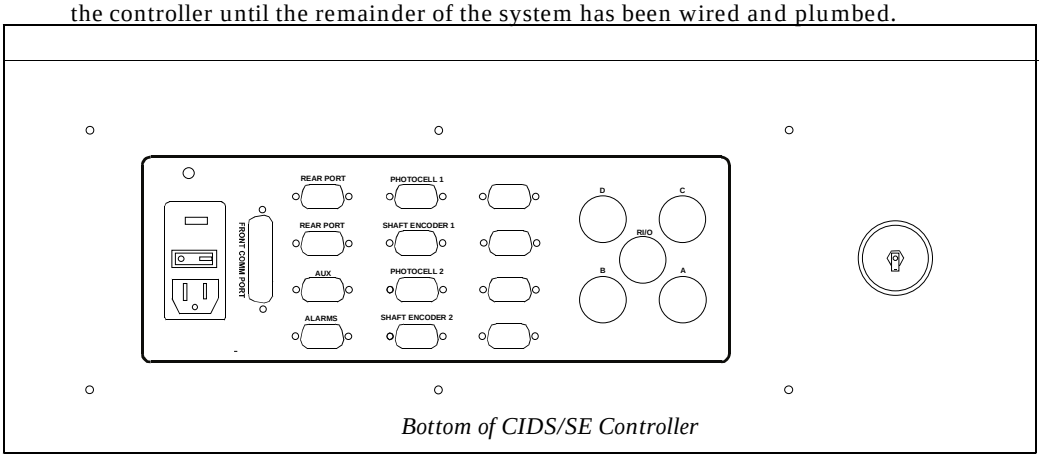
The front of the controller is a hinged door that you will need to open periodically for maintenance. Make sure when you mount the controller that you leave adequate room for the door to swing open completely. During normal use, the door should be closed.

Connecting the controller

The CIDS/SE controller runs on 115 volts, 3 amps, 60 Hz or 230 volts, 1.5 amps and 50 Hz. Select the correct fuse rating and voltage before plugging in the system.
Before plugging in the power cord, make sure that the power switch on the controller/IDS is OFF ("0" on the Power Entry Module).

Proper grounding for the CIDS/SE is critical so make sure that the power outlet for the controller is properly grounded and complies with the proper regulatory authority. See Appendix C for detailed information on testing an electrical outlet.

Starting at the interface housing, drop the 3-prong connector down through the stand column and out to a 3-wire grounded power outlet. Do not connect the power cord to the controller until the remainder of the system has been wired and plumbed.



Bottom of CIDS/SE Controller

Route all cables and ink lines out of the way of moving equipment and personnel access.

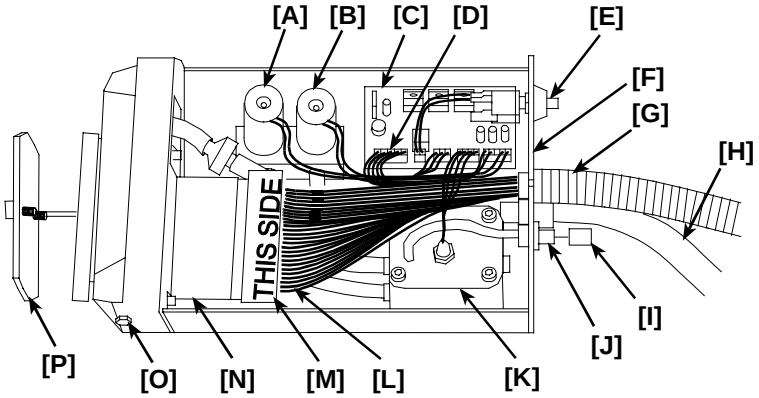
Connecting the printheads

Tools: 22 mm wrench Ohm meter or multimeter
Power to the controller must be OFF when connecting or disconnecting printheads.

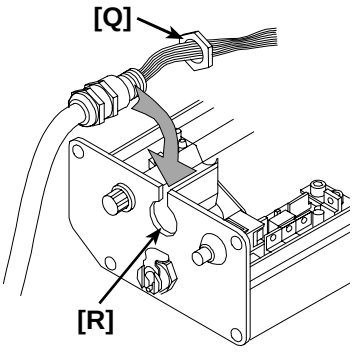
Printhead cables in the centralized system have two connectors at each end: the printhead end has a slotted 44-pin connector with a "This Side Up" label **[M]** and a 6-pin driver board connector **[D]**. The controller end has a 44-pin female connector and a small 4-wire Molex.

Before connecting any printhead cables, open the interface housing and drop all printhead cable ends down through the stand column and out to the printheads.

Wiring the printheads requires removing the printhead cover. Take care while the cover is off to prevent contaminants from entering the printhead. And leave the front cover plate **[P]** in place when wiring the printheads to prevent priming problems.



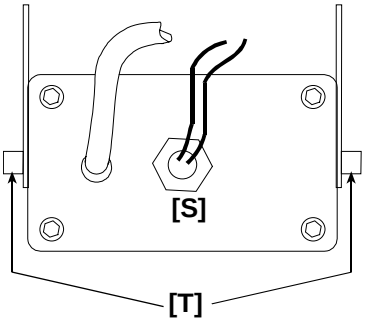
[A] Prime Solenoid
[B] intake Solenoid
[C] Printhead Control Board
[D] 6 Pin Driver Board Connector
[E] Prime Button
[F] Back Plate
[G] Printhead Cable
[H] Ink Supply Line
[I] Vent Cap
[J] Vent
[K] Printhead Reservoir
[L] Red Wire
[M] Printhead Connector
[N] Print Engine
[O] Printhead Purge CapPrinthead Cover
[P] Front Cover Plate



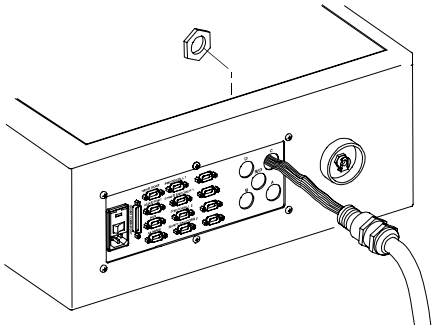
■ Printhead cable connections

1. Remove the four screws from the printhead cover and remove the cover. Identify the components from the illustration above.
2. Loosen the large nut **[Q]** on the printer cable bulkhead fitting.
3. Identify the top of the cable printhead connector from the "This Side Up" label **[M]**. If the label is missing, connect the cable with the red wire **[L]** to Pin 1.
4. Carefully push the female printhead connector **[M]** onto to the male connector on the back of the piezoelectric print engine **[N]**.

DO NOT MOVE THE CONNECTOR ON THE PRINT ENGINE UP AND DOWN. Flexing the connector can crack the piezo crystals and ruin the printhead.



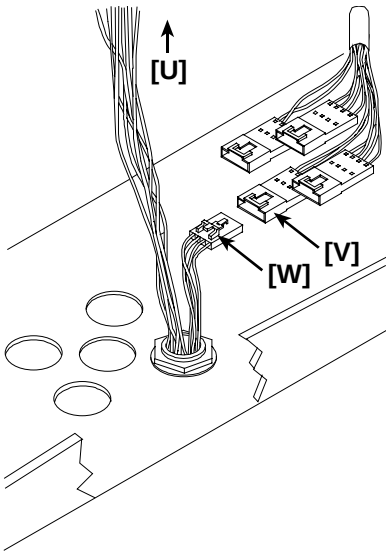
5. Push the 6-pin control board connector **[D]** onto the printhead control board **[C]**.
6. Work the printer cable down into the keyway **[R]** in the back plate.
7. Insert the section of the cable between the nut **[Q]** loosened in Step 2 and the bulkhead fitting through the slotted keyway **[R]**. Rotate the bulkhead fitting counterclockwise about 1½ turns then insert it through the keyway. Finger tighten the nut onto the bulkhead fitting then use a 22 mm wrench to tighten the bulkhead fitting into the nut by rotating it clockwise.
8. The position of the ink reservoir **[S]** in the back of the printhead can be adjusted. Loosen its mounting screws **[T]** and adjust it as close to level as possible.
9. Tighten the reservoir into a level position.
10. Replace the printhead with the four screws.



■ Printhead to controller connections

Connecting the printhead cable to the controller involves two connections: the 44-pin connector **[U]** to the first driver board connection labeled A and the 4-pin Moles connector **[W]** to the ink delivery system **[V]**.

1. Loosen the plastic nut from the bulkhead fitting on the controller end of the printhead cable and slip it over the two connectors. Set it aside.
2. Pass the 44-pin connector through any of the surrounding four holes in the bottom of the controller. Leave the center hole free for Remote I/O connections.
3. Push the 4-pin Molex connector **[W]** through the same hole.
4. Pass both connectors back through the nut removed in Step 1.
5. Push the threaded end of the bulkhead fitting into the cable opening and hand-tighten the nut against the cable's bulkhead fitting
7. Connect the 44-pin female cable connector **[U]** to the first driver board connector marked **A** for the first printhead (see the charts under "Driver Board Switch 1" in Section 3).



8. Connect the 4-pin Molex connector **[W]** to any of the four available IDS connections **[V]**.
9. Use the mulitimeter and check for continuity between the controller chassis ground and any of the screw heads on the printhead faceplate **[P]**. The resistance reading should be 0.11 ohms.

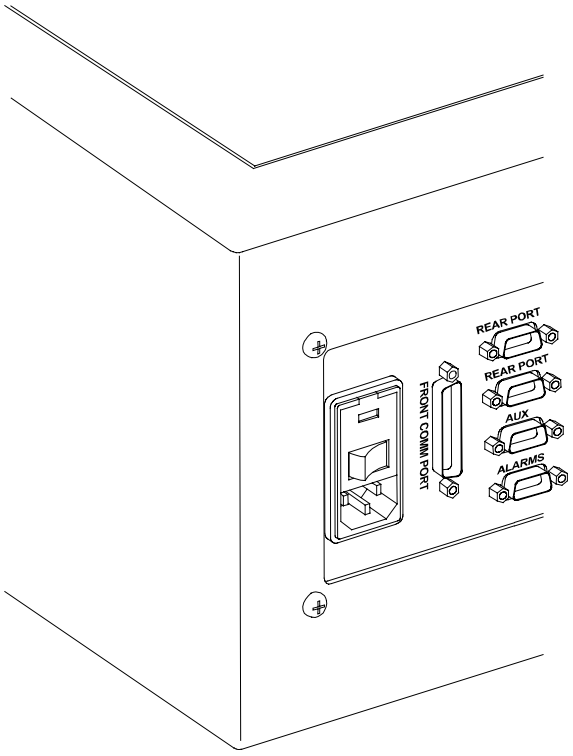
■ Connecting the RS-232 /RS-485 rear communications port

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 PEL Windows software.

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

Connecting the hand-held controller

The cable on the hand-held controller connects to "Front Comm Port" on the bottom of the main controller inside the interface housing.

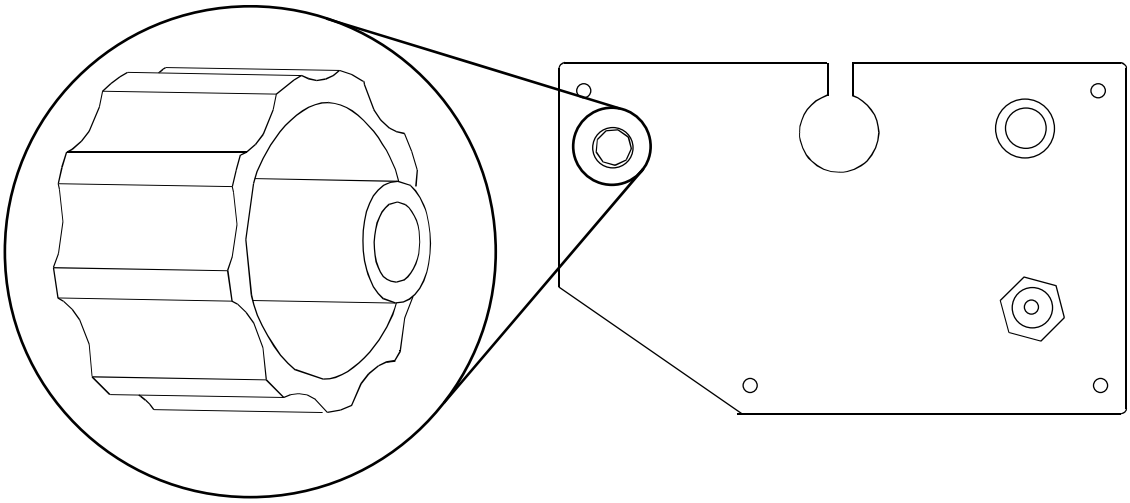


Preparation

Note: The electrical connections between the controller / IDS and the printheads must be completed prior to turning on the power. Failure to do this could cause damage.

The IDS Ink Out connection is located on the bottom of the controller / IDS inside the interface housing. Printheads have Ink In connections on their back plates under the Prime button.

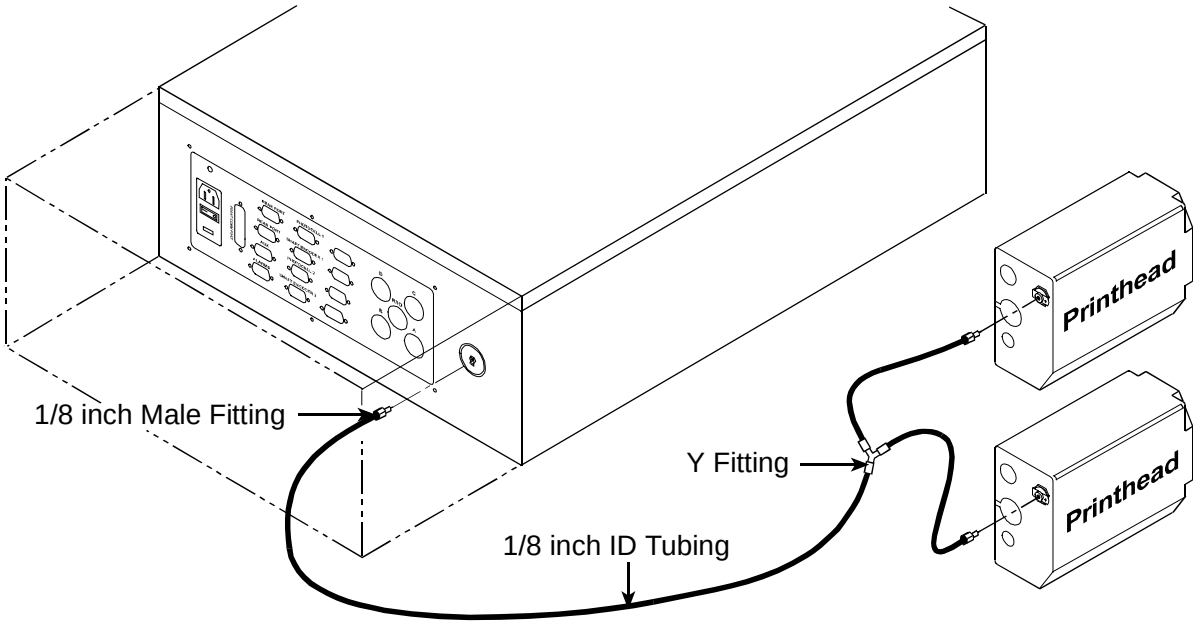
Be sure to remove the vent cap from each printhead before connecting the ink lines.



Tubing

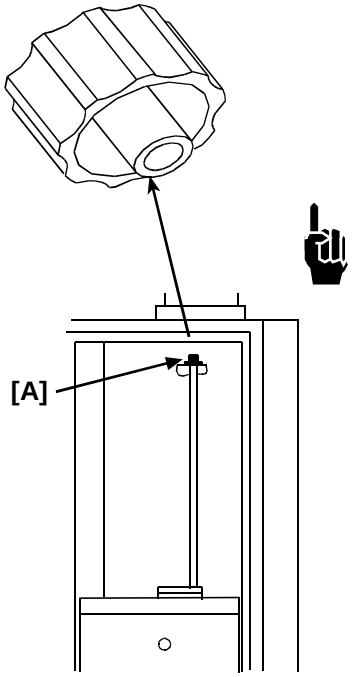
Tools: Utility knife
Clean wipes

Determine the tubing lengths by routing the tubing from the interface housing down through the stand column and out to the printheads. Cut to required lengths.



When routing ink lines, keep them away from moving equipment and anchor them to bracketry whenever possible.

1. Install male 1/8 inch flow couplings on tubing ends for connection to the controller/IDS and to the printheads.
2. Use Y fittings to branch to multiple printheads. Position these fittings so that they do not bear weight or resist movement since they are vulnerable to stress.
3. Connect the 1/8 inch quick-disconnect for ink feed into the IDS. DO NOT CONNECT INK LINES TO PRINTHEADS NOW.



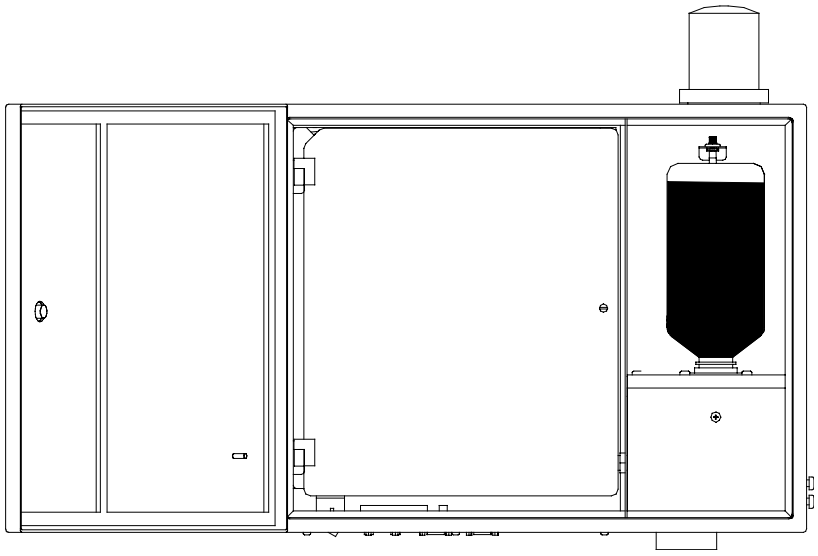
Ink

Use only Diagraph supplied ink in the CIDS/SE system. Use of unapproved inks could damage the system.

1. Remove the ink bottle from bag and peel off the foil and the plastic seal on the mouth of the bottle.
2. Remove the vent cap **[A]** from the vent tube located at the rear of the ink bottle compartment. Store the vent cap in the recessed area in front of the ink storage shelf.
3. Invert the ink bottle and screw into the ink supply fitting. Avoid tightening too much.
4. Power ON the controller/IDS.
5. Hold the printhead end of the ink line into a cloth and depress the quick-disconnect fitting end to open the flow on the fitting.
6. Push the prime button located on the back of the printhead in short pulses. Do not depress for more than 20 seconds at a time.

   Ink will fill the ink line, purging the system of air. Continue short presses until ink just starts to flow out of the fitting. Repeat this process for each section of tubing until the main line and all the branches connected with Y fittings are filled with ink.

   Operating pressure in the ink lines is low but during a purge it can increase by a factor of ten. Take appropriate precautions when purging the system.
7. Shut off the controller/IDS and connect the ink line to the appropriate printhead.



3

Hardware Configuration

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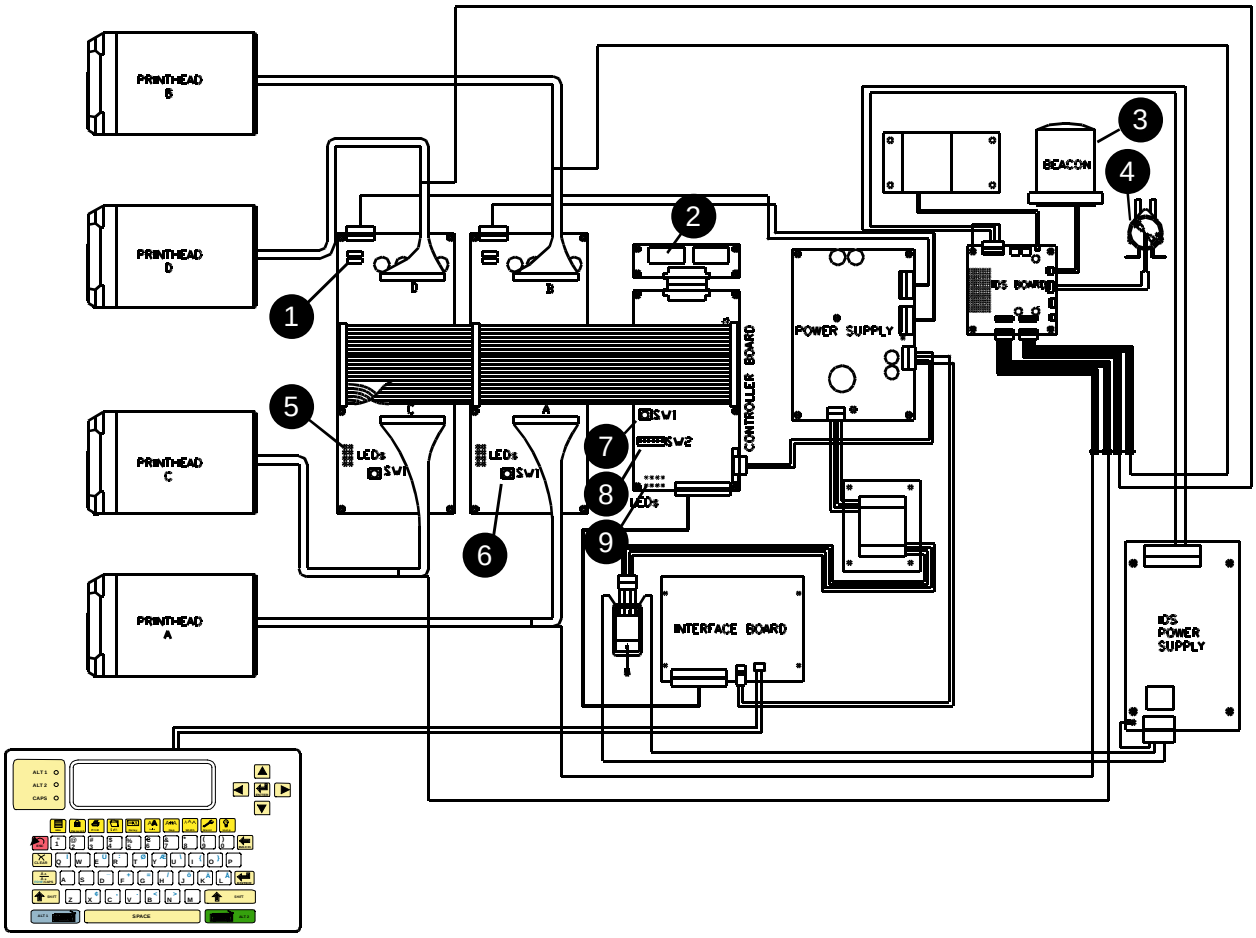
System installation involves configuring the printhead and setting the communication parameters for the system.

The diagram below shows the connections of a CIDS/SE system configured with four printheads.



❶ PICO fuses, 2 Ampere (P/N 6600-830)
❷ Firmware
❸ Low ink alarm beacon
❹ Pump
❺ Driver Board LEDs that report printhead and heater status.
❻ Switch SW1, CPU Board; sets baud rates.
❼ Switch SW1, Driver Board; configures printheads.
❽ CPU Board switch SW2. Sets parameters for various devices connected to the controller. See illustration on page 3-5.
❾ Diagnostic LEDs.

Controller configuration

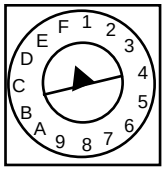
The PEL Centralized System can control three models of PEL Printheads. The chart following lists models and characteristics.

96/32 Printhead (2460-796)	192/32 Printhead (2460-792)	352/32 Printhead (2460-700)
32 channels x 3 rows = 96 orifices	32 channels x 6 rows = 192 orifices	32 channels x 8 rows = 352 orifices
Print height solid character = .75 in. (19 mm) tall	Print height solid character = 1 in. (25 mm) tall	Print height solid character = 2 in. (51 mm) tall
Head angle for solid character = 27º	Head angle for solid character = 32.3º	Designed for solid characters only; slant value = 0º.
Maximum character height = .75 in (19 mm)	Maximum character height = 1.75 in. (45 mm)	Maximum character height = 2 in. (51 mm)
Operates at 140º F (60º C) with 90 volt DC maximum voltage requirement.	Operates at 140º F (60º C) with 90 volt DC maximum voltage requirement.	Operates at 140º F (60º C) with 150 volt DC maximum voltage requirement.

The CPU board has switches to be configured for different applications. The diagram at the beginning of this section shows the location of these switches.

CPU board switch 1

SW1



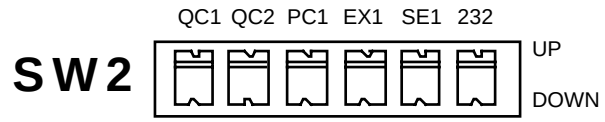
Switch SW1 selects the baud rate for the front and rear COM ports. Both ports must be configured for the correct baud rate or the communications link will fail. When using the handheld terminal, the front COM port must be set at 9600 baud. The rear port will automatically be set to 9600 baud. The switch setting for this example will be (A) as shown following.

CPU SWITCH SETTINGS FOR VARYING BAUD RATES

SW1	Front Port	Rear Port
0	2400	2400
1	2400	4800
2	2400	9600
3	2400	38400
4	4800	2400
5	4800	4800
6	4800	9600
7	4800	38400
8	9600	2400
9	9600	4800
A	9600	9600
B	9600	38400
C	19200	2400
D	19200	4800
E	19200	9600
F	19200	38400

CPU board switch 2

Switch 2 sets parameters for the various devices that connect to the PEL Controller.



Switches QC1, QC2 and PC1 should always be UP unless your system employs multiple controllers working from a single encoder.

QC1 Selects the shaft encoder type for Encoder 1, which can drive printheads A, B or A, B, C, D. The switch position for this switch is up. Only Diagraph supplied encoders should be used for this system.

QC2 Selects the shaft encoder type for Encoder 2, which can drive printheads C, D in a multi-tasking application. The switch position for this switch is up. Only Diagraph supplied encoders should be used for this system.

PC1 Selects multi-tasking or non-multi-tasking for product detection. It allows the system to use one or two photocells. Switching it down will select two photocell inputs for multi-tasking, Photocell 1 and Photocell 2. Photocell 1 will signal printheads A, B and Photocell 2 will signal printheads C, D. Switching it up will select one photocell input for non-multi-tasking. Photocell 1 will signal printheads A, B, C, D in this configuration. The normal position is up.

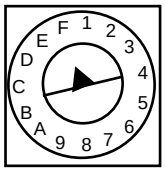
EX1 Determines whether to run on an internal clock or whether an external device is being used for simulating printing speeds. For an external line speed monitoring device-shaft encoder-set the switch in the up position. For an internal clock with line speed simulation, set this switch in the down position. The typical Diagraph system configuration employs a shaft encoder so the normal switch position is up.

SE1 This switch selects multi-tasking or non-multi-tasking for line speed monitoring, selects the use of one or two shaft encoders. Switching this switch up will select one shaft encoder, Encoder 1, which will drive printheads A, B, C, D. Switching this switch down will select two shaft encoders, Encoder 1 and Encoder 2. Encoder 1 will drive printheads A, B and Encoder 2 will drive printheads C, D.

232 This switch selects RS-232 or RS-485 communications for the Rear Communications Port. Switching this switch up will select RS-232 serial communications and switching it down will select RS-485 serial communications. Configuration for RS-485 also requires that the two-position switch on the I/F board to be set on 485.

■ Driver board switch 1

SW1



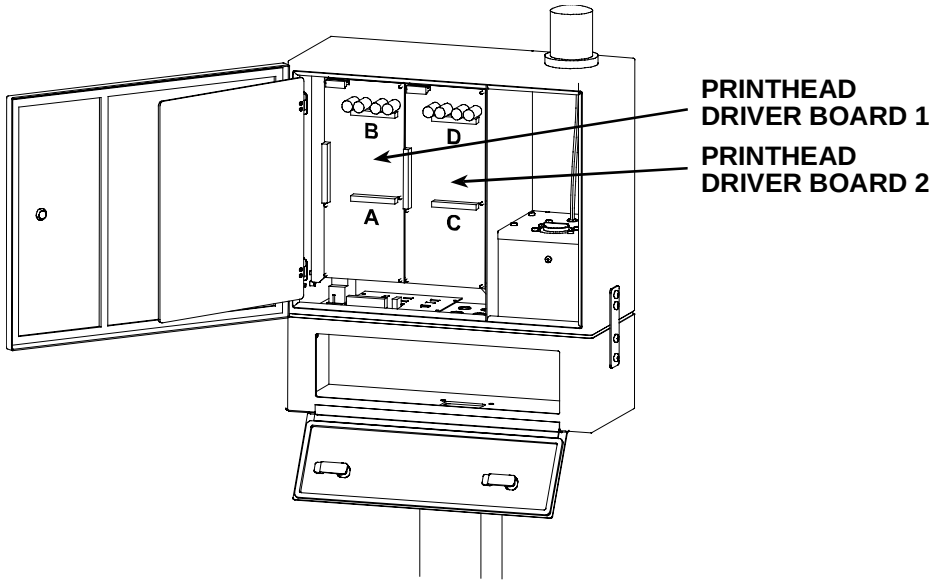
The printhead driver board has one switch which should be configured to factory default. Switch 1 sets the amount of voltage sent to the printhead(s) according to the type of printhead you are using. Use the chart below for voltage setting.

PRINTHEAD DRIVER BOARD 1

SWITCH SETTING	HEAD A	HEAD B
0	OFF	OFF
1	OFF	Not Used
2	OFF	9600
3	OFF	1920/3520
4	Not Used	OFF
5	Not Used	Not Used
6	Not Used	9600
7	Not Used	1920/3520
8	9600	OFF
9	9600	Not Used
A	9600	9600
B	9600	1920/3520
C	1920/3520	OFF
D	1920/3520	Not Used
E	1920/3520	9600
F	1920/3520	1920/3520

PRINTHEAD DRIVER BOARD 2

SWITCH SETTING	HEAD C	HEAD D
0	OFF	OFF
1	OFF	Not Used
2	OFF	9600
3	OFF	1920/3520
4	Not Used	OFF
5	Not Used	Not Used
6	Not Used	9600
7	Not Used	1920/3520
8	9600	OFF
9	9600	Not Used
A	9600	9600
B	9600	1920/3520
C	1920/3520	OFF
D	1920/3520	Not Used
E	1920/3520	9600
F	1920/3520	1920/3520



4

Operations

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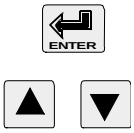
Before the system can be operated, all connections must be complete. Follow the first start routine described below to start the system for the first time.

Default system settings



Make sure that system variables have been set to the defaults listed below before attempting a start-up. See Section 5 for complete information on software commands and limits. Commands can also be entered by pressing the MENU button and using the arrow keys to scroll through command selections.

CIDS/SE Command	HW	SW	Keypad Entry	352/32 Printhead Value	192/32 Printhead Value	96/32 Printhead Value
Type Head		X	TH (ENTER)	Select 352 Head Type	Select 192 Head Type	Select 96 Head Type
Encoder		X	EN command must agree with EX1 switch.	Y = encoder N = internal clock	Y = encoder N = internal clock	Y = encoder N = internal clock
	X		EX1 switch on SW-2 must agree with EN command.	UP = encoder DOWN = internal clock.	UP = encoder DOWN = internal clock.	UP = encoder DOWN = internal clock.
Offset		X	OF*nn*(ENTER)	*nn = 8*	*nn = ∅*	*nn = ∅*
Long Bar		X	LO*nn*(ENTER)	*nn = 32*	*nn = 32*	*nn = 32*
Slant		X	SL*nn*(ENTER)	*nn = ∅*	*nn = 7*	*nn = 7*
Width		X	WI*nn*(ENTER)	*nn* = 2 (with a 142/213 DPI encoder, P/N 2460-710)	*nn* = 3 (with a 142/213 DPI encoder, P/N 2460-710)	*nn* = 3 (with a 142/213 DPI encoder, P/N 2460-710)

First start routine

1 Turn ON the power to the Controller and the IDS.

2 Open the door of the controller/IDS and check to see that all breaker (voltage) LED's are lit. If not, see Section 6 on troubleshooting.

3 Observe the PC1 or PC2 LED to verify that it lights with photocell activation.

4 Observe the SE1 or SE2 LED to verify that it lights when the shaft encoder turns.

```
DIAGRAPH      PEL
INK LOW   *A    *
HEATING   *ABCD*
COMMAND(A)    :
```

5 Check the Keypad LCD for the display shown at left.

6 If this prompt does not appear, refer to the Trouble-Shooting Section. If the prompt comes up partially, or the command screen appears scrambled, the correct terminal type must be selected using the display command (refer to Section 5, Programming).

7 The example shows a screen for a system with four printheads: A, B, C, D. If your system has only one printhead, line three will show *A *.

8 Observe the heating status line on the keypad LCD. When the printhead(s) have heated, the corresponding letter for the head (A or B) will disappear. Even though the LCD will indicate that the printheads have reached operating temperature in 3 to 5 minutes, allow them to continue to heat an additional 10 minutes.

NOTE: Operating temperature for the piezoelectric printhead is 140˚ which is constantly maintained by the system.

9 Remove the front cover clip and store it inside the controller / IDS.

10 Purge the printhead by placing an absorbent wipe over the orifices while simultaneously pushing the Prime button.

11 Push the Prime button until the nozzles expel ink.

12 Gently wipe upward along the face plate to absorb any ink on the surface. Repeat until the face plate is clean.

After completing this start-up routine, the printer is ready for operation. See Section 5 for message entry and printing.

If one or two channels do not print after purging, replace the front cover plate and allow the printheads to sit idle with the system powered ON (heating) for 60 minutes. This long heating period will draw out any tiny bubbles that block the passage of ink through the printhead.

Daily start-up routine

Successful completion of the start-up routine requires a moving conveyor to turn the encoder and some test containers to trigger the photosensor.

Printheads MUST be level from the front to back. Place a line level on the top edge of the extruded housing and shim the conveyer-mounting clamp as required to level the printhead.

1. Power on controller / IDS and allow the printhead(s) to heat for 10-15 minutes.

   When the "A" disappears under the heating status line, the printhead has reached operating temperature.

2. Remove the printhead front cover plate.

3. Hold a lint-free wipe on the orifice plate for at least one minute to absorb any excess ink and wipe the orifice plate clean before starting to print.

   During start-up, the printheads heat up and weep a small amount of ink. This weeping is normal due to the expansion of heated ink and will be present any time the controller cycles on and off for one minute or more.

4. If printhead requires purging, place a lint-free wipe on the orifice plate and push the prime button on the back of the printhead for less than 1 second.

   Do not press the prime button on the printheads for more than one second because purging requires only a quick pulse. If you try pressing the prime button for more than one second, be sure to cover the orifice plate with a lint-free wipe and hold it in place until ink weeping stops.

5. Hold the wipe on the orifice plate for approximately one minute to absorb excess ink and wipe the orifice plate clean before starting to print.

6. Repeat as necessary until all channels are printing. If one or two channels fail to print after purging, replace the front cover plate and allow the printhead to sit idle for 60 minutes with the system powered on.

7. Type TE and press ENTER to run the Test command.

8. Trigger the photosensor to ensure that all 32 channels are operating.

Daily shut-down routine

Diagraph recommends leaving the system powered ON for normal day-to-day operation. With the system ON, no maintenance should be required.

If the system is shut down for short lengths of time (less than one day) the printhead should not require any maintenance other than a possible purge during start-up. The front cover is not required except for extended shutdowns of one day or more. Specifically, allow the printhead to cool down for 10 to 15 minutes after the IDS and controller are off. Wipe the front plate clean with a lint-free cloth and then replace the front cover plate. Hand-tighten until snug on the printhead.

NOTE: If you place the front cover on a hot printhead and do not fasten it securely, the printhead will weep ink until the head cools down.

Cleaning and priming the printhead

Tools and supplies

5/64" hex key

Lint free wipes, box of 100 (Diagraph PN 6600-396)

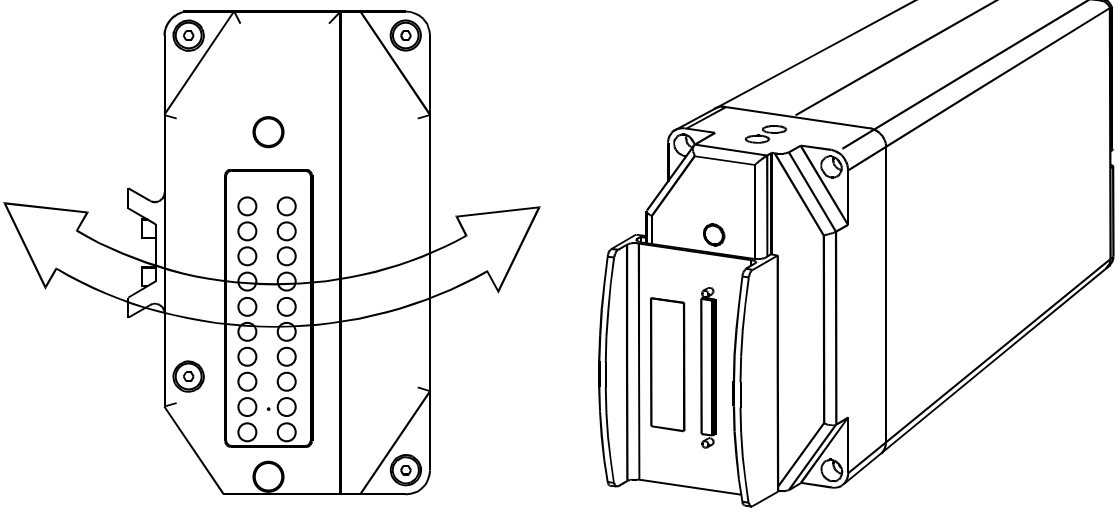
Hand cleaner, 6 oz. Tube (Diagraph PN 1901-398)

TEST
TEST
TEST

Perform daily, or when printing like samples at left

1. Place a clean, lint free wipe over orifices.
2. Push the prime switch until ink runs from the orifices.
3. Gently wipe side to side along the narrow dimension to absorb ink. Repeat with a clean wipe.
4. Do not rub hard, upward or in a circular motion, to avoid clogging the orifices with fibers.

Install the front cover



1. Clean and prime printhead as previously described.
2. Wait 15 minutes after turning off power before attaching the front cover, or the printhead will leak ink.

3. Clean the front cover with a clean wipe.
4. Attach the front cover to the face plate, taking care to align the rubber tips on the back of the cover with the rub buttons on the face of the printhead.

NOTE: If you place the front cover on a hot printhead and do not fasten it securely, the printhead will weep ink until the head has cooled down.

Flushing the printhead

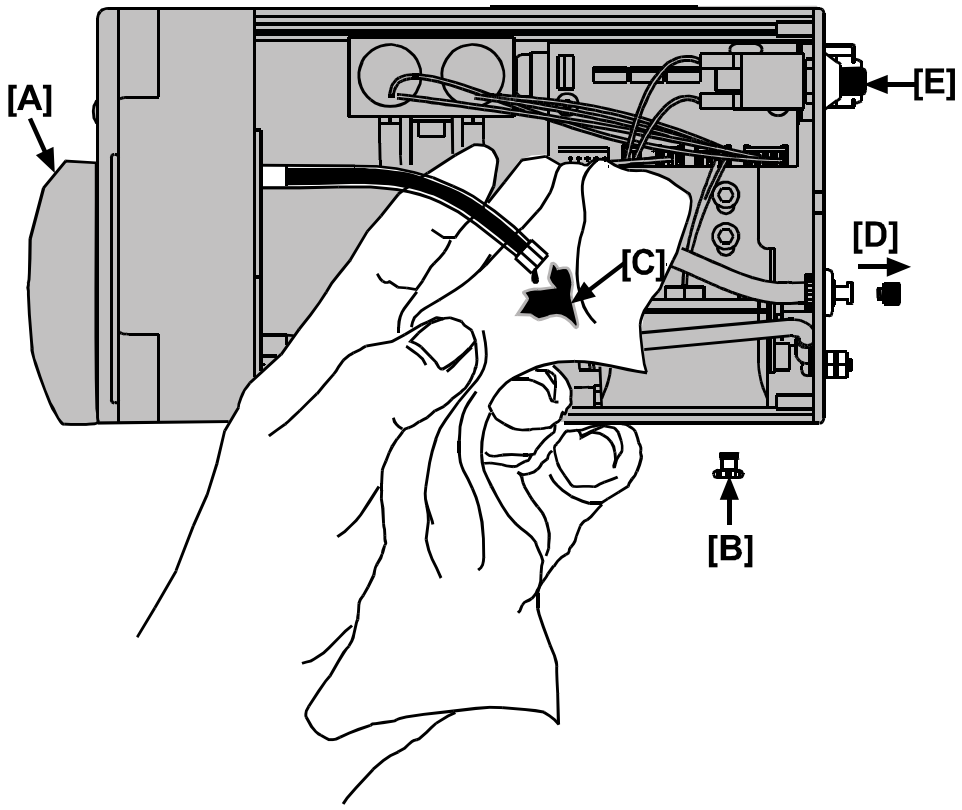
Perform when printing looks like samples on previous page.

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

On rare occasions, debris will enter through an orifice or an air bubble may be ingested. Both circumstances produce a gap in the print. Take the following steps to expel the debris or air bubbles.

Wear suitable eye protection whenever handling ink.

1. Allow the printhead 10 to 15 minutes to warm up.
2. Use a 5/64" hex key on screws and remove the printhead top cover.



3. Clean and prime as previously described. Snap on faceplate cover. Make sure that it is installed in the correct position with tips in line with the rub buttons on the face of the printhead **[A]**.
4. Remove the vent cap **[D]**. This cap is for shipping only and must be removed before operation.
5. Remove the luer plug **[B]** from the printhead drain line.
6. Place an absorbent wipe under the drain line to catch ink as you flush **[C]**.

7. Push the prime switch **[E]** for 5 seconds of ink flow while watching for air bubbles.
8. Repeat until ink flows without air bubbles.
9. Replace the luer plug while pushing the prime switch to keep ink flowing through the drain line and prevent air from entering. Do not over-tighten the fitting.
10. Leave the faceplate cover on for an additional 5 to 10 minutes; push the prime switch once before removing the faceplate cover. Clean and prime as previously described.
11. Wipe off the outside of the printhead.
12. Check that all orifices are working by printing a message in font 31. If the test print shows striping like the samples on the previous page, repeat this flushing procedure.

This procedure may have to be repeated three to five times to be effective. When print samples are satisfactory, replace the top cover of the printhead.

If these steps are not effective, please call your local Diagraph representative to arrange for cleaning and repair.

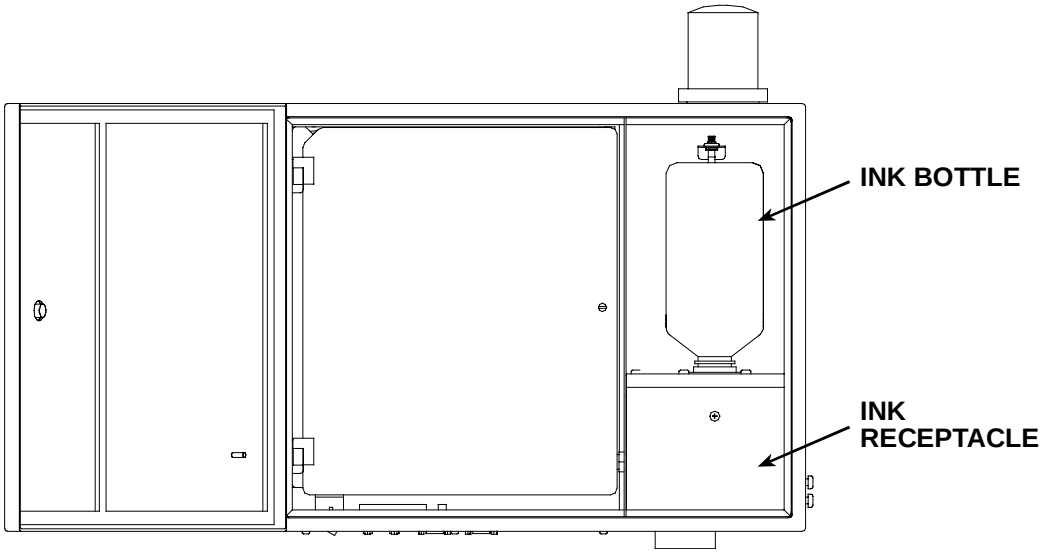
Replacing the ink container

The low ink beacon will light when ink is low. Change the ink bottle as soon you observe this condition.

The system can continue to print without deterioration in print quality if you change ink promptly

Wear suitable eye protection whenever handling ink.

Use only Diagraph-supplied ink in the CIDS/SE system. Use of unapproved inks could damage the system.



1. Open the door on the controller / IDS.
2. Unscrew the old ink bottle from the ink supply fitting and set aside. Make sure that the bottle gasket stays inside the reservoir fitting and does not stick to the empty bottle.
3. Remove the new Diagraph-supplied ink bottle from its bag and peel off the foil seal on the bottle mouth. Make sure that the foil seal is completely removed before setting the bottle into the reservoir fitting.
4. Invert the new bottle and screw it into the ink supply fitting.
5. Dispose of the old ink bottle in accordance with state and federal regulations regarding chemical waste products.

Preventive maintenance

PROCEDURES	Daily	Weekly	Quarterly
Clean and prime printhead	●		
Clean outside of controller / ink delivery cabinet		●	
Clean outside of printhead thoroughly		●	
Clean photosensor lens			●
Check that mounting hardware is secure			●
Check that all electrical connections are secure			●
Check that all ink tube fittings are secure			●

Establish and follow a preventive maintenance program for reliable operation of this CIDS / SE printer.

5

Programming

ENGLISH
DEUTSCH
ESPAÑOL
FRANÇAIS
ITALIANO

Control Options

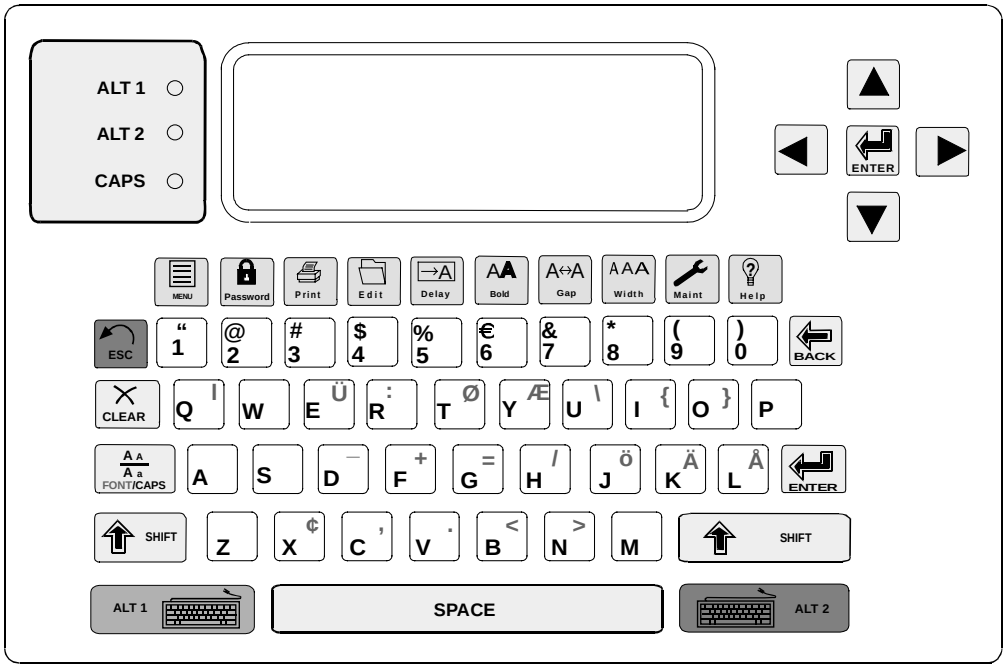
Either the keypad controller or a host computer can control the CIDS/SE printer. The host PC connects to the Rear COM Port.

The control commands through the rear port are concise with no prompts because this system has been designed for speed in control and data transfer.

The CIDS/SE controller can store 100 messages of 99 characters each.

Keypad Controller

The keypad controller, with its four-line LCD display, provides menus for setup and installation of the system and creation of messages and bar codes.



Command Screen

The Command screen consists of three lines of information followed by a command line. The first line shows the system identification. The second shows ink status and will display an "A" between the asterisks when the ink is low. The third line displays the status of the printheads as they heat up—this occurs during normal operation to keep the ink at printing temperature.

When at the COMMAND screen, the CIDS/SE is ready for a new command. Enter a command by typing the first two letters of the command name as shown in the command table (see Command Summary, next page), or push the MENU button, scroll through commands with the arrow keys and select commands with the ENTER button.

Wherever possible, the system will try and 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 change only part of the command. For example, in the date command, the month can be edited while leaving the year and day unchanged.

Saving Changes

Press ENTER to save changes to a command, or ESC to abort.

Command Summary

The commands listed below are used via the keypad controller and by the rear COM port. Entering a command simply consists of typing the first two letters of that command. Command types are described below.

Command	Description	Type	Range [Default]
ACk	Acknowledgment	U	Y / N [N]
AUto print	0 – disables, 1-9999 acts as delay between print cycles	U	0-9999
BOld	Sets the width of the printed characters	E	0-9 [0]
CAll	Used to call a parameter group	U	0-31 [0]
CLear map	Clears input and print buffers	U	Y / N [N]
COunters	Indicates the current status of the incrementing counters ***(display only)***	U	No range
DAte	Sets or displays the current date	C	
DElay	Controls print location	E	0-9999 [777]
DIsplay	Display	C	1-4 [3]
EDit	Allows message entry and editing	E	0-99
ENcoder	Selects the optional variable-speed encoder	C	Y / N [Y]
EXpir. date	Allows setup for expiration date	C	0-999 [0]
FOrmat date	Specifies order of month, day, year and separators (i.e. -/)	U	
Four **D**igit date	Switches between 2 and 4 digit year for embedded commands	U	
GAp	Sets the spacing between characters	E	0-99 [01]
HEad	Selects a printhead for changes	C	A-D [A]
ID*	Assigns a network identity to the controller*	U	1-99 [1]
INvert	Turns message upside down	C	Y / N [N]
Ink **U**sage	Estimates ink usage per 1000 images printed	U	
Label **R**equest*	Retrieves labels from SystemMaster*	U	
Label **S**ave*	Saves labels to SystemMaster*	U	
LOng Bar	Sets the height of bar codes	C	1-32 [8]
NEtwork	Enables network operation	C	Y / N [N]
NUmbers	Allows setup of product count routines	U	0-99999999
OFfset	Timing control for dual column 352 printhead	U	0-99 [8]
Pass**W**ord	Enables password protection and changes	C	Level 1, 2 or 3 1 "inkjet" 2 "111111111111111" 3 None
Photocell **C**ounter	Sets photocell counter	U	
Photocell **L**og	Indicates the current status of the photocell counter	U	
POsition	Adjusts vertical position of a message	U	0-32 [0]
REverse	Reverses the printed message	C	Y / N [N]
ROllover	Allows setup of printing auto shift codes	U	00:00:00 (midnight) to 23:59:59 00:00:00
SAve	Saves a parameter group	U	0-31 [0]
SElect	Selects the messages to print	E	0-99 [last selected]
SHift	Allows setup of three different auto shift codes	U	1-3 [1]
SLant	Adjusts the angle of the printed message	C	0-31 [7]
SMall bar	Sets height of the small bar of bar codes	C	1-32 [16]
STatus	Displays the status of the printer (***keypad controller only***)	U	
TEst	Test prints all 32 channels	U	
Type **H**ead	Selects printhead type	C	0-4

TIme	Sets or displays the current time	C		
TRigger Edge	Polarity of the product detect signal	C	R/F	[R]
VErify	Allows verification of graphic download	U		
WIdth	Controls the printing resolution	C	1-255	[1]
ZAp	Resets all parameters to default settings	U	Y/N	[N]

*Command used only in network configurations

Command Structure

The CID/SE controller has three types of commands: Configuration, Editing and Utility. The Configuration commands are used during the setup of the printer. Incorrect use of these commands 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.

Configuration Commands

The following commands configure the CIDS/SE system for printing:

Date	**Invert**	**Slant**
Display	**Long Bar**	**Small Bar**
Encoder	**Network**	**Time**
Expiration Date	**Offset**	**Trigger Edge**
Head	**Reverse**	**Width**

Utility Commands

Utility commands provide diagnostics, printing adjustments and specialty tools for the advanced user:

Acknowledge	**Number**	**Set Test**
Call	**Offset**	**Shift**
Clear Map	**Position**	**Status**
Counters	**Rollover**	**Zap**
Identity	**Save**	

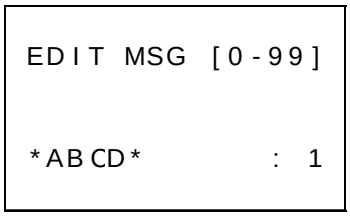
Editing Commands

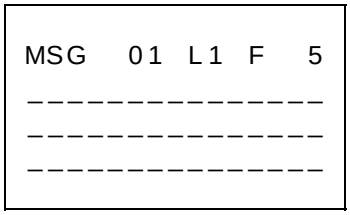
Five commands enable you to edit messages, store messages, select messages for printing and change the appearance of the printed message:

Bold	**Edit**	**Select**
Delay	**Gap**	

Note that the EDIT command and SELECT command work together to print a programmed message. The next section provides an example of creating and storing a message.

Text Messages





Creating a Message

This section details how to create a simple message with the handheld terminal. With battery-backed RAM, the CIDS/SE controller can store up to 100 messages of 99 characters each.

1. At the Main Menu Command prompt type ED. This command allows you to create and edit messages as well as select fonts and set the boldness of the font.

2. Type a message number (1 in this example) and press ENTER.

   Messages can be as long as five lines with a short font such font 05 that is only 5 dots high. Use the up and down arrows to scroll to the last two lines of the message field.

```
MSG  01 L1 F  5
TEST PRINT TEST
_______________
_______________
```

3. Message 1 will print using Font 5. To change the font, press ALT + FNT (3) and then ENTER. The cursor will move to the upper right. Select the font number from the font chart at the end of this chapter. **NOTE:** Fonts 5, 7 and 9 require leading zeros.
4. Type your message. Use the ALT + down arrow to go to the next line.
5. Press ENTER when your message is complete. The screen returns to the Command/Status prompt.

Editing Messages

You can edit your message, or change fonts, on the CIDS/SE while it is idle or while printing. In order to see the changes in your message, you must save the message then select it again.

```
MSG  01 L1 F105
TEST PRINT TEST
_______________
_______________
```

1. Type ED, select the number of the message to edit and press ENTER.
2. Make your changes and press ENTER when finished.

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

Bar Code Printing

This section assumes reader familiarity with bar code types and attributes.

Symbologies

The CIDS/SE can print several standard bar codes and bar code subsets. The chart that follows identifies those bar codes, their characteristics and the fonts to print them. The "Encodes" column stipulates the message as upper case (U), lowercase (L), digits (D) and control characters (C); and "HR" identifies those fonts which print human readable text.

Symbology	Length	Encodes	Font	HR
Code 128	2—50	U D C	43 97	Yes No
Code 39	2—50	U D	42 93	Yes No
EAN 13	13	D	40	
EAN 8	8	D	41	
Interleaved 2 of 5	1—30	D	92	
POSTNET		D	90	
Postnet (6 line)		D	95	
UCC/EAN-128	19	D	46	Yes
UPC A	11	D	98	
UPC Canadian 90%	1—30	D	4	
UPC E	6, 11	D	99	
UPC SCS (with HR)	1—14	D	94	Yes
UPC SCS	1—14	D	96	

```
EDIT MSG [0-99]

*ABCD*          :23
```

Creating a Bar Code with Default Values

1. Type ED At the Main Menu prompt. The screen will show the message selection screen with the last active message number in the lower right corner.

```
MSG 24   L1  F 16
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
```

2. Type a message number and press ENTER. The screen will show the message creation screen. The example at left shows that message 24 (MSG 24) is new (blank lines), the cursor is on line 1 (L 1) and the default font is 16 (F 16).
2. Press ALT + FNT and the cursor will move to the upper right corner of the screen.

```
MSG  24 L1 F994
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
```

3. Type a boldness value (9 in the example) and a font value (94 for UPC shipping container). Note that boldness affects only the human readable part of the bar code, not the bar code elements.

```
MSG  24 L1 F994
0001234567890_ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
```

5. Type in your bar code data. You must know the parameters of the bar code that you are creating. For example, an I 2 of 5 bar code is numeric only.

   The next four entries in descending order after the message (lines 2 to 4), define the wide bar, the narrow bar, the wide space and the narrow space.
6. Press ENTER to accept the default values for the wide/narrow bar width and the wide/narrow space width. The screen returns to the Command/Status prompt.

```
SELECT     [0-99]
*A    *
MSGS :11-12-13
14-15-16-   -
```

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

   The Select command allows you to print a string of messages. If the screen shows a string such as the example at left, move to each message by pressing the right arrow, and blank out a message by pressing the BACK button. 

8. Move to the first message position (left arrow) and type the number of your bar code message. DO NOT ENTER LEADING ZEROS in message numbers because zeros will lock up the system.
9. Press ENTER to print

Changing Bar Code Default Values

As shipped, the default specifications for the 62.5% UPC Container Bar Code (font 94) are correct. The 3520 printhead however provides multiple magnifications—62.5%, 70%, and 80%— and requires different bar width and space values. The example that follows details the changing of defaults to accommodate the 3520 printhead.

UPC Container Code for a 3520 Printhead

1. At the Main Menu Command prompt type ED. Type the message number and press ENTER.

```
MSG  24 L1 F994
0001234567890_ _
wide bar  26 _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
narr. bar 9  _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
wide space  28
narr. space 11
```

2. Type your bar code data, then press the down arrow to move to the next line.

```
BOLD              [ 0 - 9 ]

*A     *                : 0
```

The next four entries, in descending order (lines 2 to 4), define the wide bar, the narrow bar, the wide space and the narrow space.

3. Enter the value 26, then press the down arrow.
4. Repeat and on the following lines enter the values 9, 28 and 11. The display will scroll up as the cursor moves down. Enter only one value per line.
5. Hold down ALT and press FNT.

   Enter 994 (bold 9 and font 94). The Bold value of a bar code message affects only the human readable text—it does not change the bar code.
6. Press ENTER to complete the edit.
7. Assign a global BOld value of 3 to center the human readable text. Type BO, 3 under the bar code and press ENTER.

NOTE: Some bar code widths vary due to text content. The global BOLD and message bold values may have to change depending on the text.

Long Bar Command

The CIDS/SE Long Bar command (LO) sets the vertical height of a bar code. The tables following show the values to enter with the LO command and how those values translate into height in inches.

The value range of 1 to 32 corresponds to the 32 separate ink channels in the CIDS/SE printhead. Identify the model of printhead in your system before using the values in the charts below.

1920 Printhead

Value	Height (Inches)	Value	Height (Inches)	Value	Height (Inches)
1	**0.03**	12	**0.36**	23	**0.69**
2	**0.06**	13	**0.39**	24	**0.72**
3	**0.09**	14	**0.42**	25	**0.75**
4	**0.12**	15	**0.45**	26	**0.78**
5	**0.15**	16	**0.48**	27	**0.81**
6	**0.18**	17	**0.51**	28	**0.84**
7	**0.21**	18	**0.54**	29	**0.87**
8	**0.24**	19	**0.57**	30	**0.90**
9	**0.27**	20	**0.60**	31	**0.93**
10	**0.30**	21	**0.63**	32	**0.96**
11	**0.33**	22	**0.66**		

3520 Printhead

Value	Height (Inches)	Value	Height (Inches)	Value	Height (Inches)
1	**0.06**	12	**0.72**	23	**1.38**
2	**0.12**	13	**0.78**	24	**1.44**
3	**0.18**	14	**0.84**	25	**1.50**
4	**0.24**	15	**0.90**	26	**1.56**
5	**0.30**	16	**0.96**	27	**1.62**
6	**0.36**	17	**1.02**	28	**1.68**
7	**0.42**	18	**1.08**	29	**1.74**
8	**0.48**	19	**1.14**	30	**1.80**
9	**0.54**	20	**1.20**	31	**1.86**
10	**0.60**	21	**1.26**	32	**1.92**
11	**0.66**	22	**1.32**		

I 2 of 5 Bar Code Specifications for PEL Printheads

The 352 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.

	Magnification			
Command	**62.5%**	**70%**	**80%**	**100%**
Long Bar (LO)	22	23	25	30
Wide Bar	11	14	16	18
Narrow Bar	3	4	4	6
Wide Space	14	16	18	22
Narrow Space	6	7	7	9
Font	494	594	694	894

The above settings may require adjustment depending on the substrate.

UCS/SCS Bar Code with the 3520 Printhead & Font 94

In order to print alphanumerics, logos, and 100% UCS/SCS bar codes, the printhead must be printing at 300 DPI horizontal resolution. When printing a 100% UCS/SCS bar code, use Font 94 and adjust the wide bar and narrow bar setting to get the bar code in specification. The system will default to the width values for a 62.5% SCC-14 bar code. For 100%, change the values to those shown below.

Tolerances for Code 39 Bar Code (Fonts 42 & 93)

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 (Fonts 92, 94, & 96)

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

Verification

If bar code does not scan or verify, use a gauge to check the width of the narrow bars/spaces and wide bars/spaces to make sure they match the physical specifications.

If your bar code has bearer bars, use a protractor to make sure there is a 90º angle between the bearer bars and the vertical elements of the bar code.

If you are using a 3520 printhead, make sure that the printhead is mounted vertical. It will not print codes within minimum height tolerances if not vertical.

Follow the following procedure to adjust a narrow bar or the width of any element.

Element Adjustment

1. Edit the message by typing ED, the message number and ENTER.
2. Go to the four lines (Lines 2-5) below the message which determine wide bar, narrow bar, wide space and narrow space values and enter

larger numbers if your elements are too small or larger numbers if your elements are oversized. The display will scroll up with each cursor move down. Enter only one value per line.

3. Use the **LO** command To change the height of bar codes for different magnifications. The height may have to be adjusted due to the nature of the product's substrate.

Host Commands

This section describes all commands supported for the CIDS/SE system in stand-alone operation. Where applicable, keypad hot keys are illustrated next to the commands they represent.

AC - Acknowledge .....Enables acknowledgment from the rear COM port of receipt-of-message to the print buffer. Keystrokes are A, C, *x*, ENTER; *n* is either Y or N. Y returns a character from the rear port and N does not. The default is N.

AU – Auto print .....Controls the delay between print cycles. Keystrokes are A, U, *n*, ENTER; ***x*** is a number from 0 to 65,000. 1-65,000 adjusts the delay, while 0 disables it. The default is 0.

BO - Bold.....Sets the global boldness level—the number of times each pixel in a character repeats. The higher the bold level, the darker the printed character. Keystrokes are B, O, *n*, ENTER; *n* is a value from 0 to 9 which multiplies the number of dots for each character: 0=1 1=2 2=3 3=4 etc. For example, when a 5X5 character (Font 05) prints with a bold value of 2, the 5X5 character becomes a 5X15 character, 5 pixels high and 15 pixels wide. The default is 5.

CA - Call .....Recalls a message or message group with the parameters saved with the SA command. Keystrokes are C, A, *nn*, ENTER; *nn* is a value from 0 to 31 which identifies a call group location. The default is 0.

CL - Clear.....Utility command that deletes invalid messages by clearing the print buffers. Keystrokes are C, L, *n*, ENTER; *n* is either Y or N. Y clears the print buffers and N does not. The default is N.

CO - Counters.....Displays the current status of the incrementing counters. Keystrokes are C, O, ENTER. The Upper Range is 00000001, the Lower is 99999998, the Repetition is 000 and the Increase is 001. Counters are tripped each time the print buffer dumps (when the printhead prints). This command is useful only for monitoring.

NOTE: If time shifts have been set up, the incrementing counters will reset at the beginning of each shift. See the SHIFT command for more information.

CP – Change Password

Used to change a Level 1 or Level 2 password. This command is functional only when the Password command is enabled. Keystrokes are P, W, *nnn…*, ENTER; the new password, up to 15 alphanumeric characters long, is entered on the top line for Level 1 or the second line for Level 2.

DA - Date .....Sets or displays the current date. There is no default. Keystrokes are D, A, *mm*, *dd*, *yy*, ENTER; *mm* is a two-digit month (01, 02…12), *dd* is a two-digit day (01,02…31) and *yy* is a two-digit year (00,01…99). Use the left and right arrows to change only part of the date.

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

DE - Delay.....Sets the number of shaft encoder or internal oscillator pulses (rasters) that must occur between the time the photosensor triggers and the time printing begins. It

changes the position of the message on the product without having to adjust either the printhead or the photocell. Keystrokes are D, E, *n*, ENTER; *n* is the delay value which ranges from 0 to 9999. The default is 777. The delay value represents either internal oscillator pulses or the variable-speed encoder pulses divided by the value that is in the WIDTH command. A value of 220 is equal to about one inch of delay.

DI - Display ..... Selects the type of terminal emulation. Keystrokes are D, I, *n*, ENTER; *n* identifies the type of terminal: 1 for VT100, 2 for Wyse, 3 for keypad controller and 4 for ASCII. The factory default is 3 and should not be changed.

ED - Edit ..... Enables message creation and editing. Since it has more than one function, this command is actually a sequence of keystrokes. Message creation consists of three steps: (1) assigning a message number; (2) choosing a font and setting the boldness; and (3) text entry of the message with autocodes.

(1) Assigning a Message Number

Keystrokes are E, D, *nn*, ENTER; nn is a value from 0 to 99 that identifies a message. If the message number is already on the screen, move to step 2.

(2) Selecting a Font or Logo and Assigning a Message Boldness Value

ALT+FNT moves the cursor to the upper right corner of the screen. To select a font, reference the font chart at the end of this section and type a number from 1 to 99. For example, if you wanted the message in font 9, type 9. To change the boldness value for this message, the font entry should include the bold value; message bold values are in increments of 100, so font 9 with a bold value of 400 would be entered as 409. Setting the bold value through the EDIT command affects only a single message while the BOLD command resets a global bold value. If you select a font that is invalid, the font assignment will revert to the last used valid number.

- **Selecting a Logo**

Logos are custom-ordered and downloaded to a font assignment from 53 to 58. Selecting a logo to print consists of entering the edit screen, pressing ALT+FNT, and typing the logo's font number assignment. Assigning different bold values to a logos alters its shape. Try different values and observe the results. When finished, press ENTER. It is not necessary to enter text or numbers in the message field to print the logo.

(3) Message Entry

After selecting the font and adding a bold value, enter a message with text, numbers and special characters. The entries that follow show the editing options and autocodes available in an SE controller.

- **Editing Options**

LEFT ARROW	Moves the cursor left one character.
RIGHT ARROW	Moves the cursor right one character.
UP ARROW	Moves the cursor one line up.
DOWN ARROW	Moves the cursor one line down.
CLEAR	Clears the text on all lines.
ALT + FNT	Selects the font for the message.
ENTER	Quits the Edit command and saves all changes.
ESC	Quits the Edit command and aborts all changes
BACK	Back spaces and deletes

Entering Autocodes into a Message

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

Autocodes for Date

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

Autocodes for Time

{HO} Inserts the Hour
{MI} Inserts the Minute
{SE} Inserts the Second
{TI} Inserts Hour:Minute:Second

Autocodes for Expiration Date

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

Autocodes for Rollover Date

{JR} Inserts the Rollover Julian day
{RC} Inserts the Rollover date (11/22/96)
{RD} Inserts the Rollover Day
{RL} Inserts the last digit of the Rollover year
{RM} Inserts the Rollover Month
{RY} Inserts the Rollover Year

Autocodes for Shift

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

Miscellaneous Autocodes

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

Autocodes for Counts

{Ld} Prints a specified digit of the counter as a down counter (d = variable, counter digit to print).
{NL} Prints the counter as a down counter, all 8 digits.
{NU} Prints the counter as an up counter, all 8 digits.
{Ud} Prints a specified digit of the counter as an up counter.
{Vd} Prints a specified digit of the counter as an up counter, unless it is a leading zero.
{Wd} Prints a specified digit of the counter as a down counter, unless it is a leading zero.

For example, {V3V2V1}, as an autocode for numbers, will increase and drop out the leading zeros.

Variable Space Control & Bar/Space Control

Variable Bar/Space Control enables you to control the bar widths and spaces of selected bar codes. Each bar code capable of this control is controlled in a specific format. The 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 on adjusting.

EN - Encoder.....Enables the use of a variable speed encoder. Keystrokes are E, N, *x*, ENTER; *x* is either Y or N. Y will enable an encoder and N will disable it. Remember that switch EX1of SW2 must be set on the CPU board in conjunction with this command.

EX - Exp. date .....Sets an expiration date. Keystrokes are E, X, *nnnn*, ENTER; *nnnn* is a value from 0 to 9999 that represents the number of days that will be added to the current date to form an expiration date. Autocodes, listed with the EDIT command, allow expiration date entry into a message for printing.

FO – Format date.....Specifies the order of month, day and year, as well as the preferred separators (i.e., -/). Keystrokes are F, O, *n/n/n*, ENTER, with a default of M/D/Y.

FD – Four digit date.....Switches between 2 and 4 digit year for embedded commands. Keystrokes are F, D, *n*, ENTER; *n* is Y for 4 and N for 2, with a default of N.

GA - Gap.....Controls the spacing between characters. Keystrokes are G, A, *n*, ENTER; *n* is the number of character spaces, from 0 to 99, between printed characters. The default is 5.

HE - Head .....Selects a printhead for changes. Keystrokes are H, E, *n*; *n* is a letter from A to D that represents one of the four printheads. The default is the last printhead used in a command. After a Zap (see below), the program will default to A.

IN - Invert.....Turns a printed message upside-down. Keystrokes are I, N, *n*, ENTER; *n* is either Y or N. Y inverts the message and N keeps it upright. The default is N.

LO - Long bar.....Determines the number of channels that will print the long bars of bar codes. Keystrokes are L, O, *nn*, ENTER; *nn* is a value from 1 to 32 the dictates the number of channels that will print the long bar. The more channels, the taller the bar.

LR – Label request.....Retrieves labels from SystemMaster (only in network applications). Keystrokes are L, R, *message name*, ENTER.

LS – Label Save.....Saves labels to SystemMaster (only in network applications). Keystrokes are S, S, *message name*, ENTER.

NE – Network .....Selects the network mode, enabling or disabling network operation and all related commands. Keystrokes are N, E, *n*, ENTER; *n* is Y to select network or N to deselect. The default is N.

NU - Numbers.....Enables product and batch counting. The counter can count positively or negatively, increase by a multiplier, repeat by a multiplier or simply be set as a count routine. Keystrokes N, U bring up the Numbers screen with four variables (see the example at left with default values).

```
NUMBERS   *A    *
UPPER :99999999
LOWER :00000000
REP:000  INC:001
```

Use ALT + the up and down arrows to move between fields. UPPER is the value that the count routine will attain. LOWER is the value that starts the count. REP is the value that determines how many times a count repeats. INC is the value by which the count sequence increases. Press ENTER to exit this screen.

Autocodes (listed under the EDIT command) allow entry of the count into a printed message. For example, to count from 1 to 100 by 5 and repeat each count 3 times, enter {V3V2V1} in the message line: 0,0,0 / 5,5,5 / 10,10,10 / 15,15,15 etc.

OF - Offset.....Provides print alignment when printing with the 352 printhead. Keystrokes are O, F, *nn*, ENTER; *nn* is 8. See Default System Settings on page 4-3.

PC – Photocell Counter

Allows setup of the photocell counter, which is triggered each time the photocell senses a product. The photocell counter works only with SystemMaster. Keystrokes are P, C, ENTER.

PL – Photocell Log.....Used to view the status of the photocell counter. Keystrokes are P, L, ENTER.

PO - Position.....Adjusts the vertical position of a printed message within the span of the printhead image area. Keystrokes are P, O, *nn*, ENTER; nn is a value from 0 to 32 that identifies the printhead channel the starts the printing.

For example, entering 16 will allow the printed message to start at channel 16. The message will scroll if the message goes off of the screen. This command is useful when only printing small fonts with very few lines to fine-tune the printhead's position.

PW - Password.....Enables password protection and changes. Allows three levels of users with two specific passwords. Keystrokes are P, W, *n*, ENTER; *n* is Y or N, with Y enabling password protection. User levels are as follows:

Level 1: Highest level, allowing access to all commands currently supported by the controller. The default password is "inkjet".

Level 2: Mid-level, allowing access to the following commands: Bold, Call, Save, Clear, Counters, Delay, Encoder, Gap, ID, Invert, Label Request, Label Save, Long Bar, Network, Numbers, Offset, Position, Reverse, Select, Sign In, Slant, Small Bar, Sign Out, Status, Test Print, Trigger Edge, Verify and Width. The default password is "111111111111111".

Level 3: Lowest level, allowing access only to the following commands: Clear, Counters, Delay, Sign In, Status, Test Print and Verify. The default is no password.

Once password protection is enabled, the user is signed on as a Level 3 user. To access other levels, use the SI (Sign In) command and enter one of the two available passwords. To sign out, use the SO command (no password needed).

When signed in as a Level 1 user, the Change Password (CP) command is available, allowing you to change the Level 1 and Level 2 passwords.

Powering OFF/ON the controller will not sign off the current user.

NOTE: All commands are available through the rear COM port. An emergency password is available from Diagraph Technical Support.

RE - Reverse.....Reverses the direction of printing to allow for products to pass the printhead from left-to-right or right-to-left. Keystrokes are R, E, *n*, ENTER; *n* is either Y or N. Y reverses the image for a conveyor moving right to left. N leaves the image as is for left-to-right conveyors. The default is N.

RO - Rollover.....Allows setup of printing of auto shift codes, by setting an altered real-time clock for printing past the normal hours of the day. Keystrokes are R, O, *hh*, *mm*, *ss*, ENTER; *hh* is a two-digit hour (00-23), *mm* is a two-digit minute (00-59), *ss* is two-digit second (00-59). Acceptable entries range between 00:00:00 (midnight) to 23:59:59 (1 second before midnight). Use ALT + left and right arrows to change only part of the time. Use the autocodes listed in the Edit command to embed this command into a printed message: {JR}, {RC}, {RD}, {RL}, {RM}, {RY}

SA - Save.....Saves information to a call group in one of 32 different file locations. When a file is saved and then edited afterwards, it must be saved again before exiting or changes will be lost. Keystrokes are S, A, *nn*, ENTER; *nn* is two-digit group number. There are ten saved parameters in the parameter group: BOLD, GAP, DELAY, REVERSE, INVERT, SELECT, EXPIRATION DATE, NUMBERS, WIDTH, and SLANT.

SE - Select.....Selects the message(s) to print from the message library. Keystrokes are S, E, *n*, ENTER; *n* is a number from 0 to 99 that has been assigned to the message. This command also allows you to enter a string of up to eight messages for printing one right after another. Printing a string is possible because the EDIT command

and SELECT command work together to print a programmed message. The messages will be stored in the following format: 0-9.

SH - Shift ..... Defines printing codes for three different time shifts. Keystrokes are S, H, *n*, ENTER; *n* is A, B or C for shifts 1, 2 or 3. The default is A.

You can set three shifts for printing by using a specified code (A - C). Use this command in conjunction with the autocodes listed in the Edit command to embed a Shift Set into a printed message (SH is the autocode for printing the shift code).

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

NOTE: CODE is an alphabetic character only—numeric values are invalid.

Example: Shift 1: Begin 00:00:00 End 07:59:59 Code A

Shift 2: Begin 08:00:00 End 15:59:59 Code B

Shift 3: Begin 16:00:00 End 23:59:59 Code C

Between midnight and 7:59 AM, SH will print Code A. Between 8:00 AM and 3:59 PM, SH will print Code B. And between 4:00 PM and 11:59 PM, SH will print Code C.

SL - Slant ..... Adjusts the angle of the print to obtain a vertical image. Keystrokes are S, L, *nn*, ENTER; *nn* is a value from 0 to 31 that determines degree of slant in the print. The default is 7. Three variables in combination achieve a vertical image: the SLANT command, the WIDTH command and the mounting angle of the printhead.

SM - Small Bar ..... Determines the number of channels used to print the small bar in the Postnet bar code. The more channels, the taller the bar. Keystrokes are S, M, *nn*, ENTER; *nn* is the number of channels to print or the height of small bars in Postnet bar codes (1-32). Since there are 32 channels in the printhead, typing 16 enables 16 channels to fire and create a small bar 16 channels high.

ST - Status ..... Shows the status of the CIDS/SE printer. Keystrokes are S, T.

TE - Test ..... Fires all 32 channels for diagnostics on the printhead. Press T, E to activate and any key except SHIFT or ALT to exit.

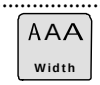
TH – Type Head ..... Selects the printhead type. Keystrokes are T, H, *n*, ENTER; scroll down the list of printhead types (0-27) to highlight one.

TI - Time ..... Sets and displays the current time. Keystrokes are T, I, *hh*, *mm*, *ss*; *hh* is a two-digit hour (00-23), *mm* is a two-digit minute (00-59), and *ss* is a two-digit second (00-59). Use the left and right arrows to change only part of the time. Autocodes, listed with the Edit command, allow time entry into a message for printing.

TR – Trigger edge ..... Selects the trigger edge, the positive or negative transitions of the product detector signal, as the print-go signal. Keystrokes are T, R, *n*, ENTER; *n* is either R (rising edge) or F (falling edge). R starts the print cycle on the leading edge of the product, whereas F starts the print cycle on the trailing edge.

VE - Verify ..... Verifies that the controller has received a graphic. Keystrokes are V, E, ENTER.

WI - Width ..... Adjusts the width of a printed message to fit on the product. Keystrokes are W, I, *nnn*, ENTER; *nnn* is a value from 1 to 255 which acts as a divider for encoder pulses. The higher the divider value, the wider the print. The default is 1.



ZA - Zap.....Resets all parameters and messages to factory defaults. After the keystrokes Z, A, the screen will prompt you to continue: type Y for Yes to reset parameters or N for No. To reset the system, turn the power OFF for one minute after executing this command.

Font Chart

HR stands for "Human Readable" text. Sample prints of these fonts are available in the *CIDS/SE Service/Technical Manual*, 2470-501.

Font	Description	Text Output
1	Micro-Spacing, only allows spaces (no characters)	Spaces
4	Canadian UPC 90%, Wide Bearer Bars, 1-30 Characters	Bar code
5	5x5 Dot Matrix, 5 dot high character	5 Lines
7	8x6 Dot Matrix, 7 dot high character	4 Lines
8	8x8 Dot Matrix, 7 dot high character	4 Lines
9	10x10 Dot Matrix, 9 dot high character	3 Lines
14	16x16 Dot Matrix, 12 dot high, Roman Character (Code Page)	2 Lines
15	16x8 Dot Matrix, 12 dot high character	2 Lines
16	16x8 Dot Matrix, 14 dot high character	2 Lines
17	16x12 Dot Matrix, 16 dot high character	2 Lines
30	32x32 Dot Matrix, 28 dot high, Roman Character (Code Page)	1 Line
31	32x24 Dot Matrix, 32 dot high character	1 Lines
32	32x24 Dot Matrix, 28 dot high character	1 Line
33	32x15 Dot Matrix, 24 dot high, OCR-B characters (numeric only)	1 Line
34	32x21 Dot Matrix, 32 dot high, OCR-B characters (numeric only)	1 Line
35	32x13 Dot Matrix, 23 dot high, OCR-B characters (numeric only)	1 Line
36	32x13 Dot Matrix, 23 dot high, OCR-B characters (numeric only)	1 Line
37	32x22 Dot Matrix, 24 dot high character	1 Line
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
46	UCC / EAN Code 128 Bar code, Application Identifiers (w / HR)	Bar code
53-58	EPROM logo space	Graphic
51	Solid Recycle Logo	Graphic
52	Outlined Recycle Logo	Graphic
60-74	User Downloadable Logos	Graphic
90	Postnet Bar code	Bar code
91	Alphanumeric Mixed Font	Up to 4 Lines
92	Interleaved 2 of 5 Bar code, 1-30 characters	Bar code
93	Code 39 Bar code	Bar code
94	UPC Shipping Container Bar code (w / HR), 1-14 characters	Bar code
95	6 line Postnet Bar code	Text / Bar code
96	UPC Shipping Container Bar code, 1-14 characters	Bar code
97	Code 128 Bar code	Bar code
98	UPC A Bar code	Bar code
99	UPC E Bar code	Bar code

6

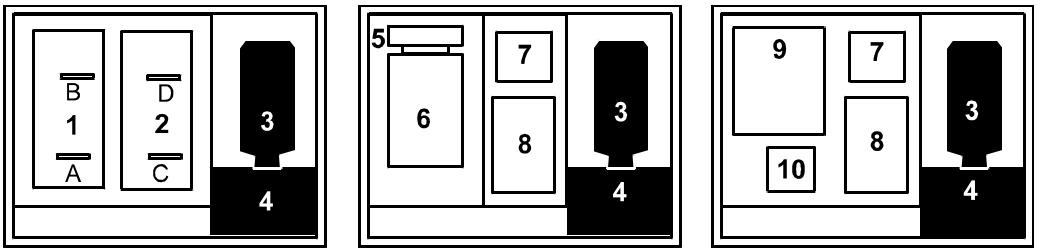
Troubleshooting

ENGLISH
DEUTSCH
ESPAÑOL
FRANÇAIS
ITALIANO

Not Printing

This section covers causes and actions to take when your CIDS/SE printer is not printing. The illustrations below show three layers of boards inside the CIDS/SE controller. The illustration on the left shows the driver board(s), the ink container and the ink pump cover—what you see when you open the front panel. The middle illustration shows the boards visible when you remove the driver board panel. The illustration on the right shows the interior with the CPU board mounting removed.

If you need to contact Diagraph Service, **call 1-800-526-2531**.



[1] First Driver Board
[2] Second Driver Board
[3] Ink Container
[4] Ink Pump Cover
[5] Firmware Board
[6] CPU Board
[7] IDS Controller Board
[8] IDS Power Supply
[9] Main Power Supply
[10] Transformer

Problem	Possible Cause
The printer is not printing and it fails to prime.	Out of ink.

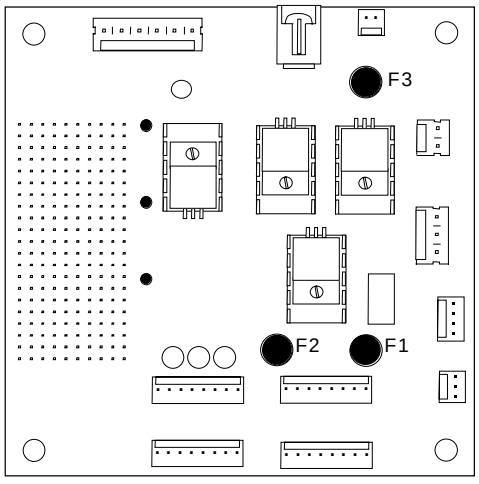
Actions

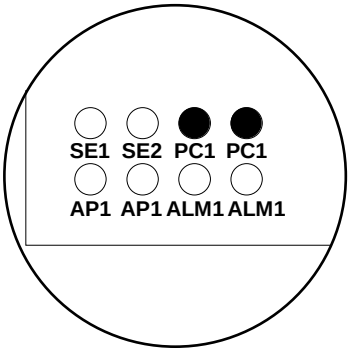
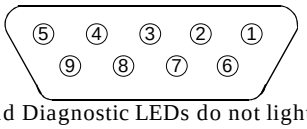
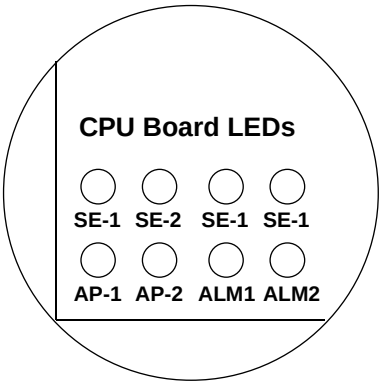
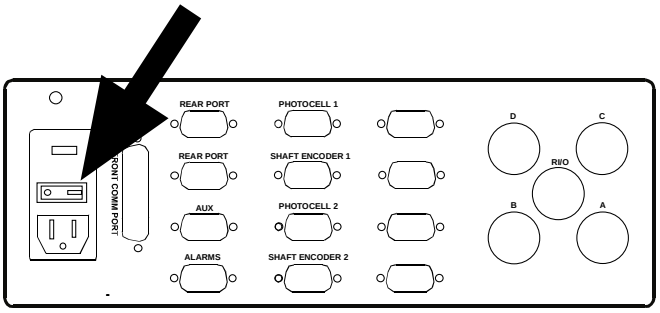
1. Check ink container for ink by removing and feeling the weight of the container and shaking. If the container still has ink, go to procedure for a Blown Fuse on the IDS Controller Board.
2. If the container is out of ink, investigate why it did not light the Ink Out beacon.
3. Check the lamp in the beacon. If the bulb is burned out, replace from Diagraph Service Kit 2470-141. If the bulb is good, then—.
4. Check fuse F3 on the IDS controller board (**[7]** and following). If the fuse is blown, replace from Diagraph Service Kit 2470-141.

Problem	Possible Cause
The printer is not printing and it fails to prime.	Blown fuse on the IDS controller board

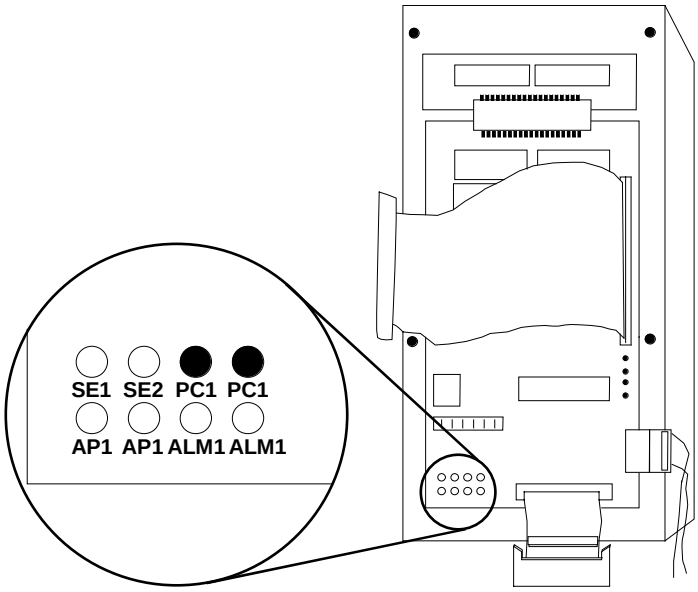
Actions

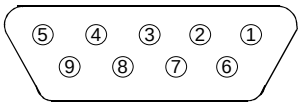
1. Remove the cover from the printhead and take voltage readings from GND and VCC (5 volts) and GND and 12V (12 volts) on the IDS float control board.
2. If you get no voltage readings, replace BOTH F1 and F2 on the IDS controller board **[7]**. Both fuses are in Service Kit 2470-141.



Problem	Possible Cause
Not printing and LED PC1 or PC2 on the CPU board **[6]** does not light. 	No photocell signal.
Actions	
1. Check photocell connections and make sure they are tight. 2. Check the photosensor by waving a piece of scrap board in front of it. The red LED on the photosensor will glow when the sensor detects an object. Failure to light indicates either a lack of power or a damaged photosensor. 	3. Check pins 5 and 6 of the photocell connection. A 12 VDC reading indicates that the controller is functioning correctly and the sensor needs replacing (P / N 5100-600). If you read no voltage from pins 5 and 6, contact Diagraph service.
No print and Diagnostic LEDs do not light. 	Blown Power Fuse 
Actions	
Check the continuity of the power fuse(s) and replace if necessary (Diagraph P / N 6600-133).	Disconnect power cord and pry open module with a slotted screwdriver to access fuse

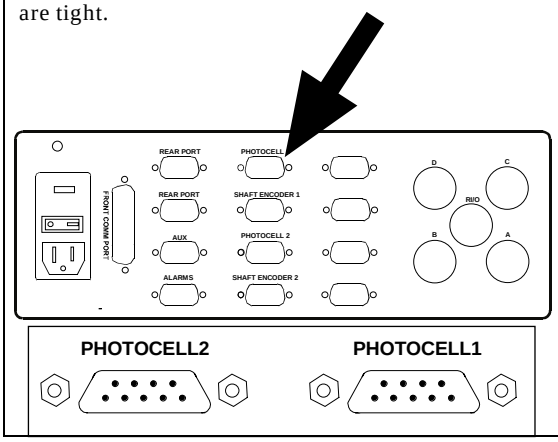
Problem	Possible Cause
No print and LED PC1 or PC2 does not illuminate.	No photosensor signal





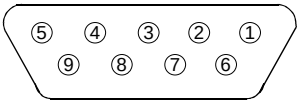
Actions

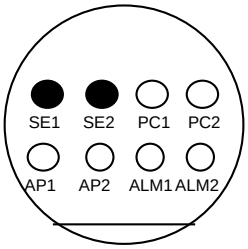
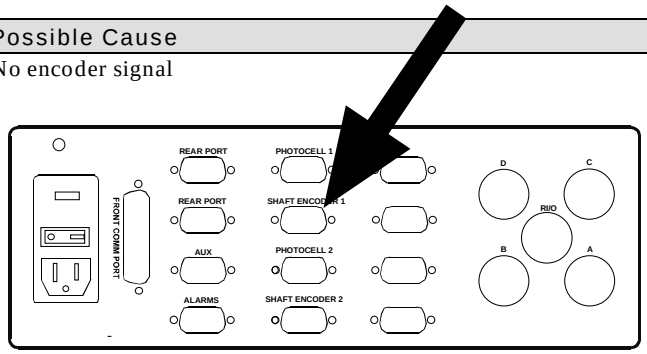
1. Check photocell connections and make sure they are tight.



2. Check the photosensor by waving a piece of scrap board in front of it. The red LED will glow when the sensor detects an object. Failure to light indicates either a lack of power or a damaged photosensor.

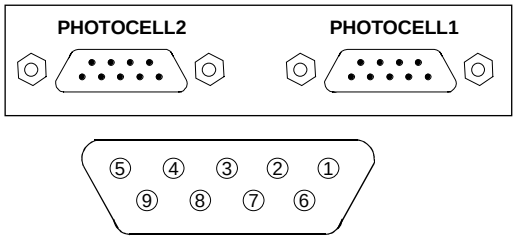
3. Check pins 5 and 6 of the photocell connection. A 12 VDC reading indicates that the controller is functioning correctly and the sensor needs replacing (P / N 5100-600). If you read no voltage from pins 5 and 6, contact Diagraph service.



Problem	Possible Cause
No print and LED SE1 or SE2 does not light. 	No encoder signal 

Actions

Check shaft encoder connections.



Check pins 5 and 6 of the encoder connection. A 12 VDC reading indicates that the controller is functioning correctly and the problem is in the encoder or its cable (142 dpi encoder: 6600-602; 213 dpi encoder: 2460-710)

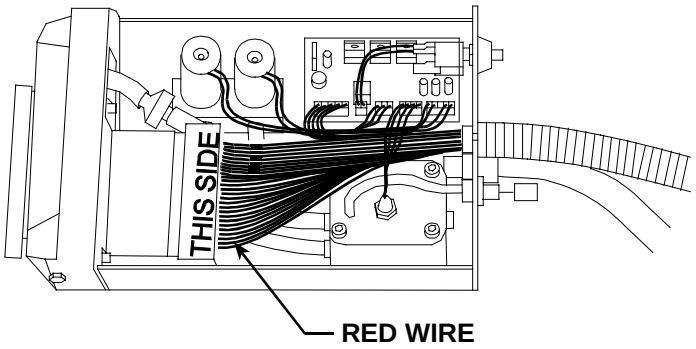
If you read no voltage from pins 5 and 6, contact Diagraph service.

Problem	Possible Cause
No print but LEDs function normally.	No data for printhead to print.

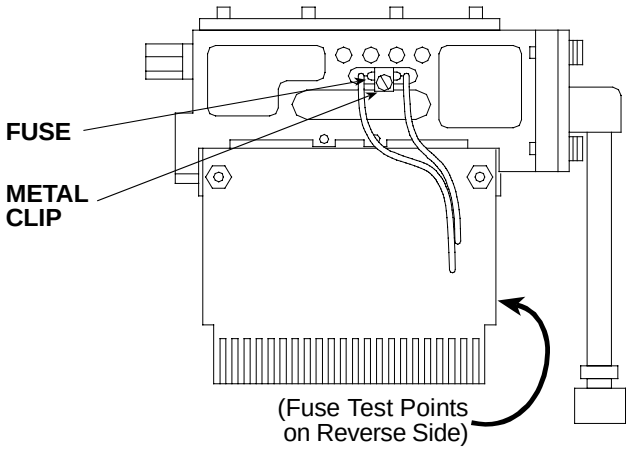
Actions

1. Check connections to the printhead. Make sure that there is a message in the edit command and that you have the correct message selected.

2. 2. Check cable connection inside of printhead by loosening the thumbscrews on the cover, sliding out the interior and inspecting the cable. The color-coded line must connect to pin one.

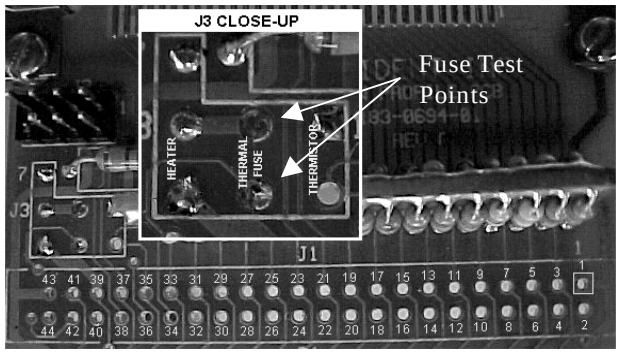


Problem	Possible Cause
No channels will fire but LEDs function normally and a hand near the top of the printhead senses that the printhead is at room temperature.	Blown thermal fuse (P / N 6600-215 for 192 / 96; 6600-319 for 352).



Actions

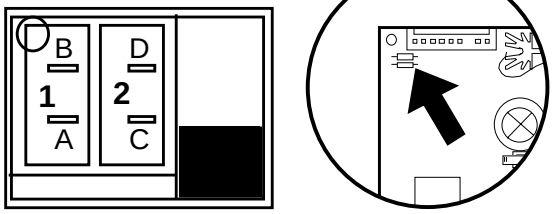
Check the thermal fuse in the printhead for continuity (at J3 test point shown at right) and replace if necessary.
Remove the metal clip holding the fuse in place and unsolder the leads from the printhead PCB.
Remove the old fuse.
Solder the new fuse into the PCB; orientation is not important. Secure fuse with metal clip.
NEVER BYPASS THE FUSE. The printhead can overheat and create irreparable damage.



Problem	Possible Cause
No channels will fire but LEDs function normally and a hand near the top of the printhead senses that the printhead is at room temperature.	Blown PICO fuse.

Actions

Check F1 and F2 on the driver board.



If bad, replace with fuses (6600-830) from Diagraph parts kit 2470-141.

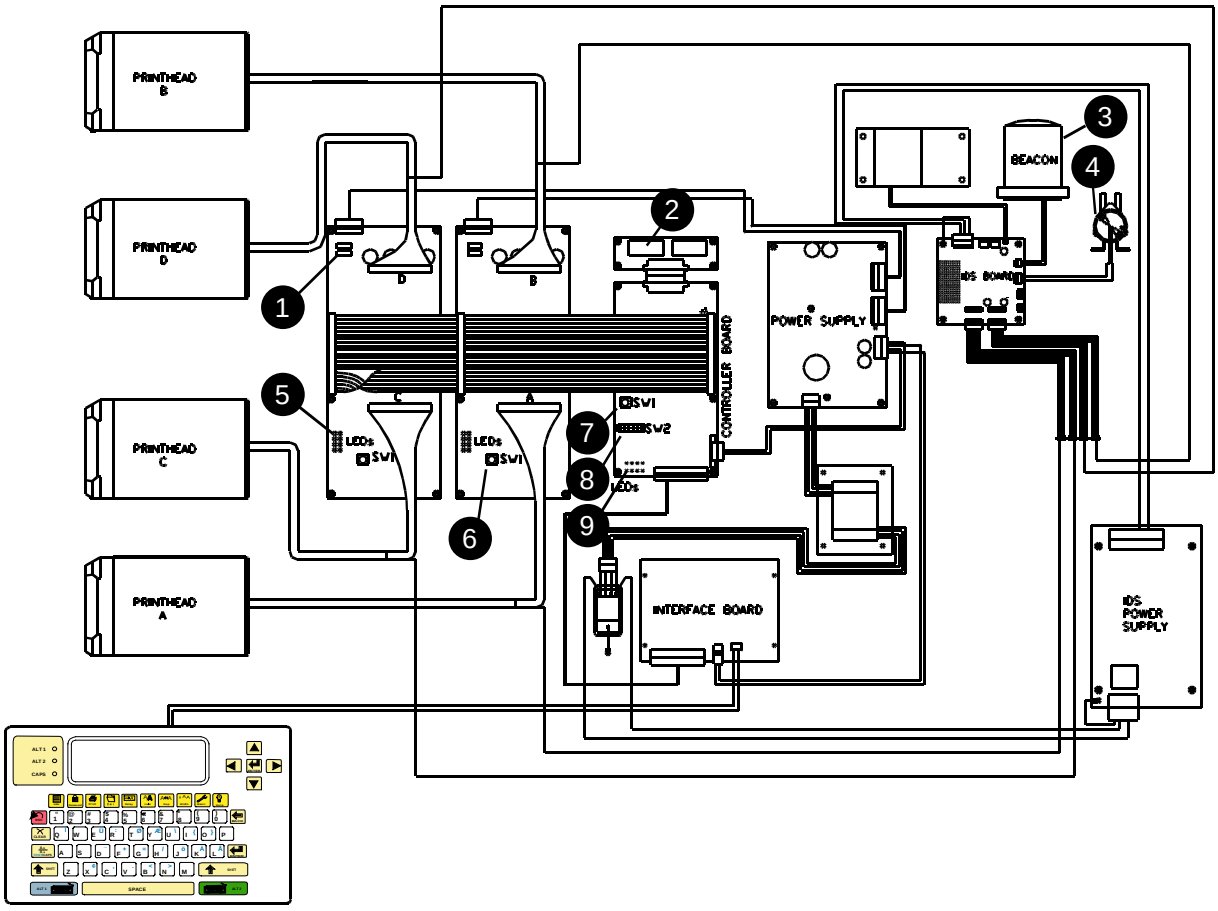
Problem	Possible Cause
No print but LEDs function normally.	Air in all channels.

Actions

Prime the printhead. If orifices flow well, then some or all channels should fire and the problem is not air-related. If no channels fire, then purge. If it still does not print, repeat the process.
Check all signal inputs as described above. It the printhead still does print, then contact Diagraph for service.

Tips to Prevent Blown Fuses
Employ surge protection on CIDS/SE modular systems. Always turn the Controller OFF before working on a printhead.

Problem:	Possible Cause		
Printing between products but not on them.	Incorrect settings for either Width or Delay.		
Actions			
Reset parameters to defaults. The default delay (**DE**) setting is 440 (about 2 inches). The correct width (**WI**) setting depends on the type of printhead in your system and the type of encoder.	Printhead Model	Dots Per Inch	Width Setting
	9600	142	3
	1920	142	3
	3520	216	2
Use the table at right to find the default width setting for your system.			



❶ PICO fuses, 2 Ampere (P/N 6600-830) from Diagraph parts kit 2470-141
❷ Firmware
❸ Low ink alarm beacon
❹ Pump
❺ Driver Board LEDs that report printhead and heater status.
❻ Switch SW1, CPU Board; sets baud rates.
❼ Switch SW1, Driver Board; configures printheads.
❽ CPU Board switch SW2. Sets parameters for various devices connected to the controller.
❾ Diagnostic LEDs.

Poor print quality

This section covers causes and actions to take when your CIDS/SE print needs attention. Refer to Appendices B and C as needed. If you need to contact Diagraph Service, **call 1-800-526-2531**.

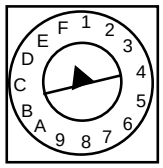
Problem	Possible Cause	Actions
Missing dots. 	Air in channels or clogged channels.	Follow the Cleaning and Priming procedure. If no channels fire, then clean and prime again. This process may need to be repeated several times. If channels are still missing after repeated purges, contact Diagraph service

Problem	Possible Cause
Light print 	Printhead too far from carton Not enough voltage to the transducers

Actions

Check SW1 on the printhead driver board (❼) for correct switch position

SW1



Printhead Driver Board 1

SETTING	HEAD A	HEAD B
0	OFF	OFF
1	OFF	Not Used
2	OFF	9600
3	OFF	1920/3520
4	Not Used	OFF
5	Not Used	Not Used
6	Not Used	9600
7	Not Used	1920/3520
8	9600	OFF
9	9600	Not Used
A	9600	9600
B	9600	1920/3520
C	1920/3520	OFF
D	1920/3520	Not Used
E	1920/3520	9600
F	1920/3520	1920/3520

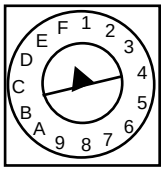
Printhead Driver Board 2

SETTING	HEAD A	HEAD B
0	OFF	OFF
1	OFF	Not Used
2	OFF	9600
3	OFF	1920/3520
4	Not Used	OFF
5	Not Used	Not Used
6	Not Used	9600
7	Not Used	1920/3520
8	9600	OFF
9	9600	Not Used
A	9600	9600
B	9600	1920/3520
C	1920/3520	OFF
D	1920/3520	Not Used
E	1920/3520	9600
F	1920/3520	1920/3520

Problem	Possible Cause	Actions
Smeared or trailing bar code and/or message. 	Printhead is too close to carton	Move printhead to 1/16” to 1/8” away, then clean and prime the printhead.

Problem	Possible Cause	Actions
Missing orifices causing streaks in bar code or message TEST TEST	Orifice obstructed or clogged	Ensure that orifices are not obstructed by cleaning and priming.

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

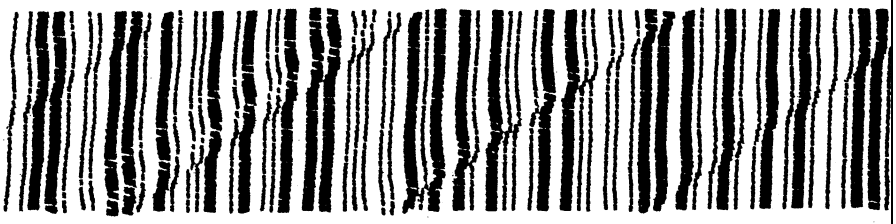
Problem	Possible Cause	Actions
Message or bar code is fuzzy. TEST	Voltage is too high.	Check SW1 on the printhead driver board for correct switch position SW1  See chart above in "Light print."

Problem	Possible Cause	Actions
Character height is too tall or too small. TEST	Printhead angle is incorrect.	Adjust the angle so that the tallest image using all 32 channels is 1/2" for the 96/32 printhead.

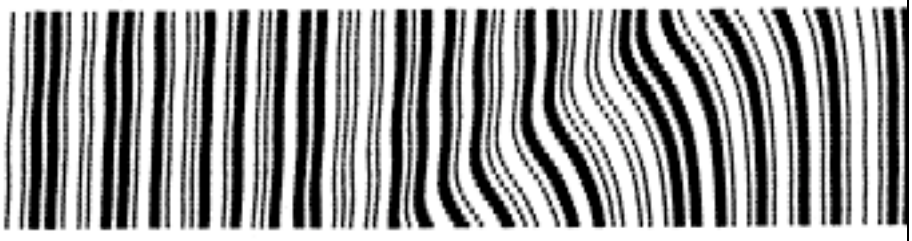
Problem	Possible Cause	Actions
Characters are unreadable.	Reverse set is wrong.	Change reverse (RE) direction in the software.

Problem	Possible Cause	Actions
Channels missing 	Air in channels	Flush.

Problem	Possible Cause	Actions
Channels drop out while printing at high speed. 	Exceed 2.5 images per second print rate.	Set print rate below 2.5 images per second.

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

Actions	
Mount CIDS/SE 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 CIDS/SE printheads while avoiding collision.

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

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

A

Preventive Maintenance

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ESPAÑOL
FRANÇAIS
ITALIANO

Establish and follow a preventative maintenance program for reliable operation of this CIDS/SE printer.

PROCEDURES	Daily	Weekly	Quarterly
Clean and prime printhead	●		
Clean outside of controller/ink delivery cabinet		●	
Clean outside of printhead thoroughly		●	
Clean photosensor lens			●
Check that mounting hardware is secure			●
Check that all electrical connections are secure			●
Check that all ink tube fittings are secure			●

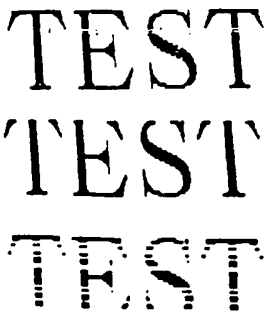
Cleaning and priming the printhead

Tools and supplies

5/64" hex key

Lint free wipes, box of 100 (Diagraph PN 6600-396)

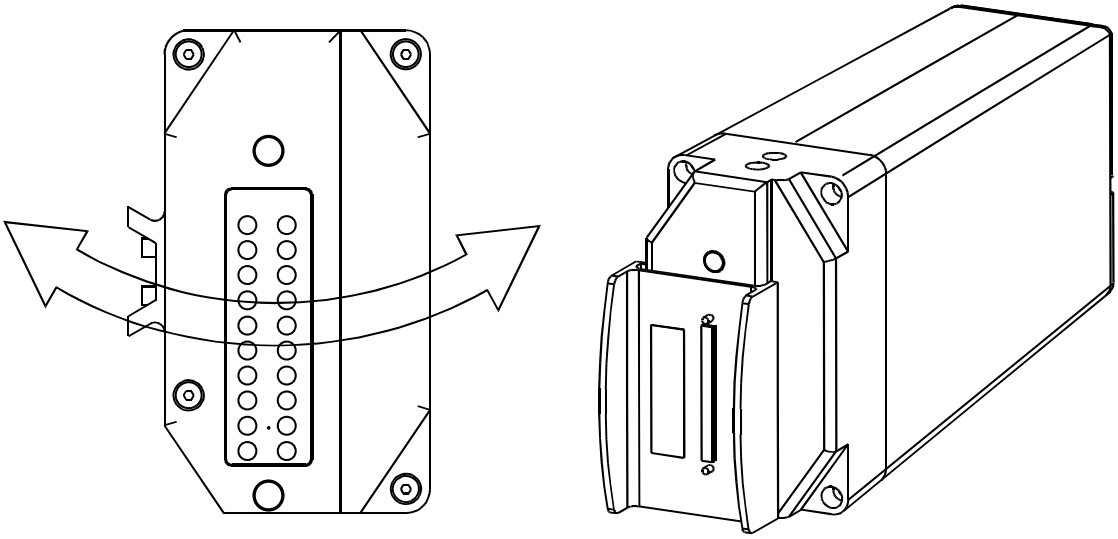
Hand cleaner, 6 oz. Tube (Diagraph PN 1901-398)



Perform daily, or when printing like samples at left

1. Place a clean, lint free wipe over orifices.
2. Push the prime switch until ink runs from the orifices.
3. Gently wipe side to side along the narrow dimension to absorb ink. Repeat with a clean wipe.
4. Do not rub hard, upward or in a circular motion, to avoid clogging the orifices with fibers.

Install the front cover



1. Clean and prime printhead as previously described.
2. Wait 15 minutes after turning off power before attaching the front cover, or the printhead will leak ink.
3. Clean the front cover with a clean wipe.
4. Attach the front cover to the face plate, taking care to align the rubber tips on the back of the cover with the rub buttons on the face of the printhead.

NOTE: If you place the front cover on a hot printhead and do not fasten it securely, the printhead will weep ink until the head has cooled down.

Flushing the printhead

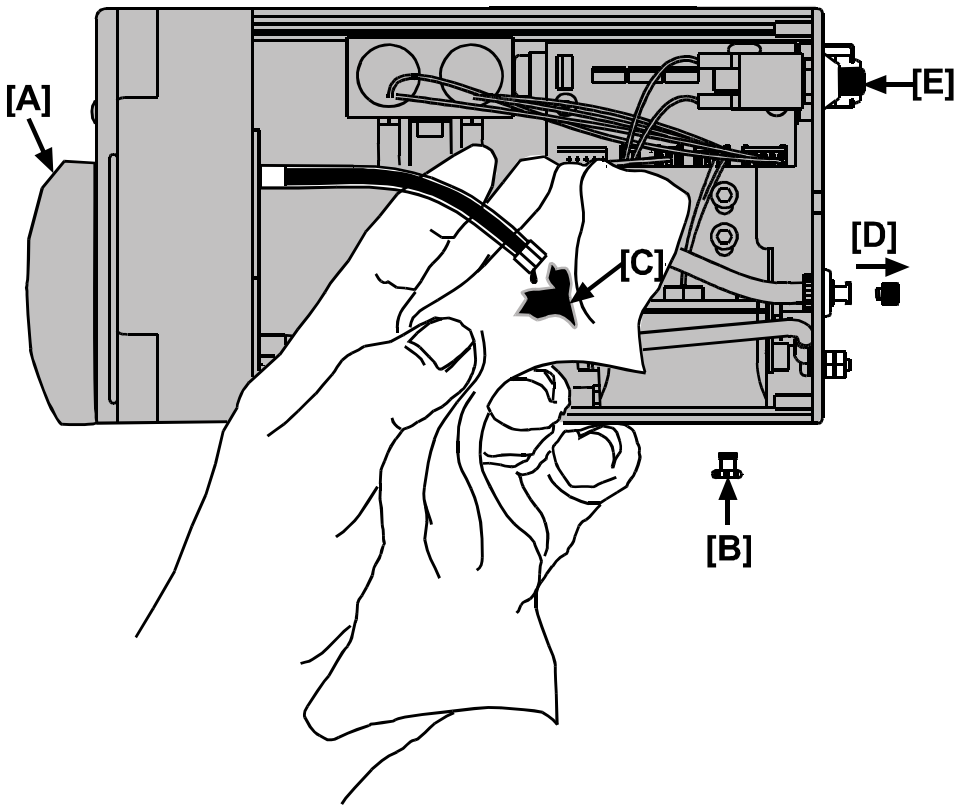
Perform when printing looks like samples on previous page.

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

On rare occasions, debris will enter through an orifice or an air bubble may be ingested. Both circumstances produce a gap in the print. Take the following steps to expel the debris or air bubbles.

Wear suitable eye protection whenever handling ink.

1. Allow the printhead 10 to 15 minutes to warm up.
2. Use a 5/64" hex key on screws and remove the printhead top cover.
3. Clean and prime as previously described. Snap on faceplate cover. Make sure that it is installed in the correct position with tips in line with the rub buttons on the face of the printhead **[A]**.
4. Remove the vent cap **[D]**. This cap is for shipping only and must be removed before operation.
5. Remove the luer plug **[B]** from the printhead drain line.
6. Place an absorbent wipe under the drain line to catch ink as you flush **[C]**.



7. Push the prime switch **[E]** for 5 seconds of ink flow while watching for air bubbles.
8. Repeat until ink flows without air bubbles.
9. Replace the luer plug while pushing the prime switch to keep ink flowing through the purge cap and prevent air from entering. Do not over-tighten the fitting.
10. Leave the faceplate cover on for an additional 5 to 10 minutes; push the prime switch once before removing the faceplate cover. Clean and prime as previously described.
11. Wipe off the outside of the printhead.
12. Check that all orifices are working by printing a message in font 31. If the test print shows striping like the samples on the previous page, repeat this flushing procedure.

This procedure may have to be repeated three to five times to be effective. When print samples are satisfactory, replace the top cover of the printhead.

If these steps are not effective, please call your local Diagraph representative to arrange for cleaning and repair.

B

Read Me Before Changing Any Circuit Boards

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APPENDIX B • READ ME BEFORE CHANGING ANY CIRCUIT BOARDS

This appendix contains more detailed information on what each circuit board in the CIDS/SE controller and CIDS printhead does and how it works. Its purpose is to ensure that you identify the correct damaged or defective board to avoid potential non-warranty charges to your department or company.

Circuit boards rarely fail. When they appear to, it is usually a grounding or configuration problem.

Always check the system grounding before changing any boards. (See part 1 of this appendix.)

After the grounding has been verified, check the configuration. (See part 2.)

If ink is not getting to the printhead and you suspect a circuit board, review part 3.

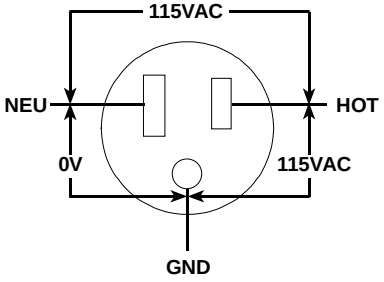
1) PEL CIDS/SE system grounding

Testing the electrical outlet

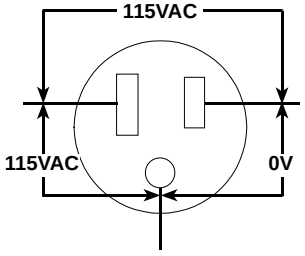
Before installing an ink jet controller, verify the integrity of the 115VAC sourced power, in accordance with the National Electric Code (NEC) and approved local electrical codes. If using a standard AC outlet, use the following procedure to verify the integrity of your outlet.

1. Place an outlet tester into the socket. (You can purchase an outlet tester at most hardware stores).
2. If the outlet tester indicates that the outlet is wired correctly, proceed with the installation.
3. If the outlet tester indicates that the outlet is wired incorrectly, tell plant maintenance immediately and do not plug the equipment into that outlet until it is re-wired.

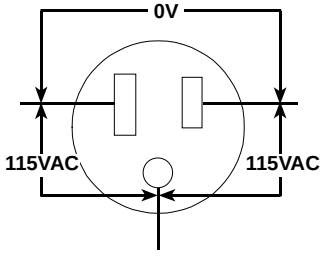
NOTE: Although an outlet tester is the preferred method of checking an electrical outlet, you can also use a voltmeter. (See below.)



CORRECTLY WIRED OUTLET



HOT AND NEUTRAL REVERSED



HOT AND GROUND REVERSED

Background information about AC wiring

Equipment running at 115VAC must have one hot wire and one neutral wire. Additionally, a separate ground wire runs to non-current carrying parts of most loads.

The wires in an AC outlet (115VAC)

WIRE	DESCRIPTION	FUNCTION
LINE	Usually black. Cannot be white or green.	Carries the voltage load to the equipment.
NEUTRAL	White or natural gray	Grounded at the service equipment* only. Serves as the return for 115 volts.
GROUND	Bare, green or green with yellow stripes may be metal armor or metal conduit.	Grounded at the service equipment* and every metal box or cabinet. Runs to non-current, carrying parts of most loads.

*The service equipment is defined as "the equipment used to disconnect the entire building and overcurrent device to protect the entire installation, but not the branch circuits individually."

At the service equipment, a single ground wire connects both the neutral and ground to earth. The NEC calls this wire the "ground electrode conductor."

Electrical line transients

Transients on the incoming AC power line can be in the form of voltage spikes and transients, over- and under-voltage events, or noise caused by poor grounding or interference. Symptoms of power related problems can be unexplained loss of controller memory (loss of message), garbled print, and unexplained hardware resets.

The best way to eliminate these types of problems is to install the controller on a dedicated line with a line conditioner. A dedicated line refers to an AC line that only the CIDS/SE components are plugged into. This is most effective when the source is at the building main service entrance.

Good quality line conditioners will provide protection against all AC line problems with the exception of power outages; if power outages are a problem at the installation, an uninterruptible power supply (UPS) can be installed.

A properly grounded CIDS/SE system can withstand static discharges of over 16 kV which exceeds compliance specification requirements of 8 kV. A direct static discharge as low as 2 kV can affect an improperly grounded CIDS/SE system. Discharges as far away as 10 feet can cause noise-related failures. Symptoms of static/noise-related failures can take many forms.

Static and noise-related failures

1. Distorted or partial characters; re-sending the message clears problem.
2. The system stops printing on one or more printheads; re-sending the message clears the problem.
3. The system stops printing on one or more printheads; cycling the power clears the problem.
4. The system stops printing on one or more printheads; executing a ZAP command clears the problem.

5. The system stops printing on one or more printheads. Cannot clear; board hardware failure.

During a cessation of print, the driver board LEDs may give erroneous indications such as not recognizing the existence of a printhead or the presence of HV. In addition, the printheads may be cold.

One of the effects of static discharge to electronic equipment is the degradation of components as the over voltage-current spike actually burns the components internally. Because of this, the symptoms will generally increase in severity and frequency as components degrade from repeated discharges. Component degradation makes the system more susceptible to static or noise events. Even though a properly grounded CIDS/SE system can withstand discharges of over 16 kV, the system can succumb to component degradation from repeated low-level static events and begin to show symptoms months after installation.

While proper grounding of the controller will minimize the potential damage to the CIDS/SE electronics by shunting the excessive voltage to ground, it is important to eliminate the static or noise at the source as well.

Static/noise sources at the print station

1. Guide rails made of nylon or plastic.
2. Ungrounded conductive plastic or metal guide rails. Since most guide rail mounts are insulated, ground straps must be installed from the guide rail to the conveyor chassis ground.
3. Static charge on the product itself. Normally, properly positioned and grounded conductive guide rails will eliminate the charge from the product, but on occasion these may have to be supplemented by grounded product brushes or ionized air blowers.

Remote static/noise sources

1. Tapers and other nonconductive packaging, material handling and processing equipment.
2. Plastic rollers on entry or exit conveyors.
3. Plastic guide rails on entry or exit conveyors.
4. Improperly grounded entry or exit conveyors.

Equipment made of nylon, plastic or Teflon that touches the product can create static or noise problems. Equipment located near the print station can create static or noise problems. There have even been cases in which the floor covering caused static events and controller failure, so this list is not comprehensive.

Ensuring proper grounding

When taking continuity (low resistance) measurements, first read the resistance of the meter leads and subtract this value from the readings. Keep in mind that a digital meter will read ±1 on the least significant digit; thus, if the meter resolution is 0.1 ohm, a reading of 0.2 ohms may be acceptable.

The first three steps outlined below should be done with the cooperation of customer maintenance personnel.

1. Check that the outlets providing power to the controller and any associated peripherals are properly grounded in accordance with applicable electrical code.
2. Ensure that the conveyor and any associated equipment are properly grounded in accordance with applicable electrical code.
3. Check the ground continuity between the conveyor and controller chassis. Because a poorly grounded controller or conveyor may be floating above ground, be sure to check the voltage between the two chassis prior to taking a resistance measurement. In addition, if the controller and conveyor have different ground runs, ground noise on one chassis will make the resistance measurement useless.
4. Check that resistance from any one of the twenty screws in the faceplate to the printhead ground stud (or bulkhead fitting if shielded printhead cables are used) is less than 0.1 ohms.
5. Check that the resistance from the printhead ground stud to the conveyor chassis is less than 0.1 ohms. If shielded printhead cables are installed, check that resistance from the bulkhead fitting on the printhead to the controller chassis is less than 0.1 ohms.

   Note: it may be necessary to remove paint from the conveyor chassis where a ground braid is attached to establish adequate contact.
6. Check that the resistance from the encoder body to the controller chassis is less than 0.1 ohms. In some cases it may be necessary to run a ground braid from the encoder body to the conveyor chassis.
7. Unplug the controller from the power outlet.
8. Check that the resistance from the controller chassis ground stud to the interface board mounting plate (the metal plate with the connectors for the photosensor, the encoder, and communications connectors) is less than 0.1 ohms.
9. Check that the resistance from the driver board TP3 to the chassis ground stud is less than 0.1 ohms. Ensure that driver board mountings of standoffs and screws are snug. Keep in mind that the standoffs break easily if over-tightened into the mounting plate.
10. Check that the resistance from the controller ground stud to the ground lug on the power supply plug is less than 0.1 ohms.
11. Check that the resistance from the controller door ground stud to the controller chassis ground stud is less than 0.1 ohms.
12. Check that the resistance from the controller chassis ground stud to the enclosure ground stud is less than 0.1 ohms.
13. Open driver board mounting door and remove the CPU board mounting plate. Check that a jumper wire is installed at location C22 (near the bottom of the board) on the power supply. If a metal oxide varistor (MOV) is installed at this location, replace it with a jumper wire. Another option is to install a PEL/SE power supply (2470-150) with the jumper wire.
14. Check that the power supply ground screw (located about 3/8 inch to the lower right of the C22 location) is tight.

15. Check that the inner chassis mounting screws are tight.
16. Reassemble the controller and plug in to the power outlet.

Tightening loose hardware

Most ground continuity problems inside the controller can be traced to loose hardware such as standoffs and mounting screws. Even when mountings are loose, you can still measure a low resistance through the loose hardware. Over time, corrosion will build up between the hardware and its mating parts and resistance will increase. Higher resistance creates a higher susceptibility to noise-related problems. The best way to prevent this is to make sure that all mounting hardware is snug.

Running a ground braid

In most cases, running a ground braid from the controller chassis to the conveyor chassis can be beneficial by reducing noise on the controller, but depending on the noise source, adding the braid can make things worse. Examples would be bad motors, bad motor controllers or poor conveyor grounds. Each installation should be handled on an application-by-application basis. Sometimes it is necessary to ground all of the equipment back to the controller.

Reducing noise

Reducing the noise at the source can be a long, tedious process. Start with the most obvious (or most common) noise source and eliminate possible sources one at a time. It is helpful to have a static meter, but most problems can be fixed by simply changing out the plastic guide rails for grounded conductive guide rails (or by grounding the conductive rails if installed). If this does not fix the problem, a static survey with a static meter will have to be performed.

Using a digital oscilloscope

If you have grounded everything properly, double-checked your work and eliminated to the best of your knowledge any environmental contributors, you can use an oscilloscope to check for ground perturbations. (Unusually high noise events such as spikes greater than 10V may correlate to product position or some other event on or near the line. When making this check it is best to use a digital oscilloscope.)

The scope will be connected between TP3 on the driver board and the chassis ground. Set up the scope as follows:

1. Connect the probe ground clip to the driver board mount. The easiest location for this connection is where the plastic door screws into the mounting.
2. Connect the probe tip to TP3 on the driver board.
3. Set vertical amp to 2V / div.
4. Set coupling to DC.
5. Set the scope for normal trigger.
6. Set the trigger level to 10V.
7. Set the time base to 0.5 mS / div.

These settings are just a beginning; noise spikes can be any polarity, and almost any amplitude or duration, so you will have to change the settings per the actual signal received.

It is normal to have noise spikes of over 3 volts here when the system is printing. Moreover, the controller may not exhibit symptoms of a static/noise related failure on every event; in fact, it can take days or weeks before the controller succumbs to its effects again. If the noise cannot be correlated to a particular event on the line (or is not seen), a static meter will have to be obtained and a static survey performed.

Conducting a static survey

Measure static levels at all of the following locations with a static meter:

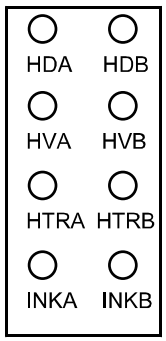
1. On the guide rails;
2. On the product at the entrance to the conveyor;
3. On the product at the printheads;
4. On the product at the conveyor exit;
5. On the printheads;
6. On the entrance conveyor--chassis, rollers, belt, etc.;
7. On the exit conveyor--chassis, rollers, belt, etc.;
8. On any plastic or ungrounded object that contacts the product at or near the print station conveyor.

It is also helpful to leave the scope connected between driver board TP3 and the controller chassis for an extended time, which will allow users to witness any environmental phenomenon that may occur on the second or third shift, and take corrective action.

It is important to understand that tracking these problems is a process of elimination that can take a significant amount of time, and corrective actions may be required to eliminate the root cause of the problems. Additionally, there are no guarantees that eliminating the static sources found will be the final solution. In fact some high level static events may occur so rarely that it is unlikely that they will occur during a one-time inspection. But having an understanding of static discharge and its causes will increase the chances of detecting and correcting problems as they occur.

Once the cause of the problem has been properly identified and corrected, the boards in the controller will continue to operate normally. Therefore it is not necessary to replace them unless there is some other issue with the boards.
The procedures in this appendix apply to both shielded and unshielded printhead cables.

2) PEL CIDS/SE troubleshooting



When troubleshooting a CIDS/SE system, you can identify most hardware and setup problems by checking the status of the LEDs and the configuration switch positions on the CPU and driver boards. Even when the controller appears to be working normally, it is a good maintenance practice to check these items.

Checking the driver board

1. Open cabinet door.
2. Check status of LEDs

   HDA and HDB indicate that the controller recognizes the printhead attachment. Should be ON.

   HVA and HVB indicate the presence of high voltage to the drivers. Should be ON.

   HTRA and HTRB indicate that heater voltage to the printheads is on. Heater voltage will stay on for approximately five minutes at controller power-up and then cycle on and off when the printhead reaches operating temperature.

   INKA and INKB indicate when a printhead is out of ink. They both turn on for approximately one second at power-up and then go off. The LED will illuminate if the printhead is run until empty. This LED will also illimunate if the Ink Low cable between J3 of the float control board and the print engine is disconnected.
3. Check Switch 1 on the driver board.
4. Check resistor packs RP8, RP9, RP10, RP11, RP13, and RP14.
5. Resistors should be installed on the second driver board in a two-driver board system or on the driver board in a single driver board system.
6. Check that connectors are installed in the correct orientation and are snug.

Driver board troubleshooting notes

If the HDA/B LEDs are not lit, it indicates that the printhead cable is not connected at one end, or the cable has broken.
NOTE: PMC VERSION 3.03 WILL TURN HIGH VOLTAGE OFF AFTER 20 SECONDS IF NO HEAD IS CONNECTED.
If the HVA/B LEDs are not lit, it indicates that the HV regulator has failed. Note that the HV LED circuit samples the high voltage supply output, and indicates that there is high voltage to the drivers, but this does not indicate that the voltage level is correct.

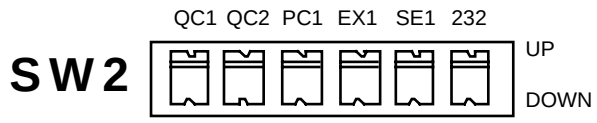
The HTRA/B LEDs will indicate two different fault conditions:
1. F1 or F2 on the driver board is open: LEDs will not light and heads are cold.
2. Thermal fuse on the printhead is open: LEDs remain on and heads are cold.

Note: Erroneous indications or print problems can result from a static or noise event. If cycling the power returns the controller to normal operation, the source of the static or noise event needs to be traced. Replacing the driver board in this case will temporarily cure the symptoms, but not correct the problem, resulting in further service calls to resolve the same issue.
Incorrect installation of the resistor packs (RP8, RP9, RP10, RP11, RP13, RP14) can cause symptoms similar to those experienced with static discharge due to increased noise on the CPU to driver board communication lines.

In most cases, a hard failure of the driver board is caused by repeated static discharges or connecting the printhead cables while the system is powered on. Wait two minutes prior to disconnecting any cable (power, printhead or CPU data) from the driver board to allow power supply voltage to dissipate.

CPU board switch settings

SW1	Front Port	Rear Port
0	2400	2400
1	2400	4800
2	2400	9600
3	2400	38400
4	4800	2400
5	4800	4800
6	4800	9600
7	4800	38400
8	9600	2400
9	9600	4800
A (default)	9600	9600
B	9600	38400
C	19200	2400
D	19200	4800
E	19200	9600
F	19200	38400



To check the CPU board LEDs and configuration switch positions, open the hinged driver board mounting plate. Check the following switches and jumpers:

Switch SW1 sets the baud rate for the front and rear communications ports. Position A is the default setting.
Switch SW2 sets the peripheral configuration:

QC1 selects sink or source for encoder one.
UP = current sink
DOWN = current source
Diagraph encoders are current sinking devices and require the switch in the UP position.

QC2 selects sink or source for encoder two.
UP = current sink
DOWN = current source
Diagraph encoders are current sinking devices, requiring the switch in the UP position.

PC1 selects multi-tasking or non-multitasking for the photosensor.
UP = non-multi-tasking: photocell one controls heads A, B, C and D.
DOWN = multi-tasking: photocell one controls heads A and B. Photocell two controls heads C and D.

EX1 selects Internal or External line speed.

UP = external line speed (encoder).
DOWN = internal line speed.

SE1 selects multi-tasking or non-multitasking for the encoder.
UP = non-multitasking: encoder one controls heads A, B, C, D.
DOWN = multi-tasking: encoder one controls heads A and B and encoder two controls heads C and D.

232 selects RS-232 or RS-485 for the rear port.
UP = RS-232
DOWN = RS-485

The RS-232/485 switch on the I/F board must also be configured for the desired rear port communication mode. Jumpers must be installed in JP3 and JP4 locations for RS-485 communications.

Jumper configuration

JP3/4 RS-485 termination resistor jumpers, must be installed for RS-485 communication.
JP5 Battery Jumper:
UP (D) = battery disconnected.

DOWN (B) = battery in circuit

JP2 External reset jumper; system will not operate with jumper installed at this location.

JP1 Manufacturer's board test jumpers; system will not operate with jumper installed at this location.

After the CPU board configuration is verified, check the status LEDs.

Status LEDs

1. SE1/2: LEDs illuminate with encoder signal input.
   Note: The SE1/2 LEDs may be illuminated when the encoder is not turning, depending on the position of the encoder wheel.
2. PC1/2: LEDs illuminate when photocell detects an object.
3. AP1/2: Indicates auto-prime output is on, this function is not used in the CIDS system.
4. Alarm1: Printhead status

   ON = heads operational, at temperature, and system is ready.
   OFF = system not operational.
5. Alarm2: LED illuminates when printhead is out of ink.
6. LEDs 1, 2, 3, 4: Communication status indicators.

   RS-232: LED 1 and 4 illuminated, LED 2 and 3 off.
   RS-485: LED 1, 2 and 3 flash with data transfer, LED 4 off.

Note: In RS-485 communications, LEDs 2 and 3 will not illuminate if the networking mode setting (NE Y/N) does not match the PC networking protocol (networking on/off).

CPU board troubleshooting notes

The CPU board rarely fails. Usually the reported symptoms are the result of programming errors or mistakes in hardware configuration.

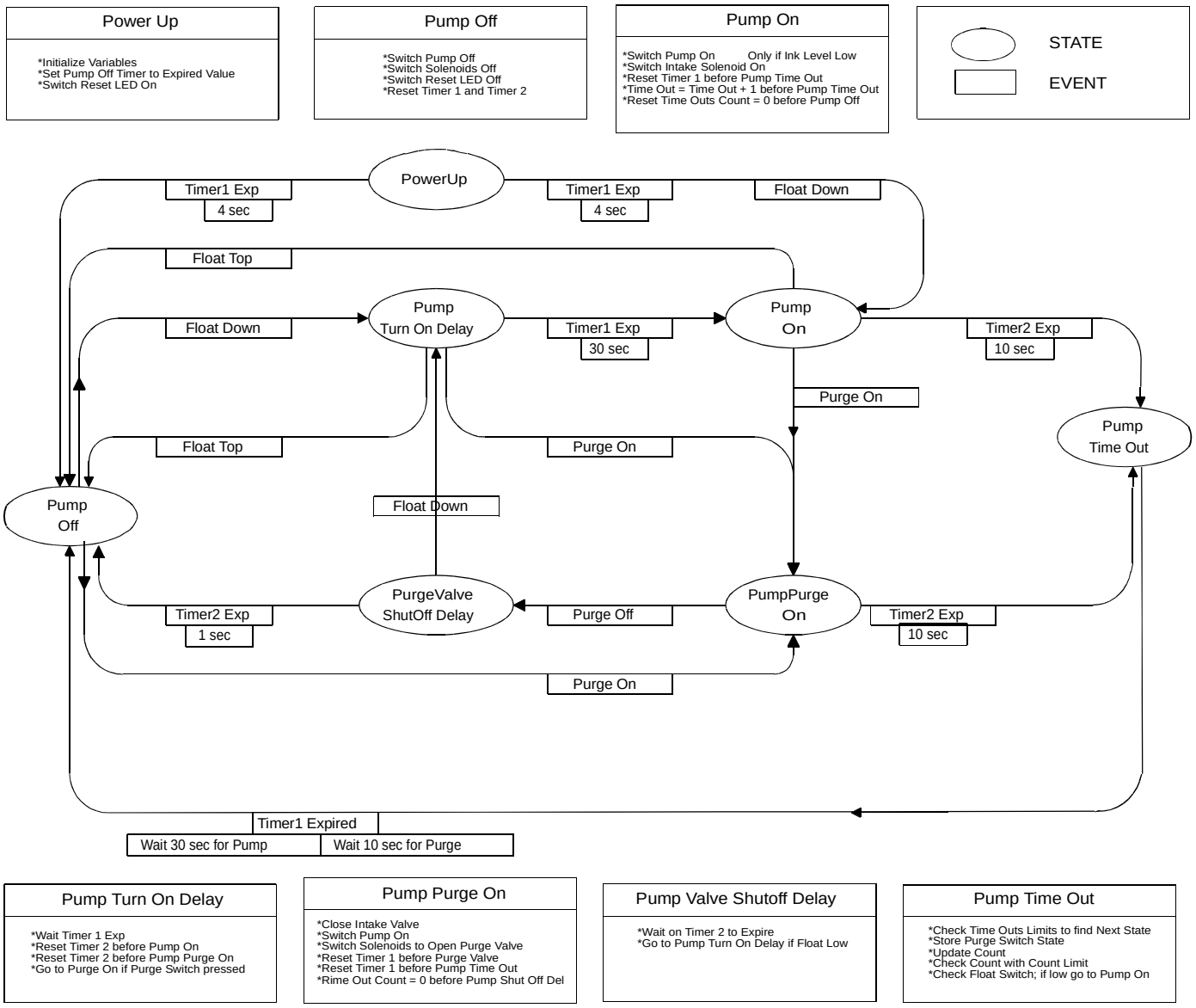
The battery is the source of most failures experienced with the CPU board. When left connected (JP5 in the down or B position) for an extended period with no power supplied to the controller, the battery can be damaged by too great a discharge. This can cause the battery charging circuit to fail. The low battery condition is seen as a failure of the system to boot. Note that the newer CPU boards have a non-rechargeable lithium battery and should not experience these problems until the battery has reached the end of its service life.

The second most common failure of the CPU board is loss of communication due to an over voltage (static discharge or ground differential) condition on the communication port. If a communications hardware failure occurs, try to determine the source of the over voltage condition prior to replacing the CPU board.

Other failures of the CPU board are generally related to plugging in the driver boards or firmware module when the system is powered on.

The CPU board can frequently be reset using the ZAP command, followed by cycling the power, to recover from most problems.

3) Check the PEL float control board



This board is a microprocessor controlled printhead ink reservoir float controller. The Microchip EPROM based 8 bit CMOS microcontroller (PIC16C54-XT/P) operates at 2Mhz supplied by a crystal oscillator. Two 18pF capacitors are used to increase oscillator stability. An external Power On Reset (POR) circuit consisting of R1, RN1D, C6 and D1 is used to maintain a chip reset during the power up slope characteristics exhibited by the crystal oscillator. Faster crystal oscillators require less of a POR delay.

Input power

12VDC is supplied to the Float Control board from the IDS via connector J1. The 12VDC is used to source the 5VDC voltage regulator (U1), power the ink low relay (K1) and bias the Field Effect Transistors (Q1-Q3).

Voltage regulator

Capacitor C1 is used to store voltage such that 12VDC will be stable during any minor power glitches and allow the 5VDC voltage regulator to operate without temporary loss of output due to power glitches. Diode D7 is used to provide a diode drop (.7VDC) from ground reference to the DC output of the voltage regulator. The voltage regulator will maintain 5VDC between pins 2 and 3, but, since the Float Control board is referenced a diode drop above pin 2, then the VDD input to the microprocessor will be 5.7VDC. The VDD pin is rated at upto 6.25VDC maximum.

Ink low input

The IDS supplies an ink low input to the Float Control board via connector J1. When the IDS is powered up the SPDT relay (K1) will be energized. Thus, an open contact will be passed on to the print engine via connector J3. The print engine will then route the open contact to the Foxjet Controller and ultimately to the hand held unit indicating power "ON" and an ink not low condition. The IDS will de-energize the low ink relay (K1) when the ink reservoir is low or the IDS is not powered. Either condition will cause a closed contact to be sent to the print engine. The print engine will then route the closed contact to the Foxjet Controller and ultimately to the hand held unit indicating an IDS not powered or an ink low condition.

The IDS will supply the same low ink status to all printheads (up to 8) on the system. The Float Control board will supply both a normally open (N.O.) contact and a normally closed (N.C.) to the J3 connector. For our application only the N.C. contacts will be routed to the PEL engine for reasons stated above.

Pump driver

12VDC is provided to the pump and the microprocessor can turn the FET (Q1) on to activate the pump via connector J1. This FET is parallel with the other printheads such that any one printhead may activate the pump at any time. The 10K gate resistor is tied to ground and will prevent any unwanted pump activations during power up. The microprocessor can activate the pump by driving the gate of the FET high. If the IDS ink reservoir indicates a low ink condition then the IDS will inhibit the pump from turning "ON" regardless of the printheads command. Current from the pump driver circuit will sink through Q1 when the microprocessor brings pin 17 to a logic "1" (approximately 5.2VDC because of the 5.7VDC bias on the microprocessor and the voltage divider network of resistors RN1A and RN3A). Diode D2 is used to clamp the voltage upon activation of the pump.

Purge solenoid driver

12VDC is provided to the purge solenoid via connector J5 and the microprocessor can turn the FET (Q2) on to activate the solenoid. The 10K gate resistor is tied to ground and will prevent any unwanted solenoid activations during power up. The microprocessor can activate the solenoid by driving the gate of the FET high. Purge solenoid current will sink through Q2 when the microprocessor brings pin 18 to a logic "1" (approximately 5.2VDC because of the 5.7VDC bias on the microprocessor and the voltage divider network of resistors RN1B and RN3B). Diode D3 is used to clamp the voltage upon activation of the purge solenoid.

Intake solenoid driver

12VDC is provided to the intake solenoid via connector J5 and the microprocessor can turn the FET (Q3) on to activate the solenoid. The 10K gate resistor is tied to ground and will prevent any unwanted solenoid activations during power up. The microprocessor can activate the solenoid by driving the gate of the FET high. Intake solenoid current will sink through Q3 when the microprocessor brings pin 1 to a logic "1" (approximately 5.2VDC because of the 5.7VDC bias on the microprocessor and the voltage divider network of resistors RN1C and RN3C). Diode D4 is used to clamp the voltage upon activation of the intake solenoid.

Purge switch input

The purge switch is a manual dry contact and is input to the microprocessor via connector J2. The purge switch will be open when the purge operation is not selected. The purge switch is closed when the purge operation is selected. The RC network, consisting of RN2C and C9, will provide 10ms debounce of the switch so that the microprocessor will not see any switch chatter. When the manual purge operation is selected the microprocessor will activate the purge solenoid and the pump, causing ink to flow into the printhead, bypass the reservoir and exit through the print engine orifices. This allows air to escape from the system, or is used in preparation of flushing the printheads. The purge solenoid and pump will remain activated for only as long as the purge switch is manually held closed.

Float high switch input

The float high switch is a dry contact and is input to the microprocessor via connector J4. The RC network, consisting of RN2B and C8, will provide 10ms debounce of the switch so that the microprocessor will not see any switch chatter. The float high switch will be closed when the reservoir is full. The float high switch will be open when the reservoir falls below full. This input is used by the microprocessor to de-activate the intake solenoid and the pump when the reservoir becomes full.

Float low switch input

The float low switch is a dry contact and is input to the microprocessor via connector J4. The RC network, consisting of RN2A and C7, will provide 10ms debounce of the switch so that the microprocessor will not see any switch chatter. The float low switch is available to the microprocessor but is not used in this application.

4) Check the IDS PEL controller board

This board is used to power/control an IDS system supplying up to eight PEL printheads.

Input power

12VDC is supplied to the Controller board from the IDS power supply (PSA-110-112) via connector J6. The 12VDC is used to source the 5VDC voltage regulator (U1), ink low switch, power lamp, low ink beacon, pump and the printheads.

Voltage regulator

Capacitor C1 is used to store voltage such that 12VDC will be stable during any minor power glitches and allow the 5VDC voltage regulator to operate without temporary loss of output due to power glitches. The voltage regulator will maintain 5VDC between pins 2 and 3. This 5VDC regulator is used to source power to the Remote I/O boards. Up to two Remote I/O boards may be sinking power from the Controller board. Connector J7 is assigned to sourcing 5VDC to the first Remote I/O board that may be in the system. Connector J12 is assigned to sourcing 5VDC to the second Remote I/O board that may be in the system. Earth ground is also routed through the Controller board for reference to the Remote I/O boards. If no Remote I/O boards are in the system then U1 will be idle (not sourcing a load).

Ink low input

The ink low input switch comes directly from the ink bottle reservoir. The switch will be open when the reservoir contains ink. The switch will close when the ink supply is low and needs to be replenished. The ink low switch input is at connector J9.

When the ink low switch is open the 10K resistor (R6) will provide a path to ground for the gate of the Field Effect Transistor (FET, Q5). When Q5 is "OFF", the low ink beacon at connector J10 will remain extinguished. Also, the gate of Q4 will be 12VDC and Q4 will be "ON". When Q4 is "ON", the base of transistor Q2 will not conduct, allowing Q3 to be controlled by any one of the printheads. The "PUMP" signal from connectors J1, J2, J3 or J4 is sourced by the printheads. If a printhead is low of ink it will bring the "PUMP" signal to ground potential, causing transistor Q1 to turn "OFF", and causing the gate of Q3 to go to 12VDC, thus allowing Q3 to turn the pump "ON" by sinking current. The "PUMP" signal will be 12VDC if none of the printheads is in need of ink.

When the ink low switch is closed, 12V will be routed through connector J9 and, due to the voltage divider circuit of R5 and R6, the gate voltage at Q5 will be 6VDC. This will turn Q5 "ON", causing the low ink beacon at connector J10 to illuminate by sinking current. When Q5 is "ON", the gate of Q4 will be .12VDC, turning Q4 "OFF". When Q4 is "OFF", the base of transistor Q2 will be conducting and the gate of Q3 will be .12VDC. Thus, Q3 will remain "OFF" even if the printheads request the pump to be turned "ON", so the pump will be inhibited whenever the ink is low.

In addition, when the ink is low the pump inhibit signal is routed out to each of the printheads via the "LOW INK" signal at connectors J1, J2, J3 and J4. The printhead will de-activate its low ink relay and send a closed contact signal to the print engine. The print engine will relay this signal back to the Foxjet Controller, which will then provide an "INK LOW" indication at the hand held unit.

Pump driver

12VDC is provided to the pump via connector J8, and any printhead can activate the pump by setting the "PUMP" signal to 0VDC at connectors J1, J2, J3 or J4. If the ink is not low, then 0VDC on the "PUMP" signal will activate Q3 allowing the pump to turn "ON" by sinking current through Q3. If ink is low, then Q2 will be activated, causing the gate of Q3 to go to 0VDC and de-activating Q3. Thus, the pump cannot be turned "ON".

Auxiliary low ink

The SPDT relay (K1) is provided as an auxiliary for any unforeseen application. A set of normally open (N.O.) and normally closed (N.C.) contacts is provided at connector J5. This will allow the operator to utilize the configuration that best suits his needs.

Printhead power

The Controller board supplies 12VDC and GND to each printhead via connectors J1, J2, J3 and J4. Two .5A fuses (F1 and F2) are provided in series with each bank of four printheads. These fuses are plug in types and can be replaced by removing the cover, unplugging the failed fuse and replacing it with a good fuse.