Marksman *PRO*
VxJet

FOXJET ®

High Resolution Printing
for the **Real World**

Operations Manual

2465-165
Revision A

for Software Version 1.3

FOXJET
AN ITW COMPANY

VxJet Ink Jet System
Operations Manual

2465-165

VXJet

The VXJet system, including all components unless otherwise specified, carries a limited warranty.

The inks and conditioners used with the VXJet system carry a limited warranty.

For all warranty terms and conditions, contact the Distributor for a complete copy of the Limited Warranty Statement.

VXJet

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Section 1: Introduction

This manual covers the installation, operation, and maintenance of the VxJet Integrated Valve Ink Jet Printing System. Also included is a troubleshooting section, parts list and glossary.

Your Vxjet Ink Jet System consists of:

- **Controller** - An ink jet controller with color display, touch screen, and full size QWERTY keyboard designed to work with VxJet print heads and Ink Supply.
- **VxJet Print Heads** - Print Heads designed for high-speed printing applications in harsh environments using porous and non-porous inks.
- **Ink Supply** - An ink supply capable of supplying porous and non-porous ink to a maximum of eight 18-dot or sixteen 9-dot VxJet Print Heads.

Section 2: Safety

Following is a list of safety symbols and their meanings, which will be found throughout this manual. Pay attention to these symbols where they appear in the manual.

Wear safety goggles when performing the procedure described!

Caution or Warning! Denotes possible personal injury and/or damage to the equipment.

Caution or Warning! Denotes possible personal injury and/or equipment damage due to electrical hazard.

NOTE: (Will be followed by a brief comment or explanation.)

Only trained personnel should operate and service the equipment.

CAUTION: The Ink Supply contains hazardous voltage (115/230VAC). Turn off the equipment's main power before:
• Performing preventive maintenance.
• Performing any repairs to the unit.
• Servicing the equipment in any manner.

ESD protection should be worn when servicing internal printed circuit boards.

After service to the equipment is completed, replace all protective devices such as grounding cables and covers before operating equipment.

WARNING: This equipment contains ink under pressure. Be sure to depressurize the system before servicing.

TSO ink contains ethanol and isopropanol. MEK ink contains methyl ethyl keytone. TWP ink contains ethylene glycol. It is extremely important to:
• Clean up all spills with the appropriate conditioners immediately and dispose of all waste according to local and state regulations.
• Wear safety glasses and protective clothing, including gloves, when handling all inks and conditioners.
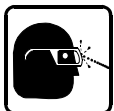
Store inks and conditioners under the recommended conditions found on the MSDS (Material Safety Data Sheet).

Section 3: System Components

1 Controller
2 Ink Delivery System
3 Print Heads
4 Conveyor
5 Product
6 Print Head Bracketry
7 Ink Status Beacon
8 Encoder
9 Ink Supply Container
10 Photosensor
11 Ink Level Detect
12 Power Cord
13 Ethernet Connection
14 Beacon Cable

15 Ink out to Print Heads
16 Ink Supply Tubing
17 Ink Regulator
18 Encoder Cable
19 Photosensor Cable
20 Controller to Print Head Cable
21 Print Head to Print Head Cable
22 Ink Filter
23 Throw Distance
24 Ink "T" Fitting
25 Male Quick Disconnect
26 Ink Supply Cap Assembly
27 Ethernet Cable
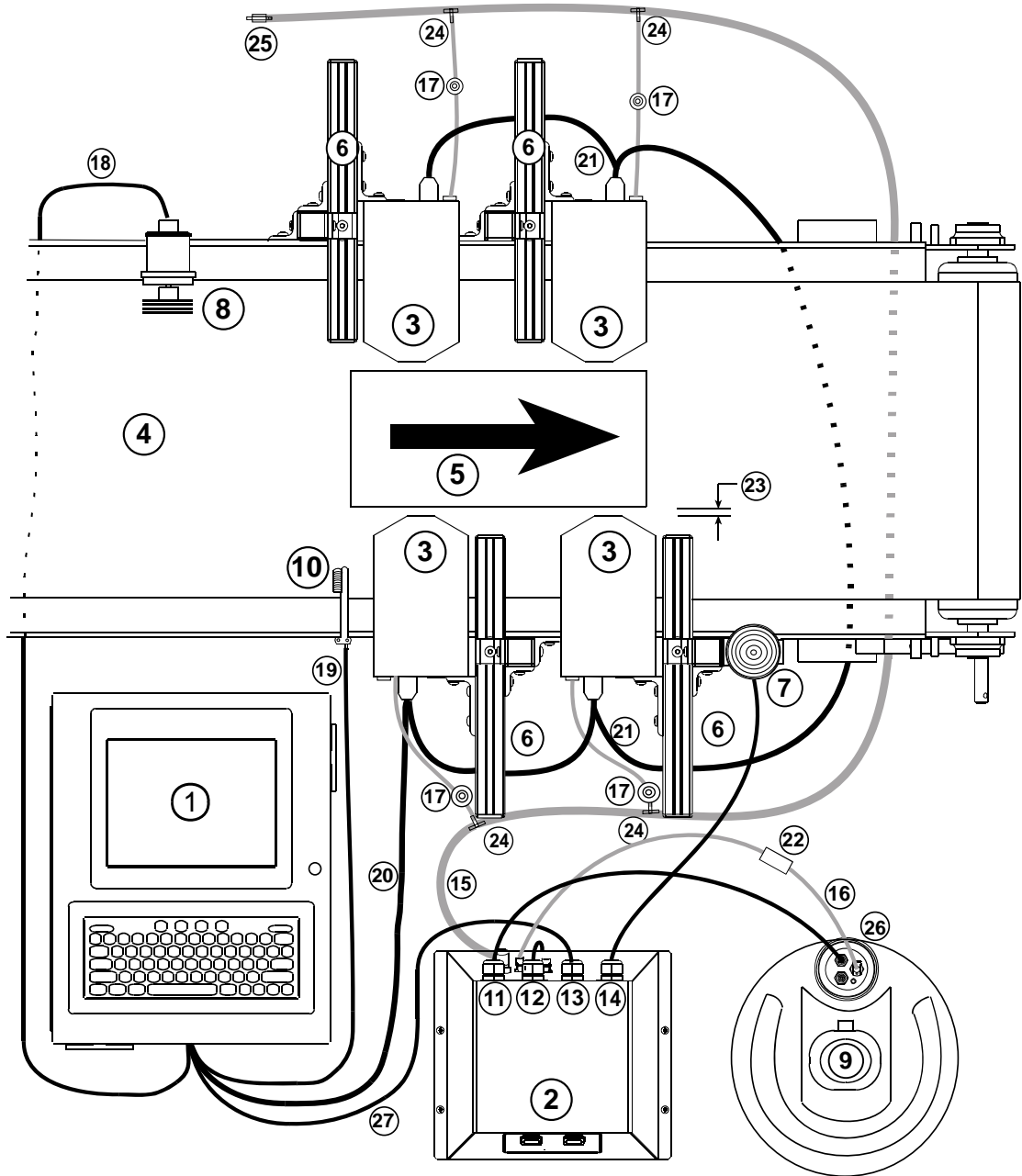
The VxJet Ink Jet System is available with the following components and options:

Part Number	Description
	Print System
PROVX-2HD-1/2DP	Dual Head 1/2" Porous
PROVX-2HD-7/8DP	Dual Head 7/8" Porous
PROVX-2HD-1/2DN	Dual Head 1/2" Non-Porous
PROVX-2HD-7/8DN	Dual Head 7/8" Non-Porous
	Controller Assembly
2465002D1	Marksman Pro VxJet, Domestic
2465002E1	Marksman Pro VxJet, European
2465162	Marksman Pro VxJet Controller Board
	Print Head
5770002P500FX	1/2" 9-Dot Print Head, Porous
5770002P875FX	7/8" 9-Dot Print Head, Porous
5770002N500FX	1/2" 9-Dot Print Head, Non-Porous
5770002N875FX	7/8" 9-Dot Print Head, Non-Porous
	Cabling
5700245-002	VxJet Print Head Cable, 2'
5700245-010	VxJet Print Head Cable, 10'
5700245-025	VxJet Print Head Cable, 25'
2464182-010	Photocell Extension Cable, 10'
2464182-025	Photocell Extension Cable, 25'
2464176	Encoder Extension Cable, 12'
2464179	Encoder Extension Cable, 24'
	Ink Supply
5760012SDPFX	Ink Supply, Porous Ink
5760012SDNFX	Ink Supply, Non-Porous Ink
5760310	Tubing/Filter Kit
5750503	Effluent Bottle Kit
5760307	Ink Cap Assembly, 5 Gallon
5760309	Ink Cap Assembly, 30 Gallon
	Bracketry
5760821	VxJet Print Head Mounting Kit
2465220	Ink Supply Mounting Kit
2464563	Print System Floor Mounting Kit
2465201	Controller T-Base Mounting Kit
2465219	Controller Conveyor Mounting Kit
	Controller Accessories
2464603	Encoder and Bracket Assembly
2466525	Photocell and Mounting Kit
2465223	Marksman Pro Alarm Beacon
2464040	Marksman Hub, Domestic
2464041	Marksman Hub, European

Controller

The controller gathers and stores all the information required for printing a message. This information can come from the following sources:

1. The user interface, which tells the controller what message to print on the product.
2. The photosensor, which tells the controller when to print.
3. The encoder, which tells the controller how fast to print. There are two types of encoders:

   •A built-in **fixed speed encoder** is used when the conveyor speed does not change.

   •An optional, conveyor-mounted **variable speed encoder** is used when the line speed varies or has frequent starts and stops.

With this information, the controller knows exactly when the leading edge of the product will reach the print head and at what rate of speed.
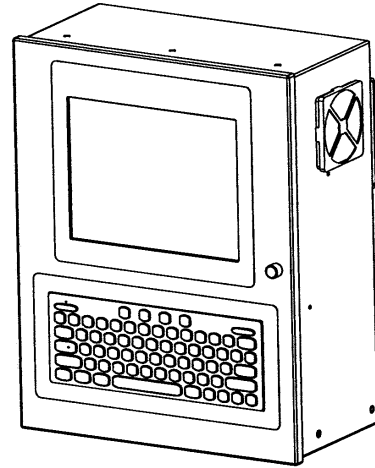
Ink Supply

The Ink Supply provides ink to the print heads. The Ink Supply contains an Ink Pump, Accumulator, and Printed Circuit Board to control ink supply to the print heads. Ink is pumped into an internal accumulator to supply constant ink pressure to the print heads.

The Ink Supply includes system connectivity to supply operational data including Ink Low, Ink Out, and Broken Line safety information. See *Appendix B, Theory of Operation*, for a complete operational description.
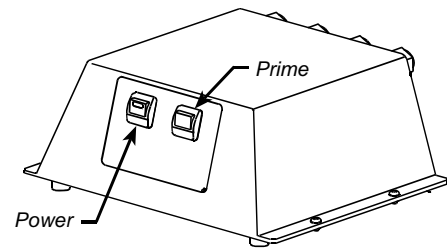
Bracketry

Bracketry is the structure that supports the controller, ink supply, print heads, and other accessories. This manual details instructions for mounting all system components to a conveyor. Other mounting options for the controller and ink supply include the T-stand and pedestal mount, shown below. Assembly instructions are included with parts kits.

Conveyor Mount
(2465-219)

T-Base Mounting Stand
(2465-201)
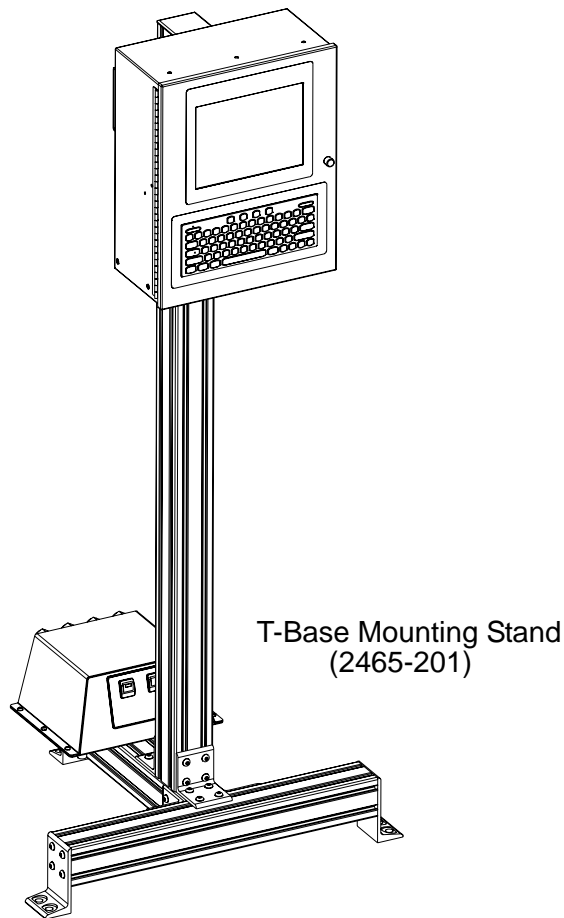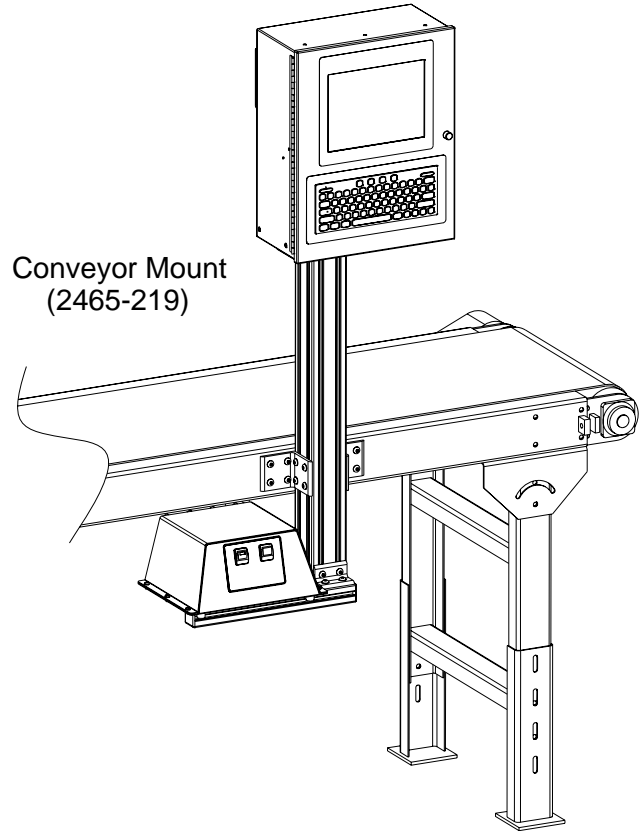
Print Head Bracketry

There are numerous options for mounting print heads. Bracketry is modular and can assume several configurations:

- Single-pole conveyor mount
- Double-pole conveyor mount
- Single-pole floor mount

SINGLE POLE
CONVEYOR MOUNT

SINGLE POLE
FLOOR MOUNT

DOUBLE POLE
CONVEYOR MOUNT
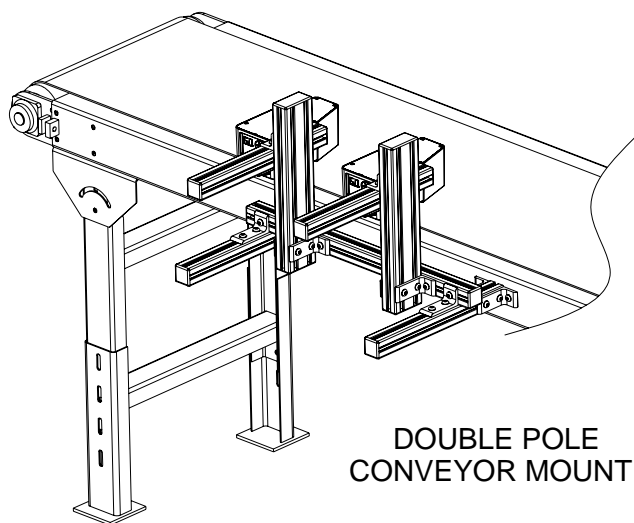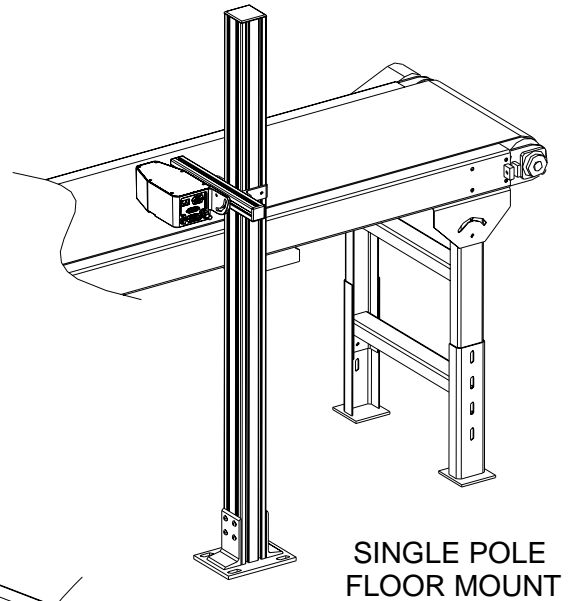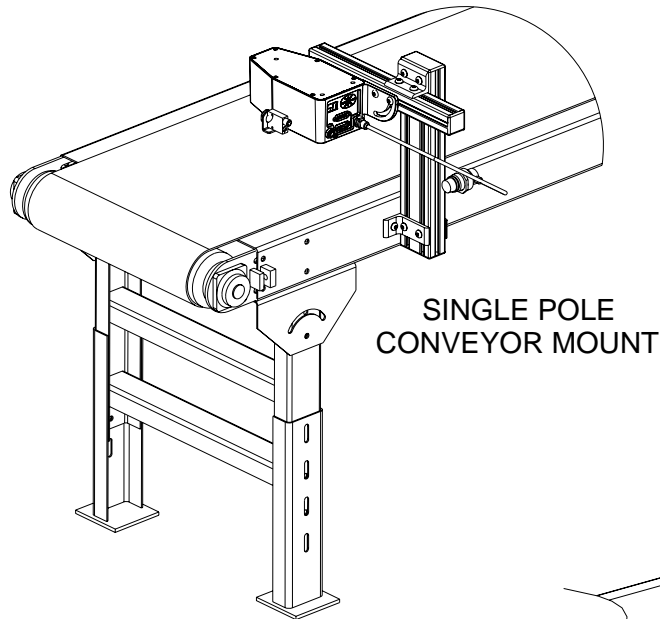
Print Heads

The VxJet Print Head uses a flexible membrane sandwiched between two plates, which propels ink droplets onto moving surfaces by solenoid activation.

This design keeps the ink between the front-plate and membrane, away from the solenoids.

The VxJet Print Head is capable of printing at very high line speeds with a minimum of required maintenance. It can produce highly legible ¼" to 2" tall alphanumerics, special characters and logos.
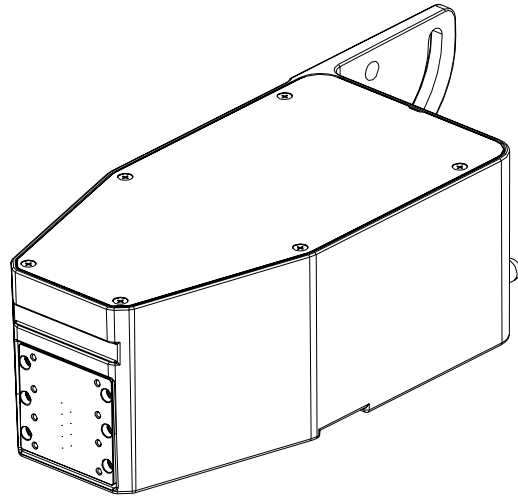
Each type of print head has specific distances above and below the orifices, spaces in which the print head cannot print. These non-printing zones are critical when designing print head layout in multi-head applications. The figure at right shows the print and non-print areas obtained when two 9-dot print heads are stacked on a vertical bracket, as in the "Single Pole Floor Mount" illustration on the previous page. See the table on the next page for specific non-printing zones for each print head model.
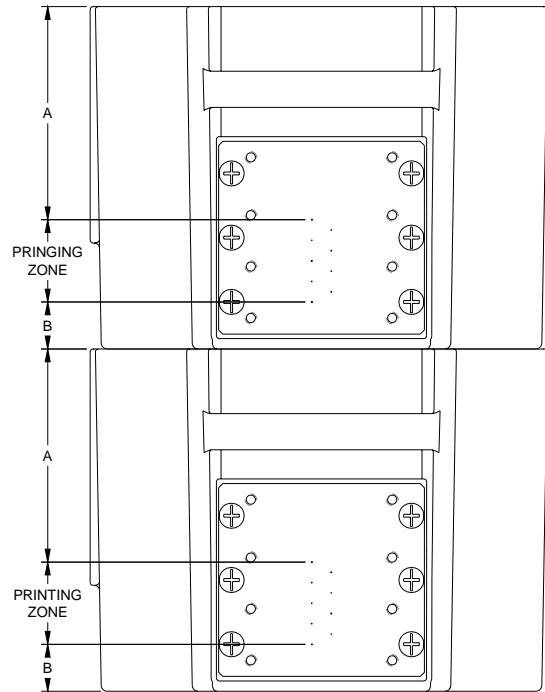
Print Head Models

The following table lists the VxJet print heads and their characteristics.

Part Number	Type	Characteristics	Non-Print Base Area (B)	Non-Print Top Area (A)	Total Non-Print Area (A+B)
5770002P500FX	1/2" 9-Dot Porous	Prints 1/4", 5/16" and 1/2" tall characters on porous substrate	.86"	2.07"	2.93"
5770002N500FX	1/2" 9-Dot Non-Porous	Prints 1/4", 5/16" and 1/2" tall characters on non-porous substrate.	.86"	2.07"	2.93"
5770002P875FX	7/8" 9-Dot Porous	Prints 7/16", 5/8" and 7/8" tall characters on porous substrate.	.46"	2.07"	2.53"
5770002N875FX	7/8" 9-Dot Non-Porous	Prints 7/16", 5/8" and 7/8" tall characters on non-porous substrate.	.46"	2.07"	2.53"

Ink Regulator

The Ink Regulator, supplied with the print head, regulates ink pressure to the print head. The regulator is preset at the factory to the correct output pressure.
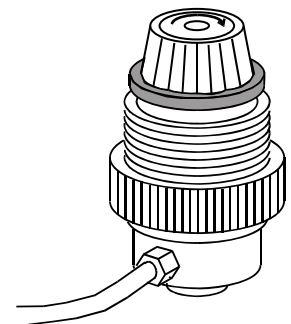
Photosensor

The Photosensor is both a light source and a sensor. It emits light and detects the arrival of a product when the product reflects the light source back to the sensor. The sensor then sends a signal to the controller to start the printing cycle. An LED on the back of the sensor illuminates when a reflective object is detected.

Encoder

The Encoder assembly provides conveyor line speed information to the controller. It also allows automatic disabling of printing when the line stops.

The Marksman© Pro System uses a 5000 ppr open collector output encoder. The wheel is sized to provide the correct timing inputs to allow the print heads to print from 150 to 300 dpi.

The variable speed encoder assembly provides conveyor line speed information to the controller.

In addition to providing line speed information, an encoder also allows automatic disabling of printing when the line stops.
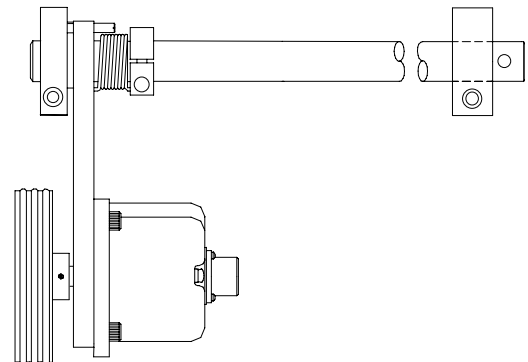
ENCODER ASSEMBLY

Ink Supply

Ink is supplied via 5-gallon or 30-gallon plastic containers. The ink cap assembly contains a float mechanism that detects a low ink condition and sends this information to the ink supply.

NOTE: Check the label on the Print Head for correct ink type.

Ink Cap Assembly

Level Detect

5-Gallon Ink Pail
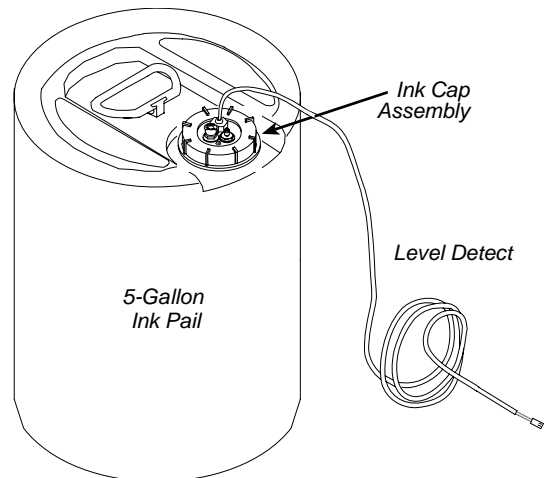
Section 4: Installation

The figure below illustrates a typical install, with conveyor-mounted controller and four print heads. (Cables and ink lines are not shown.)
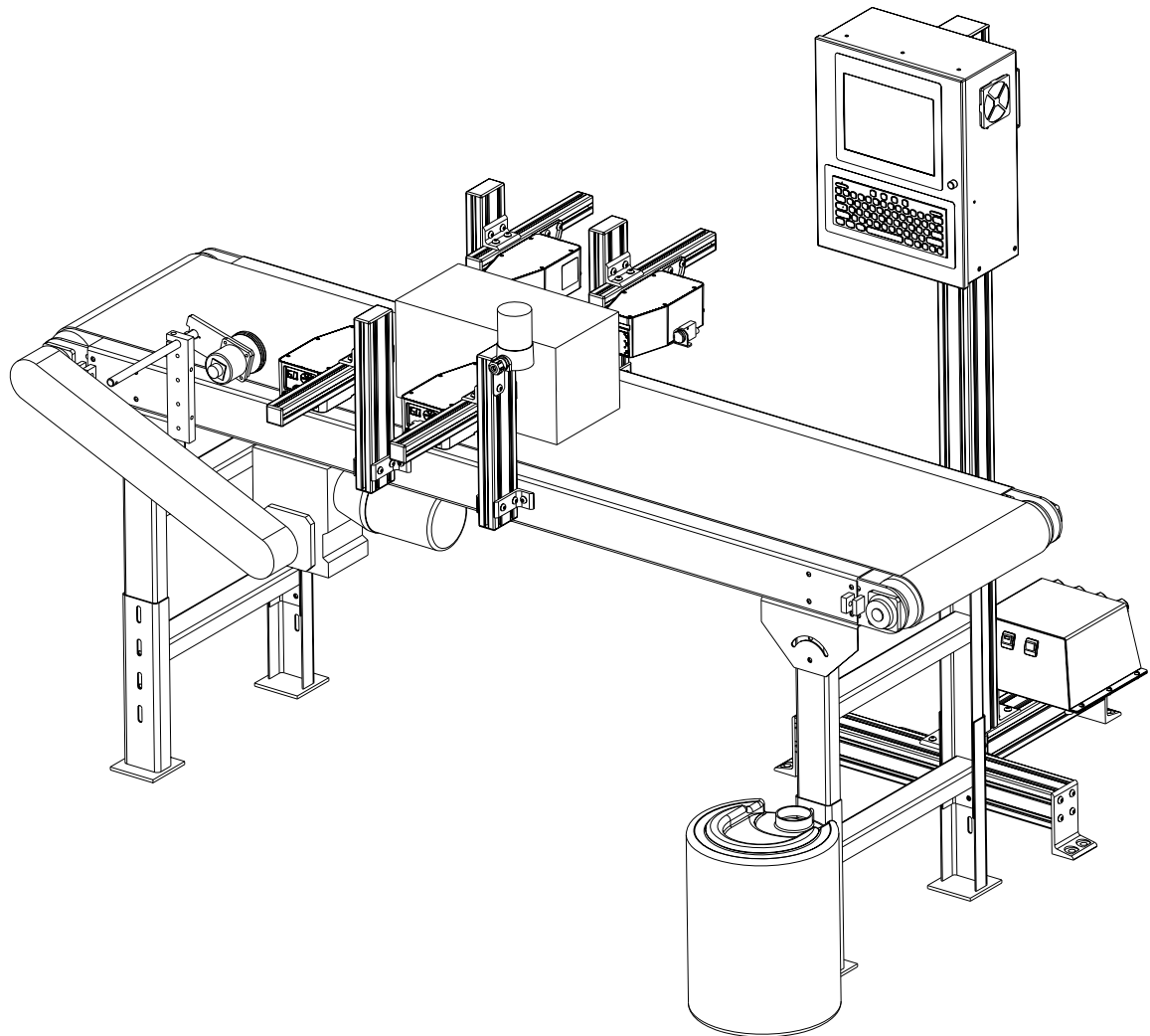
Testing the Electrical Outlet

CAUTION: The outlet must be installed near the equipment and must be easily accessible.

ATTENTION: On doit installer à côté de l'appareil une prise de courant facilement accessible.

Before installing the system, 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, inform plant maintenance immediately and do not use the outlet until it has been re-wired. See *Appendix G, Testing an Electrical Outlet,* for more information.

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 system components are plugged in to. 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) should be installed.

CAUTION: Not for use in a computer room as defined in the Standard for the Protection of Electronic Computer/Data Processing Equipment, ANSI/NFPA 75.

ATTENTION: Ne peut être utilissé dans une salle d'ordinateurs telle que définie dans las norme ANSI/NFPA 75 Standard for Protection of Electronic Computer/Data Processing Equipment.

Materials Required for Installation

You will need the following items:
- Bottle of conditioner
- Lint-free wipes
- Ink pressure gauge
- Safety goggles
- Level
- Tape measure
- Effluent bottle

Use appropriate safety equipment and procedures. Leave print heads in their shipping cartons until all bracketry is in place and tightened down.

Installing Controller/Ink Supply Bracketry

This section shows controller/ink supply bracketry mounted to a conveyor. This is the most common mounting method, and the most stable, as all bracketry is bolted directly to the conveyor. Detailed assembly instructions are included with the parts kit.

Other mounting options, including parts kit numbers, are illustrated in *Section 3, System Components*.

Corner brackets are attached to aluminum bars as shown.

ATTACHING
CORNER
BRACKET

Single T-nut

Corner Bracket

4-Hole Corner Bracket Mounts to Conveyor

Controller/IDS Mounting Plates

2-Hole Corner Bracket
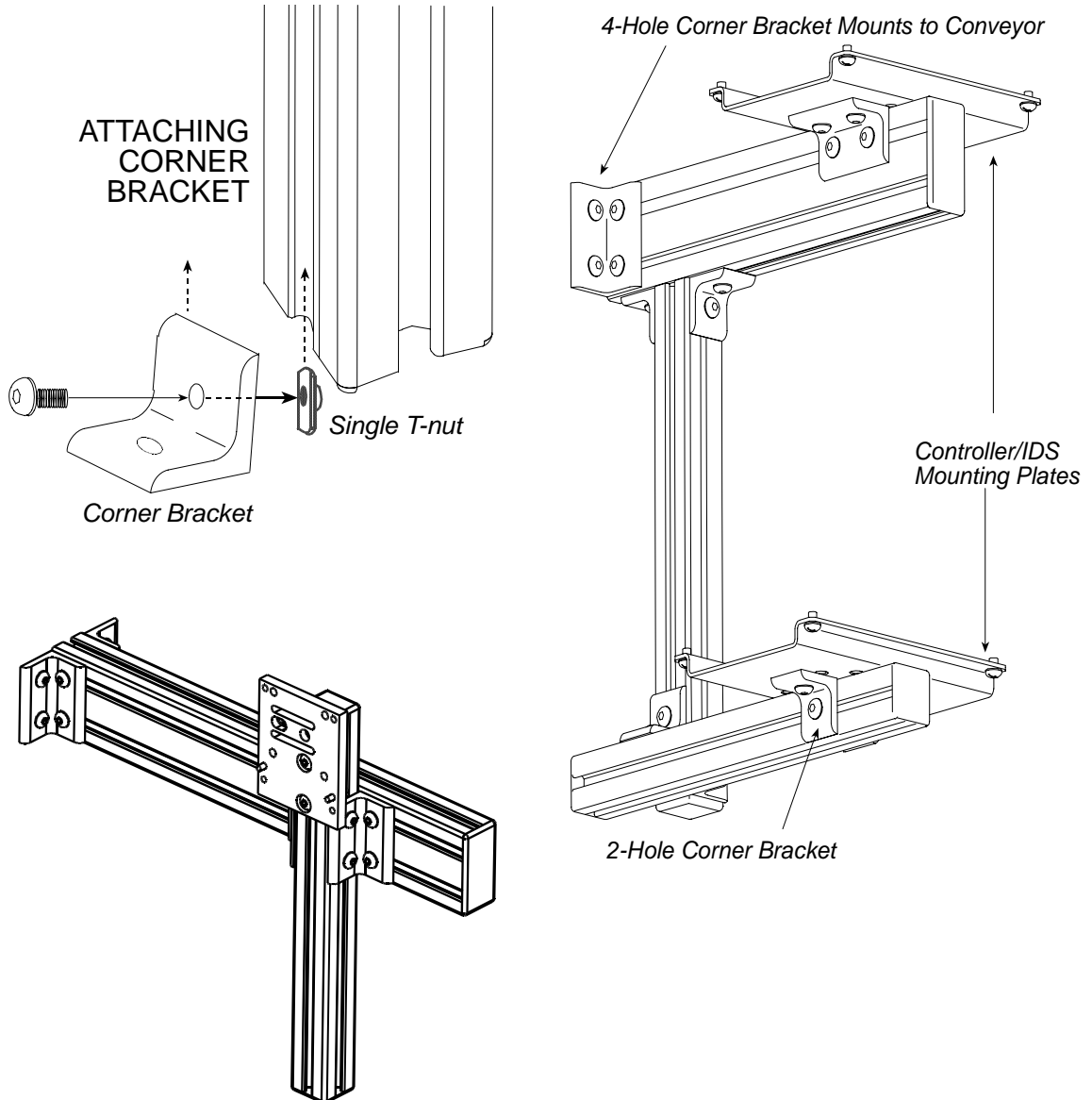
Print Head Bracketry

This section shows bracketry for conveyor-mounted print heads. See *Section 3, System Components*, for other print head bracketry options.

With all conveyor-mounted options, plant maintenance will need to drill holes in the conveyor for final attachment.

VERTICAL BAR
WITH CORNER
BRACKETS
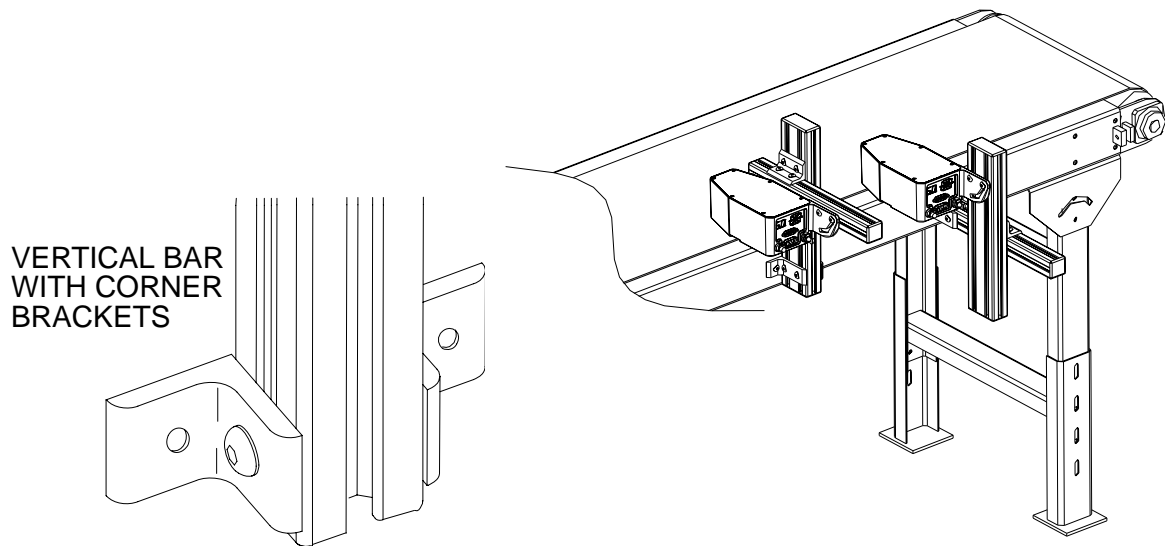
Mounting the Print Heads

Unpack the print head just before mounting to the bracketry.

Attach the print head to the bracketry with a print head mounting bracket.

You may need to vertically adjust each bracket's horizontal bar later to fine-tune message placement. This is especially true when using multiple print heads, as message lines will need to be synchronized with each other.

NOTE: When adjusting the horizontal bar or print head mounting bracket, always support the print head with your hand to keep it from falling forward onto the conveyor.

Mounting the Photosensor

Position the photosensor upstream from the first print head. The maximum placement distance is 81 inches from the photocell to the print head. The mounting bracket is included.

The Encoder

The encoder uses a wheel that rolls against the conveyor belt to track the speed. It sends a signal to the controller, which makes adjustments for reported changes in the line speed.

It is not necessary to install the encoder immediately adjacent to the print heads. It is more important to place it where it will accurately measure the speed of the conveyor. Install it in contact with the conveyor, or with a wheel or roller moving the same speed as the conveyor.

The encoder's mounting bracket is spring-loaded. Adjust the spring collar to ensure that the encoder maintains stable contact with the conveyor.
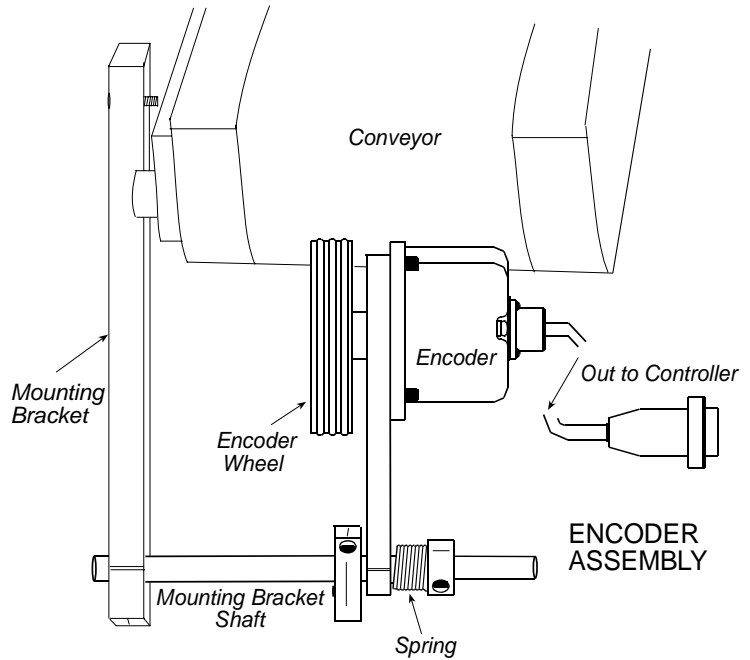
CAUTION: Do not excessively load the encoder wheel against the surface of the conveyor. A radial force of over 40 lbs. will reduce the life of the bearings.

Controller Connections
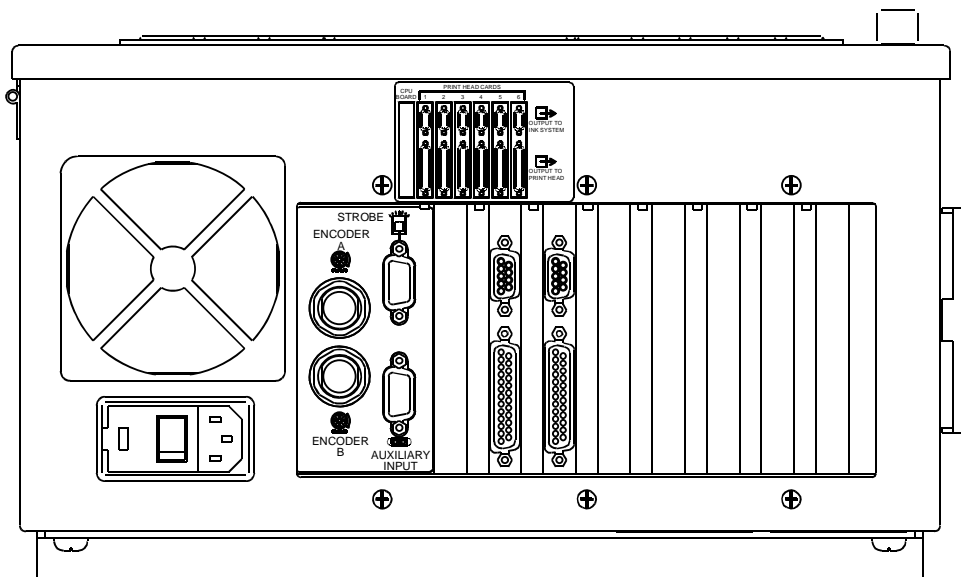
CPU Connections

The controller to print head cable must be connected to the highest vertical head. Print head to print head cables should be connected from the top head down as shown in the following drawing.

The system allows text to be shared between the boundaries of the print heads. If text overlaps the boundaries, the data from the overlap goes to the next print head in the daisy chain.
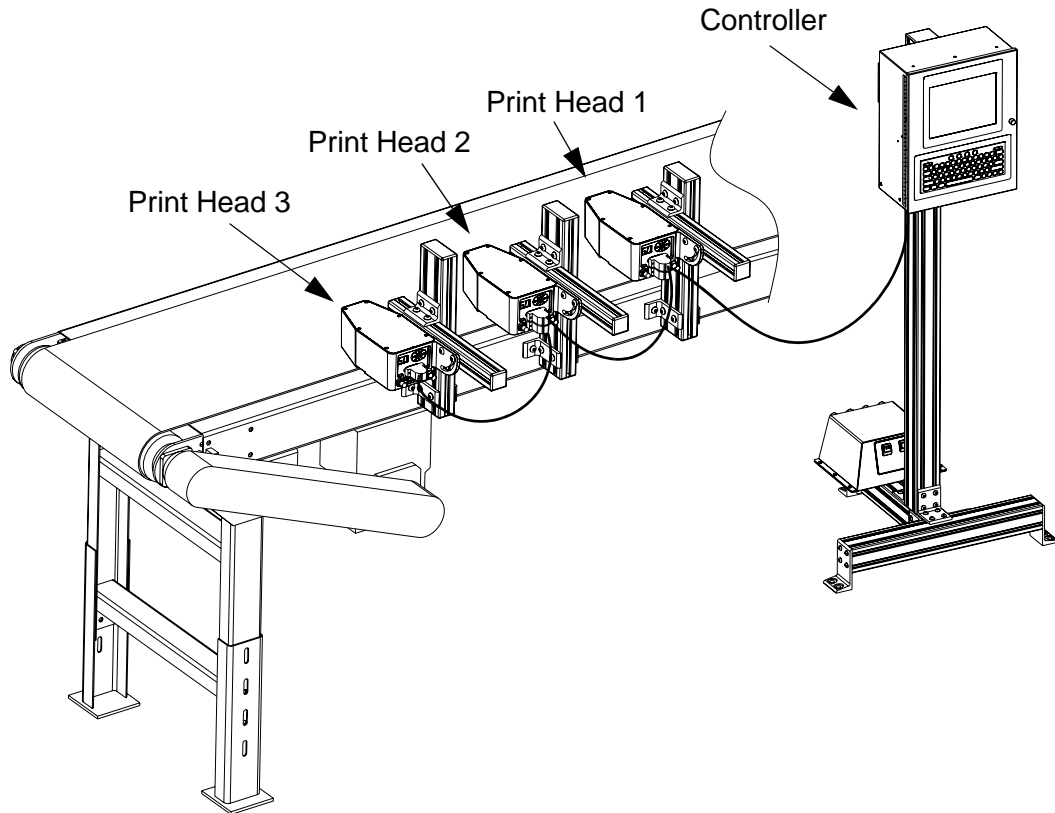
Configuring the Ink Supply

1. Remove the Ink Supply cover.
2. Install cables through their respective bulkhead fittings, leaving ¼" of the large cable jacket extending outside the bulkhead fitting.
3. Connect the beacon cable to Ink supply circuit board connector J5. Connect the level detect cable (from ink cap assembly) to J4. (See the wiring diagram in *Appendix B, Theory of Operation.*) Connect the ethernet cable to the appropriate receptacle.
4. Tighten bulkhead fittings by hand, then ½ turn with a wrench, and replace the ink supply cover.
5. Place the Ink Status Beacon where it can be seen by plant personnel, and attach it to bracketry with a T-nut.
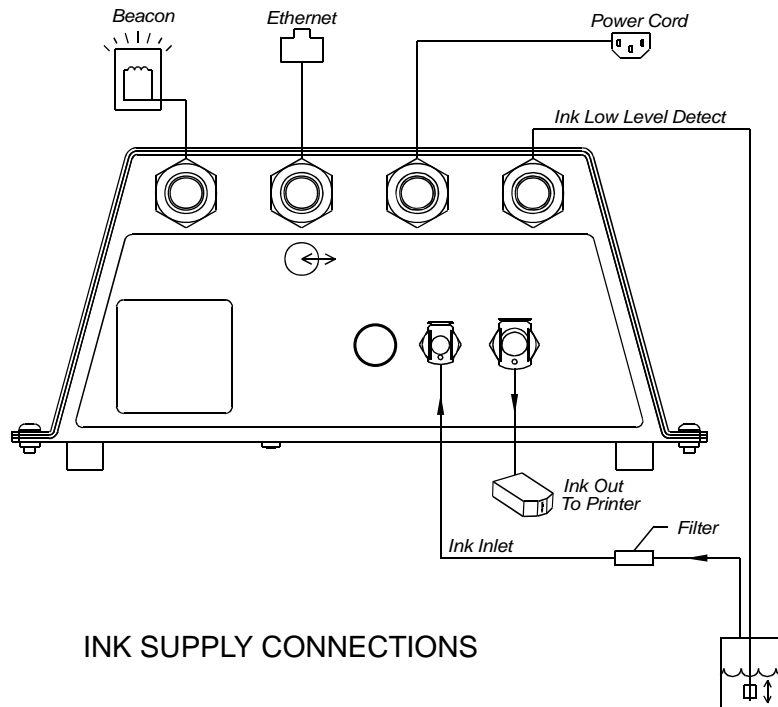
INK SUPPLY CONNECTIONS

Attaching Ink Regulators

1. Attach a single T-nut loosely to the bottom side of the regulator bracket.
2. Slide the regulator bracket and T-nut into the slotted bar and tighten into place.
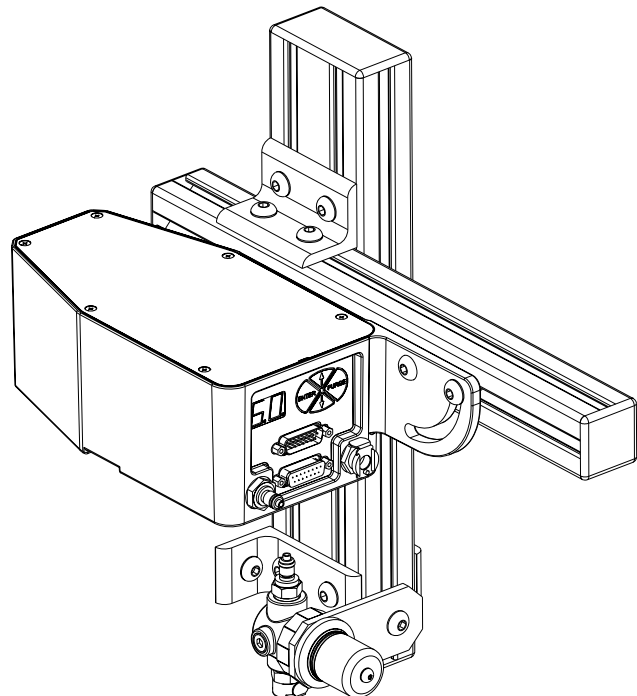
Plumbing the System

All ink line connections should be as short as possible. The Ink Supply may be located up to 100 feet from the print heads. Additional ink line can be purchased if necessary.

When installing ink line, be sure to slide the tubing completely over the exposed barbs on the fittings to prevent ink line leaks while under pressure.

Correct   *Incorrect*
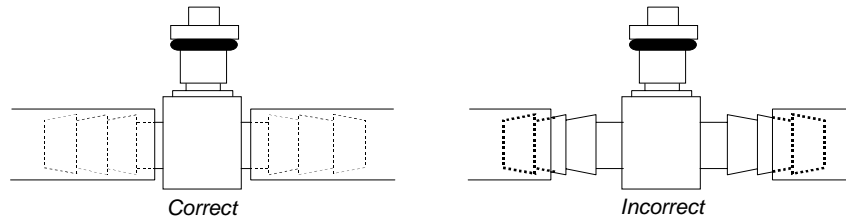
1. Obtain a suitable length of ink line **[I]** fitted with the elbow connector **[H]**. Attach the elbow connector to the "Ink Out To Printer" quick-disconnect **[F]** on the ink supply **[G]**. Cut line to the length desired and insert over the barbed end of a T connector **[J]**.
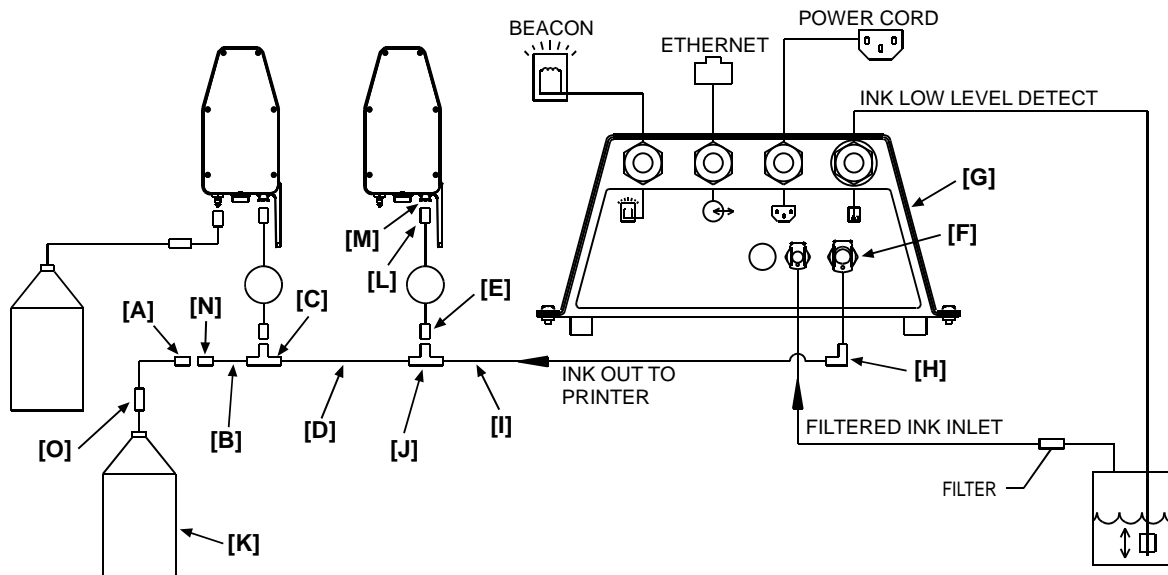
2. Insert the female connector end of the ink regulator **[E]** tubing assembly over the male fitting on the T connector. Attach the male connector end **[L]** of the ink regulator tubing assembly to the female connector **[M]** ink inlet port of the first print head.

NOTE: Listen for a click as you push the quick disconnects together **[A]**. The thumb tab on the female quick disconnect will be in its out position when successfully attached. Test the ink line's security by gently tugging on it.

3. Cut an ink line **[D]** to the desired length and connect one end to the other side of the T connector **[J]**. Add another T connector to this line and attach the second ink regulator and the second print head. Repeat with all remaining print heads.

4. Cut another line of tubing **[B]** to connect to the last T connector on the line **[C]**. Attach a male quick disconnect **[N]** to the other end of the tubing.

5. Attach the effluent bottle assembly **[K]**, with its female quick disconnect **[A]**, at the end of the line.

NOTE: Be sure the effluent shutoff valve **[O]** is off at this time. To close the shutoff valve, depress the metal tab on the valve; the connections will pop apart slightly but not disconnect.

CLOSE SHUTOFF VALVE
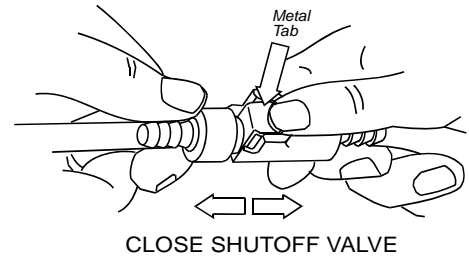
Connecting the Ink Supply

Wear eye protection and use appropriate safety equipment when working with ink.

1. Place a pail of ink within eight feet of the Ink Supply.
2. Unscrew the shipping cap from the pail. Insert the cap assembly and tighten snugly by hand.
3. Connect the 1/8" ink supply line from the "Filtered Ink Inlet" quick disconnect on the Ink Supply to the female coupling on the ink cap assembly.

CAUTION: Porous ink must be used with a porous ink supply. Non-porous ink must be used with a non-porous ink supply. The Ink Supply can <u>not</u> be flushed to use a different ink type.
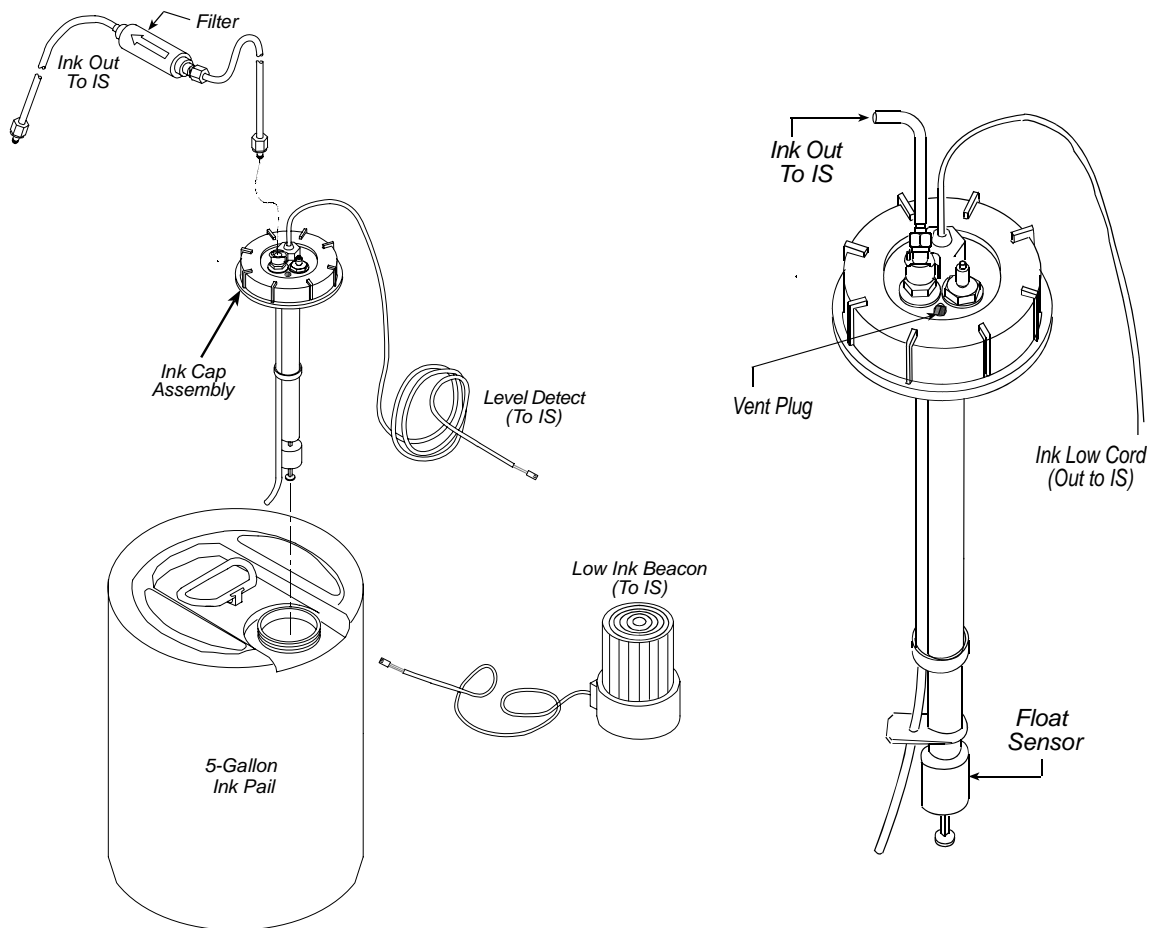
Priming the System

1. To prime the Ink Supply for the first time after installation, hold the prime button and simultaneously depress the Power button. The pump will automatically start, and will run for up to 20 cycles, pushing ink into the lines. The pump will turn off when the accumulator reaches its normal operating pressure. (If there is excessive air in the lines, the process may need to be repeated, as the pump will turn off automatically after 20 cycles.)

Prime

Power

2. It will still be necessary to bleed air from the lines. Open the shutoff valve on the effluent bottle assembly by pushing together until the connections snap into place; this will allow air to flow out of the main line. As soon as ink begins flowing into the effluent bottle, close the shutoff valve and disconnect the assembly. Keep a clean wipe handy to clean up any ink drips.

OPEN SHUTOFF VALVE

EFFLUENT BOTTLE

FLUSH BOTTLE
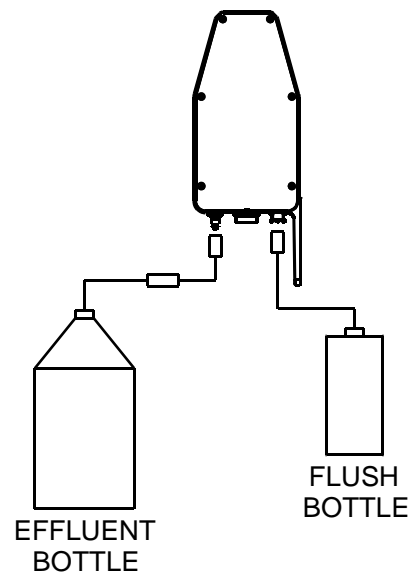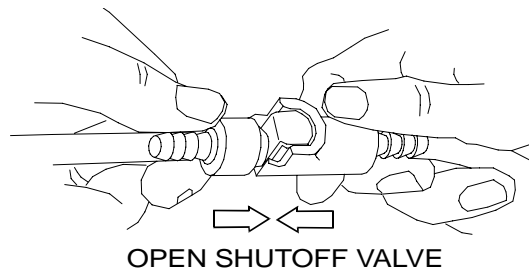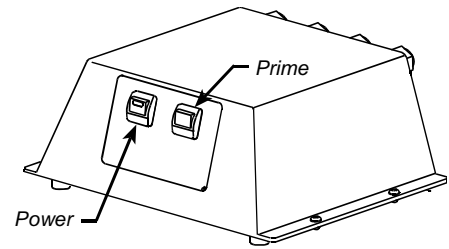
3. Move the effluent bottle assembly to the first print head in the line and connect it to the ink exit fitting on the head. Repeat Step 2 for each print head to remove all air from the lines.

Checking Ink Pressure

Variations in ink pressure produce different dot sizes; the higher the pressure, the larger the dot. However, over-pressurizing a print head can result in leakage, or cause ink to shoot across the conveyor. Under-pressurizing can cause ink to drip from the front plate while printing; the print head may also take a long time to print all the dots at morning startup. (See *Print Head Ink Pressure Test* in *Section 10: Troubleshooting.*)

Setting Ink Pressure

(See *Setting Ink Pressure* in *Section 10: Troubleshooting.)*

Section 5: Getting Started

The Marksman© Pro VxJet is a stand alone unit capable of operating one to eight VxJet 9-Dot heads or one to four VxJet 18-Dot heads. Head types can be interchanged, as long as the total does not exceed 72 dots per card. Each controller can support up to two cards, allowing for independent operation of two production lines.

NOTE: Opening and closing programs can cause a shift in the print on the box. This includes opening or closing the editor.

The main dialog for the print control application is shown below:
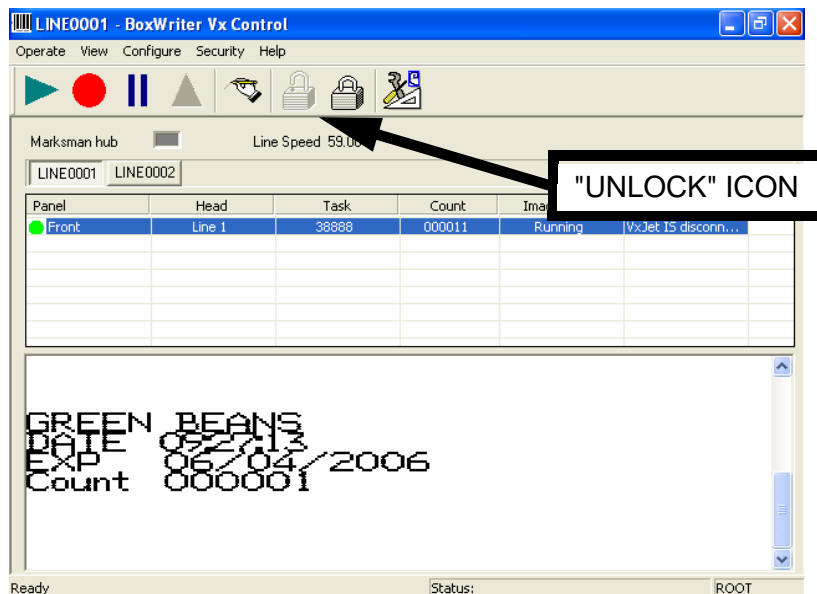
To log on, click the "Unlock" icon, then enter the Username and Password. (Note: Usernames and passwords are not case sensitive.)

> Username: ADMIN

> Password: FOXJET

The menu tree at right shows all the menus and sub-menu options available from within the control application.

Menu options are configurable and may be unavailable for operators with limited access. The operator must have administrative privileges to access all menu options.

The operator may also use the tool bar for quick access to the **Start**, **Stop**, **Idle**, **Resume**, **Edit**, **Logout** and **Login** menu selections.

Marksman© Hub: A green icon indicates that the device Hub is connected; a red icon indicates that the device Hub is not connected; a gray icon indicates that the Hub is disabled.

MARKSMAN PRO MENU TREE:

Operate
    Start
    Stop
    Resume
    Idle
    Print Test Pattern
    Edit
    Change User Element
    Change Counts
View
    Printer Report
    Scan Report
    Diagnostic Dialog
    Preview
    Refresh
Configure
    Print Heads
    Production Line
    System
        Date/Time Codes
        Shift Codes
        General Settings
Security
    Users
    Group Options
    Login
    Logout
Help
    About
    Translate

Line Speed: The line speed indicates the distance traveled on the production line in feet per minute.

Production Line: The production line name is selected and viewed by selecting the tabbed folders. The production line configuration provides for a means of grouping print heads. Up to two production lines can be created and configured.

Panel: The panel name indicates a specific side of a rectangular cube representing the product container. Each of the six panel names may be utilized to aid in describing the physical location of a print head in relation to the product.
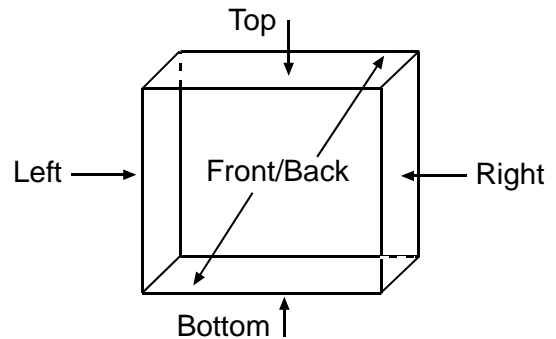
Head: The print head name indicates a user-defined alphanumeric name associated with a physical print head. Up to six print heads may be defined. Each print head name must be unique to the system.

Task: A task refers to one to six panels that are to be printed together as a label.

Count: The count indicates the number of times that a task has been printed.

Image State: The image state indicates the current image status for a task. The Image State may be Running, Paused, Idle or Stopped.

Status Message: The status message displays messages pertaining to the print head status. A status message may include one of the following:

    OK - No faults.

    Ink Low - The Ink Supply needs to be replaced.

    Out of Ink - The Ink Supply is out of ink.

    Broken Line - The Ink Supply has detected a broken ink line.

    Disconnected - There is no Ethernet communication with the Ink Supply.

The system will not print if the status message is "Broken Line" or "Out of Ink." If a strobe is connected, it will flash on and off for these errors. For all other errors, the strobe will be on solid. If there are no errors, the strobe will be green.

Status Line: The status line is used to display other system messages and system status. The name of the user currently logged in is also shown.

Section 6: BoxWriter© Pro

Configuration

Production Line Configuration

The production line configuration allows for grouping of settings that relate to a particular setup. Select **Configure**, then select **Production Line** from the menu. To edit a line, select it and click **Edit**; or double-click the line.

Add: The Add button allows for the addition of another production line, for a maximum of two production lines.

Delete: The Delete button allows for the removal of a production line from the configuration. All messages/tasks created for this production line will be deleted.

Description: The description field is used to help define the production line.

Coupled: If this field is checked, starting a task on one line will also start it on the other. The same is true for Stop, Idle and Resume. Note that you must have two lines configured to use this feature.
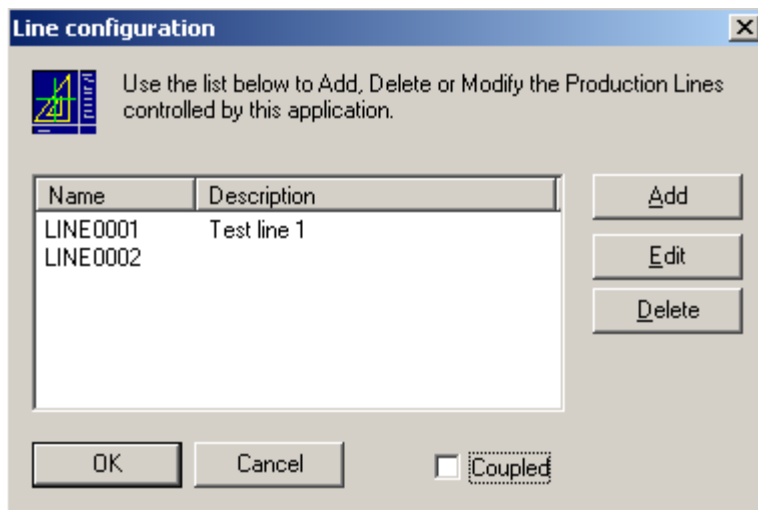
Fixed Scanner

This group defines the parameters for a fixed scanner that may be connected to the Marksman© Hub. The data is stored under the Scan Report (see *View Scan Report* later in this section).

No Read String: The No Read String must match the No Read string that is transmitted from the fixed scanner.

Consecutive No Reads: The Consecutive No Reads field is used to perform a quality check on barcodes that are printed. This value determines the maximum number of consecutive No Reads that may be transmitted by a fixed scanner. The printing will be stopped upon reaching the maximum value.
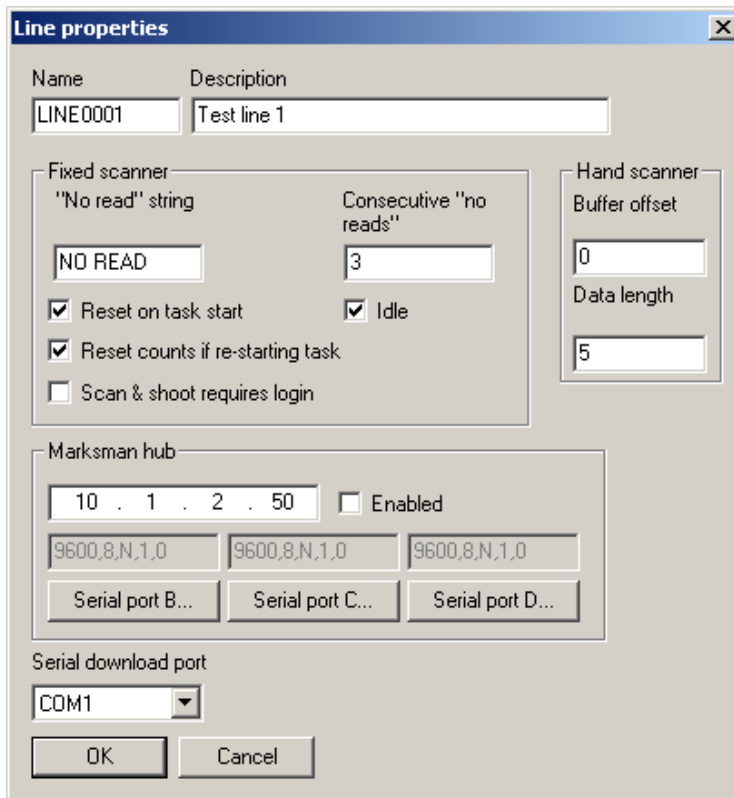
Serial Download Port: Select the port to be used to send the data out if it is required to be transmitted to a device at the start of each task. The data is entered through the Editor Task properties.

Reset on Task Start: The Reset on Task Start check box determines that the current number of consecutive No Reads will be reset to zero upon a task start operation.

Scan & Shoot requires login: Requires the operator to login before the hand scanner can be used to select a new task.

Hand Scanner

This group defines the parameters for parsing the data stream transmitted by a hand scanner. The data transmitted by the hand scanner must contain a valid task name in order to allow the task to start.

Buffer Offset: The Buffer Offset value determines the number of characters to offset into the buffer as transmitted by the hand scanner.

Data Length: The Data Length value determines the number of characters to extract from the data buffer that will form a task name.

Marksman© Hub:

The Marksman© Hub may be connected to the Marksman© Pro through a TCP/IP connection. The device provides additional interface methods such as serial ports. A proper IP address must be entered and the Enabled field selected to connect to the device. The main dialog screen will display a green LED when communicating with the device.

IP Address: The IP Address dialog contains the IP address of the Marksman© Hub.

Enabled: The Enabled button determines if a connection to a Marksman© Hub should be attempted. Click the button to toggle the option between enabled and disabled.

Serial Port: Select the appropriate button to edit the setup parameters for a serial port on the Marksman© Hub. The available properties for the serial ports are shown in the Serial Settings dialog box.

Each of the properties may be selected using the corresponding drop-down menu choices. When selections are complete, click **Apply**. The default selections are shown in the screen at right.

Baud: The Baud option determines the speed of the transferred data and may be set to 9600, 19200, 38400, 57600 or 115200.

Parity: Parity determines the type of parity bit to be used. It may be set to None, Odd or Even.

Data Bits: Data Bits determines the number of data bits used. It may be set to 7 or 8.

Stop Bits: Stop Bits determines the number of stop bits to be used: 1 or 2.

Device Type: Select a device that is going to be attached to the serial port of the Hub: Hand Scanner, Fixed Scanner or Remote/PC. This tells the computer what to do with the string of information when it is received.
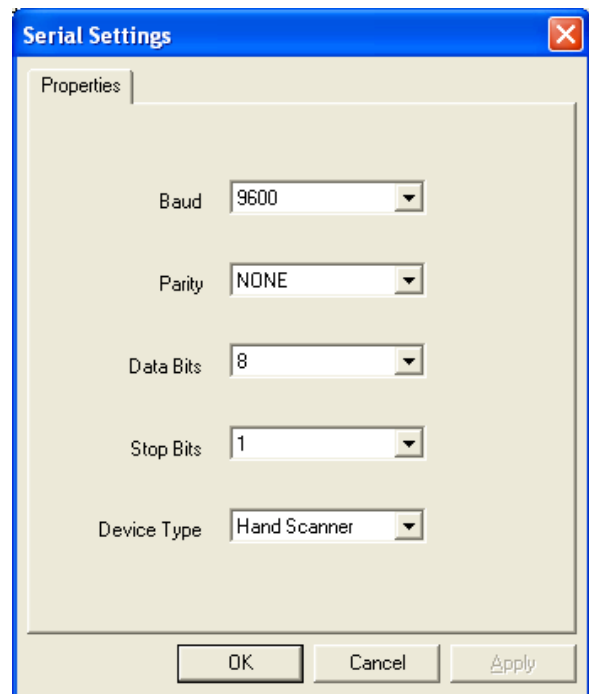
Print Head Configuration

Select **Configure**, then select **Print Heads** from the menu. Select a panel and click on a head. Print heads or cards can be added, deleted or edited from this menu.

Add head is used to assign a print head to a card and/or a side of a box. There is a limit of 72 dots of print per card. A head must be configured once it has been added to a card.

Add card is used to assign cards to a line. There is a maximum of two cards per controller.

Edit allows the user to modify the configuration of the cards and/or the heads that are assigned to the line. Highlight the item to be changed, then select **Edit**.

Delete is used when a head or a card is no longer needed.
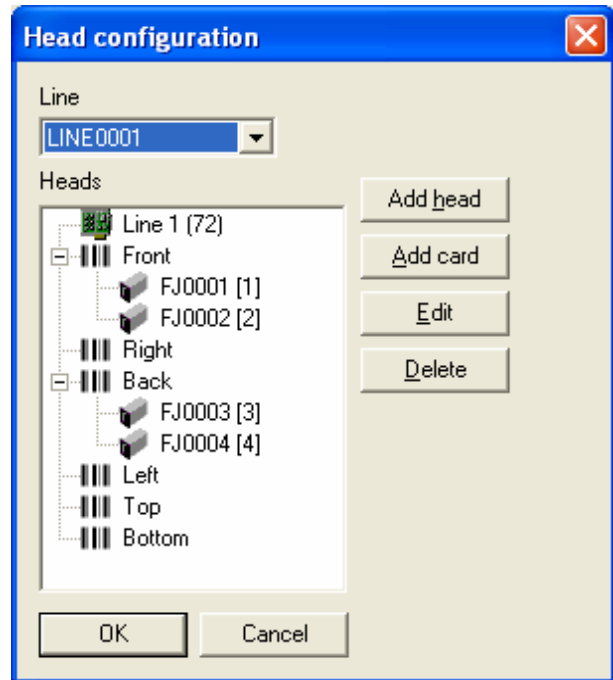
Edit Head Properties

Name: The head's user-defined name.

Index: The position number of the head in relation to the other heads that are plugged into the card.

Linked to: Link heads together to increase the size of print, or group heads together.

Card: Identifies the card that the head is attached to.

Print height: The print height is the maximum print coverage of a single print head at a selected angle.

Direction: The direction of travel of the product may be right-to-left or left-to-right, as viewed from behind the print head.

Panel: The panel which the head will print on.

Photo delay: Photo Delay is the horizontal distance (in inches) measured from the photocell to the print head.

Type: Select a head type from the drop-down menu list.

Upside down: If this box is checked, the print head will print upside down.
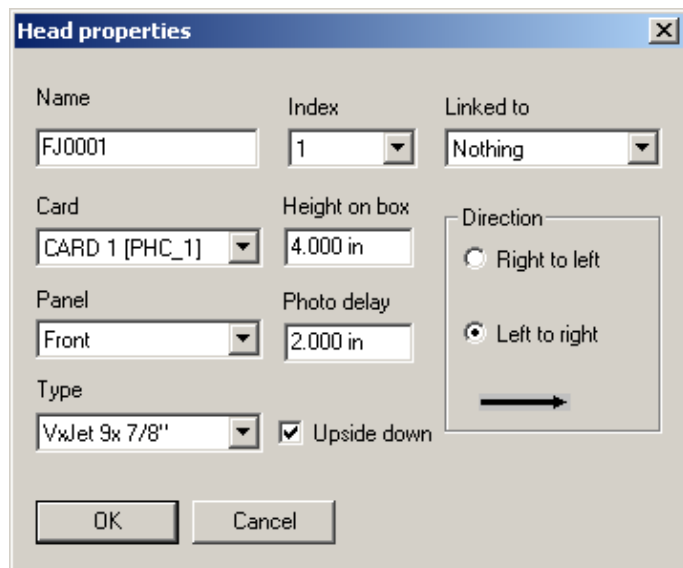
Edit Card Properties

Name: The card's user-defined name.

Encoder Resolution: Can be set to either 300dpi or 426dpi - the current types available.

Print Resolution: The resolution at which the head will be printing. This may need to be adjusted to improve print quality or due to high line speeds.

Head Type: VxJet is the only selection available at this time.

Address: The address of the card. This is automatically assigned and cannot be changed.

Auto print inches: If internal photocell is selected, this number indicates the length of the message to be printed. For example, if it is set to 36, the internal photocell will fire once for every 36 inches of travel of the conveyor, as indicated by the encoder.

Encoder Speed: The desired internal encoder speed measured in feet per minute. The default is 60 feet/min.

Serial params: The port settings for the PHC card. Click **Define…** to change the settings. This is only applicable to PHC_1 and is the Auxiliary Input connection on the Marksman© Pro.

Photocell source: Indicates whether the photocell is external or internal. The photocell signal from another head may also be used (shared). [See *Guidelines for Sharing* below.]

Encoder source: Indicates whether the encoder is external or internal. The encoder signal from another head may also be used (shared). [See *Guidelines for Sharing* below.]
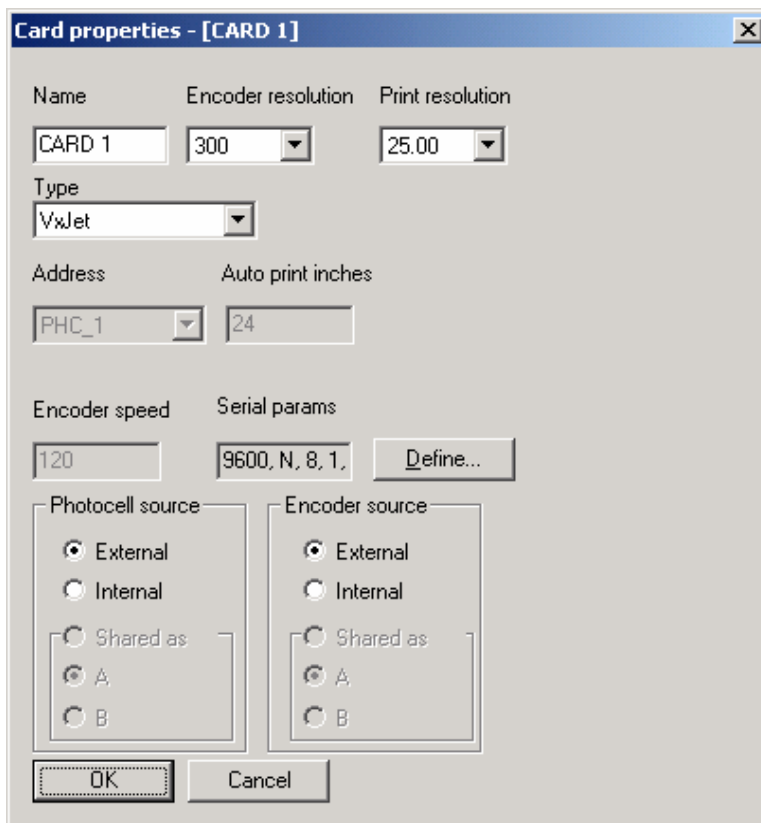
Guidelines for Sharing:

PHC_1
• Can use encoder A and photocell A only, cannot use photocell or encoder from any other head.

PHC_2
• Can use encoder B and/or photocell B.
• Can use encoder A and/or photocell A, but must be shared from PHC.

System Date/Time Codes

Refer to *Section 7: BoxWriter Editor, Define, Date/Time Codes.*

System Shift Codes

Refer to *Section 7: BoxWriter Editor, Define, Shift Codes.*

VxJet Ink Supply

The VxJet controller gets the Ink Supply status through an Ethernet connection. Before communication can take place, the ink supply will need to be assigned an IP Address. Setting the IP Address is done by entering the unique MAC address of the ink supply (refer to *Appendix F* to locate the MAC address of the ink supply) and the desired IP address into the appropriate fields. When **Set** is selected, the device with this MAC address will be assigned the IP address entered in the field. If a connection is made, the ink supply will respond to the ping request.
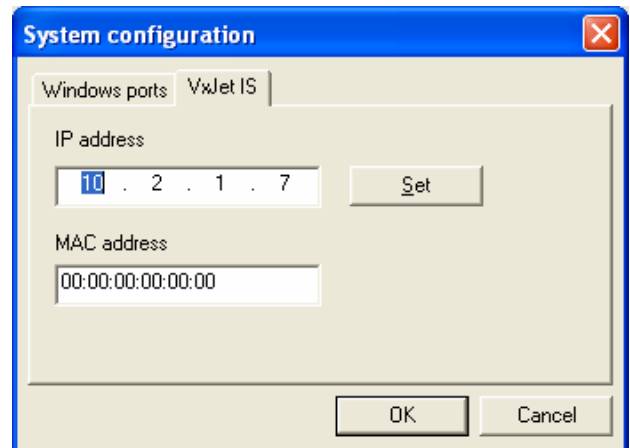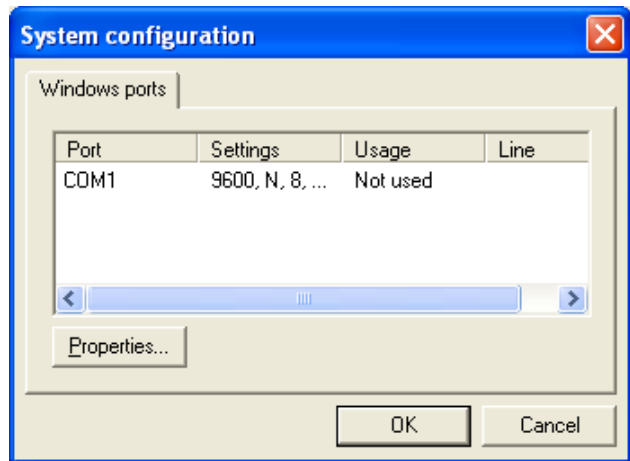
Security

Configure Users

The security feature of the Marksman© Pro Series allows the system administrator to configure users and access rights.

Add: Select the **Add** button to create a user account.

Remove: Select the **Remove** button to delete a user account.

Properties: Select the **Properties** button to modify or view the user account information.
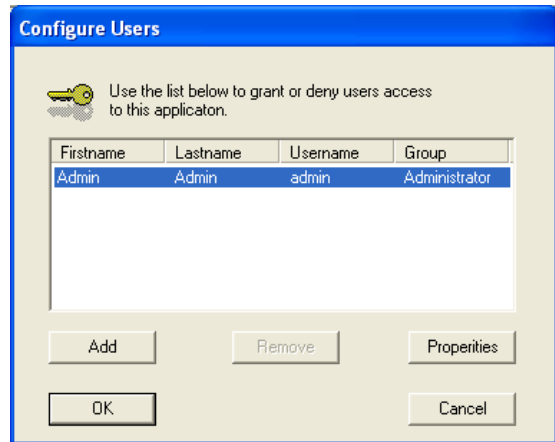
Firstname: Enter the user's first name in this edit box.

Lastname: Enter the user's last name in this edit box.

Username: Enter a unique user account name in this edit box.

Password: Enter a unique alpha-numeric user password in this edit box.

ReEnter Password: Enter the same password again for confirmation.
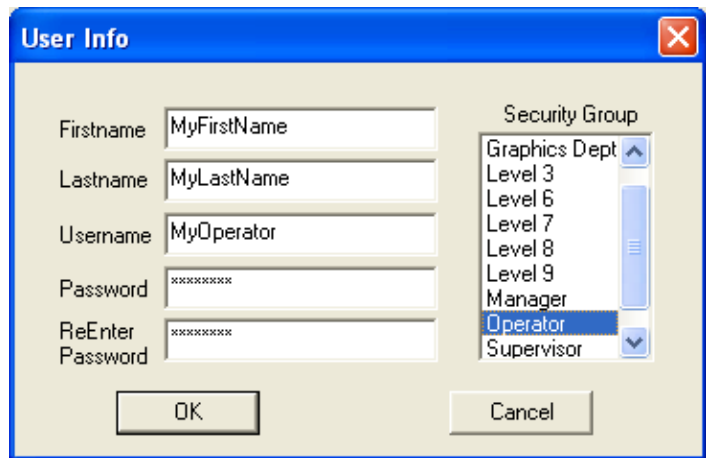
Security Group: Select a security group that provides the access level desired for the user. The user's security group options may be modified or the user may be assigned a different group at a later date.

Click **OK** to save entries and exit the User Info dialog.

Group Options

Security groups allow the administrator to assign similar users with a specific set of access rights. Select **Security**, then **Group Options** from the menu.

Ten configurable security groups are available. A user must be assigned to one group. Group names may be modified to better describe the access level. Select a Group, then select or unselect Options. Click **Close** to accept changes and close screen.
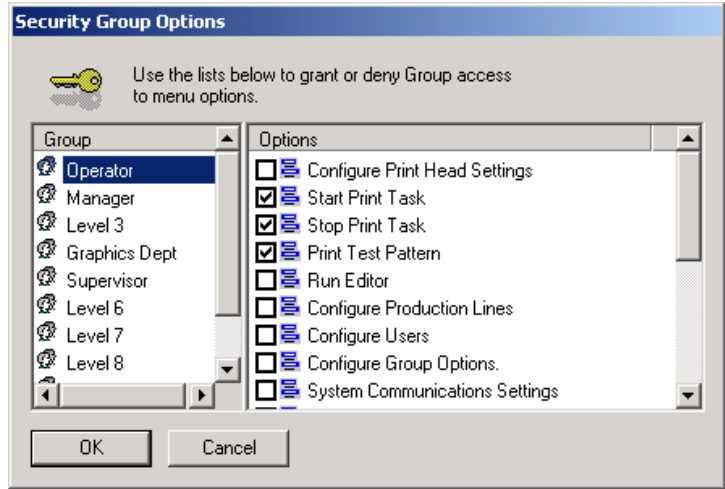
The default access rights for each security group are shown in the following table:

Security Group / Option Access Table	Operator	Manager	Level 3	Graphics	Supervisor	Level 6	Level 7	Level 8	Level 9	Administrator
Configure Print Head Settings		X	X		X	X				X
Start Print Task	X		X							X
Stop Print Task	X		X	X	X					X
Enable/Disable Preview Mode										X
Print Test Pattern										X
Run Editor										X
Configure Production Lines			X	X		X				X
Configure Users										X
Configure Group Options										X
System Communications Settings										X
View Printer Report										X
View Scanner Report										X
Configure Date/Time Codes										X
Define Global Barcode Parameters										X
Define the Shift Codes										X
Translate the Software										X
Configure Dynamic Data Table										X
Configure General Windows Settings										X
Refresh Preview										X
Quit the Application										X

Login

Each user must login to the Marksman© Pro application. The user may log in using the system menu or by selecting the open padlock icon from the tool bar. The shortcut key combination **Ctrl+L** may also be used.

User Name: Enter the user name assigned by the system administrator. The user name is not case sensitive.

Password: Enter the password assigned by the system administrator. The password is not case sensitive.
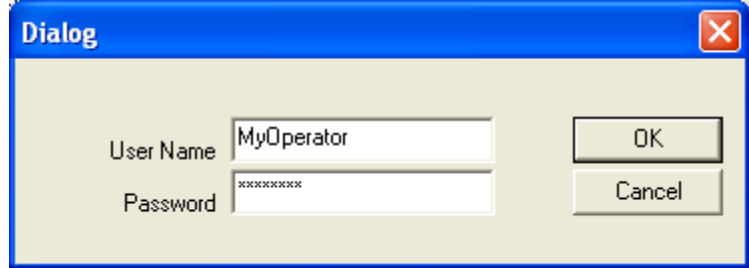
Press the **OK** button to log in.

Logout

Each user should log out of the Marksman© Pro application to enforce the security restrictions. The user may log out using the system menu option **Security > Logout**; or the user may also select the closed padlock icon from the tool bar. The system will continue operating in its current state. All menu options are disabled after the user logs out, with the exception of the Login, About and View Diagnostics items.

Help

Translate

Access **Help > Translate** to select the desired language to be converted to. When the files have been translated, the application will be restarted in the desired language.
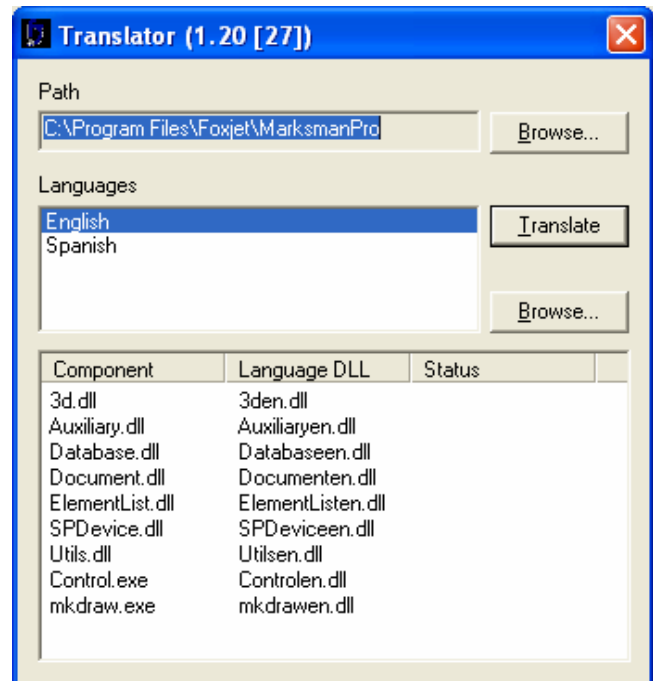
Operation

Operate Start Task

The start task function is used to ready the system to print a label or image that is created with the BoxWriter© Editor.

Select **Operate > Start** from the system menu. Select the desired task from the list, or enter the task name, and press the **OK** button.

The start task icon may be selected from the tool bar, or the shortcut key combination **Ctrl+S** may be used to start a task.

Reset Count to zero: This allows the count value to accumulate if needed or to be reset on every task.
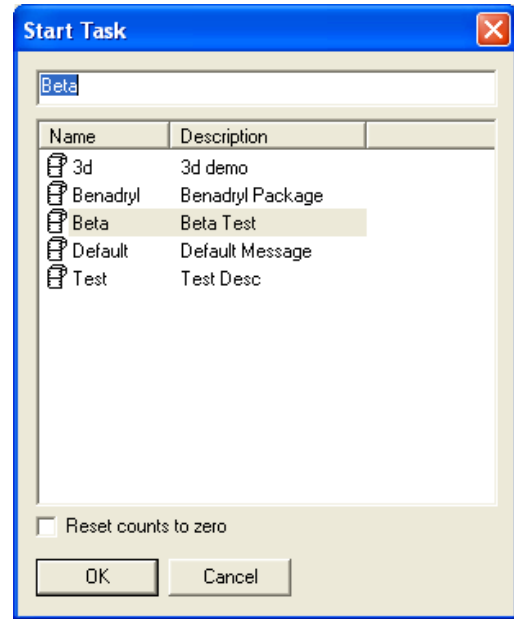
Operate Stop Task

Stopping a task halts all printing related to the selected production line. The product count is reset to zero.

Select the desired production line from the folder tabs; then choose the menu options **Operate > Stop** to halt printing.

The stop task icon may be selected from the tool bar to stop the task on the selected production line, or the shortcut key combination **Ctrl+End** may be used to stop a task from printing.

Operate Idle Task

The Idle task option causes the printing to pause on the selected production line. The product counts are halted until the current task is resumed.

Select the menu options **Operate > Idle** to pause printing.

The Idle Task icon may be selected from the tool bar to invoke the idle function; or the shortcut key combination **Ctrl+I** may be used to idle a running task.

Operate Resume Task

The Resume Task option causes the printing to resume on the selected production line. The product counts are restored from the previously idled task.

Select the menu options **Operate > Resume** to restore printing.

The Resume icon may be selected from the tool bar to initiate the resume function, or the shortcut key combination **Ctrl+R** may be used to resume a task.

Operate Edit

The Edit menu option launches the Marksman© BoxWriter© Editor application. The user must have the required access rights to use this feature.

The Edit icon may be selected from the tool bar, or the shortcut key **Ctrl+E** may be used to launch the Editor.

See the BoxWriter© Editor section of the manual for additional documentation.

Test Pattern

This function is designed to exercise every channel on the print head to verify all are printing properly.

When the user clicks the "Test Pattern" button, a test image is generated. Each head on the currently selected line will print this pattern (along with the print head's name). In the example at right, the print head's name is "FJ0001".

Operate Change User Elements

User elements may only be changed if the task is loaded. The task must contain user elements and be "Running" or "Idle" in order to modify user elements.

Select the user element from the list in the dialog. Edit the data in the lower edit box and press **OK** to save changes. For multiple elements, make all data changes before pressing **OK** to save changes. Press **Cancel** to exit without saving changes.

The **F2** function key may be used as the shortcut key to open the user element data dialog.
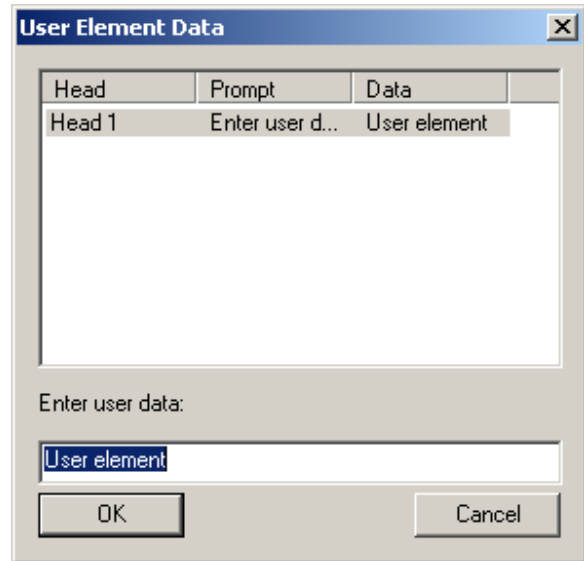
Operate Change Counts

Set Counts: The count values being printed can be changed by entering the value and pressing **OK**.
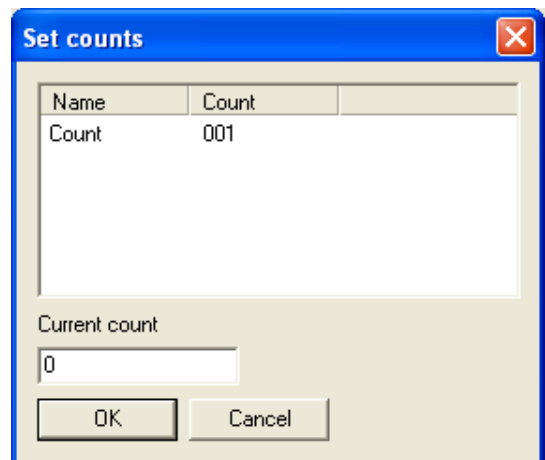
Operate Exit

The user may exit the Marksman© Pro Series control application if the proper security level is assigned. Under normal circumstances there should be no reason to exit the application.

View

View Print Report

The Print Report contains historical information regarding the printing operation. The print report is a table named **reports** within a Microsoft® Access® Database named Marksman-Net. Click on **View**, then select **Printer Report** from the menu.

Time: Time is the date and time that the action occurred.

Action: Action indicates the event such as Start or Stop Task.

User: User is the name of the user who was logged in at the time the action occurred.

Line: Line is the print line that the information is for.

Taskname: Taskname is the name of the task for which the action applies.

Counts: Counts is the product count of the task for which the action applies.

Export: Export allows the information to be saved in a comma delimiter format so it can be used in other software applications.

A sample Print Report is shown below:

Time	Action	User	Line	Task name	Counts
2004/02/18 15:15:15	Start task	ROOT	LINE0001	17002	45
2004/02/18 15:18:31	Start task	ROOT	LINE0001	17002	49
2004/02/18 15:20:37	Start task	ROOT	LINE0001	17002	43
2004/02/18 15:25:02	Start task	ROOT	LINE0001	17002	34
2004/02/18 15:27:14	Start task	ROOT	LINE0001	17002	34
2004/02/18 15:29:44	Start task	ROOT	LINE0001	17002	77
2004/02/18 15:33:22	Start task	ROOT	LINE0001	17002	34
2004/02/18 15:35:25	Stop task	ROOT	LINE0001	17002	95
2004/02/18 15:35:25	Stop task	ROOT	LINE0001	17002	73
2004/02/18 15:35:25	Start task	ROOT	LINE0001	17002	85
2004/02/18 15:37:51	Start task	ROOT	LINE0001	17002	46
2004/02/18 15:38:55	Start task	ROOT	LINE0001	17002	48

Print Report — Clear | Export... | Close

Select **Clear** to remove all items from the report.

View Scan Report

The Scan Report contains information relating to the current task and scan results of a barcode. The scan results are received through the RS232 port from a barcode scanner properly configured and connected to the Marksman© Pro controller.

NOTE: A Marksman© Hub is required to connect more than one scanner to the Marksman© Pro Controller.

Select **View > Scan Report** from the menu.

Date: Date is the date the scan event occurred.

Line: Line is the production line that the scan event occurred on.

Taskname: Taskname is the task name operating while the scan event occurred.

Barcode: Barcode is the barcode data scanned and received. The contents of this field may contain the words NO READ if the barcode could not be decoded.

Total: Total indicates the total number of decode attempts, including successful and failed decodes.

Good: Good indicates the number of successful decodes of the scanned barcode.

Export: Export allows the information to be saved in a comma delimiter format so it can be used in other software applications.

A sample Scan Report is shown below:

Date	Line	Task name	Barcode	Total	Good	
2004/02/18 15:02:20	LINE0001	79086	9315446168	51	50	
2004/02/18 15:02:33	LINE0001	81700	9314326168	23	20	

Clear   Export...   Close

Select **Clear** to remove all items from the report.

View Diagnostic Dialog

The Diagnostic dialog is designed to aid in debugging and verifying the data stream from an externally connected serial device.

The most common use is to verify that a data string is received from a device and that the data is in the desired format.
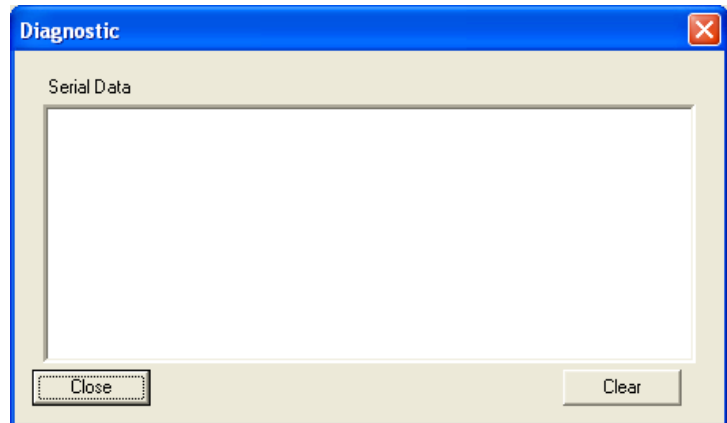
Select **Clear** to remove all items from the dialog.

Preview

This feature may be disabled in certain applications that are switching tasks very quickly.

Refresh

Select a head, then select Refresh to force the preview screen to update all variable fields.

Section 7: BoxWriter© Pro Editor

Define

Boxes

To define boxes, select **Define > Boxes**.

To add a new box, click **Add**. Enter the length, width, height and name. The length, width and height fields must be between 1 and 27 inches. The description field is optional.

To edit an existing box, select it and click **Edit**, or double-click the item.
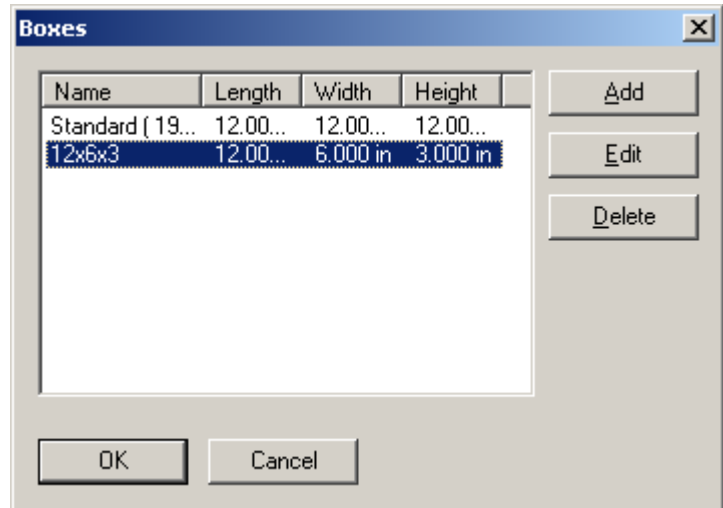
To delete an existing box, select it and click **Delete**. Multiple boxes can be selected by using the shift and/or control keys. Boxes that are currently in use in a task cannot be deleted. The task's box property must be changed before the box can be deleted here.

Pre-printed information can be added to the box to give the operator a true representation of how the box will look as it is being printed on.

Add: Allows the operator to assign a .bmp or .jpg file to a panel on the box.

Edit: Allows the operator to change which .bmp or .jpg file is assigned to a panel of the box.

Delete: Will remove the file from the panel.
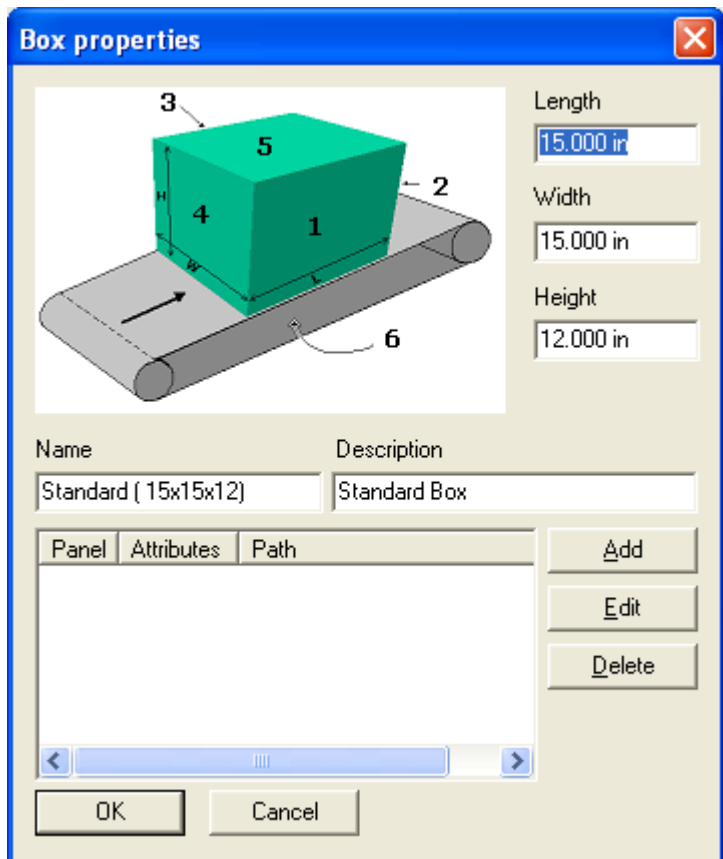
Box Usage

To define box usage, select **Define > Box usage**.

If it is desirable to restrict a box from a given line, it can be done here. By default, all new boxes are available on all lines. To restrict it, select the line, then select the box. It can then be moved to the "restricted" list by clicking the "<" key. Clicking the "<<" moves all boxes for a given line to the restricted list, regardless of selection. Conversely, the ">" and ">>" keys move boxes to the "available" list.
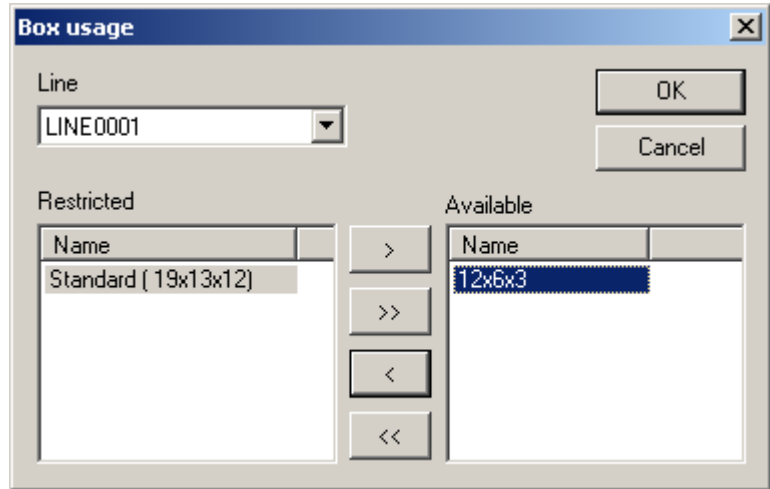
Editor Defaults

To define editor defaults, select **Define > Editor defaults**.

This dialog controls the editor's display units.

The "Resize handle size" field is used by re-siz-able elements (such as a Bitmap element). Valid values range from 5 to 15. Larger values make it easier to perform a resize operation on a touch screen.
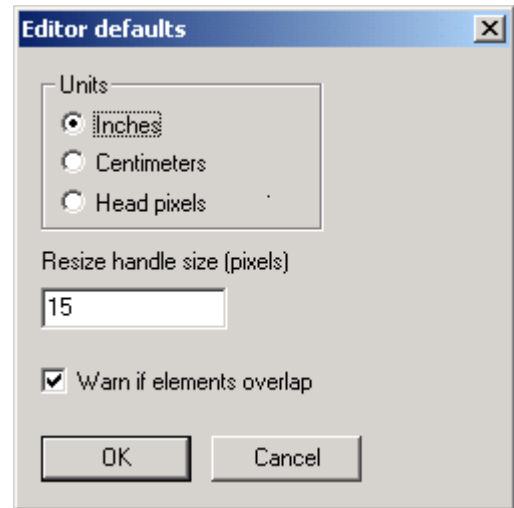
In the example at right, the eight squares around the perimeter are the resize handles.

Checking the "Warn if elements overlap" box will warn the user when element fields overlap in a message.

Element Defaults

To define element defaults, select **Define > Element defaults**. To change the defaults, select an element type and click **Properties**, or double-click the item.

The elements listed here define how new elements are created. (For a description of the individual elements, refer to *Elements* later in this section.)
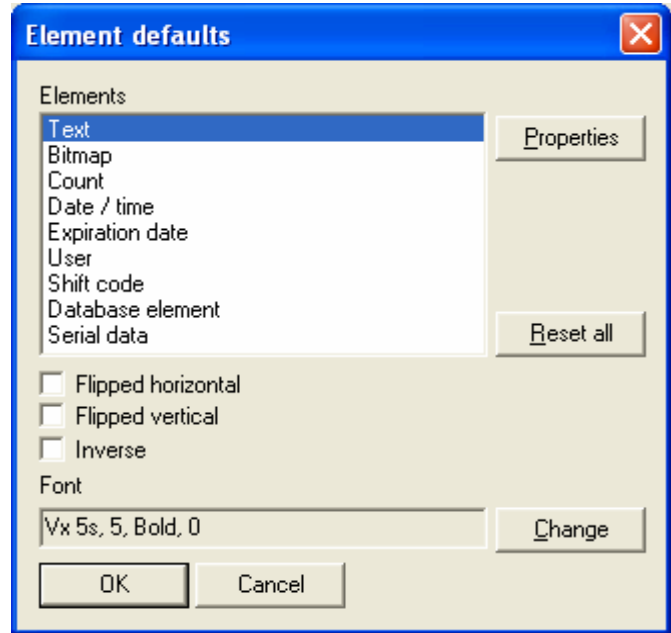
To change the font, click the **Change** button. The dialog at right is used to change the default font parameters.

The Font drop-down box will display a list of all TrueType fonts installed on the system.
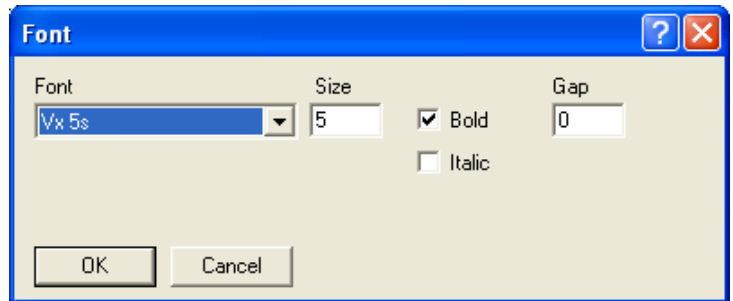
The Size field refers to the height of the font in pixels.

Gap defines the distance (in pixels) between characters.

Custom Date/Time Formats

To define date/time settings, select **Define > Custom date/time formats**.

The date/time settings shown here are used by Date/time and Expiration date elements.

To create a new custom format, click **Add**.

To delete an existing custom format, select it and click **Delete**. Multiple codes can be selected by using the shift and/or control keys.
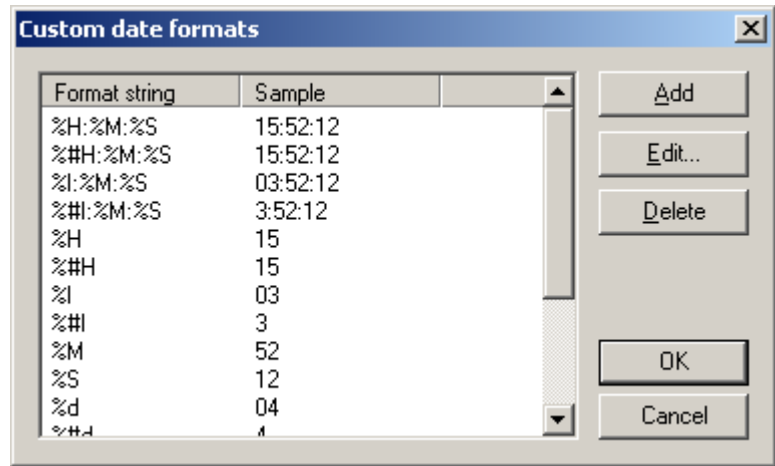
To edit an existing custom code, select it and click **Edit**, or double-click it. The Build date/time format dialog is shown below.
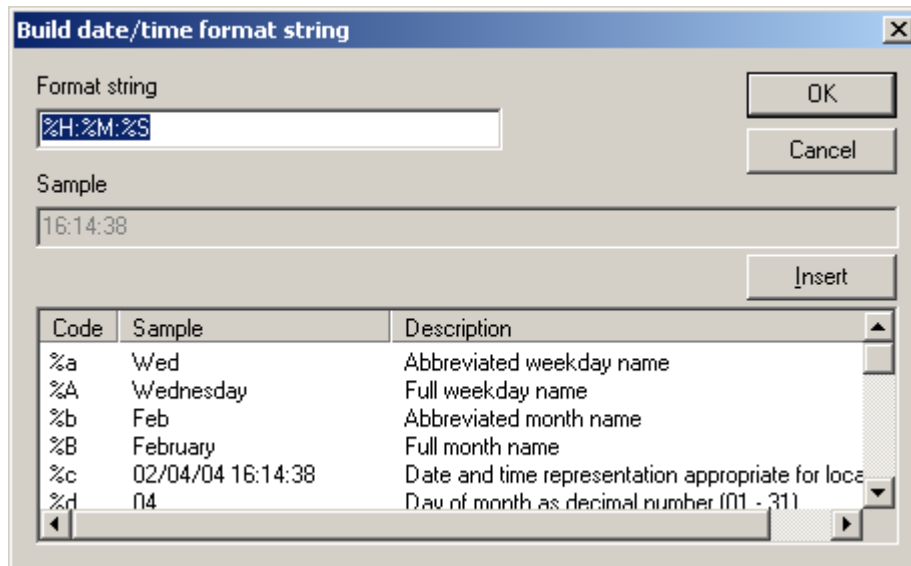
The "Format string" contains a user-defined string consisting of format specifiers.

The "Sample" field shows a sample of the current Format string.

Valid format specifiers are listed at the bottom of the dialog. To insert them in the current string, select them and click **Insert** (or double-click).

Possible format specifiers are listed in the following table:

Specifier	Meaning
%a	Abbreviated weekday name
%A	Full weekday name
%b	Abbreviated month name
%B	Full month name
%c	Date and time representation appropriate for locale
%d	Day of month as decimal number (01 - 31)
%%D	Day of month as decimal number (arbitrary length)
%%-D	Day of month as decimal number, left justified (arbitrary length)
%#d	Day of month as decimal number; no leading zero (1-31)
%H	Hour in 24-hour format, with leading zero (00 - 23)
%#H	Hour in 24-hour format; no leading zero (0-23)
%H:%M:%S	Hour: Minute: Second in 24-hour format, with leading zero on the hour (00-23)
%#H:%M:%S	Hour: Minute: Second in 24-hour format, no leading zero on the hour (0-23)
%I	Hour in 12-hour format (01 - 12)
%#I	Hour in 12-hour format; no leading zero (1-12)
%I:%M:%S	Hour: Minute: Second in 12-hour format; with leading zero on the hour (1-12)
%#I:%M:%S	Hour: Minute: Second in 12-hour format; no leading zero on the hour (1-12)
%j	Day of year as decimal number (001 - 366)
%m	Month as decimal number (01 - 12)
%M	Minute as decimal number (00 - 59)
%%M	Month as decimal number (arbitrary length)
%%-M	Month as decimal number, left justified (arbitrary length)
%p	Current locale's AM/PM indicator for 12-hour clock
%S	Second as decimal number (00 - 59)
%U	Week of year as decimal number, with Sunday as first day of week (00 - 53)
%w	Weekday as decimal number (0 - 6; Sunday is 0)

%W	Week of year as decimal number, with Monday as first day of week (00 - 53)
%x	Date representation for current locale
%X	Time representation for current locale
%y	Year without century, as decimal number (00 - 99)
%Y	Year with century, as decimal number
%%Y	Year as decimal number (arbitrary length) <u>Examples:</u> "%%YYYY" is formatted as "2004" "%%YY" is formatted as "04" "%%Y" is formatted as "4"
%%-Y	Year as decimal number, left justified (arbitrary length)
%z; %Z	Time zone name or abbreviation; no characters if time zone is unknown
%%	Percent sign
%%0H	Hour Code
%%0M	Month Code
%%0A	Day Code
%%0Q	Quarter Hour Code
NOTE: The # flag may prefix any format specifier. In that case the meaning of the format code is changed as follows:	
%#a, %#A, %#b, %#B, %#p, %#X, %#z, %#Z, %#%	# flag is ignored
%#c	Long date and time representation, appropriate for current locale. For example: "Tuesday, March 14, 1995, 12:41:29"
%#x	Long date representation, appropriate to current locale. For example: "Tuesday, March 14, 1995"
%#d, %#H, %#I, %#j, %#m, %#M, %#S, %#U, %#w, %#W, %#y, %#Y	Remove leading zeroes (if any)

Date/Time Codes

Select **Configure**, **System**, then **Date/Time Codes** from the menu.

Line: Line indicates the production line selected.

Click on the folder tabs to access the date/time code tables. Select an entry in the table by clicking on the desired row. Click on **Edit** to modify the data for the selected table entry.

Click **OK** to exit and save changes or **Cancel** to exit without saving changes.

Months: Months represents the string values that are used in date codes for the standard months of the year.

Hours: The Hours table stores the twenty-four codes for the hours of the day. The codes may be customized for special coding.

Quarter Hours: The Quarter Hours' table stores codes for 15 minute intervals.

Days: The day table holds the value to be used for the appropriate day.

Rollover: The time at which the expiration and date codes will change to a new value. The default rollover value is midnight.

"Hold": Holds the Date or Expiration Date until the Roll over time.
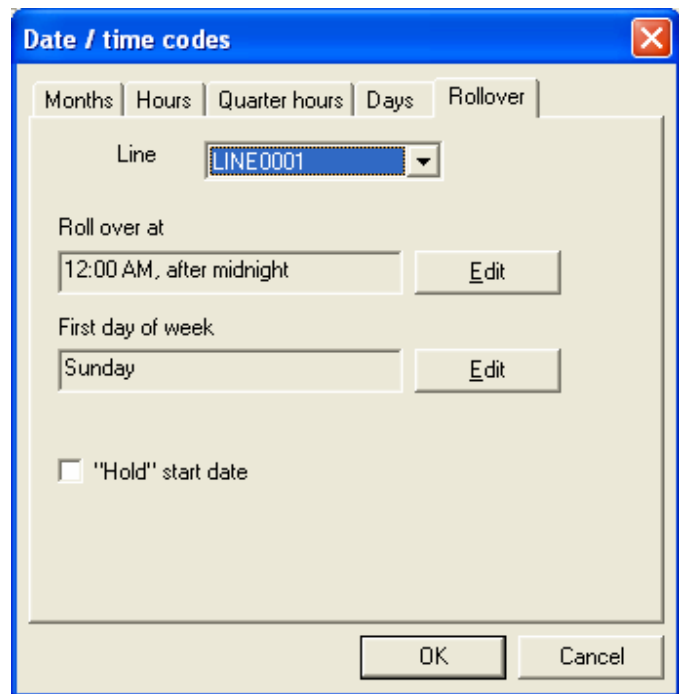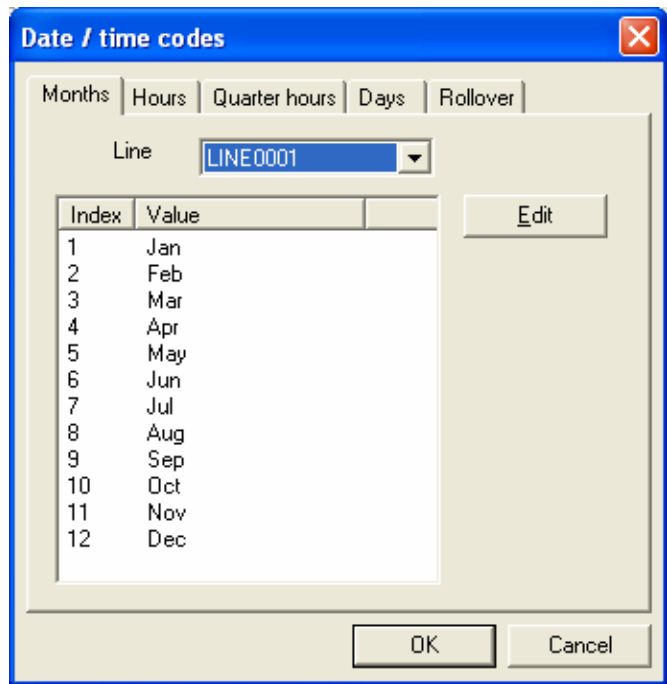
Bitmap Settings

To define bitmap settings, select **Define > Bitmap settings**.

The "Bitmap editor" field defines the program used to edit bitmaps. By default, it is Microsoft® Paint. To change it, browse and select the program to be used.
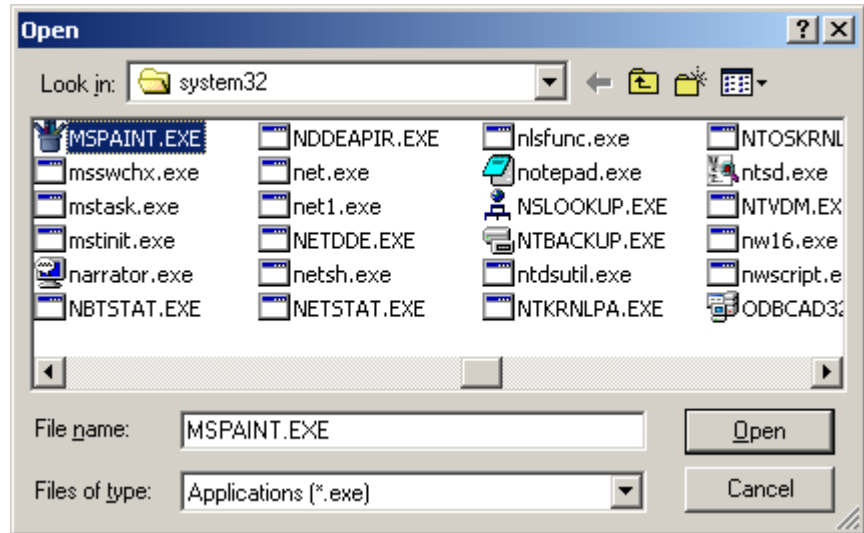
Shift Codes

To define shift codes, select **Define > Shift codes**. Shift codes are used by Shift elements.

The shift code's length must be from 1 to 15 characters. The code's times must be in order from least to greatest (i.e., code 1 cannot be later than code 2 or 3).

Line: This determines the production line for the shift code definitions.
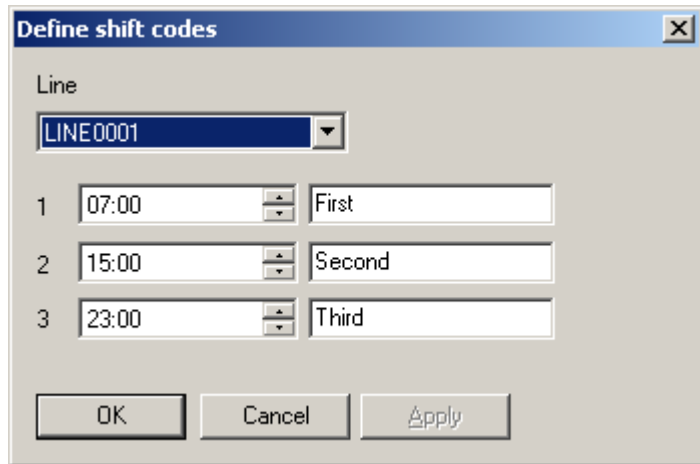
Select the appropriate production line. Enter the shift start times and any user-defined codes. The shift start times must be entered in 24-hour format. The shift code may contain a maximum of 15 alphanumeric characters.

The sample dialog shows shift 1 starting at 7:00 AM, shift 2 starting at 3:00 PM and shift 3 starting at 11:00 PM.

Files

New

To create a new task, choose **File > New**.

The user will be presented with the dialog at right. Pick which production line the task is to be created for, give it a name (and description, if desired) and select the box it will be printed on.

The "Task name" field should contain only letters and numbers, with no spaces or special characters. The maximum number of characters is 50.

New task

Task

Blank task

Production line
LINE0001

Task name
Untitled

Description

Box
Standard (15x15x12)
Standard Box

OK   Cancel
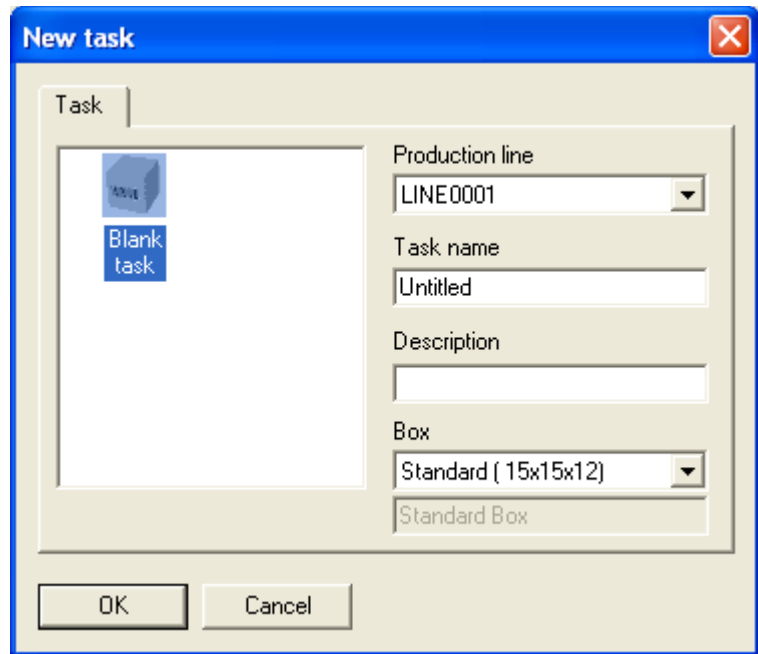
Creating a Task

The next step is to insert elements into the label to be printed. The box is shown with high-lighted areas showing where heads have been placed on the box. The printing areas cannot be changed from the editor because the information about the heads and their relationship to the box comes from the system configuration, which is limited by physical devices installed. Different panels can be selected to add elements to the task. Once a head has been chosen, select an element to be placed on the box. The process is repeated until all the desired information needed on all sides of the box are completed. The next step would be to save the task. (Refer to appropriate sections in this manual relating to Elements and Saving Files.)
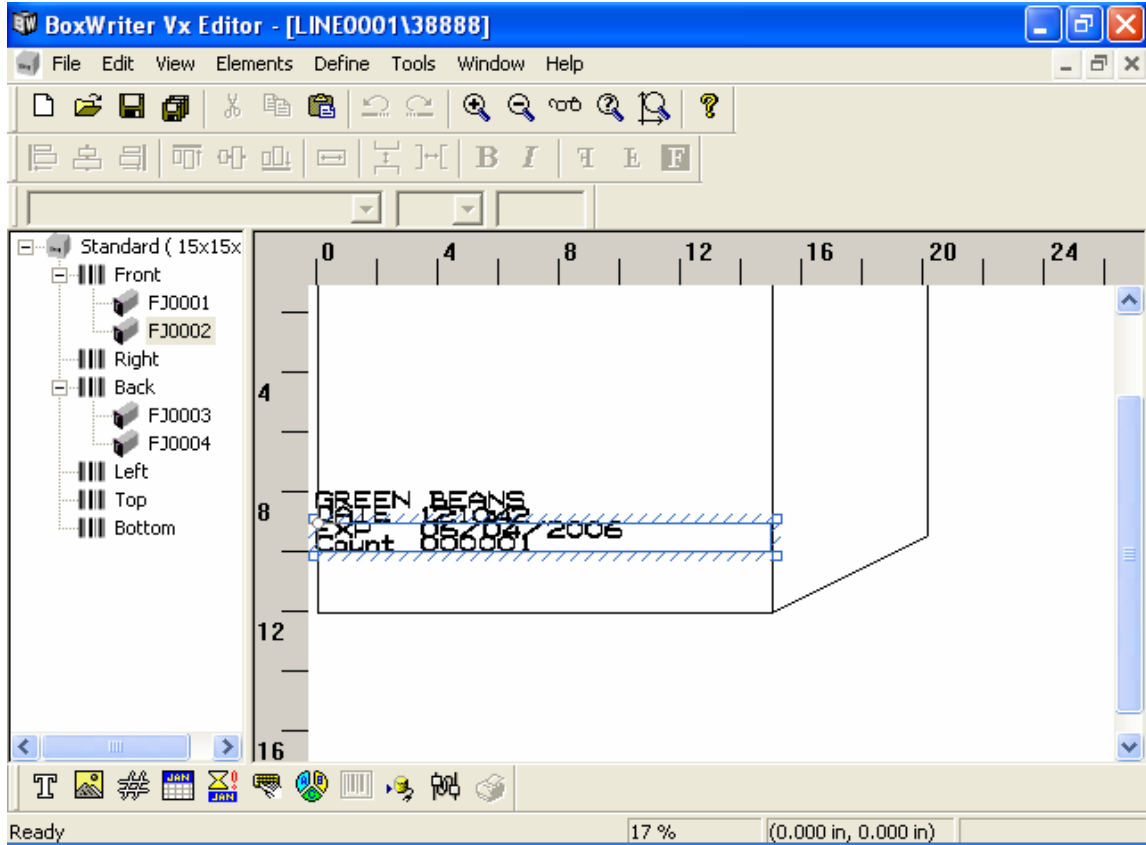
NOTE: If "Warn if elements overlap" has been checked in the Editor Default screen, and two element overlap each other, they both will show up in red. The operator will also be warned before saving the task. To enable or disable the element overlap warnings, see *Define, Editor Defaults* earlier in this section.

<u>Open</u>

To open an existing task, choose **File > Open**.

Select the task to be opened, and click **OK**; or double-click the task to be opened.

Checking the "Open read only" box will open the task in read-only mode (i.e., the user will not be able to modify the task).

Checking the "Show preview" box will show a preview of the selected task. For large tasks, it may take several seconds to generate the preview.
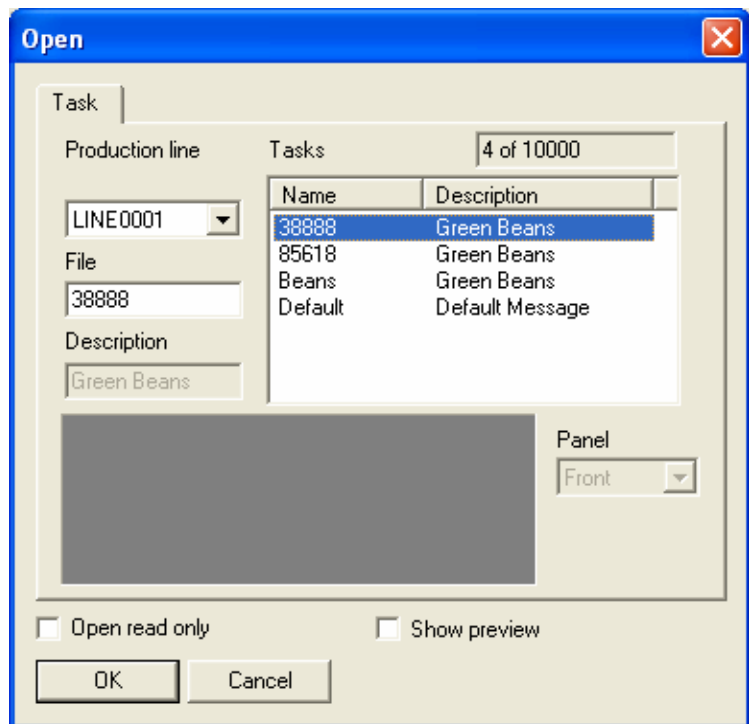
Copy

To copy tasks from one line to another, choose **File > Copy**.
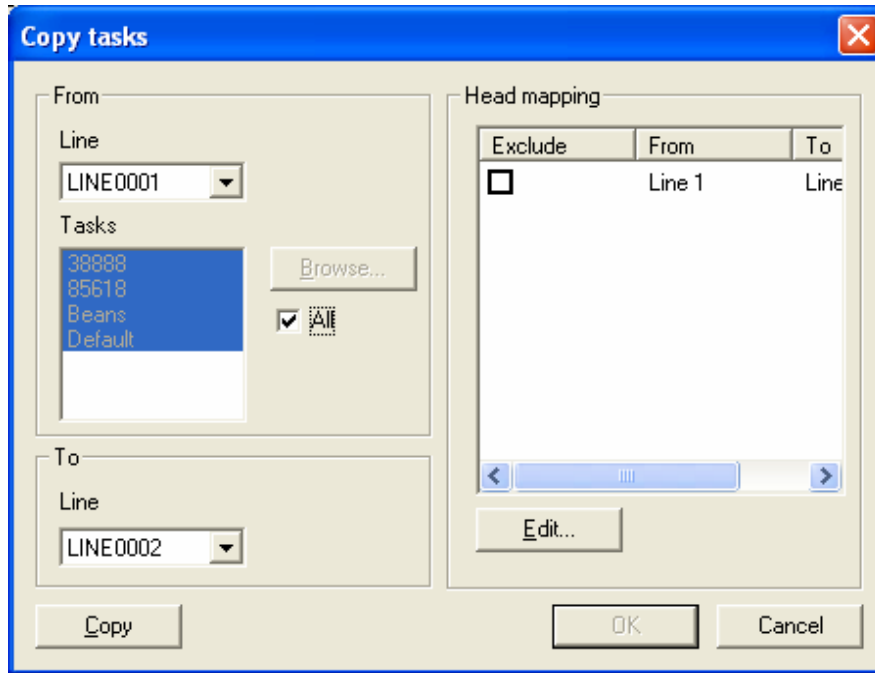
Select the line to copy from, then select the tasks to be copied. Checking the "All" box will automatically select all existing tasks for the given line.

When the desired tasks are selected, click **Copy**.

If successful, you will see a confirmation message similar to the one at right.

The user may change both the "To" and "From" lines and perform the copy function multiple times.
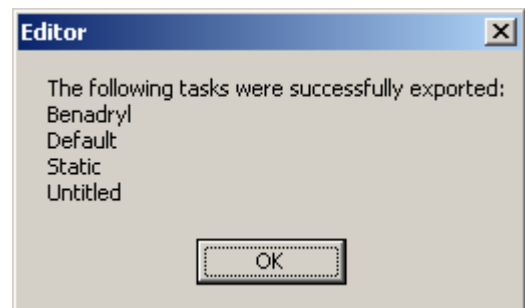
Click **OK** after to save the changes.

This function works best when both the "To" and "From" lines have identical head configurations. However, if they do not, the user may elect to configure the head mapping. To do this, select the head to be mapped and click **Edit** (or double-click).

The user will be presented with the dialog at right. Select the head to map to in the "To" field and click **OK**.
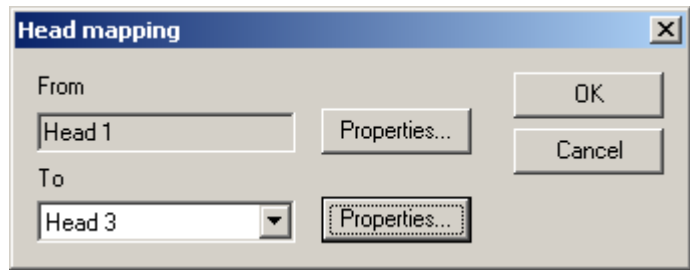
Clicking **Properties** will bring up the Card properties dialog. Note that card properties are read-only in the Editor.
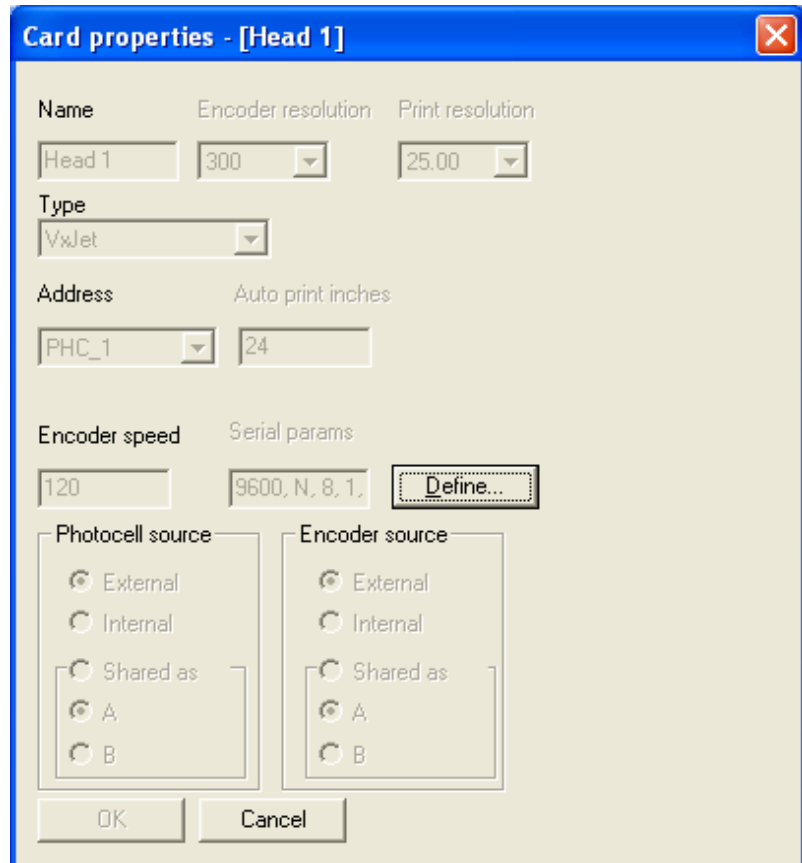
Import

NOTE: It is recommended that all printing tasks be stopped until the Import function has been successfully completed; and that the current database be exported for backup purposes.

To import all tasks that were previously exported, choose **File**, then **Import**.

In the "filename" field, input the name of the file (full path) the exported tasks were saved to; or browse for the file by clicking the **Browse** button.
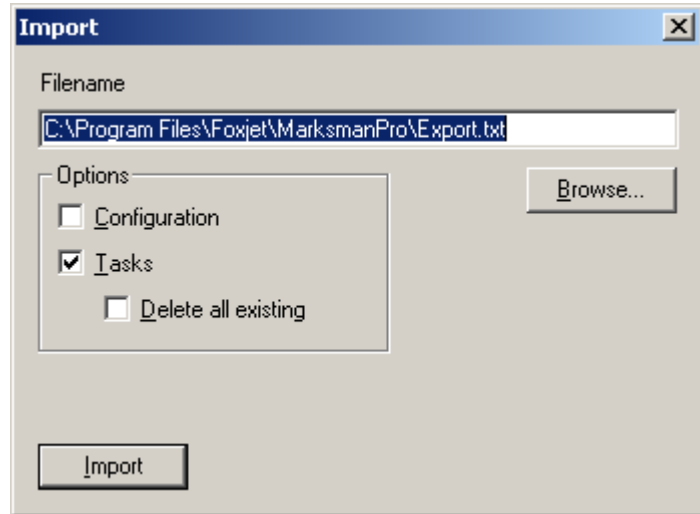
If there is data on the controller that the user does not want to lose, click **Yes** on the following screen.
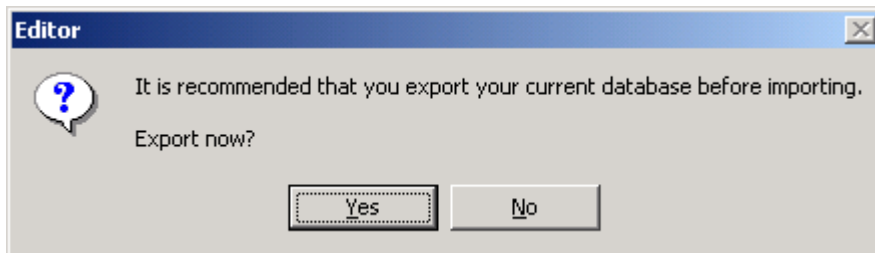
The screen at right will appear at the completion of the Import function.
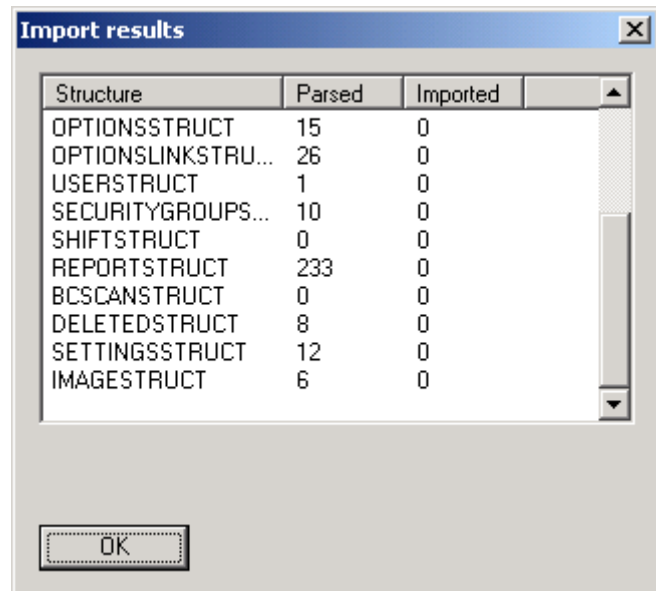
Export

NOTE: It is recommended that all printing tasks be stopped until the Export function has been successfully completed.

To export all existing tasks, choose **File**, then **Export**.

Input the name of the file to export to, or browse for an existing file by clicking the **Browse** button. Click the **Export** button. If the file already exists, the user will be prompted to overwrite the file or cancel the request.
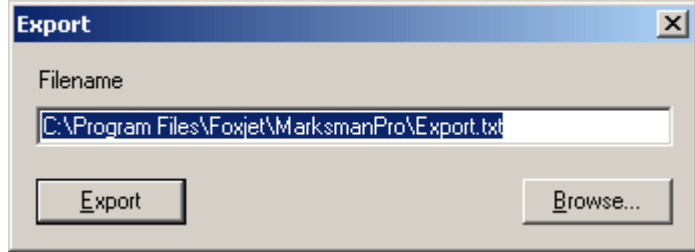
If successful, a confirmation message will appear.

Delete

To delete existing tasks, choose **File > Delete**.

Select the task to be deleted. Multiple tasks may be selected by using the control and/or shift keys. When the selection has been made, click **Delete**.

The delete function may be used several times without closing the window. Tasks on other lines may also be deleted.

Click **OK** to save the changes.

Checking the "Show preview" box will show a preview of the selected task. For large tasks, it may take several seconds to generate the preview.
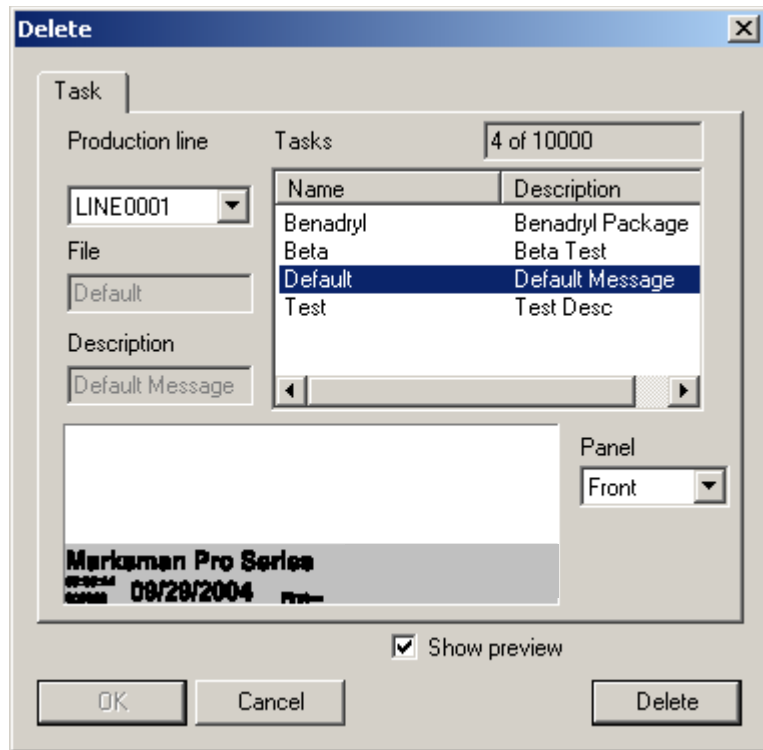
Save As

To save an open task under a different name, choose **File > Save as**.

The "File" field should contain only letters and numbers, with no spaces or special characters. The maximum number of characters is 50.
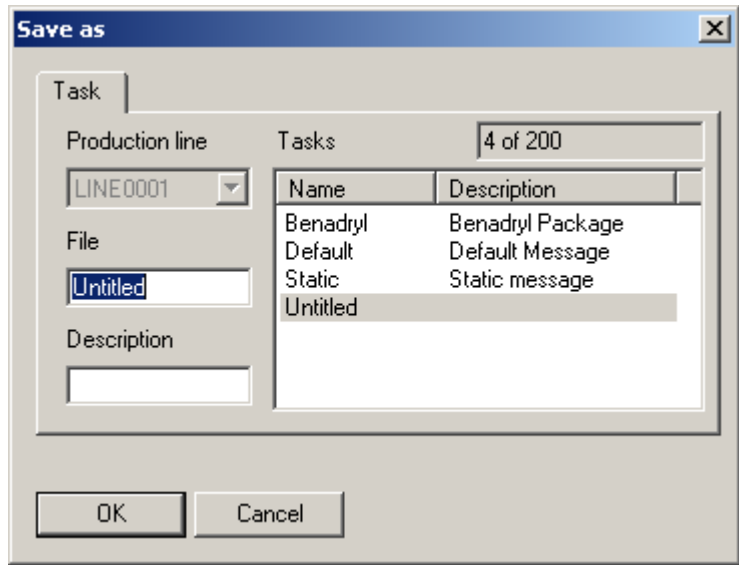
If the name entered matches a task already in the database, the user will be prompted with a confirmation dialog, like the one at right.
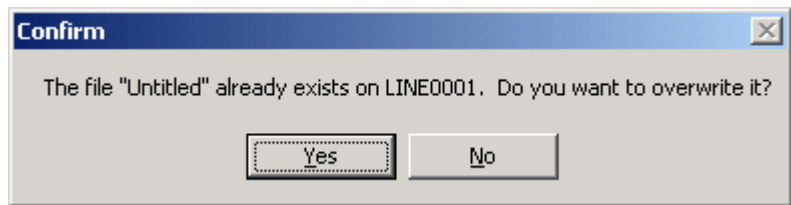
Properties

To change an open task's properties, choose **File > Properties**. The task's description, download string, box and/or expiration data may be changed using this dialog.
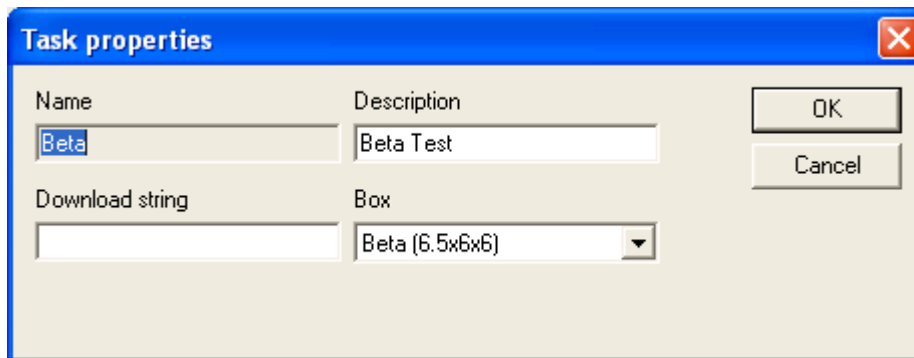
The following table lists special ASCII characters that can be entered in the "Download String" field. (For example, to send 0012345 terminated by a carriage return, enter "0012345<CR>" in the Download String.)

Character	Description
<NULL>	Null
<SOH>	Start of heading
<STX>	Start of text
<ETX>	End of text
<EOT>	End of transmission
<ENQ>	Enquiry
<ACK>	Acknowledge
<BEL>	Bell
<BS>	Backspace
<HT>	Horizontal tab
<LF>	NL Line feed, New line
<VT>	Vertical tab
<FF>	NP Form feed, New page
<CR>	Carriage return
<SO>	Shift out
<SI>	Shift in
<SLE>	
<DC1>	Device control 1
<DC2>	Device control 2
<DC3>	Device control 3
<DC4>	Device control 4
<NAK>	Negative acknowledge
<SYN>	Synchronous idle
<ETB>	End of transmission block
<CAN>	Cancel
<EM>	End of medium
<SIB>	Substitute
<ESC>	Escape
<FS>	File separator
<GS>	Group separator
<RS>	Record separator
<US>	Unit separator

Exit

To exit the Editor, choose **File > Exit**.

Elements

Element Bar

Using the element bar, the user can add new elements to a task. Element types, from left to right, are as follows:

- Text
- Bitmap
- Count
- Date / time
- Expiration date
- User
- Shift
- Barcode (not used)
- Database
- Serial

New elements can be created by clicking one of the buttons on the element bar, by right-clicking on the printable area of the box, or by using the **Elements > Add** menu.

When creating a new element, its x, y position (top-left corner) is set to the current location of the crosshairs.

To edit an existing element's properties, select the element by clicking it, then choose **Elements > Edit** from the menu (or press **Enter**); or double-click an element to edit its properties. Only one element at a time can be selected to edit.

<u>Text</u>

The Text element properties are shown on the right. Text can be entered into the field either a single line at a time or multiple lines, paragraph mode. To get to the next line, simply press Control and Enter at the same time. This will advance the cursor to the next line where text can also be entered.

Average width defines the average character width (in pixels). A value of 0 means that Windows will use the font's default widths.

The Text field displays the data to be printed. This field can contain between 1 and 255 characters.

The Orientation field determines if the data is printed horizontally or vertically.
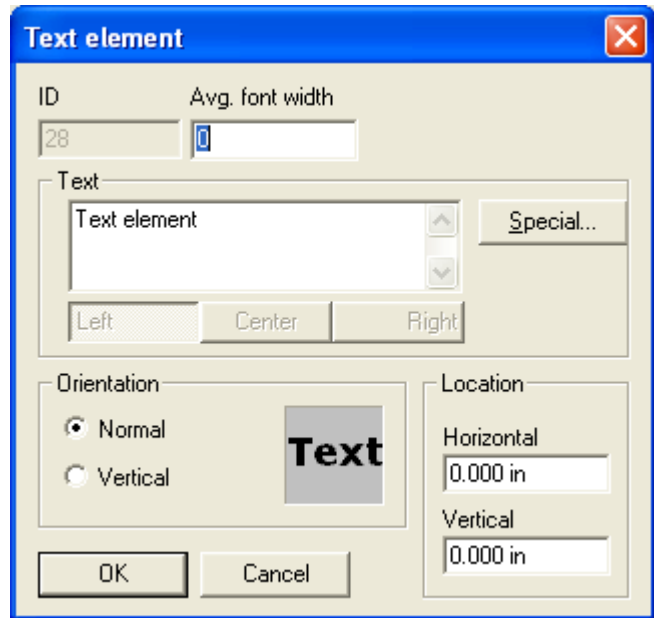
Figure 1: Horizontal orientation

Figure 2: Vertical orientation

To insert special characters, click the **Special** button. This will open the Windows Character Map utility, which can be used to copy and paste special characters.
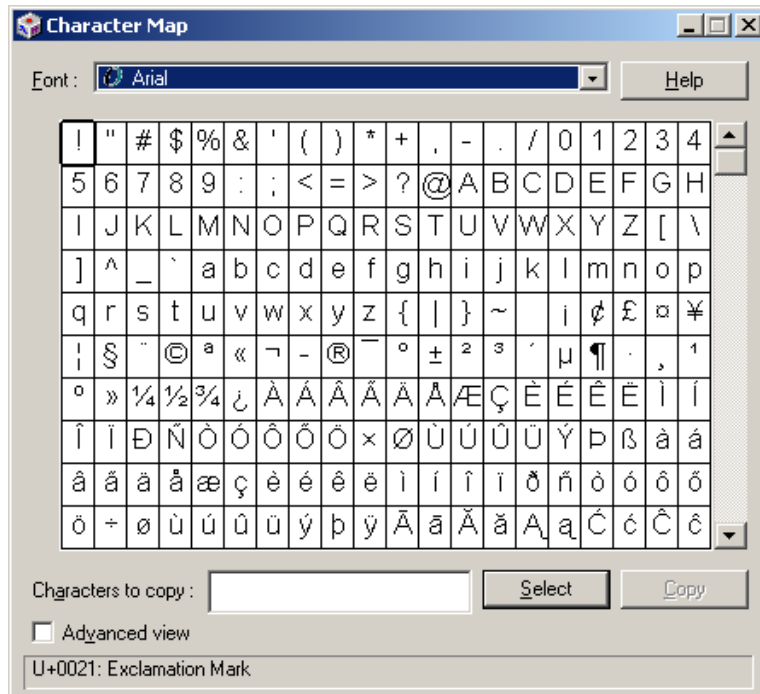
 **NOTE:** Close the Character Map before returning to the Text Element properties box to avoid locking up the screen.

 **NOTE:** Special characters are only available in TrueType fonts.

Bitmap

The Bitmap element properties dialog is shown at right.

The Filename field displays the full path and filename of the selected bitmap. To select a different bitmap, click the **Browse** button.

To edit the selected bitmap using the default bitmap editor, click **Edit**. Note that the BoxWriter© Editor will be disabled until the bitmap editor is closed. To change the default bitmap editor, see *Define, Bitmap Settings*.

The Width and Height fields display the size of the bitmap.
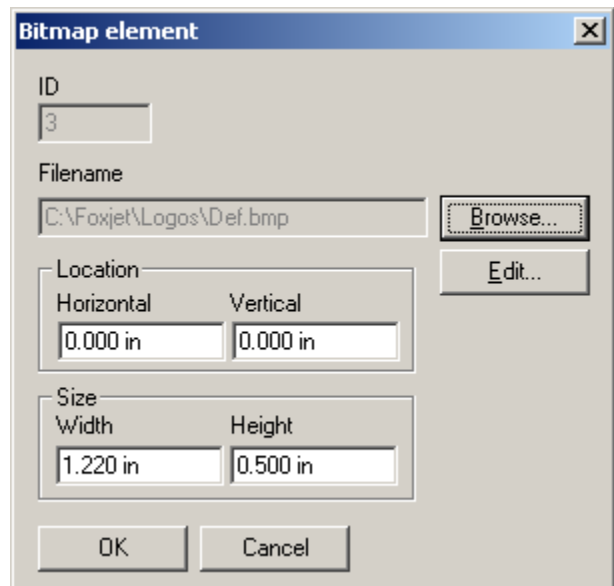
Count

The Count element properties dialog is shown below.

"Average width" defines the average character width (in pixels). A value of 0 means that Windows will use the font's default widths.

The "Name" field allows the count description to be changed. There can be up to two unique counts.

The "Start value" field displays the starting value of the counter.

The "Roll over on" field determines when the counter rolls back to the Start value. (The maximum number of digits for this field is six.)

The "Increment by" field is the number of units added to the current count when a photocell event is fired.

The "Number of digits" field determines the number of significant digits printed. If "Leading zeros" is checked, the count will be padded with zeros. For the example shown here, 000001 would be printed.

The "Orientation" field determines if the data is printed horizontally or vertically. See the *Elements, Text* section for examples of horizontal and vertical text.

For a pallet count, click the "Pallet count" tab and click the **Enabled** button. The "Current count", "Start value", "Roll over on", and "Increment by" fields' semantics are identical to the ones under the "Box count" tab (see previous example).

The "Units per pallet" field is the number of boxes that are loaded onto one pallet.

The pallet count's "Current count" is incremented when the "Units per pallet" value is met. For example, if a pallet holds 144 boxes, this number would be entered into the Units per pallet field. After 144 boxes have been printed, the pallet count would increment.
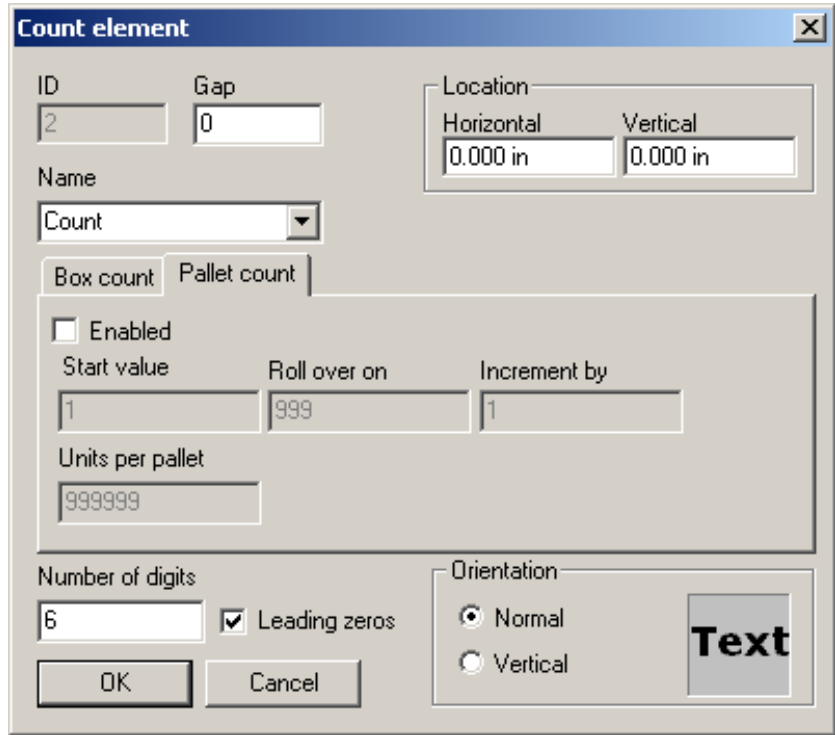
Date / Time Element

The Date / time element properties dialog is shown at right.

"Avg. font width" defines the average character width (in pixels). A value of 0 means that Windows will use the font's default widths.

The "Format" field determines how the current date or time is printed. For a list of pre-defined formats, see the *Define, Custom Date / Time Formats* section of this manual.

To build a new format, click the **Build** button. For a description of the Build date/time format dialog, see the *Define, Custom Date / Time Formats* section of this manual.

The "Orientation" field determines if the data is printed horizontally or vertically. See the *Elements, Text* section for examples of horizontal and vertical text.
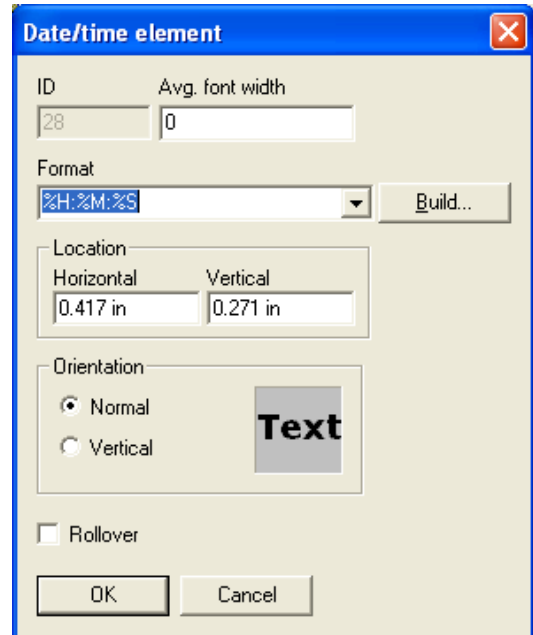
Expiration

The Expiration date element properties dialog is shown at right.

"Avg. font width" defines the average character width (in pixels). A value of 0 means that Windows will use the font's default widths.

The "Format" field determines how the current date or time is printed. For a list of pre-defined formats, see the *Define, Custom Date / Time Formats* section of this manual.

To build a new format, click the **Build** button. For a description of the Build date/time format dialog, see the *Define, Custom Date / Time Formats* section of this manual.
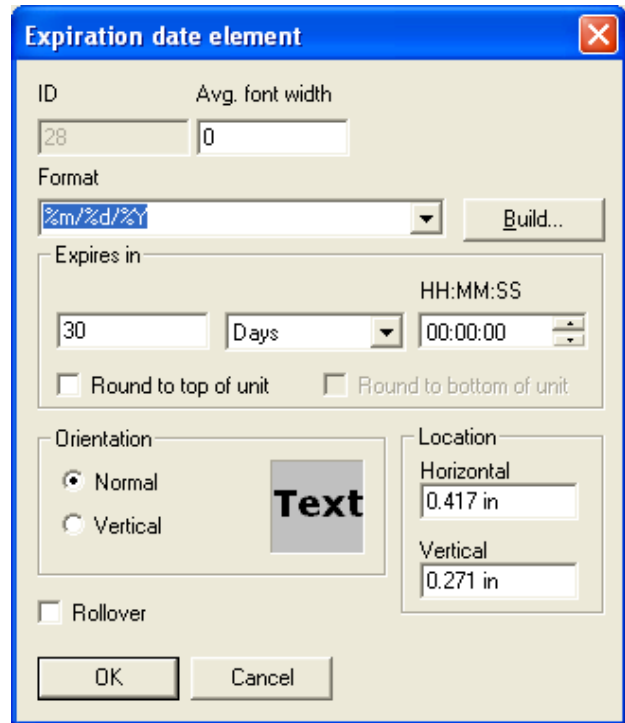
The expiration period is determined by adding the "Days" and "HH:MM:SS" fields to the current system time.

"Round to top of unit" will force the expiration code that is printed to round up to the next whole unit.

The "Orientation" field determines if the data is printed horizontally or vertically. See the *Element, Text* section for examples of horizontal and vertical text.

When "Rollover" is selected, the expiration code rollover time can be changed to a different value than midnight. See *Define, Date/Time Codes, Rollover* to enter a new setting.

User

The User element properties dialog is shown at right.

"Avg. font width" defines the average character width (in pixels). A value of 0 means that Windows will use the font's default widths.

The "Data" field displays the data to be printed. If "Use default character" is checked, the data shown in the editor will be drawn with the "W" character. In this example, "WWWWWWWWWWW-WWWW" would be displayed in the editor (15 W's, since "Max chars" is set to 15).

If "Prompt at task start" is checked, the operator will be prompted by the Marksman© Pro Control application when the task is started. The data displayed in this prompt is determined by the Prompt field.
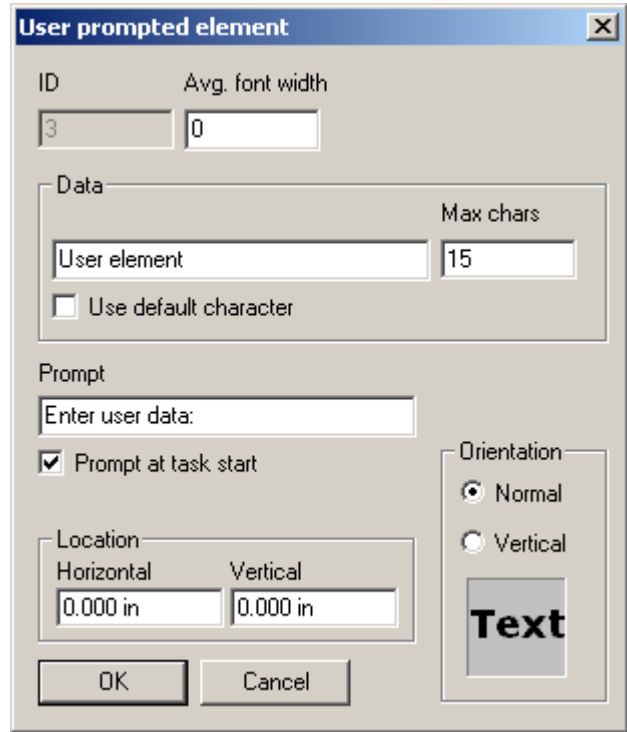
The "Orientation" field determines if the data is printed horizontally or vertically. See the *Elements, Text* section for examples of horizontal and vertical text.

Shift

The Shift element properties dialog is shown at right.

A Shift element prints the current shift code. See *Define, Shift Codes* for more information.

"Avg. font width" defines the average character width (in pixels). A value of 0 means that Windows will use the font's default widths.

The "Orientation" field determines if the data is printed horizontally or vertically. See the *Elements, Text* section for examples of horizontal and vertical text.
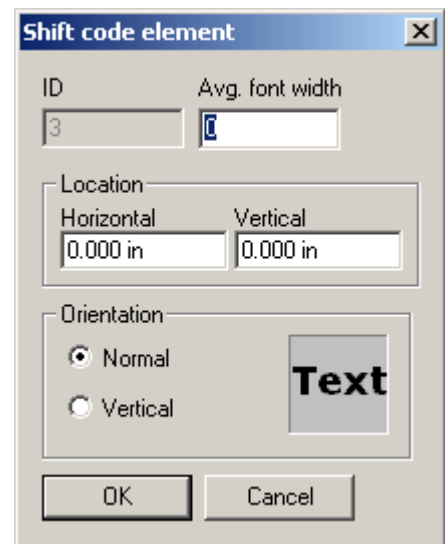
Database

The Database element properties dialog is shown at right.

A Database element looks up a piece of data from a given database and prints it.

"Avg. font width" defines the average character width (in pixels). A value of 0 means that Windows will use the font's default widths.

The "DSN" field displays the name of the selected ODBC database. To select a different data-base, click **Browse**. The user will be presented with the "Select Data Source" dialog (see next page).

The "Table" field displays the database table that will be queried.

The "Field" field displays the field name in the selected table. The value of this field is data that will be printed. The user may also browse the fields in the current table by clicking **Select** (see the Select field dialog on the next page).

If a given record is to be retrieved by a key value, check the "Use" box under "Key field". In this example, the record from the Messages table whose ID is equal to 2434 will be selected. The value of its Name field will be printed. The Key Field may be selected by clicking the "Select" button (see the Select field dialog on the next page).

The "Orientation" field determines if the data is printed horizontally or vertically. See the *Elements, Text* section for examples of horizontal and vertical text.
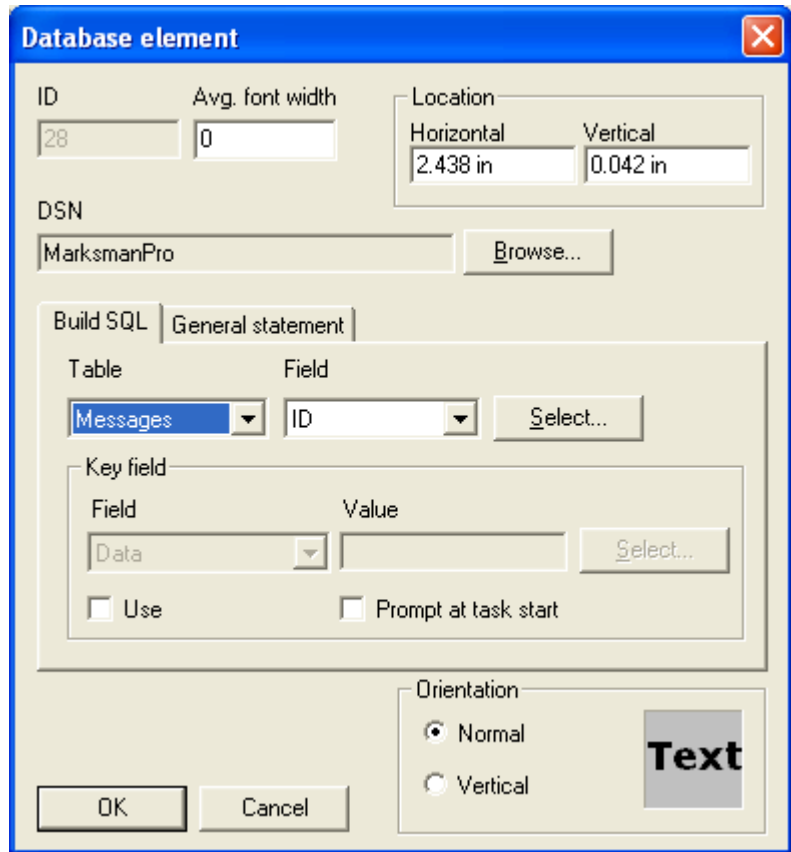
The following is an example of what the "Select Data Source" dialog might look like:
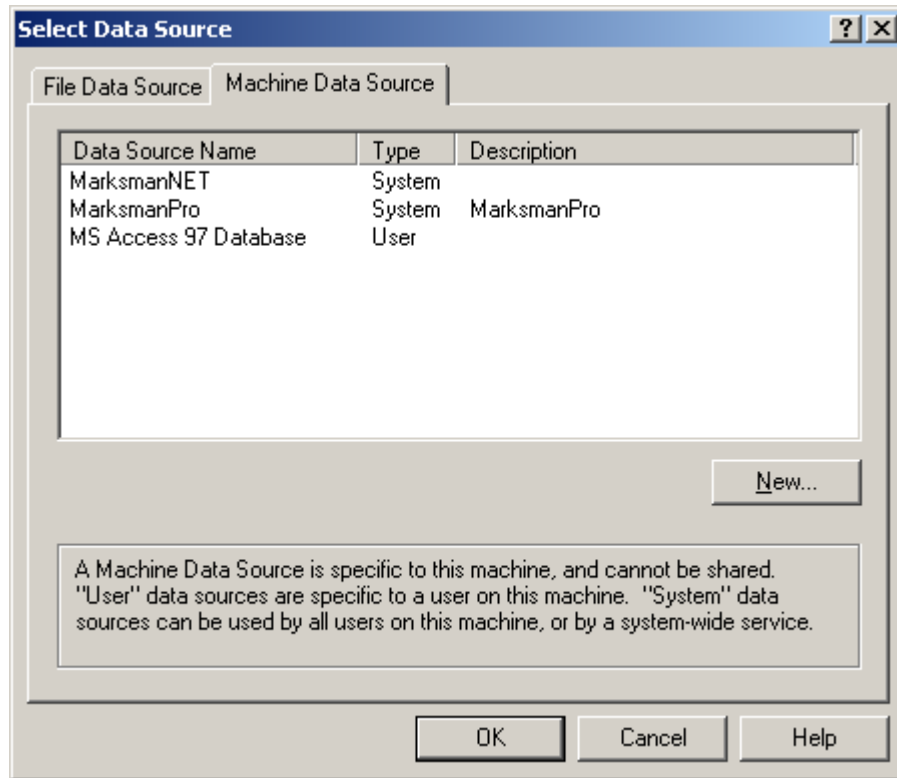
The following is an example of what the "Select field" dialog might look like:
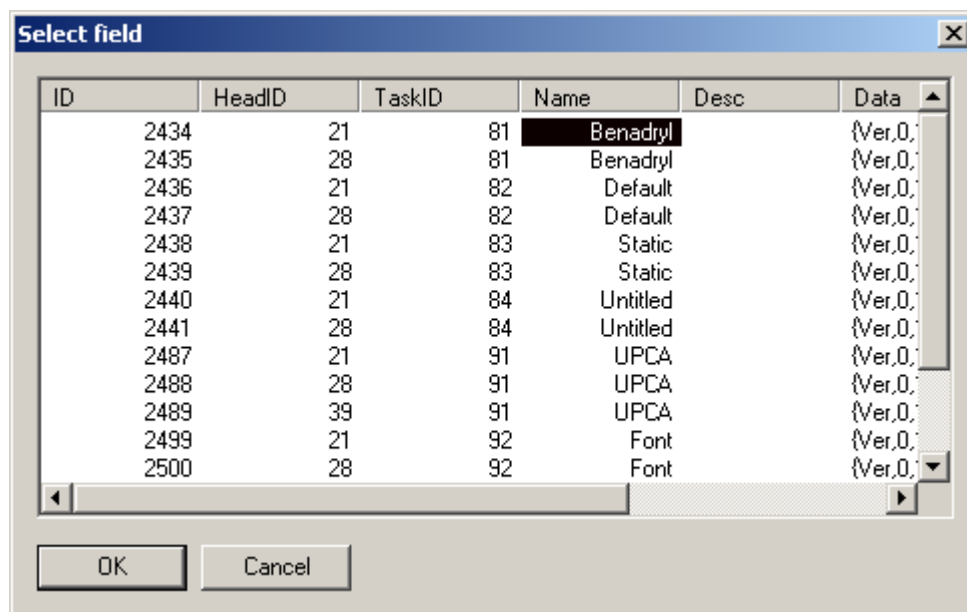
To insert an SQL statement directly, click the "General statement" tab. An example using a general SQL statement is shown at right.

If this option is used, the first field in the first record of the result set will be the data selected to print.

Database element

ID
28

Avg. font width
0

Location
Horizontal
2.438 in
Vertical
0.042 in

DSN
MarksmanPro   Browse...

Build SQL | General statement

SQL statement

Orientation
◉ Normal
○ Vertical

Text

OK   Cancel

<u>Serial</u>

The Serial element properties dialog is shown at right.

A Serial element prints data from the serial buffer. The serial buffer is defined in the Marksman© Pro Control application.

"Avg. font width" defines the average character width (in pixels). A value of 0 means that Windows will use the font's default widths.

The "Start index" specifies the index in the serial buffer to start copying from.

The "Length" field specifies how many characters to copy from the serial buffer.

The "Orientation" field determines if the data is printed horizontally or vertically. See the *Elements, Text* section for examples of horizontal and vertical text.

In the Editor, a Serial element will be displayed with W's. In this example, it would look like this:
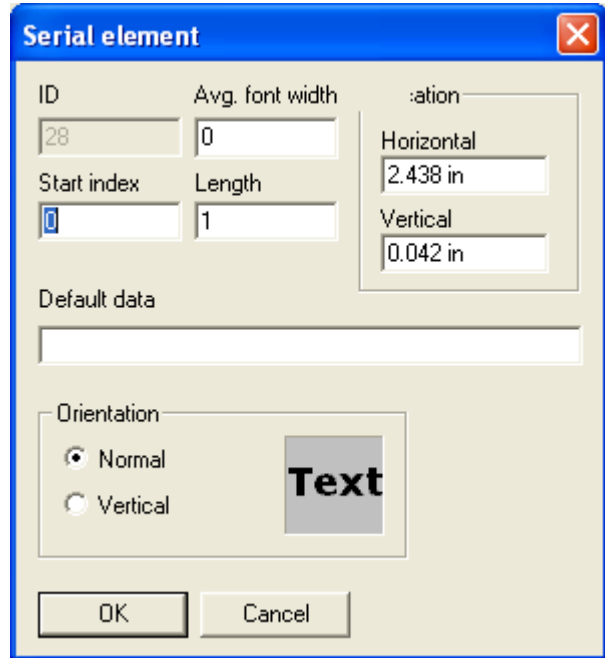
ToolBar

Toolbar icons are listed in the table below in order from left to right:

Button	Menu Command	Keyboard Shortcut
New	File > New	Ctrl + N
Open	File > Open	Ctrl + O
Save	File > Save	Ctrl + S
Save all	File > Save all	
Cut	Edit > Cut	Ctrl + X
Copy	Edit > Copy	Ctrl + C
Paste	Edit > Paste	Ctrl + V
Undo	Edit > Undo	Ctrl + Z
Redo	Edit > Redo	Ctrl + Y
Zoom in	View > Zoom > In	+
Zoom out	View > Zoom > Out	-
Zoom normal	View > Zoom > Normal	
Zoom custom	View > Zoom > Custom	
Fit View to screen	View > Zoom > Fit to Screen	
About	Help > About	F1

New

Creates a new task. See the section on *File, New*.

Open

Opens an existing task. See the section on *File, Open*.

Save

Saves the task currently being edited.

Save All

Saves all open tasks.

Cut

Cuts the selected elements and places them on the clipboard.

Copy

Copies the selected elements to the clipboard.

Paste

Pastes the contents of the clipboard into the current task.

New elements created by this operation will have their position set relative to the current crosshairs position.

Undo

Undoes the most recent operation.

Redo

Redoes the most recent Undo operation.

Zoom In

Zooms the current view in by increments of 25%.

Zoom Out

Zooms the current view out by increments of 25%.

Zoom Normal

Sets the current view's zoom to 100%.

Zoom Custom

This command allows the user to set an arbitrary zoom factor for the current view. Valid zoom factors are in the range of 10% to 200%.
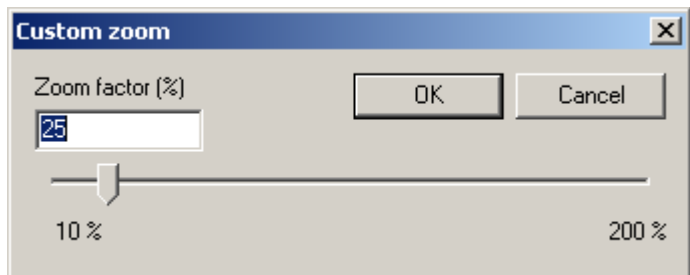
Fit View to Screen

Sets the current view to fit the screen.

About

This command displays the "About" dialog. This dialog lists all the major components of the editor and their version numbers.
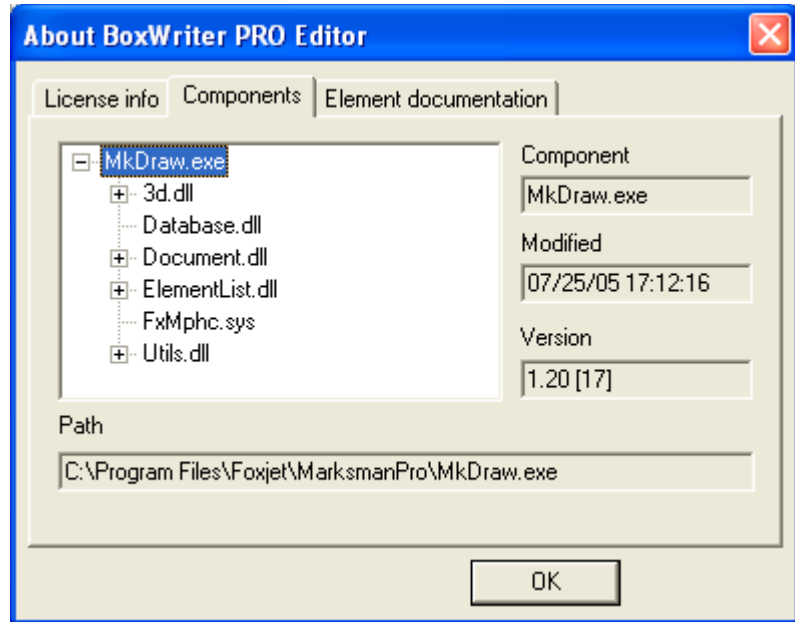
Font bar

The font bar allows the user to change the font properties of any selected elements that have a font (i.e., Text, Count and Date / time elements).
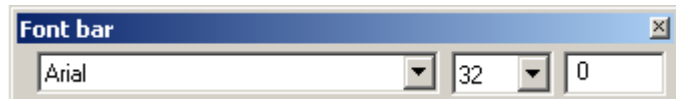
Name

The name of the currently selected font.

Size

The font's height, in pixels.

Width

Defines the average character width, in pixels. A value of 0 means that Windows will use the font's default widths.

NOTE: If "Warn if elements overlap" has been checked in the Editor Default screen, and one field overlaps another, both fields will be highlighted in red. The operator will also be warned before saving the task. To enable or disable the element overlap warnings, see *Define, Editor Defaults* earlier in this section.

Rotation Bar

The rotation bar allows the user to change the box's orientation, relative to the print heads.
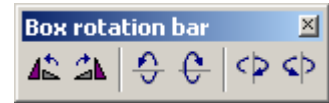
The buttons rotate the box in the following order (starting from the left-most button):

- Counter-clockwise
- Clockwise
- Down
- Up
- Left
- Right

Following are illustrations of some possible rotations. First, suppose the box has a length, width and height of 12 inches, 6 inches and 3 inches, respectively. By default, it has the following orientation in a new task: 3 inches tall by 6 inches long of printable area:
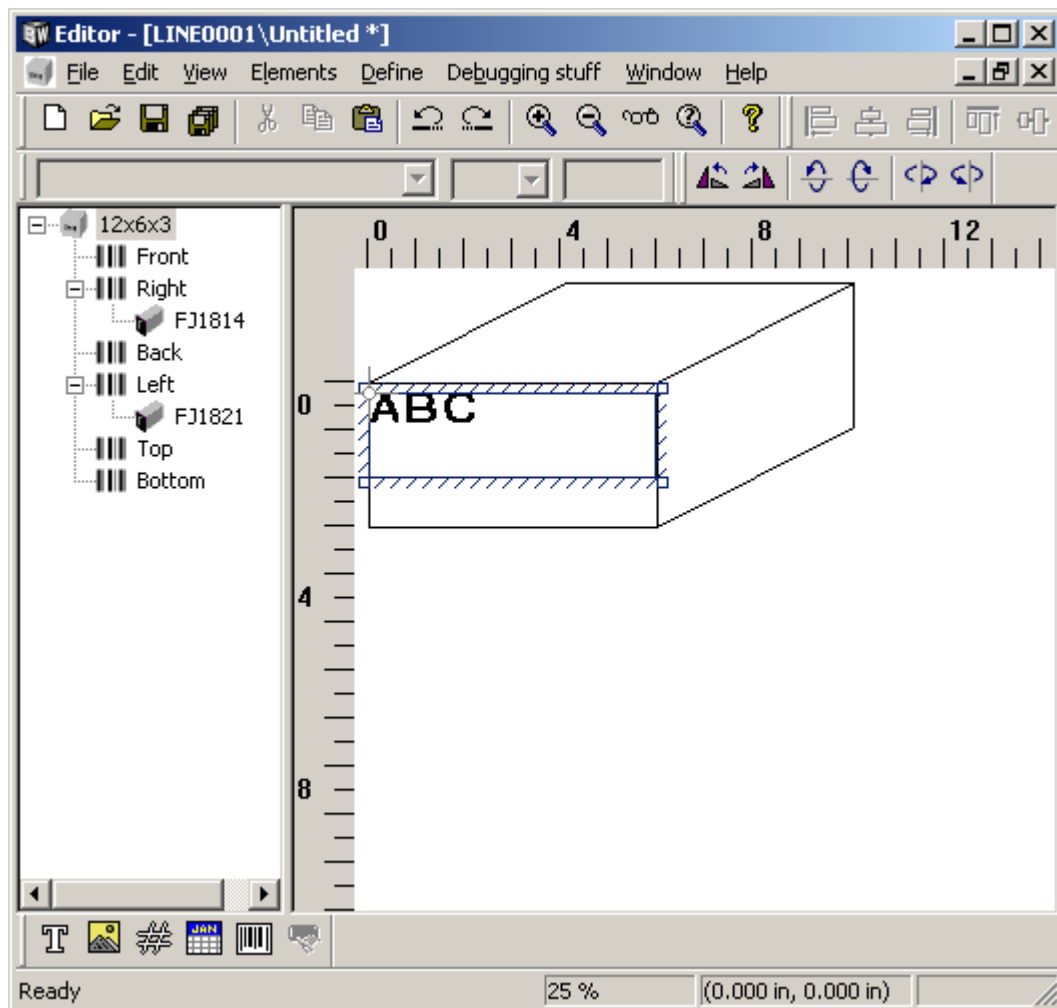
Spinning the box clockwise (or counter clockwise) will result in a printable area that is now 6 inches tall by 3 inches long:
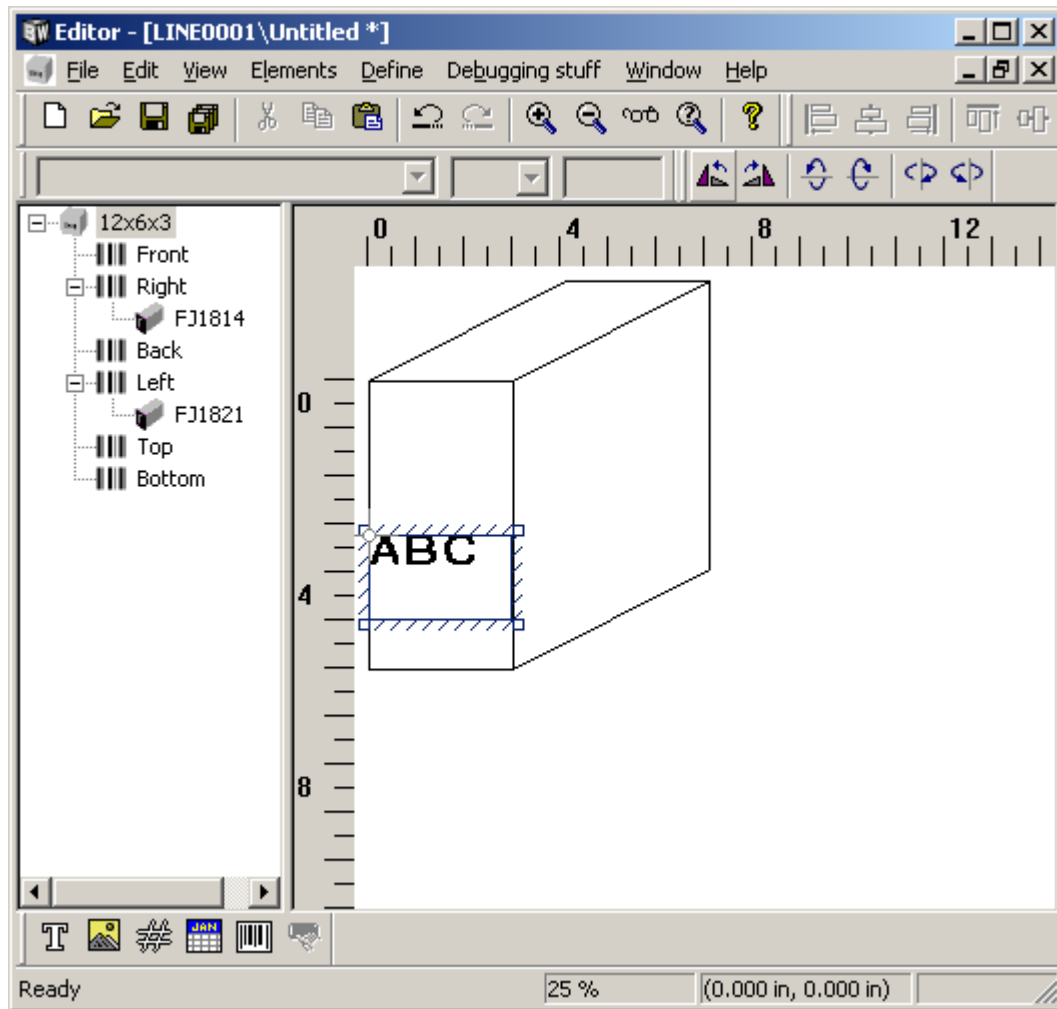
Spinning the box up (or down) will result in a printable area that is now 12 inches tall by 6 inches long:
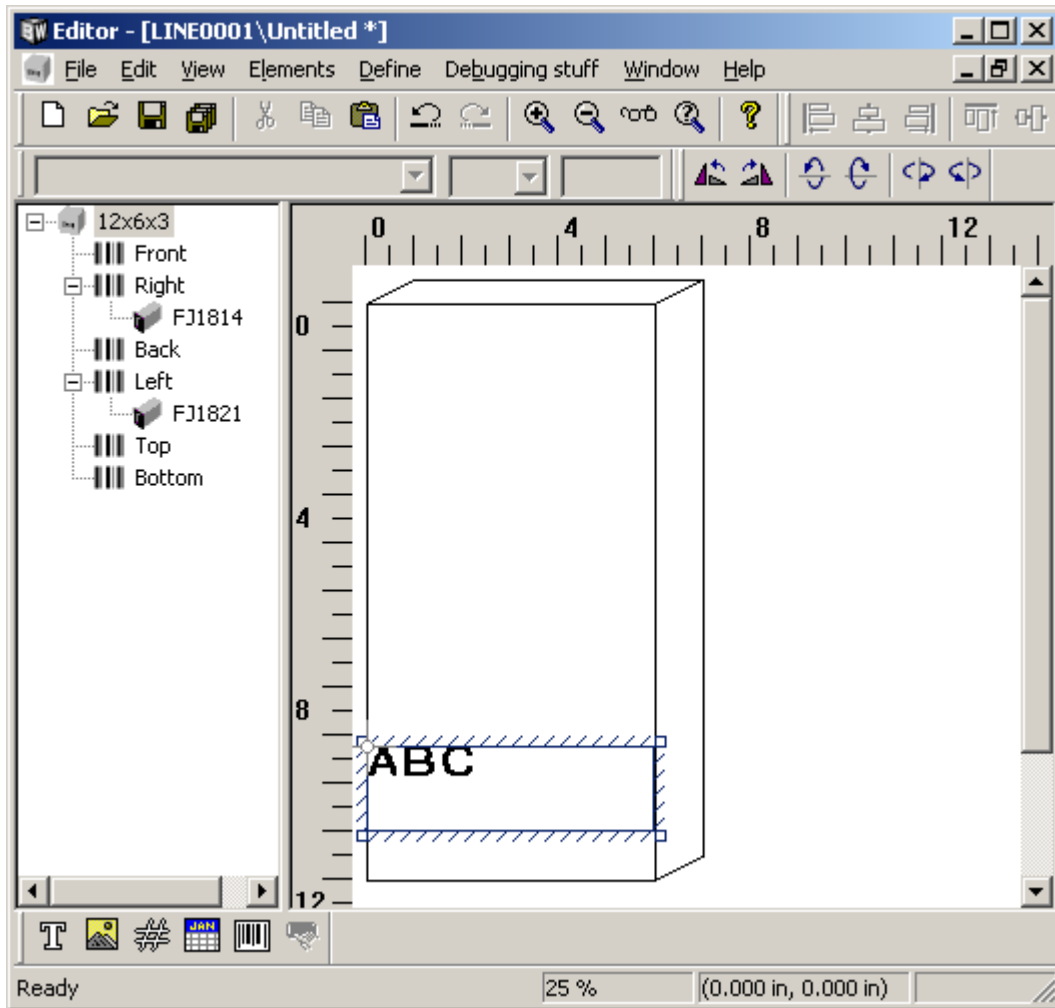
Spinning the box left (or right) will result in a printable area that is now 3 inches tall by 12 inches long:
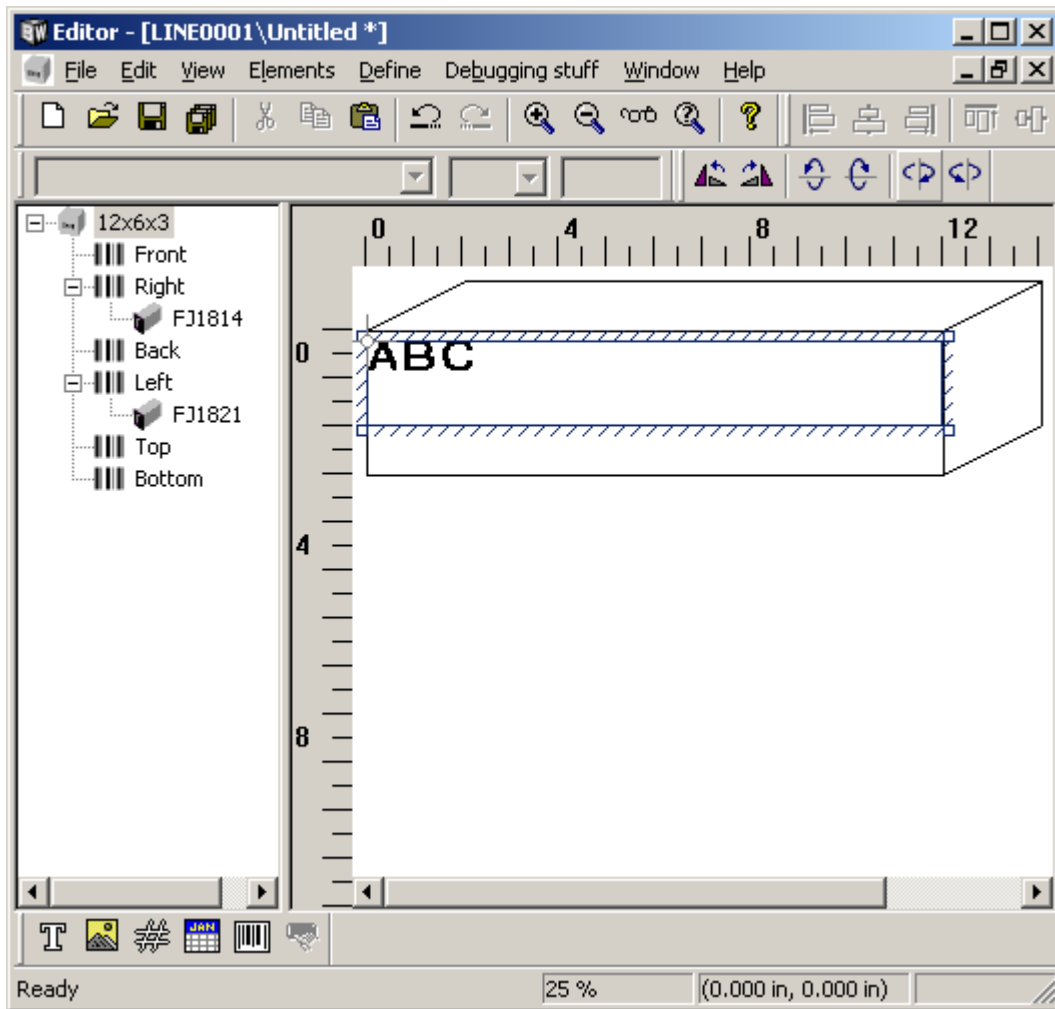
Sometimes changing the box's orientation will result in some elements being forced outside the printable area. When this happens, the Editor will warn the user with the following message:
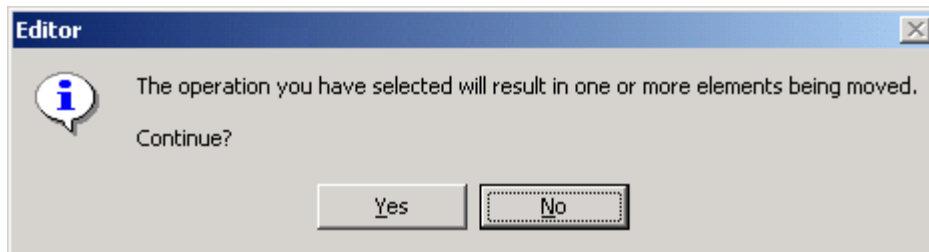
If it is acceptable to move the affected elements, click **Yes** and they will automatically be repositioned. Otherwise, click **No** and the box will be returned to its original orientation.

Alignment Bar

The alignment bar allows the user to apply various transformations to the currently selected elements.

Toolbar icons are listed in the table below in order from left to right:

Button	Keyboard Shortcut	Minimum number of elements that must be selected
Left		2
Center		2
Right		2
Top		2
Middle		2
Bottom		2
Center (on box)		1
Distribute evenly vertically		3
Distribute evenly horizontally		3
Bold	Ctrl + B	1
Italic	Ctrl + I	1
Flip horizontally		1
Flip vertically		1
Inverse		1

Figure 1: Left aligned
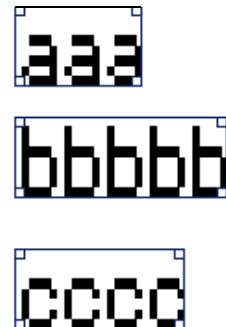
Figure 2: Center aligned

Figure 3: Right aligned

Figure 4: Top aligned

Figure 5: Middle aligned

Figure 6: Bottom aligned

Figure 7: Center (on box)
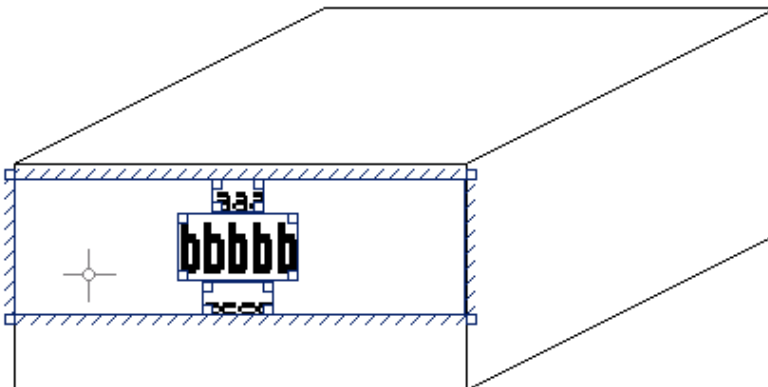
Figure 8: Distribute evenly vertically
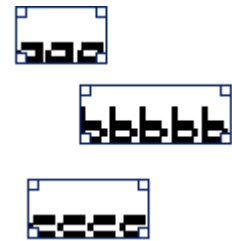
Figure 9: Distribute evenly horizontally

Figure 10: Text element with no bold factor

Figure 11: Bold factor of 3
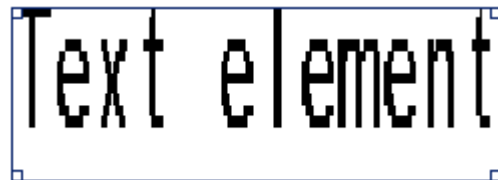
Figure 12: Flip horizontally

Figure 13: Flip vertically
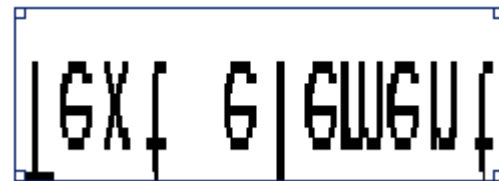
Figure 14: Inverse

Perspective

To change the perspective of the box view, select **View > Change perspective**.

The x and y axis perspectives must be between -90 and 90 degrees.
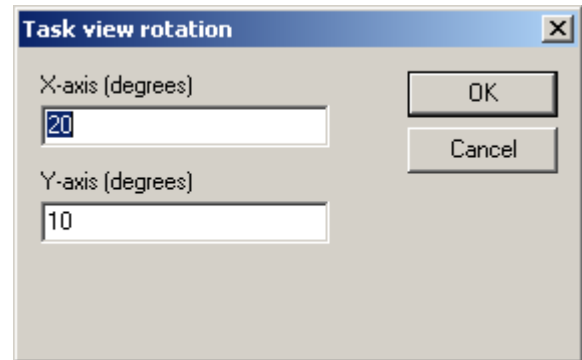
Figure 1: Perspective as viewed with [x, y] set to 20, 10
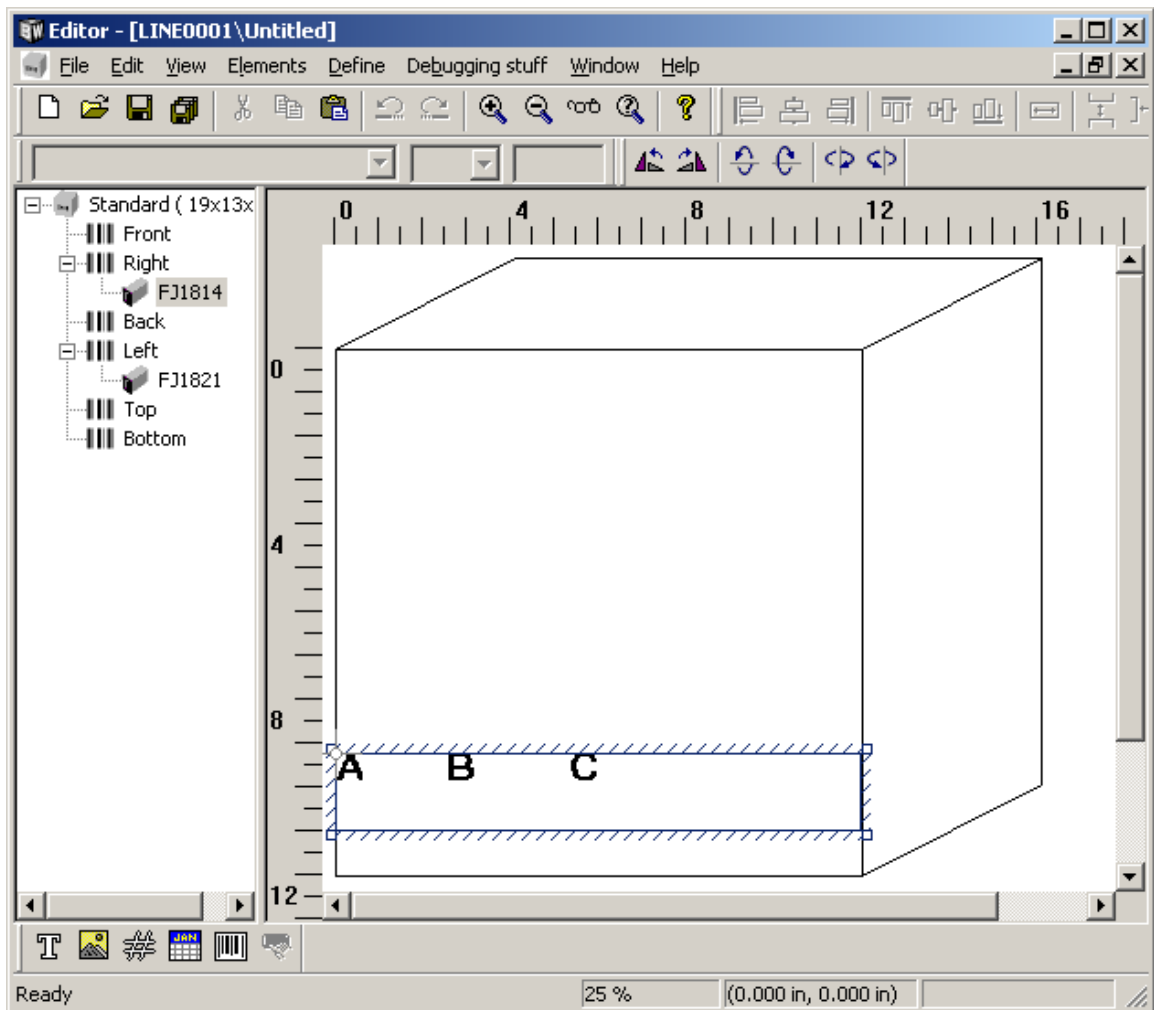
Figure 2: Perspective as viewed with [x, y] set to -20, 10
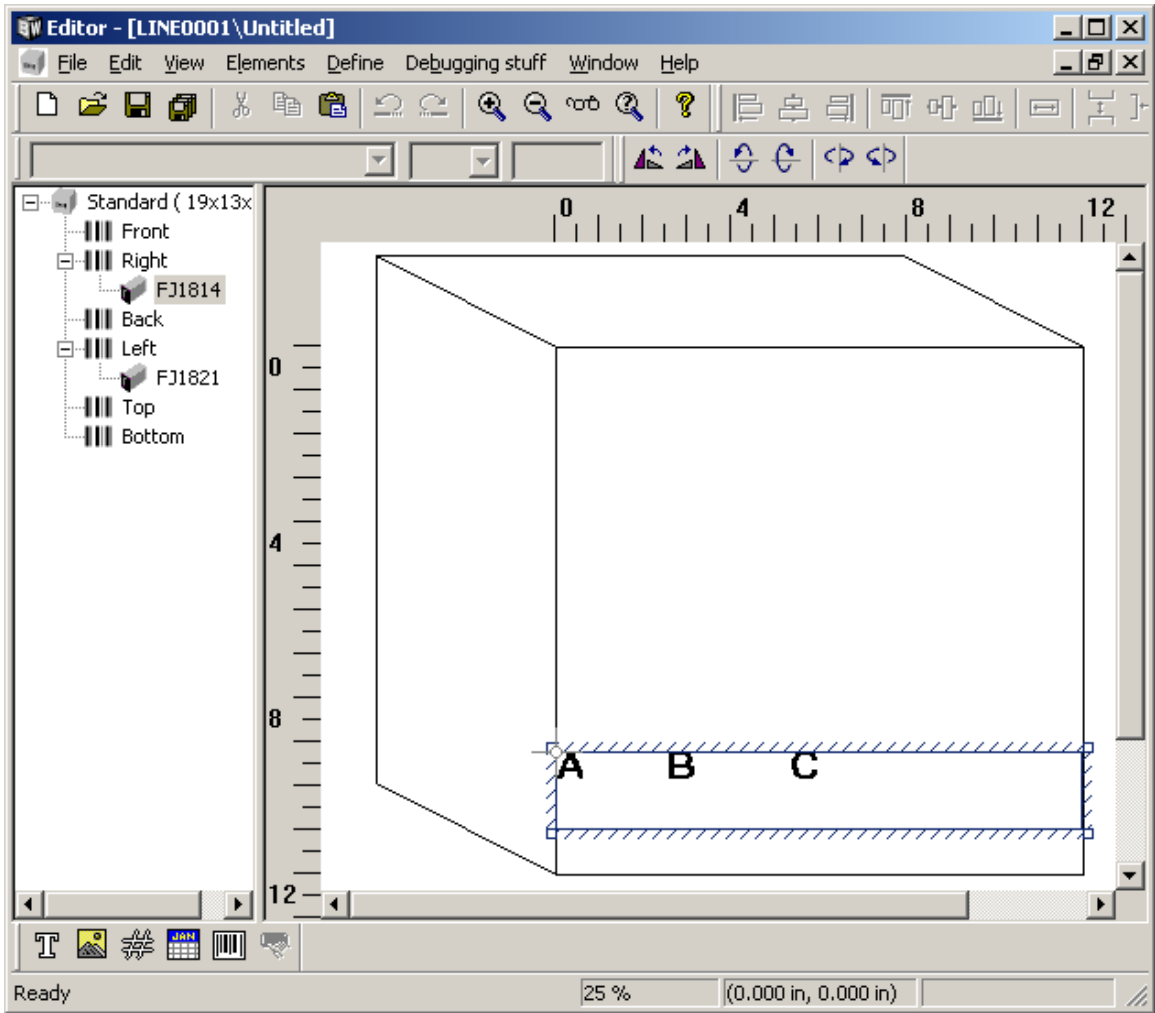
Section 8: Frequently Asked Questions

Q: *Will changing the print resolution change the positioning of the print on the product?*

A: Yes. An increase in resolution moves the dots, and thus the characters, closer together, increasing the rate at which the message downloads to the print head, and thus starting the print cycle earlier. A decrease in resolution has the opposite effect.

In addition, the point at which the print head begins printing can be affected by the number and types of autocodes (which also affect download time) and conveyor speed.

Q: *Can I print an 18-dot font with 9-dot print heads?*

A: Yes. When entered as an 18-dot font, the data will span two message lines on the display, and will be printed by two 9-dot print heads.

NOTE: Printing an 18-dot font with two 9-dot print heads requires precise alignment of the heads. You will need to fine-tune both the vertical placement of the print heads on bracketry (see **Mounting the Print Heads**, *Section 4, Installation*) and the Product Sensor offset.

Section 9: Maintenance

The following are the recommended maintenance procedures to keep the ink jet system printing cleanly and efficiently.

System Maintenance

Intermittent (as required):

1. Be sure the photosensor is clean and free of debris.
2. Be sure the O-rings on the encoder wheel are present and not worn (cracked and/or chipped).
3. Be sure the nuts and bolts holding the bracketry in place remain tight.
4. Equipment may be cleaned utilizing the appropriate conditioner for the ink in use.

⚠️ **Caution:** Do not spray conditioner on, or wipe off, exposed electrical connections.

Annually:

Replace encoder O-rings.

Recalibrate Touch Screen.

Print Head Maintenance

Daily Startup

Wear safety goggles when working with industrial inks or solutions!

Clean print head faceplates with the appropriate conditioner for your ink supply. Spray conditioner on a lint-free wipe and wipe the faceplate in a circular motion to remove ink from the orifices.

Inspect lines and connections for leaks. Make repairs if needed.

To check for proper purging, swipe a sheet of cardboard or other material across the front of the print head at about the normal printing distance as the print head purges. If all orifices are purging, the result should be a solid band of ink across the material. It is not uncommon for the first purge to show streaks where some of the orifices are not purging properly. Purge the head a few more times until all orifices are purging. Repeat the process with all the heads in the daisy chain.

Shutdowns of Seven Days or Longer

Flush and thoroughly purge the print head(s) and the ink supply.

After extended shutdown periods of a week or longer, it may be necessary to flush all print heads with conditioner, as follows:

1. Begin with the last print head in the system (the one just before the effluent bottle). To prevent ink drips, enclose the couplings in a clean cloth when changing connections. Have a cloth handy to wipe up any ink spills.

FLUSH
BOTTLE
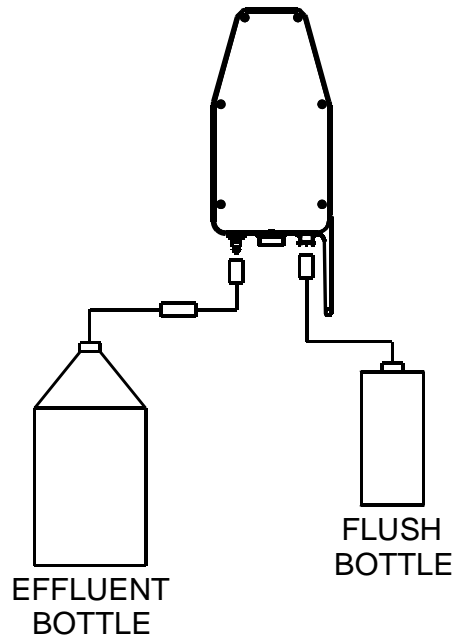
EFFLUENT
BOTTLE

2. Disconnect the ink line from the female quick disconnect (upper fitting) on the back of the print head, and attach the Flush Bottle assembly (1902-964).
3. Close the shutoff valve and disconnect the effluent bottle assembly from the male quick disconnect that terminates the ink-feed line to the print heads.
4. Attach the effluent bottle to the effluent port's male quick disconnect (lower fitting) on the back of the print head, and open the shutoff valve.
5. Squeeze the flush bottle to force conditioner through the print head. Note the color of the liquid in the waste line, and continue flushing until it runs clear.
6. Close the shutoff valve and disconnect the effluent bottle and flush bottle assemblies.
7. Re-attach the ink line to the print head and purge the print head until ink is again flowing to the orifices.
8. Repeat steps 2 through 7 for each print head in the system.

Store the effluent bottle where it cannot be knocked over or damaged. When the effluent bottle is full, dispose of the waste in accordance with local, state and federal regulations.

Spare Print Heads

It is recommended that spare print heads be circulated into operation on a regular basis. Rotate the print heads every couple of months to keep them performing up to expectations. Rotating spare print heads prevents hardening of internal components, making startup much easier. Before returning a spare print head to the shelf, be sure to thoroughly flush with conditioner.

Ink Supply Maintenance

Changing Ink Containers

⚠️ **CAUTION:** Porous ink must be used with a porous ink supply. Non-porous ink must be used with a non-porous ink supply. The ink supply can <u>not</u> be flushed to use a different ink type.

The Ink-Out Beacon lights when the ink pail is almost empty. This alerts the operator to ready a new pail of ink for changeover. However, it is not necessary to change ink until the beacon switches from a steady glow to a slow flash, signifying that the pail is empty.

When the beacon begins flashing, the system will continue to print, as the accumulator contains enough ink for a few more minutes of operation. The amount of print time remaining is dependent on the number of print heads and the message being printed, so the operator may have anywhere from five to thirty minutes to change the ink container. If timely action is not taken, printed dots will begin to diminish in size until they disappear altogether.

👆 **NOTE:** Allowing the system to run longer with the beacon flashing will not pump more ink out of the pail. A flashing beacon means the accumulator is no longer receiving ink from the pail. Any ink remaining in the bottom of the pail should be carefully poured into the new pail or disposed of in accordance with state and local regulations.
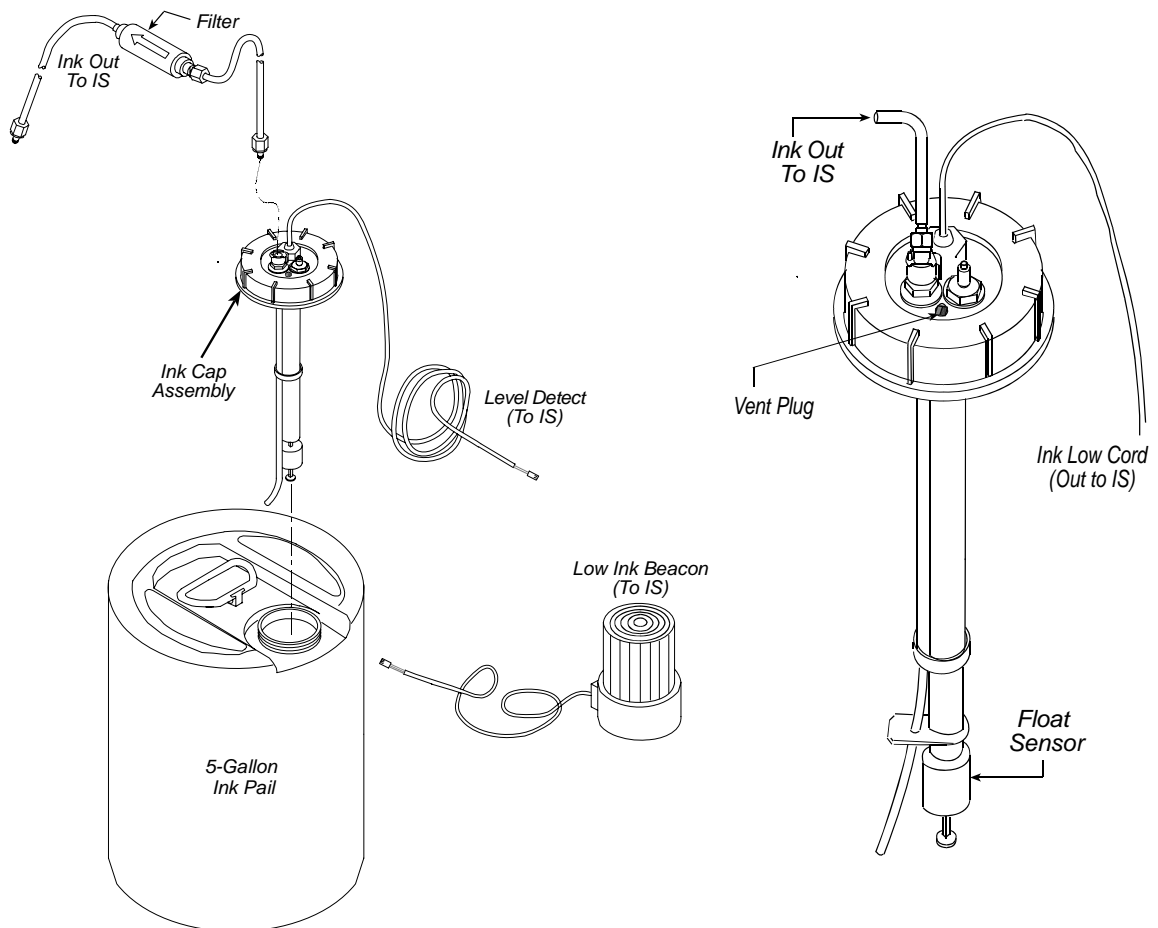
The following procedure explains how to change ink while the system continues to print. Determine whether the system is using porous (TWP) or non-porous (TSO) ink, and replace with the same type of ink.

Changing ink colors is a two step process: First flush the system with the appropriate conditioner for your ink type, then change ink colors - making sure to use the same ink type. Changing ink colors without first flushing the system with conditioner may damage the system.

⚠️ **NEVER USE PIGMENTED INK IN THE INK SUPPLY.** This system is not designed to operate with pigment particles. Use of pigmented ink will permanently clog the ink supply.

Wear eye protection and use appropriate safety equipment when changing pails of ink.

1. Disconnect the 1/8" supply line from the female quick-disconnect in the ink pail cap, and set the empty pail aside.
2. Set the new pail in place and remove the cap.
3. Remove the cap assembly from the empty pail and insert it into the new pail. Tighten snugly by hand.
4. Connect the 1/8" ink supply line from the ink supply to the female quick-disconnect on the ink cap. Make sure the couplings snap into place.
5. Press the Prime button on the ink supply momentarily to prime the system. The beacon should turn off.

Daily Startup

Be sure all ink lines are undamaged and free of entanglement before operation.

Intermittent (as required)

When disconnecting ink lines, spray the quick disconnects with the appropriate ink conditioner to prevent them from sticking open.

Annually

Replace the filter assembly as follows:
1. Disconnect the old filter assembly via the quick disconnects at the rear of the ink supply and at the ink supply container.
2. Connect the new filter assembly (5760-319) by snapping the ends into the quick disconnects. Be sure the arrow on the filter is facing toward the ink supply.
3. Discard the old filter in accordance with local regulations.

⚠️ **CAUTION:** Ink is under pressure within the ink supply and ink lines. Be sure to bleed pressure from the system prior to removing any components.

Section 10: Troubleshooting

The VxJet ink jet system incorporates advanced designs, both in hardware and in software. However, if the system ever fails to perform properly, some built-in indicators will help in troubleshooting. This section will help minimize system downtime and explain some of the diagnostic features built into the system.

Troubleshooting Notes

Ink Supply

Most ink supply problems involve an empty ink container, kinked or crushed ink lines, or leaks (internal or external). If there are no apparent leaks, the ink supply container is not empty, and the ink supply will not supply sufficient pressure at the output, the pump is the most likely suspect. The accumulator rarely fails, so all other suspect components should be checked first. Check the power fuse (F1) and the beacon fuse (F2). (See *Appendix B, Theory of Operation* for more information.) The normal output pressure should be 20-25 psi.

Print Heads

Electronic failures in the print head will normally open the print head fuse, which will open the 15VDC line to the driver board and the daisy chain output connector. Mechanical problems generally show up as leakage or print quality issues, but distance from the substrate and solenoid pulse width will also effect overall print quality.

Troubleshooting Tests

Purge Test

This test will determine if the print heads are functional.
1. Place cloth in front of print head front plate.
2. Press and hold the Purge button according to procedure in *Section 9, Maintenance*.
3. Listen for solenoid buzz.
4. Check for ink on cloth.

NOTE: An encoder signal is not required for the purge function.

If solenoids buzz and ink dots appear on cloth, the print head is functional.

If solenoids buzz but no ink dots appear on cloth, the print head is clogged or there is an ink supply problem.

If solenoids do not buzz, there may be a cable, print head, or controller electronics failure.

Print Test

This test will determine if the print heads are printing.
1. Place cloth in front of print head front plate.
2. Initiate print cycle by tripping photocell.
3. Check for ink on cloth.

Printed dots on cloth indicate that the system is printing; delay may be set incorrectly, or photocell is not sensing product correctly.

No ink on cloth indicates that the system is not printing.

Print Head Ink Pressure Test

This test will determine if the print head pressure is correct.

1. Connect the ink pressure gauge (5700-743) to the ink out port on the rear of the print head, or monitor the ink pressure via the LED at the rear of the print head.
2. While printing (not purging), check the pressure; refer to the print head pressure chart for the optimum pressure for your print head. The ink pressure gauge must be level with the print head. Note that pressure can vary by as much as 0.75 PSIG while printing.
3. Pressure should be such that the nominal print head pressure is centered within the deflection of the gauge

If pressure is not correct, see *Setting Ink Pressure* later in this Section.

Ink Regulator Input Pressure Test

This test will determine if the regulator input pressure is within operational range.

1. Connect ink pressure gauge to end of ink line where effluent line is normally attached.
2. Check that pressure does not fall below 10 PSIG at any time.

NOTE: The lowest pressure should be just prior to when the pump turns on.

Print Quality Troubleshooting

Diagnosis

HOW TO USE THIS SECTION:

1. Look at the problem characters on your substrate and compare them with the figure below to diagnose the exact name for the problem.
2. Look at the next segment entitled "Print Quality Definitions" to verify that you classified the problem correctly.
3. Look at the table on the following page to identify possible causes for your printing problem.
4. See subsequent pages for solutions to various print quality problems.

Internal dot size var.
Extra Dots
Tails
Splatter
Dragging type dot size var.
Undersized Dot
Stuck Open Valve
Oversized Dot
Off Target Printing
No Print
Dot Columns out of alignment.
Smearing Print.
Satellites
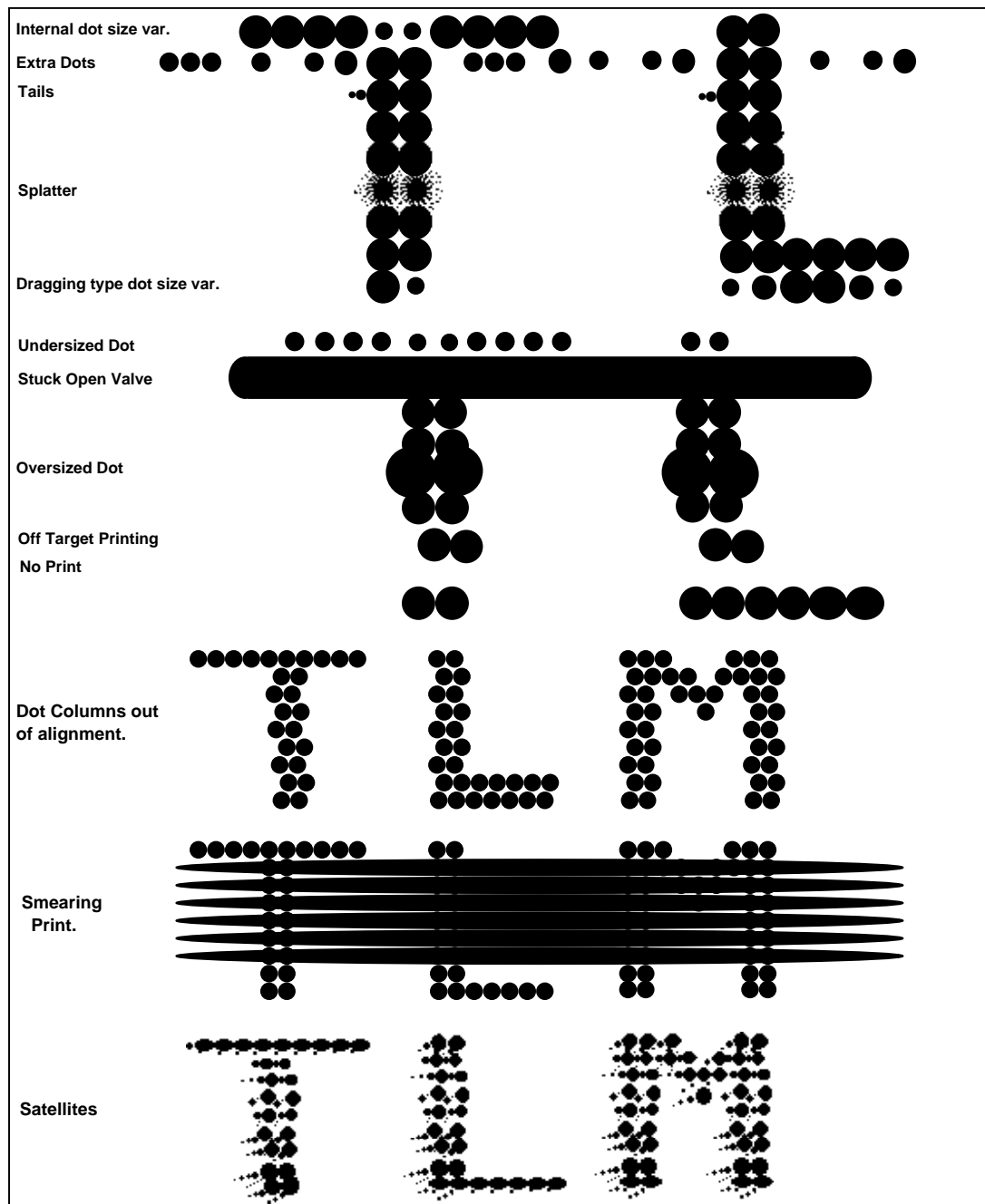
Print Quality Definitions

[1] Internal Dot Size Variation	The system prints dots that are different in size.
[2] Extra Dots	The system continues to print dots outside the designated dot columns.
[3] Tails	The system prints dots with small trails of ink.
[4] Splatter	The system prints shapeless dots surrounded by tiny "aerosol" dots.
[5] Dragging type dot size variation	The system prints different size dots.
[6] Undersized Dot	The system prints dots that are smaller than normal.
[7] Stuck Open Valve	The system prints a solid row of ink ejecting from an orifice.
[8] Oversized Dot	The system prints dots that are larger than normal.
[9] Off Target Printing	The individual dots do not line up exactly.
[10] No Print	The system prints nothing.
[11] Dot Columns Out of Alignment	The dot columns do not exactly line up.
[12] Smearing Print	The system prints individual dot columns that run together giving a "dirty" look to the printed message.
[13] Satellites	Any extraneous ink particles found near the printed dots.
[14] Message Broken	Incomplete printing or gaps in printed message.
[15] Dynamic Seepage	Seepage from orifices during print.
[16] Static Seepage	Seepage from orifice when system is not printing.
[17] Missing Dots	Individual print head dots not printing.

NOTE: Seepage is defined as ink running down the front plate from one orifice far enough to connect to an adjacent orifice.

PRINT QUALITY PROBLEM	POSSIBLE CAUSE
Internal Dot Size Variation	• Low ink pressure
Extra Dots	• High ink pressure • Pulse width set too high • Incorrect pre-load
Tails	• Print head too far from the target • Pulse width set too high • Incorrect pre-load
Splatter	• Print head too far from the target • Pulse width set too high • Incorrect pre-load
Undersized Dot	• Low ink pressure • Pulse width set too low • Incorrect pre-load
Stuck Open Valve	• High ink pressure • Pulse width set too high • Incorrect pre-load
Oversized Dot	• High ink pressure
Off Target Printing	• Print head too far from target • Low ink pressure
No Print	• Low ink pressure • Pulse width set too low • Print head failure • Controller or cabling failure
Dot Columns Out of Alignment	• Internal line speed turned on • Incorrect direction selected in software
Smearing Print	• Print head too close to target • Incorrect ink usage for your application
Satellites	• Print head too far from target
Message is Broken	• Photocell is triggering multiple times per box • Loose cable connections
Garbled Printing	• System improperly grounded • Excessive line noise
Dynamic Seepage	• Pulse width set too low • Low ink pressure • Incorrect pre-load
Static Seepage	• High ink pressure • Incorrect pre-load
Missing Dots	• Pulse width set too low • Clogged orifice

NOTE: Pre-load adjustment should be performed after all other causes are eliminated.

Setting Ink Pressure

Ink pressure must be set within specifications. Lowering the ink pressure to alleviate print head seepage may result in performance and reliability problems. The design relies on the equilibrium of ink pressure, pre-load, and pulse width.

The orifice size and membrane excursion areas have been specifically tuned to work with the ink pressure specified for the print head. When operating correctly, all ink will jet from the orifices and leave only a moist seal of the membrane against the orifice. Lowering the pressure reduces the dot velocity and does not allow all of the ink to evacuate through the orifices. The ink left behind will seep out and run down the front plate.

1. Either connect a pressure gauge to the back of the print head ink or monitor the ink pressure via the LED at the rear of the print head (depending on print head type).

2. Monitor ink pressure while printing. Note that the pressure drops by as much as 0.75 PSIG (usually less) during the print cycle. Nominal pressure should be centered within the deflection range while printing.

3. If pressure is low, remove the regulator adjustment locking screw and pull the adjustment knob up into the unlocked position (see illustration).

4. Open the regulator by slowly turning the knob clockwise until the nominal print head pressure while printing is centered within the deflection of the gauge.

Regulator adjustment locking screw
Connect to the ink supply trunk line
Adjustment knob
Pull adjustment knob to unlock
Ink input line
Ink output line
Direction of ink flow
Connect to printhead
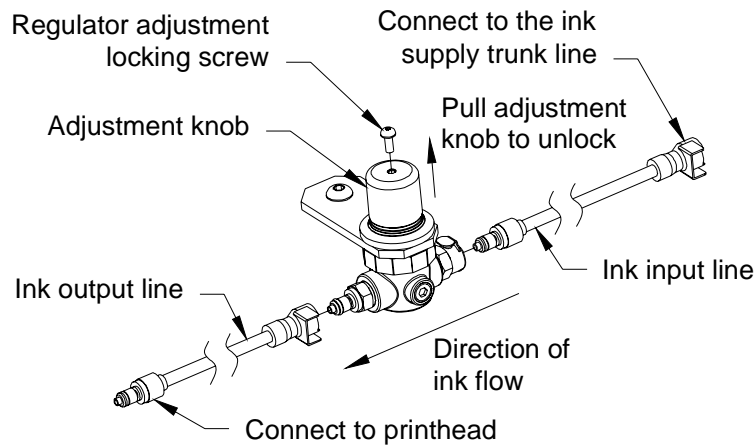
5. Check pressure 15 minutes after setting it. The pressure should be within the same range +/- 0.5 PSIG. If not, perform the regulator maintenance procedure.

NOTE: Lowering the ink pressure also reduces the amount of ink that reaches the substrate. To compensate for the lighter mark, the technician may increase the pulse width to obtain an acceptable size dot. By doing so, the pulse width can exceed the maximum recommended by specification and significantly lower the life expectancy of the solenoid. In high line speed applications, the mortality of the solenoid will shorten exponentially.

Ink Regulator Maintenance Procedure

Pressure swings (decreasing and increasing pressure from nominal setting) can be caused by obstructions in the valve seat of the ink regulator. Obstructions in the valve seat area may also cause the pressure to creep up over a period of time (for example, the pressure is set at 7 PSIG, and fifteen minutes later it has increased to 9 PSIG).

The following maintenance procedure can remove obstructions from the valve seat area of the ink regulator, restoring normal operation.

1. Ensure that the system is idle and not in print mode.
2. Install a NEW can of conditioner into the receiver (ink may be used, but conditioner is preferred).
3. Unplug the ink line from the printhead.
4. Plug the ink line into an effluent bottle (5750-503).
5. Remove the regulator adjustment locking screw, and pull the pressure adjustment knob into the unlocked position.
6. Rotate the pressure adjustment knob clockwise until it stops, then counterclockwise until it stops. Repeat six to twelve times.
7. Disconnect the ink line from the effluent bottle and re-connect it to the printhead.
8. Turn the ink regulator off (completely counter-clockwise).
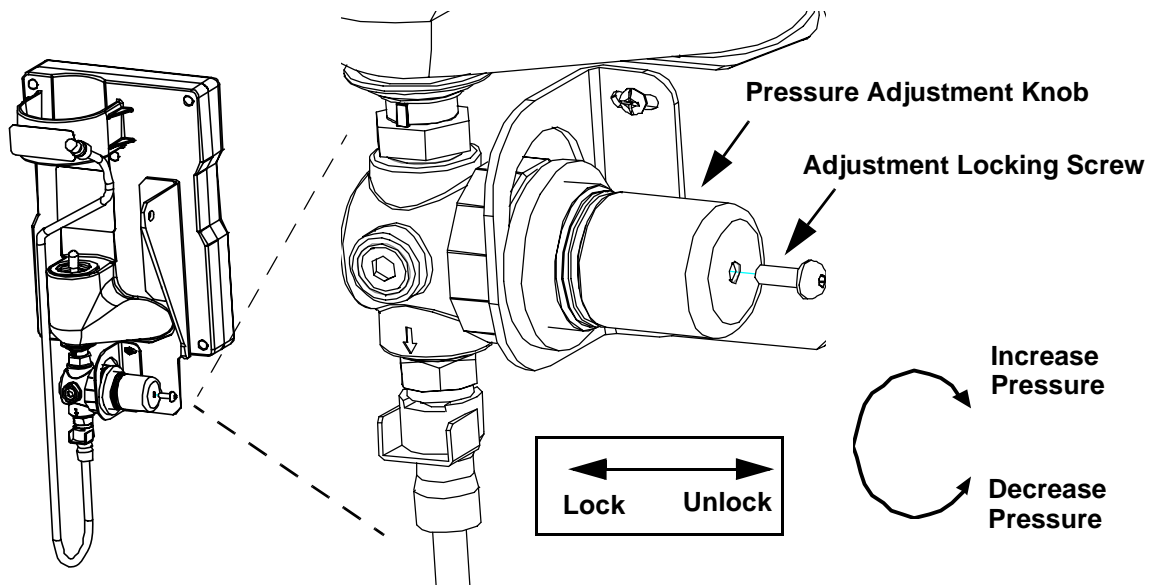
9. Attach a pressure gauge to the ink outlet (male quick-disconnect). The gauge must be level with the printhead for accurate measurements.
10. Increase the regulator to 7psi (nominal operating pressure).

NOTE: The ink regulator pressure setting should always be adjusted by turning the pressure adjustment knob clockwise (increasing pressure). Never set the regulator pressure by turning the knob counterclockwise (decreasing pressure). If the regulator was adjusted above desired setting, turn the regulator knob fully counterclockwise until it stops and purge the printhead to relieve internal pressure. Then, slowly open the regulator by turning it clockwise until the desired pressure has been achieved.

Print Head Pulse Width Adjustment

When a print head solenoid is on, the piston pulls away from the membrane, ink pressure moves the membrane away from the orifice, and ink is expelled through the orifice to form a dot. When the solenoid turns off, the piston moves forward which pushes the membrane forward to seal the orifice. Solenoid pulse width controls the amount of time that the solenoid is on. If printed **dots are over- or under-sized**, pulse width adjustment may be required.

To adjust the pulse width, hold down the up and down arrows simultaneously. The last channel to be accessed will be displayed. Press the ENTER button. The pulse width setting will be displayed. This value is relative and can range between 15 and 65. The higher the value, the larger the dot size, and vice versa. **Generally, pulse width adjustment on a new print head is not recommended. These values are factory set.** However, it may be necessary to increase pulse widths if there are long print head cable lengths in the daisy chain. Decreasing the pulse widths will likely result in missed dots at first start-up. If a pulse width is changed, the ENTER button must be pressed to save the new value(s). Again, press the down arrow until "Pr" is displayed. Press ENTER to exit to the Home Screen.

NOTE: If the ENTER button is not pressed, the display will revert to the home screen after 30 seconds and the pulse width value will not be saved.

Cleaning the Front Plate of a Clogged Print Head

If dots are missing from the print, the print head front plate may have dried ink or debris covering the orifices. To clean the front plate:

1. Wipe the front plate with a conditioner-wetted towel (towel should be very wet).

NOTE: A squeeze bottle of conditioner can be used to flush the front plate.

2. Purge the print head; check if missing dots are purging.
3. Wipe the front plate with a conditioner-wetted towel and inspect front plate. (There should be no dried ink or debris on front plate).
4. Repeat steps 1 through 3 until front plate is clean. If cleaning the front plate and purging do not clear the clogged orifice, follow the orifice broaching procedure.
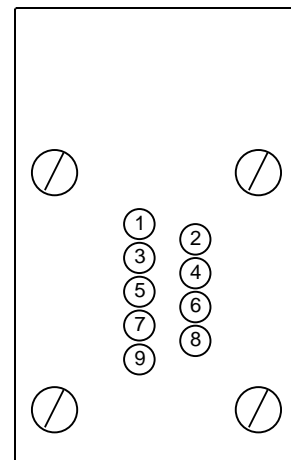
Printhead front plate orifices (NOT TO SCALE)

Broaching the Orifice

If a print head orifice is clogged or obstructed and wiping the front plate and purging will not clear it, the appropriate orifice should be broached.

⚠ **CAUTION:** Failure to follow the broaching instructions can result in damage to the print head.

1. Wipe the front plate with a conditioner-wetted towel.

2. Make sure the broach pin does not extend out of the handle more than 0.10 inch. This will ensure that the broach pin will not poke a hole in the membrane and cause internal leaking. (Internal leaking will show up as a no print failure several weeks later.)

0.10 inch →
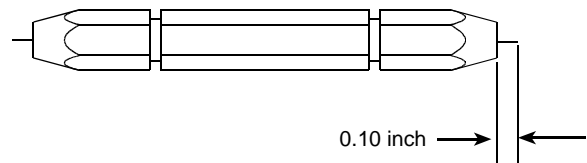
3. Identify the clogged orifice by identifying the missing dot(s) from a print sample.

Channels

4. Count the orifices on the front plate up or down to locate the clogged orifice. A flashlight may be necessary as the orifices are very small.

1
2
3 (Missing)
4
5
6
7

5. Carefully insert the broach pin into the orifice until the handle touches the front plate. Remove the pin and create a print sample.

6. If the print sample shows that the orifice is still clogged, purge the print head and make a second print sample.

7. If still clogged, count the orifices again to make sure you are broaching the correct orifice, and repeat steps 5 and 6.
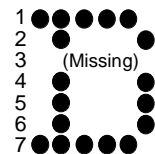
⚠ **CAUTION:** Avoid broaching repeatedly. The broach pin is like a microscopic file that will enlarge the orifice with repeated insertions. The enlarged orifice will seep ink, print off target or produce other print anomalies.

Print Head Pre-Load Adjustment

WARNING: Wear safety goggles when servicing the print system.
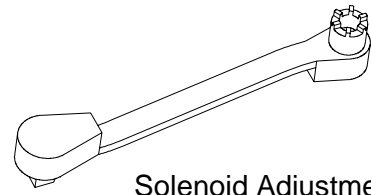
Solenoid Adjustment Tool

If a print head is leaking when not printing (static leakage), it requires solenoid preload adjustment. Pre-load is the amount of force a piston **[H]** applies to the membrane in the print head **[D]** to prevent ink **[E]** from leaking when the print head is idle or not printing. The Preload Pressure is 9 psig, and the Operating Pressure is 7 psig.

[A] Adjustment nut [E] Ink
[B] Bushing   [F] Ink droplet
[C] Solenoid   [G] Chamber plate post
[D] Membrane   [H] Piston
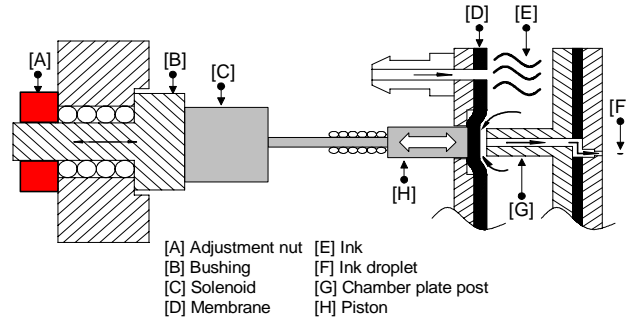
Preload Adjustment Procedure:

1. Adjust the regulator to the preload pressure.
2. Clean the front plate with a clean cloth and maintenance spray.
3. Remove the print head enclosure cover.
4. Channel Purge the print head.
5. Clean the front plate with a clean cloth and maintenance spray.
6. Identify the orifice that is leaking from the diagram at right.
7. Use the diagram at right to locate the adjustment nut that controls the leaking orifice.
8. Using the solenoid adjustment tool, SLOWLY AND CAREFULLY turn the adjustment nut counterclockwise approximately 1/8 turn to add additional pressure to the piston.

VIEW OF FRONT PLATE IDENTIFING ORIFICE LOCATION

VIEW OF FRONT PLATE IDENTIFING ORIFICE LOCATION

REAR INTERNAL VIEW OF SOLENOID ADJUSTMENT NUT LOCATION ON SOLENOID MOUNTING BLOCK

REAR INTERNAL VIEW OF SOLENOID ADJUSTMENT NUT LOCATION ON SOLENOID MOUNTING BLOCK

9-DOT PRINTHEAD   7-DOT PRINTHEAD
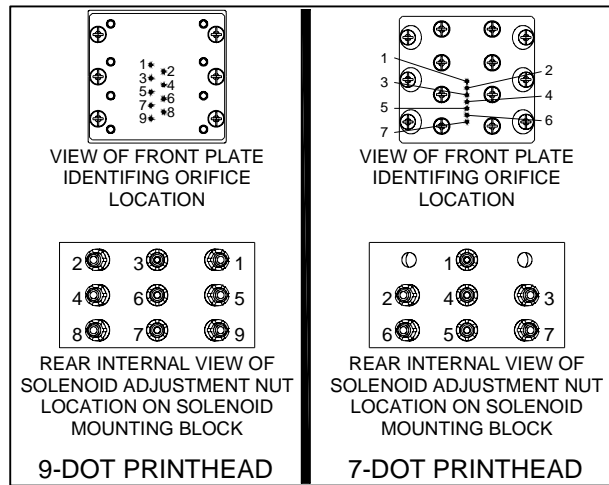
CAUTION: Excessive preload will damage the print head.

SOLENOID MOUNTING BLOCK

SOLENOID ADJUSTMENT NUT

SOLENOID ADJUSTMENT TOOL
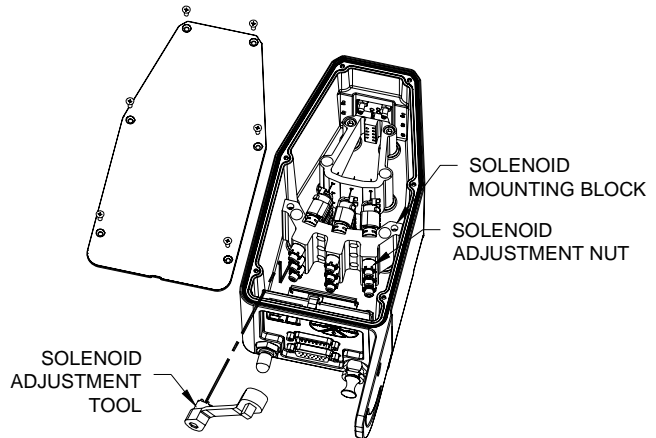
9. Channel Purge the print head again.
10. Clean the front plate again with a clean wipe and maintenance spray.
11. If no static leakage is observed after 1 minute, then replace the print head enclosure cover. If static leakage continues, then repeat the pre-load adjustment procedure until static leakage stops.
12. Adjust regulator pressure to operating pressure.

Appendix A: Specifications

Controller Specifications
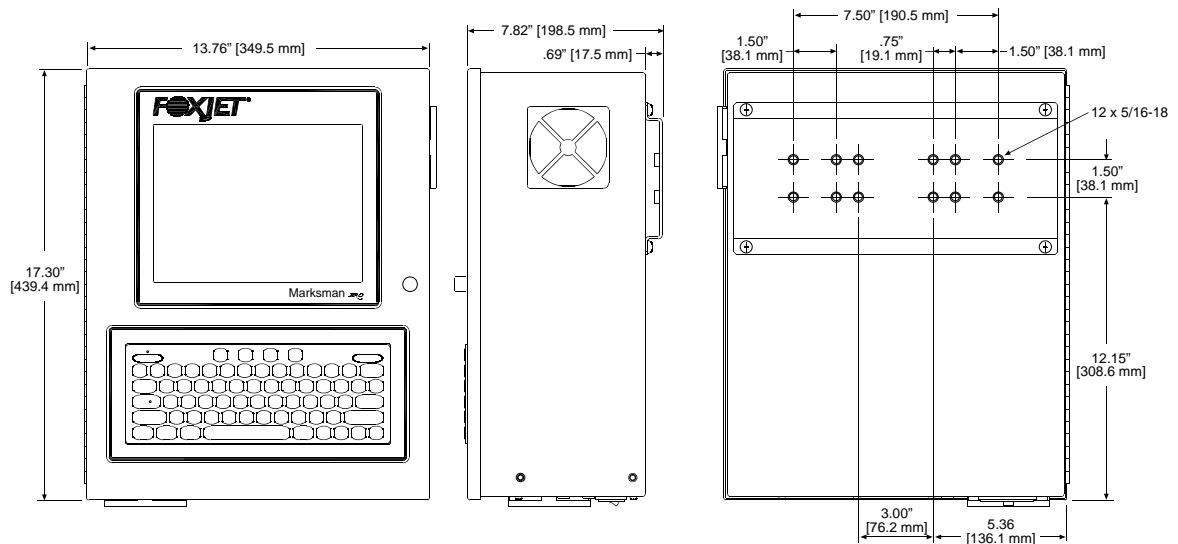
Processor:	SBC 667 MHz or 800 MHz with 128 MB RAM
Power Input:	100-240VAC, 50-60Hz at 3A max
Ports:	COM 1 - Serial Port RS232
	APS
	10/100 Base-T Ethernet
	Print head, ProSeries (up to six heads)
	Encoder A
	Encoder B
	Strobe
	Auxiliary Port - Serial Port (Scanner)
	VGA Output
	Keyboard/MS Mouse
Enclosure:	Stainless Steel
Weight (Controller only):	28.4 lbs. (12.9 kg)
Operating System:	Windows XP®
Environment:	Ambient operating temperature: 40° to 104° F (5° to 40° C)
	Operating humidity: 10-90%, non-condensing
Print Heads:	ProSeries up to eight (8) 9-Dot heads per card
Storage:	40 GB hard drive
Alarms:	Optional beacon
User Interface:	Type: Graphical User Interface
	Keyboard: 70-Key, QWERTY style, Elastomeric Keyboard
	Display: 640 x 480 color LCD with touch screen, 10.4" diagonal
Print Head to Controller:	Maximum distance between print head and controller is 25 feet

Print Head Specifications
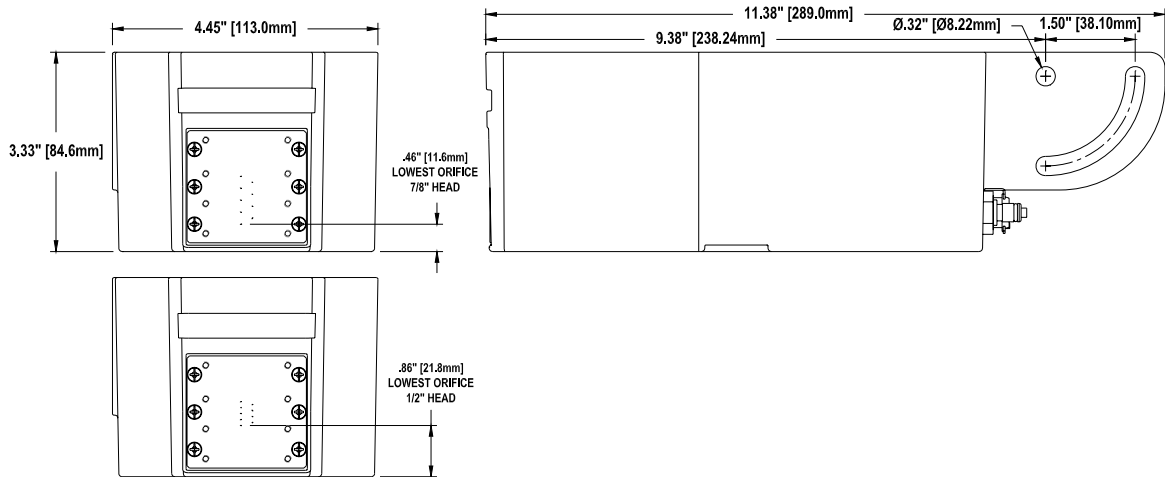
Weight:	5.4 lbs (2.4 kg)
Enclosure:	Paint over anodized aluminum
Electrical:	15 VDC input from controller
Ink Filtration:	25 micron in-line
Print Speed:	Up to 650 ft/min (print resolution dependent)
Ink Type:	Porous (water based) or Non-Porous (alcohol or MEK based) as indicated on label.
Operating Pressure:	7 psi ink input
Environment:	Ambient operation temperature: 40°F to 104°F (10°C to 40°C)
	Operating humidity: 10 - 90% non-condensing

Ink Supply

Size

Height: 5.7" (144mm)

Width: 12.0" (304.8mm)

Depth: 10.0" (255mm)

Weight: 14 lb. (6.4kg)

Cable Clearance: 3" from the rear of the ink supply

Enclosure

Cold rolled steel (painted black) or stainless steel

Ink Filtration

100 micron absolute (5760-319 Ink Filter Assembly)

Electrical

Non-European: 103VAC-122VAC, 60Hz, 1.0 Amp max.

European: 207VAC-253VAC, 50Hz, 0.5 Amp max.

Normal Operating Pressure Range

20 psi to 25 psi (approximately)

Cable Ports

• Ink low level

• Ethernet

• Power cord

• Ink status beacon

Environment

Ambient operating temperature: 40°F to 104°F

Operating humidity: 10-90%, non-condensing

Tubing Limitations

Maximum horizontal tube length = 100 ft.

Maximum vertical tube length (bottom of ink supply to bottom of highest print head) = 20 ft.

Ink Supply Limitations

Maximum height above ink supply (top of ink supply to bottom of ink supply) = 8 ft.

Maximum distance below ink supply (bottom of ink supply to bottom of ink supply) = 8 ft.

Maximum horizontal distance between ink supply and supply = 8 ft.

Maximum number of valves = 144
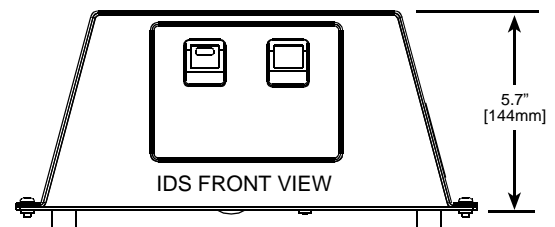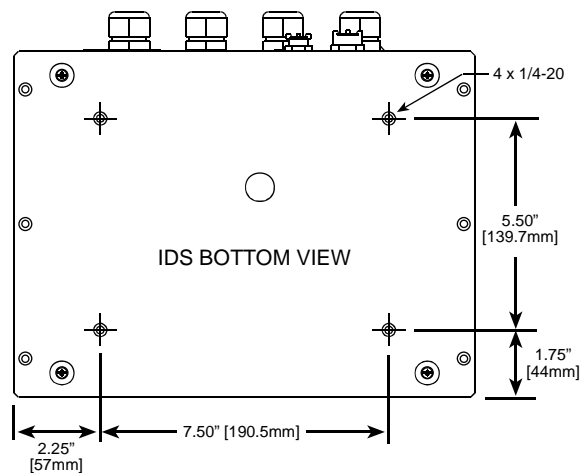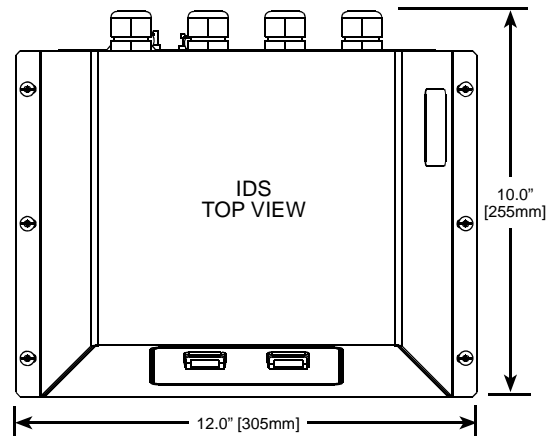
Marksman© Hub
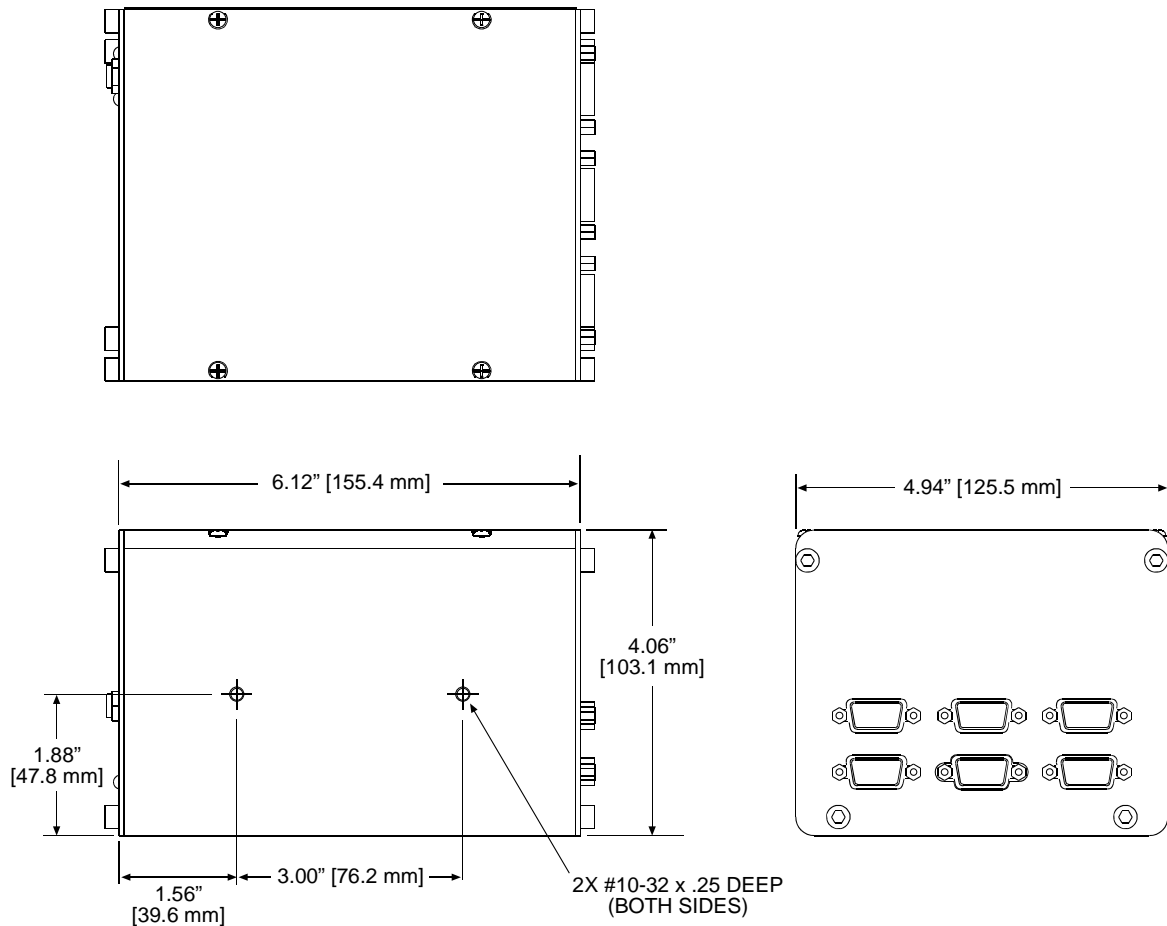
Processor: Rabbit 2000
Supply Input: 100-240 VAC 47-63 Hz at 0.4A max
Ports: (4) RS232

        Serial B is used to configure IP Address

 (2) Beacon/Strobe

(1) Power, 12 VDC @ 1.5

(1) 10 Base-T Ethernet port

Indicators: Power - Green

Malfunction1 - Red, no connection

Malfunction2 - Red

Enclosure: Extruded aluminum top and bottom with aluminum end plates
Weight: 2 lbs.

Appendix B: Theory of Operation

Functional Description

The VxJet ink jet system prints text, autocodes (such as product counts or time and date stamps) and/or graphics onto products as they travel by conveyor past stationary print heads. Print can be on any one of, or a combination of, the product's sides, top, or bottom. The conveyor speed is monitored using a variable speed encoder or a built-in fixed speed encoder. Products are detected using a photosensor. The information to be printed is defined as a message and is programmed into the controller via a user interface.

Print Head Daisy Chain(s)

Print heads attach to the VxJet in a daisy chain configuration. The first print head plugs into a Print Head Interface Board (P1), the second print head plugs into the first print head, the third plugs into the second, etc. A daisy chain can be up to 72 dots long (eight 9-dot heads, four 18-dot heads, or a combination of 9- and 18-dot heads totaling no more than 72 dots), and a VxJet can have one or two daisy chains (one for each Print Head Interface Board).

Electrically, a print head daisy chain is a shift register. A shift register moves bits of information along a line one bit at a time in step with a clocking signal. It works like this: A bit is placed at the entrance to the line of bits and waits for the clock (step) signal. When the clock signal is given, the bit steps into the first spot on the line. The bit that occupied the first spot in line steps to the second, the second steps to the third, the third to the fourth, and so on until the last bit in line steps off the end of the line and is lost. Repeat the process enough times and all of the information in the shift register is replaced. Repeat the process 72 times and you've output a column of print data. A latch (print) signal sent after the 72 dots have been shifted prints the column.

The VxJet always sends 72 dots of print data per column regardless of the number of print heads on a daisy chain. On a daisy chain with less than 72 dots the first dots shifted out are lost, not printed. For example, a daisy chain with two 18-dot heads prints the last 36 dots sent; the first 36 dots are lost.

All daisy chain signals - DATA, CLOCK and LATCH - are generated and controlled by circuitry in the FPGA (Field Programmable Gate Array, used as a print head driver chip) on the Print Head Interface Board.

Photosensor

The photosensor detects when a product is about to pass by the print heads and signals the VxJet controller to start a print cycle. The photosensor signal is active low, and it must remain low for at least one encoder pulse. Once a print cycle starts it continues to completion regardless of what the photosensor signal does.

Encoder

The encoder determines the time period between the printing of individual columns, or the print speed. As a product's speed increases, the time period between columns must decrease, that is, the print speed must increase, to maintain consistent column-to-column spacing. The VxJet has two encoder options, external and internal. Use the external encoder where the conveyor speed fluctuates. You can use the internal encoder when the conveyor speed is constant.

Marksman© Hub

The Marksman© Hub is a device that can be attached to a network and used by the Marksman© Controller to turn on and off alarm beacons or strobes. The Hub has the capability to control two different beacons, each containing two colors: red and green.

If a low ink condition exists on a controller, the red beacon will be turned on solid; if an error occurs that prevents the system from printing (i.e. out of ink, low head temperature, no high voltage), the red beacon will flash. The green beacon will be turned on when all errors are gone. If multiple controllers are using the beacon, it is possible that both the green beacon and the red beacon could be on.

The Marksman© Hub has its own IP address (10.1.2.50 default value) for communication with the Marksman© Controller. The Marksman© Controller is configured via the Configuration / System Internet web page, designating which port the Hub communicates to. Multiple Marksman© Controllers can be connected to a single Marksman© Hub to control the beacon. The strobe will stay on or flashing, depending on the error, until all the Marksman© Controller errors are resolved.   The Hub also contains four RS232s that are not supported by the Marksman© Controller. Serial B is used to set the IP address of the Hub. There are three LEDs on the front of the Hub: 1 green (POWER) and 2 red (MALFUNCTION 1 and 2). The POWER LED comes on when power is applied; MALFUNCTION 1 will stay on until a Marksman© Controller connects to it through the Ethernet port. MALFUNCTION 2 is not used.

MK Pro Board
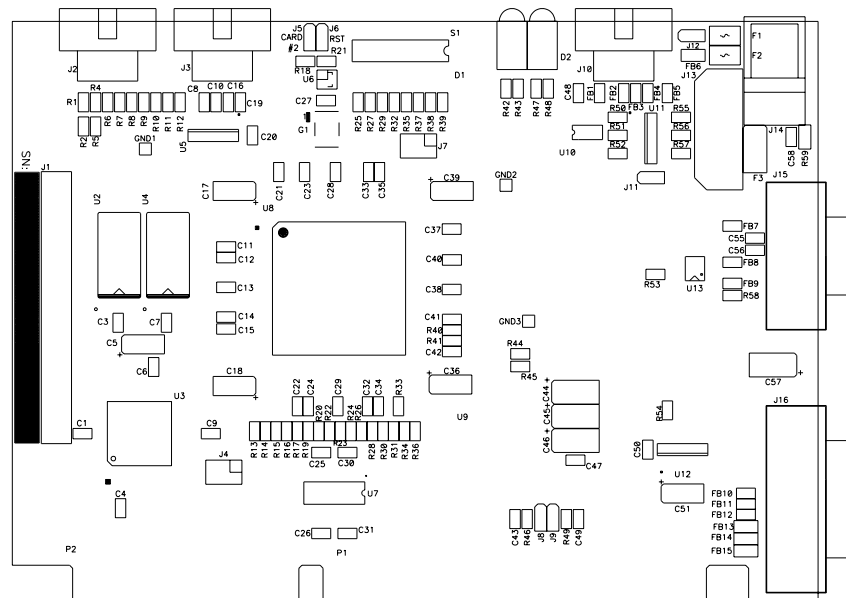
Ink Supply Features

The Ink Supply provides ink to the print heads. In addition to pumping ink from the supply container, the ink supply is programmed with the following features:

1. *Continuous monitoring and maintenance of ink line pressure.* Whenever the pressure drops to a level of 20 psi, the ink supply pump turns on for five seconds and the pressure returns to a level between 23 and 27 psi.

2. *Ink supply "low" detection.* A float sensor mounted to the end of the ink cap assembly in the ink container informs the ink supply when the container is almost empty. The ink supply then alerts the operator by turning on the beacon light, and by sending a signal via ethernet to the VxJet controller.

3. *Ink supply "out" detection.* After the ink container float has dropped low and the ink supply pump has turned on for 60 cycles, it automatically shuts down the pump and alerts the operator via a slow flashing of the beacon, as well as an ethernet signal to the controller. Sufficient ink remains in the accumulator to continue printing while the operator replaces the ink supply container. Depressing the Prime Switch will allow for an additional 10 pump cycles.

4. *Broken line detection.* Any break in the ink line downstream from the ink supply causes the accumulator to quickly empty its supply through the break. When the ink supply senses this precipitous drop in pressure, it shuts down the pump and alerts the operator via a rapid flashing of the beacon and an ethernet signal to the controller.

Startup Operation

After the appropriate fluid lines are plumbed to the inlet and outlet ports and all electrical connections are made, the ink supply can be turned ON. Depressing the ON/OFF (I/O) switch starts the process of automatically flushing the ink supply with the supply fluid. Ink is sucked from the supply tube in the tank, through the filter, and into the ink supply. After entering the system, the fluid passes through a check valve and a pump. Upon startup, the ink supply checks accumulator pressure status.

Normal Operation

During normal operation, fluid is pumped into the accumulator in 5-second-on / ½-second-off cycles until the system reaches a pressure of 20 psi. The pump cycles off in this manner in order to accurately measure pressure. Continuous monitoring of the line pressure occurs after reaching the goal pressure.

The print head(s) drains the accumulator until a line pressure of 20 psi or lower is detected by the pressure sensor circuitry. At this point, the pump cycles until the system reaches the target pressure. This operation continues until the ink supply is depleted.

INK OUT TO PRINTER

FILTERED INK INLET

PRESSURE SENSOR

CKECK VALVE

LOGIC BOARD

TO ACCUMULATOR

ACCUMULATOR

PUMP

ON/OFF SWITCH

THERMAL
CUT-OFF

PRIME SWITCH

——▶ REPRESENTS INK FLOW
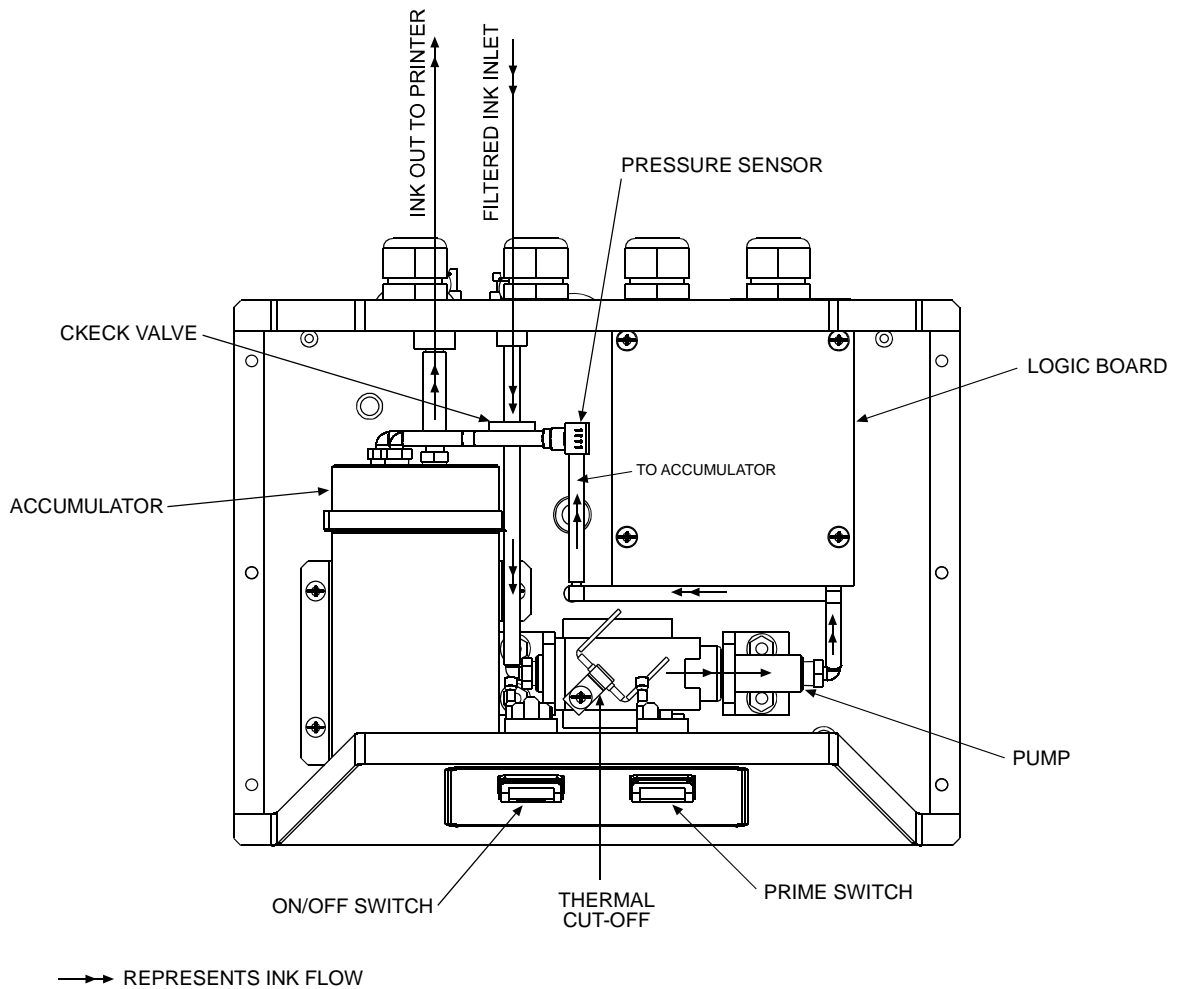
Ink Low Detection

At a point prior to supply depletion, the low level detect sensor sends a closed signal back to the ink supply. The sensor is mounted on the end of a rod connected to the supply cap assembly and immersed in the ink supply. The float sensor acts as a reed switch that closes a contact and completes the signal detection circuit to the ink supply. This conditional information is then passed on to the user via a fixed "on" beacon light to the VxJet controller via ethernet. Note that the low ink condition has no operational effect on the system. It is merely a notification to the user that a new ink supply should be at the ready.

Ink Supply Replenishment

After the ink supply container is replaced, the operator depresses the prime button on the ink supply front panel. This re-primes the system via a 10-second flush of ink through the diverting solenoid valve (see *Startup Operation* in this Appendix) and the ink supply returns to normal operation. Depending on the length of time of the changeover and the ink consumption by the print heads, the accumulator may have dropped below 20 psi, in which case the pressure sensor circuitry initiates the 5-second pump cycle and pressure is restored to 23-27 psi.

Print Head Broken Line Detection

Because accidents are possible in any factory environment, the ink supply provides protection against continuous dumping of fluid from the ink supply after an "open" has been created in the print head supply line. When any downstream ink line is broken, the accumulator immediately dumps all of its supply through the broken line. As expected, the pressure drop measured by the pressure sensor immediately initiates the pump to replenish. However, the sensor is continuously measuring the change in pressure over time. When no increase in system pressure is detected after a pump cycle, the ink supply immediately shuts down the pump and alerts the operator via a rapid flashing of the beacon light and an ethernet signal to the VxJet controller. After the broken line has been repaired, depressing the prime button automatically restarts the pump.

Temporary Broken Line Override Feature

During first-time priming after installation, or other instances when it is necessary to purge air out of downstream ink lines, the broken line detection feature can be temporarily overridden by holding the prime button and simultaneously depressing the power button. This will allow the pump to cycle up to 20 times without shutting down. (The beacon will flash with each cycle.)

The ink supply will automatically end this process after 20 pump cycles. If more override cycles are desired, simply repeat the process. If immediate use of the broken line feature is desired, then simply depress the prime button only; the ink supply will automatically continue normal pumping and monitoring.

The following two conditions can emulate a broken line and necessitate an override:

1. Excessive opening of the effluent bottle line.

2. Very long lengths of downstream printer ink lines.

Permanent Broken Line Override Feature

When using an automatic flushing system, or other instances when it is necessary to permanently override the broken line feature, a jumper may be placed between pins 4 and 5 of J1 on the ink supply board. This will allow the pump to cycle continuously without shutting down. (The beacon will flash with each cycle.)

Overheating Protection

If the pump becomes clogged for any reason and the circuitry does not shut it down, the pump will become very hot. A thermal cut-off (TCO) device rigidly attached to the top of the pump acts as a thermal fuse by creating an "open" in the pump power circuit when excess temperature is encountered, shutting down the ink supply.

Ink Supply Board Test Points
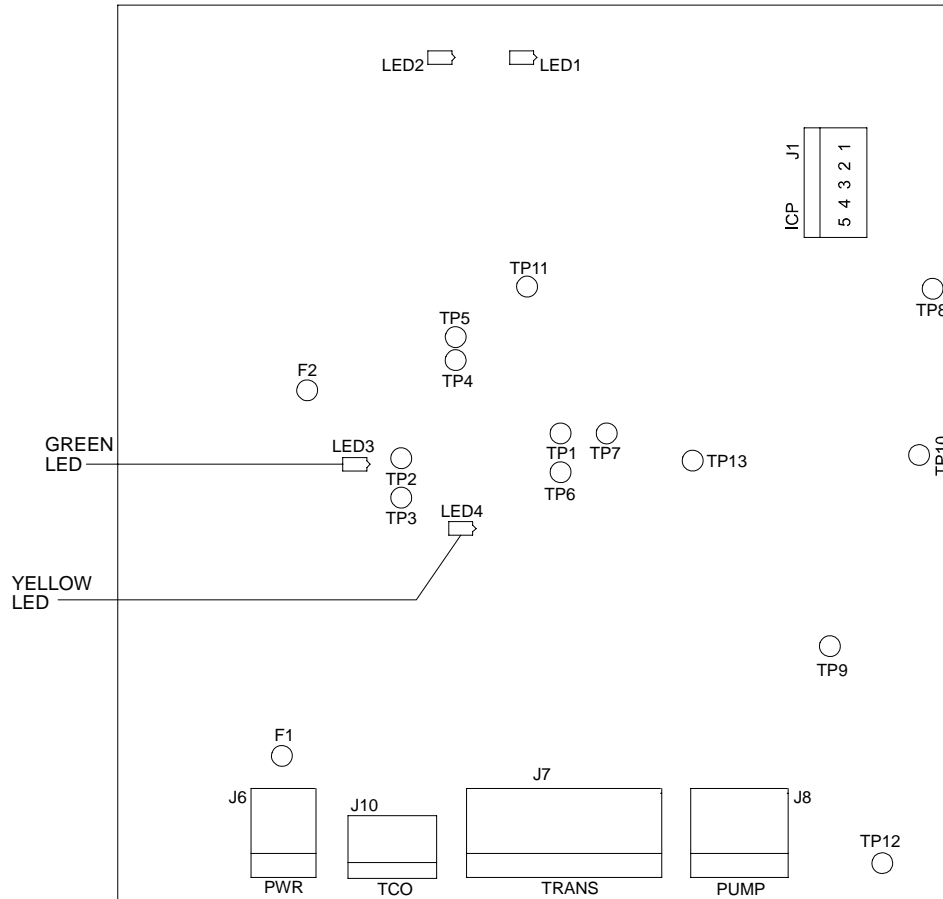
Test Points:
TP1, TP2:	(TP1 - TP2) = 8mV/PSI at the vacuum sensor (applies only to Ink Delivery System Assembly, Revisions A - F)	
TP3:	0.2V/PSI of vacuum (applies only to Ink Supply Assembly, Revisions A - F)	
TP4, TP5:	(TP4 - TP5) = 1.2mV/PSI at the pressure sensor	
TP6:	0.1V/PSI of pressure	
TP7:	Toggles at the end of a pressure sampling period	
TP8:	GND	
TP9:	50VDC (approx.) unregulated from ink delivery power supply	
TP10:	24VDC	
TP11:	12VDC	
TP12:	5VDC	
TP13:	Toggles at the end of a vacuum sampling period	

LEDs:
LED1:	(Not defined)
LED2:	Green; indicates traffic on the network
LED3:	Green; indicates the solenoid is energized, diverting ink back to the ink container
LED4:	Yellow; indicates the pump is running

Fuses:
F1:	Power fuse, 250V, 315mA
F2:	Beacon fuse, 125V, 1A

Connectors:
J1:	A jumper between pins 4 and 5 will permanently override the broken line feature.

Ink Supply Wiring Diagram

WIRING DIAGRAM FOR EUROPEAN COUNTRIES (230V)

WIRING DIAGRAM FOR NON-EUROPEAN COUNTRIES (115V)
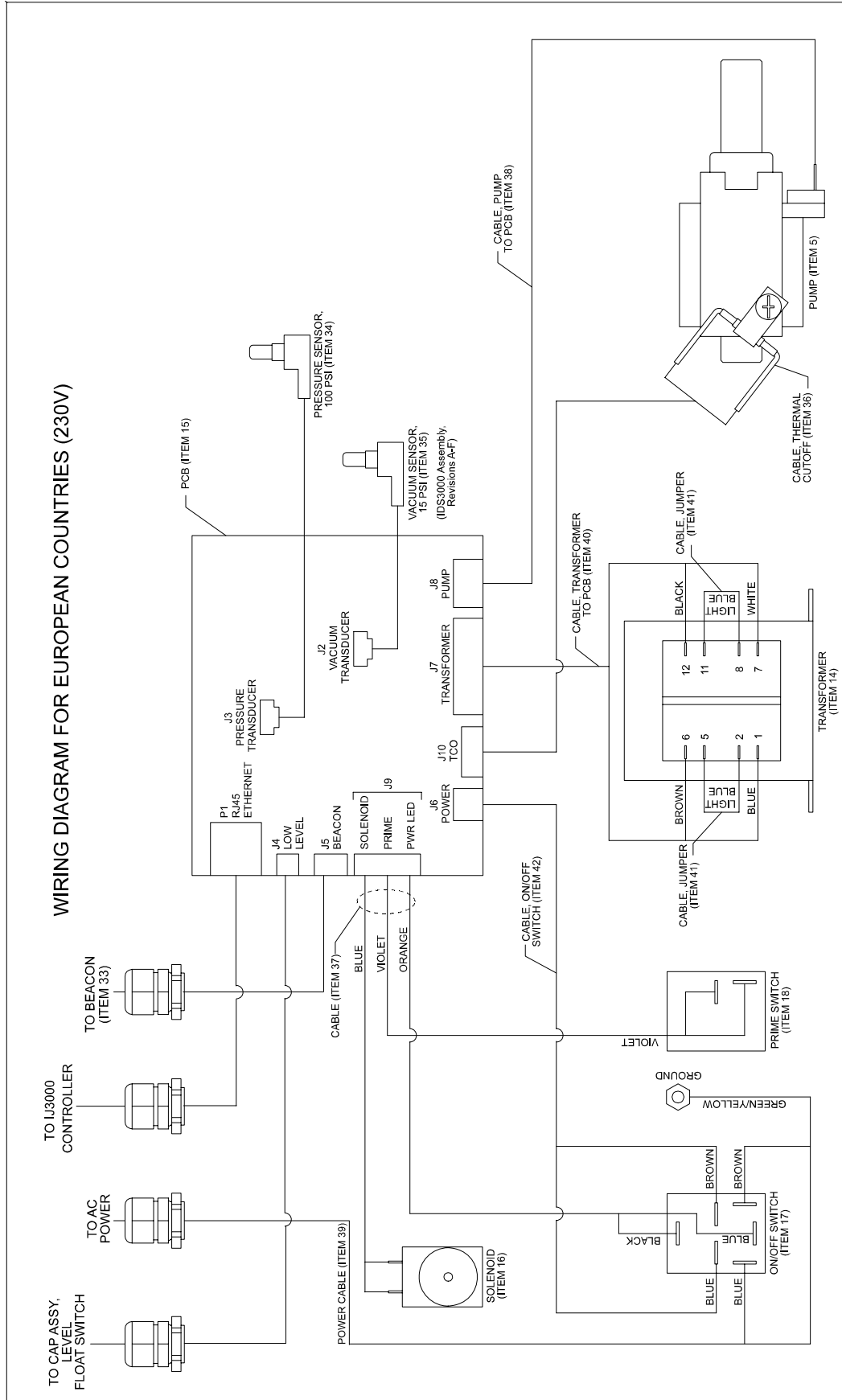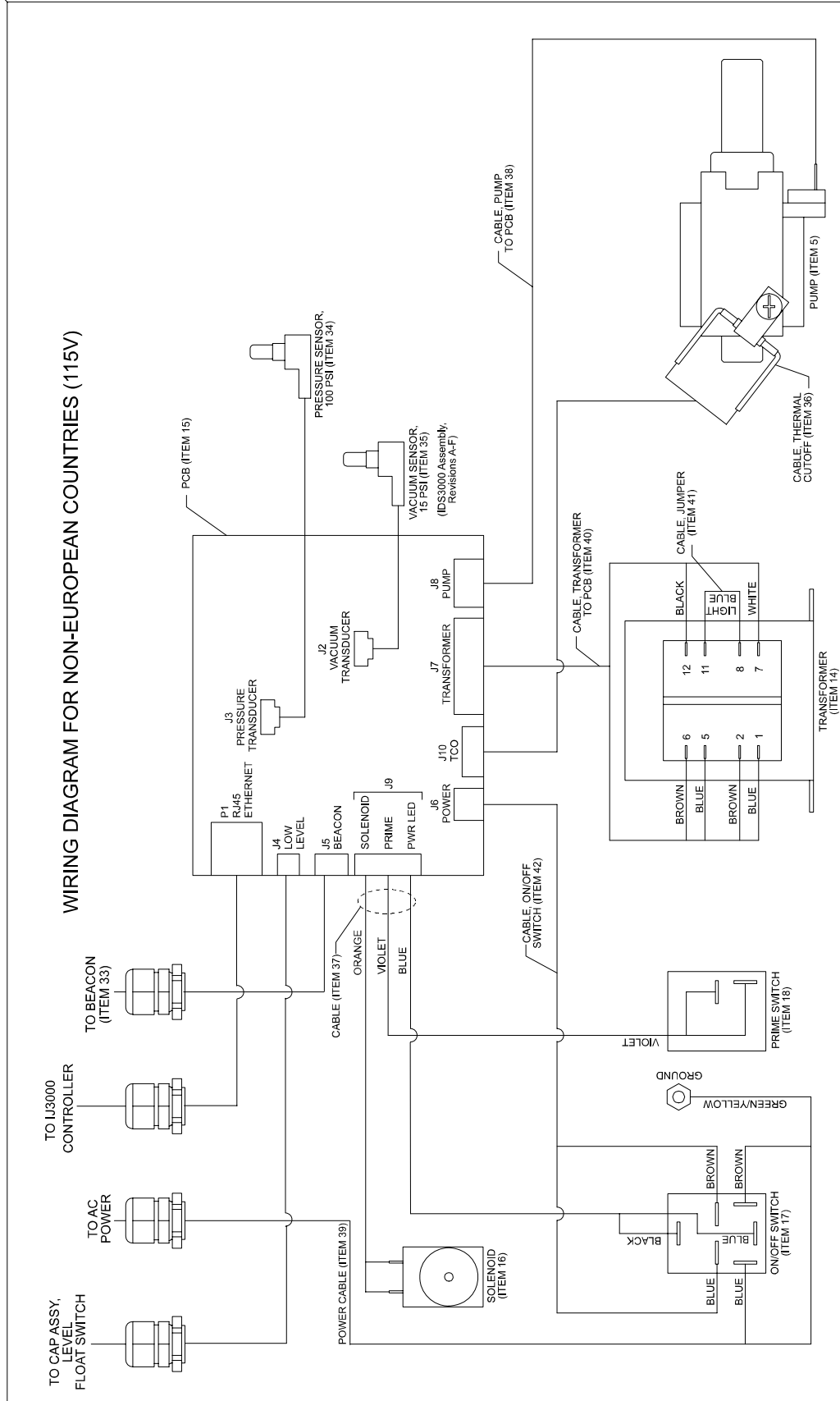
Appendix C: Parts and Supplies

Consumables

Ink

The following is a partial list of inks and conditioners. Your sales representative can advise you on the proper ink for your application.

Porous Inks

Part Number	Description
2600928F	Conditioner, TWP (Water-Based), 5 Gallon
2601016F	Ink, TWP-1 Black, Porous (Water-Based), 5 Gallon
2601021F	Ink, TWP-101 Black, Porous (Water-Based), 5 Gallon
2600947SCF	Ink, TWP-GB Black, Porous (Water-Based), 5 Gallon

Non-Porous Inks

Part Number	Description
2600199F	Conditioner, TSO Non-Porous (Alcohol-Based), 5 Gallon
2600201F	Ink, TSO-1 Black, Non-Porous (Alcohol-Based), 5 Gallon
2600227F	Ink, TSO-101 Black, Non-Porous (Alcohol-Based), 5 Gallon
2600970F	Ink, TSO-3100 Black, Non-Porous Fast Dry (Alcohol-Based), 5 Gallon
2600981F	Conditioner, TSO-4000, Non-Porous (MEK), 5 Gallon
2600986F	Ink, TSO-4400 Black, Non-Porous (MEK), 5 Gallon

Parts in Modular Kits

Part #	Description	Contents
1902-964	Flush Bottle Kit	
1902-857	Print Head Broach Kit	
5700-743	Pressure Gauge	
5701-501	Ink Regulator Kit (Non-Porous)	1 regulator, 1 bracket assembly
5701-502	Ink Regulator Kit (Porous)	1 regulator, 1 bracket assembly
5750-503	Effluent Bottle Kit	
5760-300	Ink Supply Spare Parts Kit	2 fuses, 1 beacon bulb
5760-310	Ink Supply Inlet-Outlet Tubing and Filter Kit	
5760-311	Ink Supply PCB Replacement Kit	
5760-314	Ink Supply Transformer Replacement Kit	
5760-315	Ink Supply 115VAC Pump Replacement Kit	
5760-316	Ink Supply Beacon Replacement Kit	
5760-317	Ink Supply Internal Tubing and Fittings Kit	All internal tubing, fittings, check valve and sensors
5760-318	Ink Supply 230 VAC Pump Replacement Kit	
5760-319	Ink Filter Kit	
5760-389	Thermal Cutoff Kit	
5760-394NP	Accumulator Replacement Kit, Non-Porous	Accumulator Assembly with outlet fittings (without mounting bar)
5760-394P	Accumulator Replacement Kit, Porous	Accumulator Assembly with outlet fittings (without mounting bar)

Ink Supply Assembly Kits
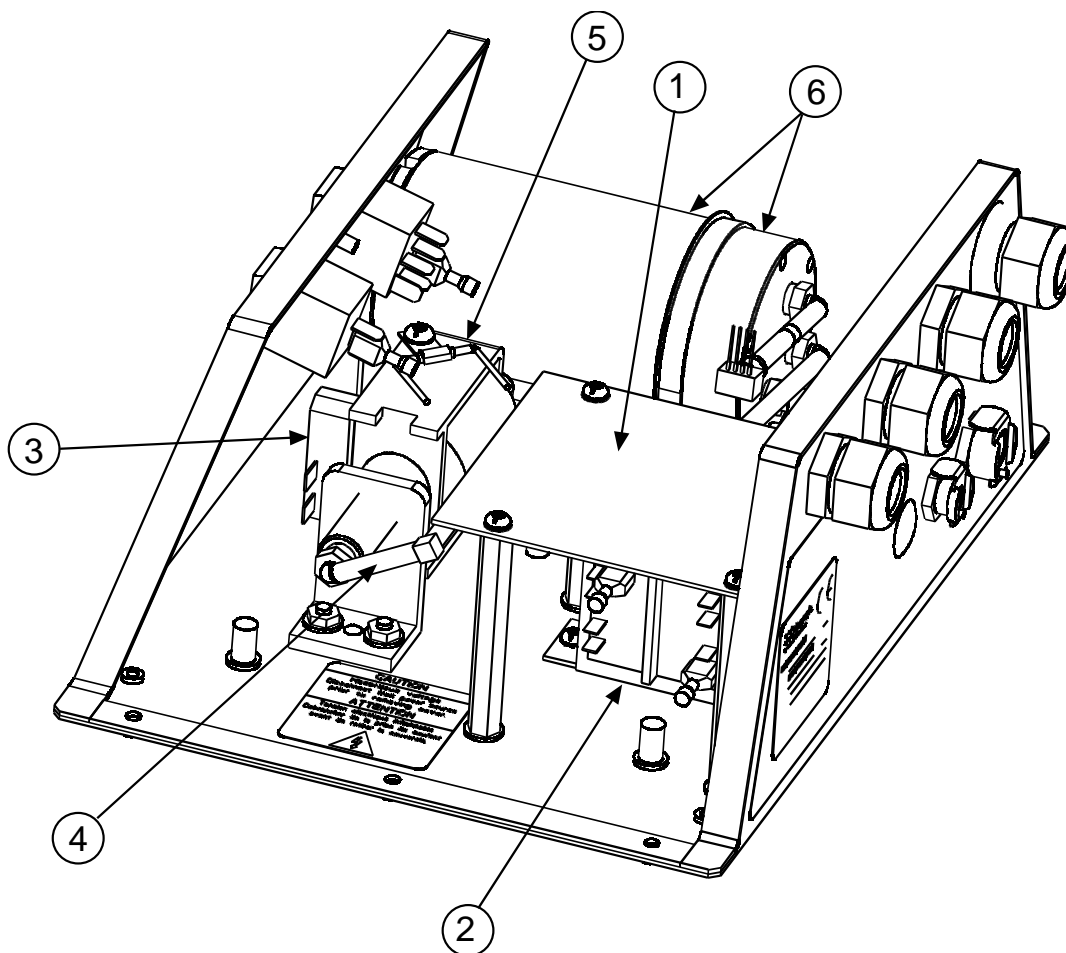
| ITEM	PART NO.	DESCRIPTION
(not shown)	5760-310	TUBING/FILTER KIT
1	5760-311	PCB REPLACEMENT KIT
2	5760-314	TRANSFORMER REPLACEMENT KIT
3	5760-315 5760-318	PUMP REPLACEMENT KIT, 115VAC PUMP REPLACEMENT KIT, 230VAC
4	5760-317	INTERNAL TUBING AND FITTINGS KIT
5	5760-389	THERMAL CUTOFF KIT
6	5760-394	ACCUMULATOR REPLACEMENT KIT

Appendix D: Maximum dpi Calculation for a Given Line Speed

The maximum line speed of a valve print head is limited by the maximum frequency of the solenoid, which is 1000 Hz. The following steps will determine the operating frequency of the solenoids in the application. The graph on the following page can also be used to determine the maximum print resolution for a given line speed.

1. Determine the values for:

- Line speed in feet per minute: If a tachometer is not available, the line speed can be estimated by measuring the conveyor belt and using a stop watch to time one complete revolution of the belt. For example, a 20-foot, 7-inch conveyor belt takes 34 seconds to make a complete revolution. Divide 60 seconds by the number of seconds per revolution (34 in this case). Multiply the resulting number by the length of the belt (21 feet in this example; always round up to the next foot for this calculation). The answer is 37 feet per minute (60/34 x 21 = 37).

- Print resolution in dots per inch (dpi): Print resolution is selected through the software. This setting is measured in dots per inch; a setting of 4 denotes 4 dots, or print columns, per inch. Resolution can be set from 4 to 25 dpi.

2. The operating frequency of the solenoids can be determined with these two parameters by following the next two steps:

- Determine the line speed in inches per second. Divide the line speed in feet per minute by 5 to get inches per second. A line speed of 200 feet per minute is equal to 40 inches per second (200/5 = 40).

- Multiply the number of inches per second by the dpi setting to determine the solenoid operating frequency in Hz (cycles per second). Printing at 25 dpi, at a line speed of 40 inches per second, would result in a frequency of 1000 Hz (40 x 25 = 1000).

The operating frequency of a valve print head must be less than or equal to 1000 Hz. If it exceeds 1000 Hz, the print head will have reliability and print quality problems. In such a case, the best solution is to decrease the print resolution, which will decrease the operating frequency.

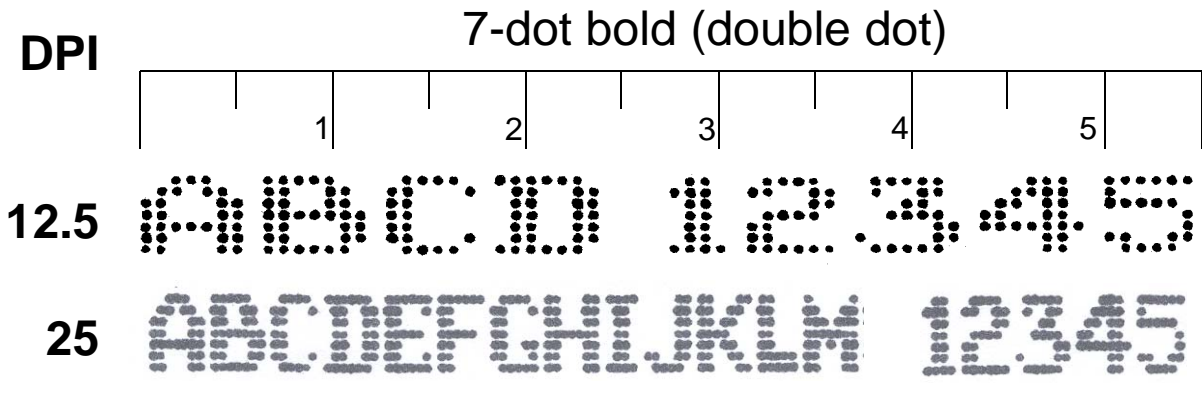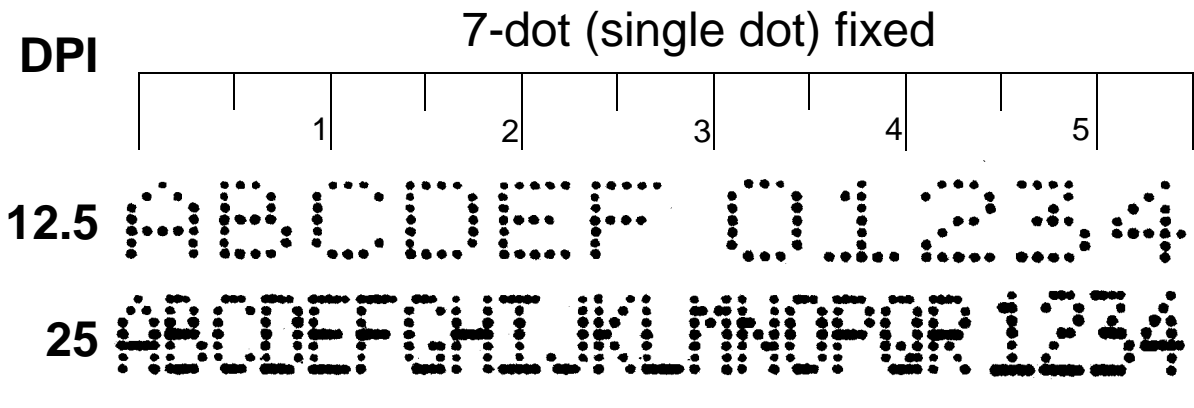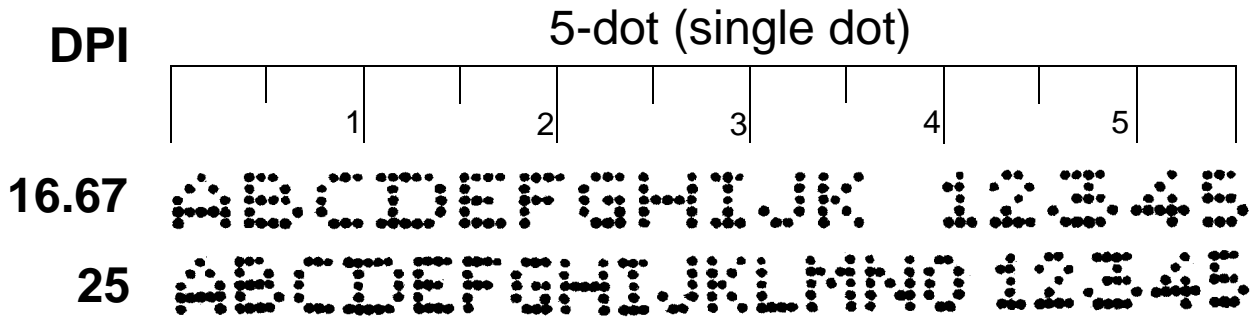To determine the maximum print resolution for a given conveyor, divide 1000 by the conveyor speed in inches per second. Using the previous example, 1000 divided by 40 inches per second equals 25 dpi maximum print resolution. Even if a higher resolution is desired, the valve print head is not capable of it without encountering performance and reliability problems.

Maximum Print Resolution for a Given Line Speed
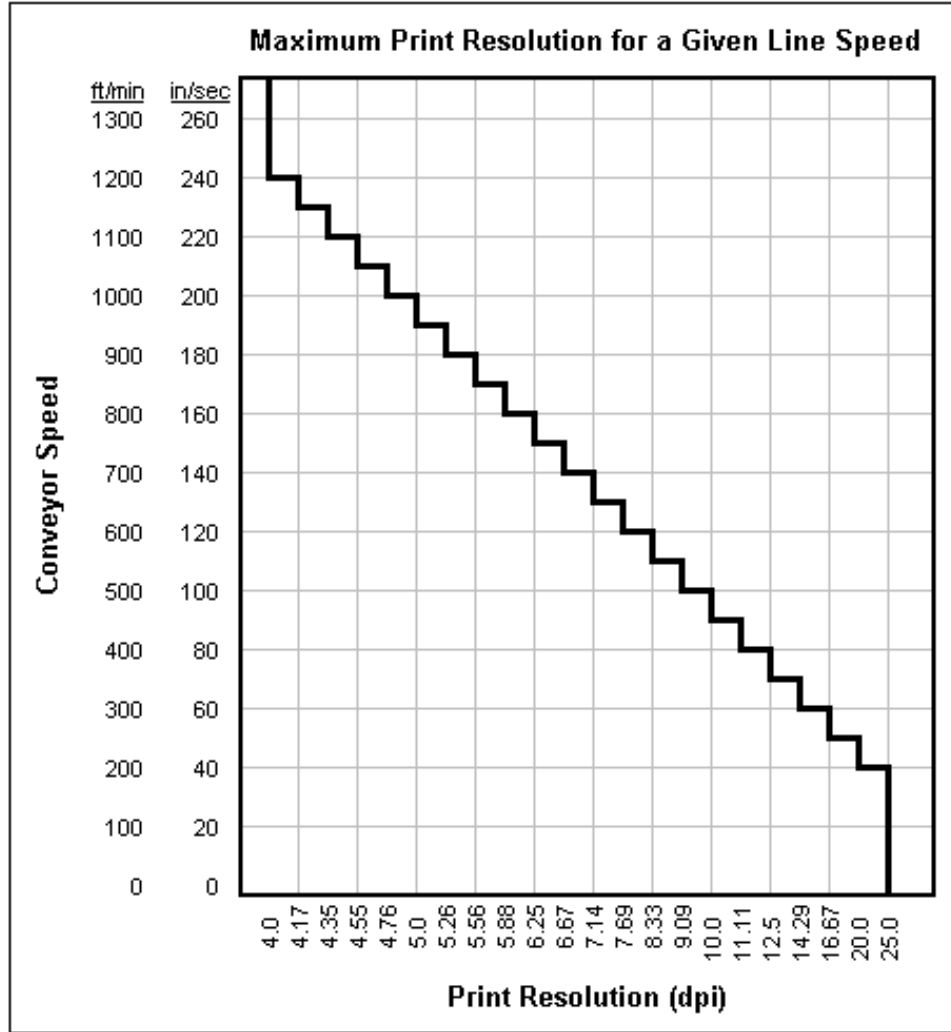
Appendix E: Font Samples

Character appearance is affected by weight and dots per inch (dpi). Character weights available are single dot and bold (double dot). The term "fixed" means the space allotted per character is the same regardless of the character. (An "I" occupies the same space as a "W".)

PRINT SAMPLES FOR A ½" 9-DOT PRINT HEAD

DPI — 5-dot (single dot)

	1	2	3	4	5

16.67 ABCDEFGHIJK 12345

25 ABCDEFGHIJKLMNO 12345

DPI — 7-dot (single dot) fixed

	1	2	3	4	5

12.5 ABCDEF 01234

25 ABCDEFGHIJKLMNOPQR 1234

DPI — 7-dot bold (double dot)

	1	2	3	4	5

12.5 ABCD 12345

25 ABCDEFGHIJKLM 12345

9-dot (single dot)

DPI
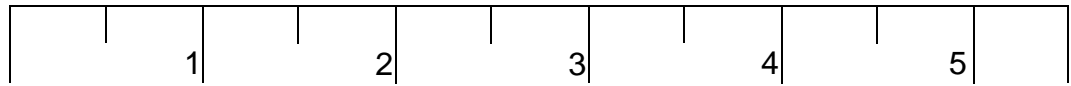
| | 1 | 2 | 3 | 4 | 5 |

12.5 ABCD 0123

25 ABCDEFGHIJK 123456

9-dot bold (double dot) fixed

DPI

| | 1 | 2 | 3 | 4 | 5 |
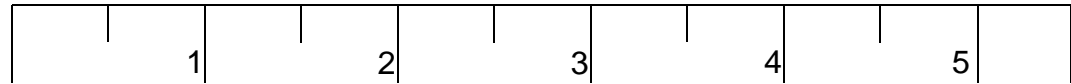
12.5 A B C 1 2

25 ABCDEF 0123

VXJet

PRINT SAMPLES FOR A 7/8" 9-DOT PRINT HEAD

DPI — 5-dot (single dot)

| | 1 | 2 | 3 | 4 | 5 |

12.5 ABCDEFG 12345

16.67 ABCDEFGHIJ 12345

DPI — 7-dot (single dot) fixed

| | 1 | 2 | 3 | 4 | 5 |

12.5 ABCDEF 01234

20 ABCDEFGHIJKLM 1234

DPI — 7-dot bold (double dot)

| | 1 | 2 | 3 | 4 | 5 |

12.5 ABCD 12345

20 ABCDEFGH 12345

DPI   9-dot (single dot)

12.5

20

DPI   9-dot bold (double dot)

12.5

20
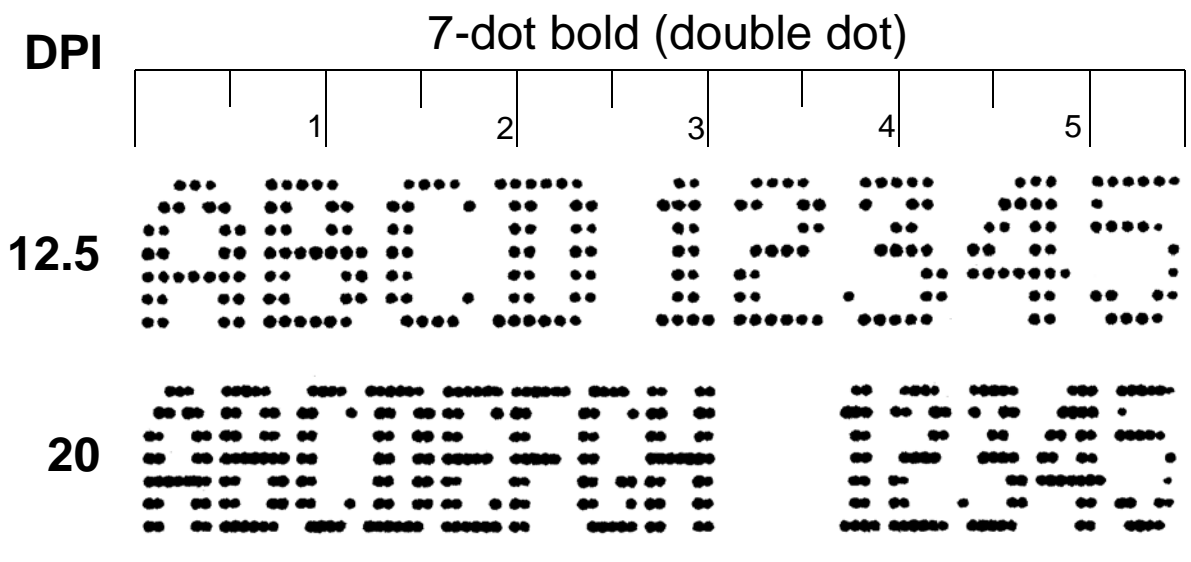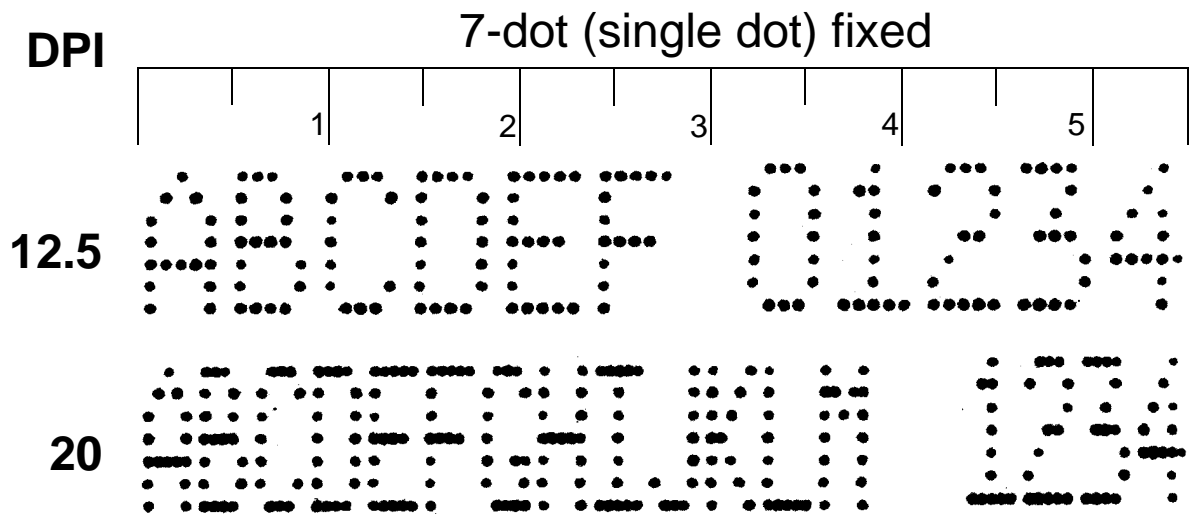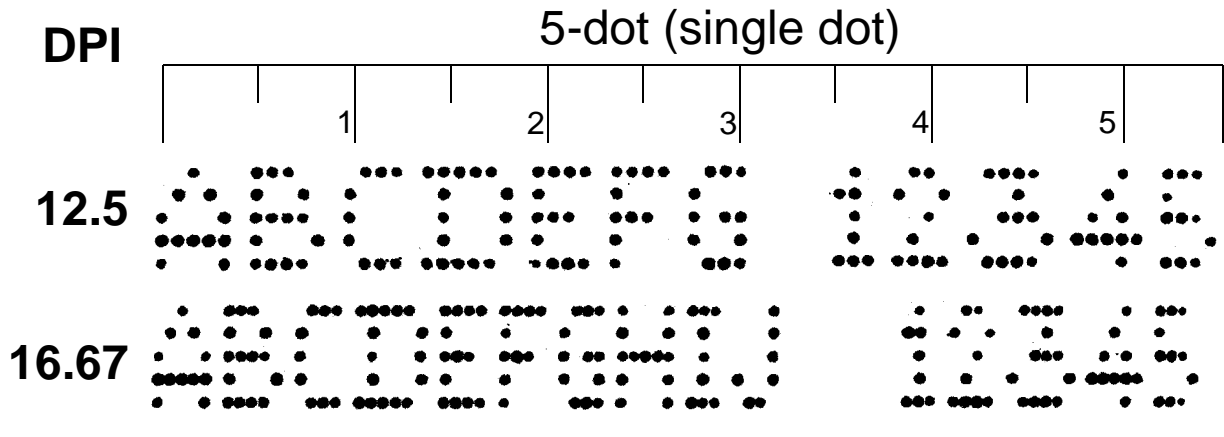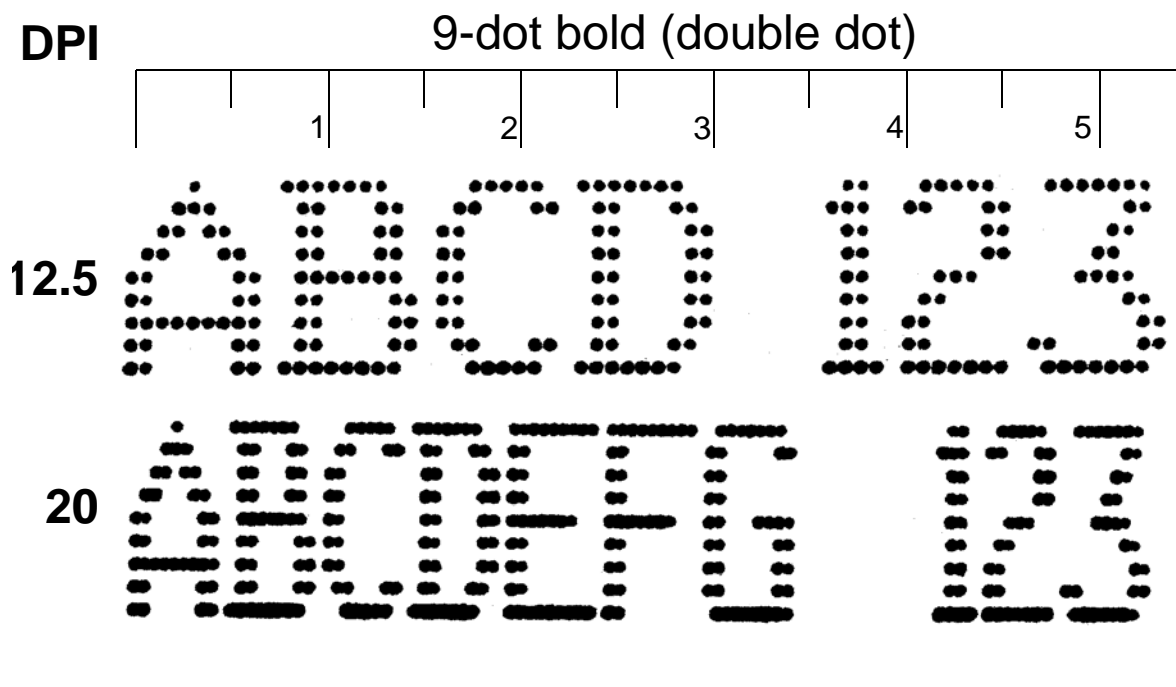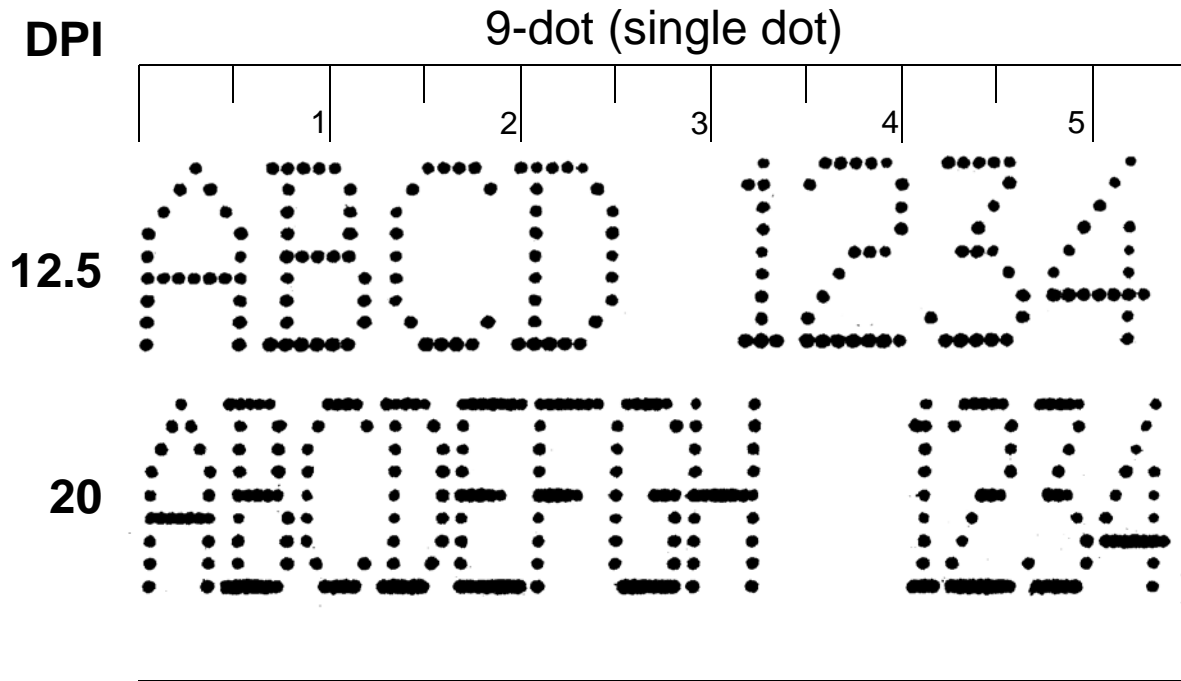
Appendix F: Setting the IP Address of an Ink Supply

Equipment Needed

- Ink Supply
- Marksman Pro VxJet
- Ethernet crossover cable (part number 5760-240, shipped with the ink supply)
- Phillips head screwdriver

Procedure

1. Unplug the Ink Supply.
2. Remove the Ink Supply cover.
3. Locate the integrated circuit with the label at the center back of the circuit board. (See photos below.)

The label will look similar to this:

V1.00.0024
00:06:0B
00:00:13

Record the bottom two lines of numbers. This is the ink supply MAC Address.

4. Plug one end of the Ethernet crossover cable into P1 on the circuit board. Plug the other end into the Ethernet connector on your Marksman Pro VxJet.
5. Plug in the Ink Supply and turn it on.
6. Enter the new IP Address and MAC Address into System Configuration on the VxJet Ink Supply.
7. Select **Set**.
8. When the IP Address is programmed, the Ink Supply will connect to the Marksman Pro through the Ethernet connection.
9. Turn off the Ink Supply and replace the cover.

Appendix G: Testing an Electrical Outlet

An outlet tester is the preferred method of checking an electrical outlet, although a voltmeter can also be used.
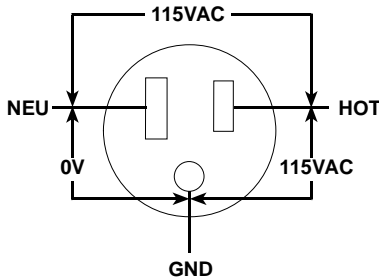
| CORRECTLY WIRED OUTLET | INCORRECTLY WIRED HOT AND NEUTRAL REVERSED | INCORRECTLY WIRED HOT AND GROUND REVERSED |
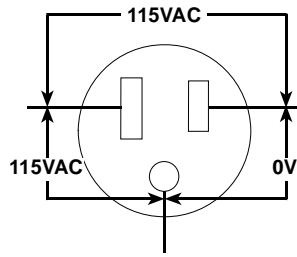
BACKGROUND INFORMATION ABOUT AC WIRING

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)

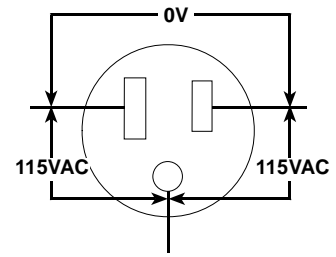| WIRE	DESCRIPTION	FUNCTION
LINE	Usually black. Cannot be white or green.	Carries the live voltage and current to the equipment.
NEUTRAL	White or natural gray.	Grounded at the service equipment* only. Serves as the return for 115 volts.
GROUND	Bare, green, or green with yellow stripes. May be metal armor 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."

Appendix H: Electrostatic Discharge (ESD)

What is ESD?

Electrostatic Discharge (ESD) is a triboelectric charge generated by separating or rubbing together two non-conductive materials.

What causes ESD?

Friction can cause ESD. Friction can be generated by walking across a floor, removing tape from a tape dispenser, pulling a work order from a plastic work order holder, rolling the wheels of a push-cart across the floor, sitting on a foam cushion such as a stool or blowing air across a nonconductive surface.

Source	70-90% Relative Humidity Volts	10-20% Relative Humidity Volts
Walking across a carpet	1,500	35,000
Working at a bench	100	12,000
Sitting on a foam cushion	600	20,000
Removing plastic bag from bench	12,000	20,000
Removing work-order from plastic pouch	600	7,000

ESD at the print station can be caused by the product rubbing against ungrounded guide rails, conveyor belt static voltage build-up, or a residual static charge on the product from earlier processing.

Generally, ESD problems are more prevalent in the winter months. Heated air has a much lower relative humidity than the cold air had prior to heating. In many instances ESD problems appear in the fall when the outside temperature drops, and go away in the spring when the outside temperature begins to rise.

What are the effects of ESD?

Unexplainable system resets, controller lockups, and multiple prints on the product can be signs of static discharge to the system. When static electricity is discharged to an electronic circuit (components or printed circuit boards), permanent damage may also occur. This damage may be in the form of reduced functionality, reduced life, or complete non-functionality.

The static charge does not have to be noticeable to the human touch in order to cause problems in an electronic system. A human being does not start to feel the effects of static electricity until the voltage reaches or exceeds 4000 volts. Voltage as small as 100 volts can cause problems with some sensitive electronic components.

What prevents ESD?

Prevention begins with training and knowledge. The use of wrist straps, heel straps, work-bench mats, floor mats, and monitoring systems for electronic devices will drastically reduce the ill effects of ESD when handling circuit boards. Anytime you handle electronic components or printed circuit boards, ESD wrist straps should be used.

If static discharge is suspected of causing controller problems at the print station, check the grounding of the conveyor and print station components. Nonconductive or ungrounded guide rails are the most common cause of static discharge. Ionized air blowers and static dissipating material have proven effective in eliminating many static problems.

Appendix I: Glossary of Terms

Accumulator - Housed within the ink supply, the accumulator stores ink for delivery to the print heads.

Bracketry - Mounting hardware for ink jet system components.

Broken Message - A message that is broken into two or more pieces, usually from the encoder slipping.

Check Valve - A valve that allows air or liquid to flow in only one direction.

Columns Out of Alignment - Dot columns line up in a zigzag pattern.

Conditioner - A non-pigmented ink solvent designed for flushing and cleaning print heads and ink line components.

Controller - The heart of the inkjet system, this unit gathers information from the computer, the photosensor, and the encoder, and facilitates the printing of messages by the print heads.

Daisy Chain - A series of print heads, totaling up to 72 dots, connected to one interface board. The VxJet can control one or two daisy chains.

Dragging Type Dot Size Variation - Dots smaller than average, at the beginning of print only.

Dynamic Seepage - Ink seepage from orifices only during printing.

Encoder - This device gathers line speed information via a wheel rolling against a conveyor belt. The controller uses this information to determine when to send print signals to the print heads.

ESD - Electrostatic Discharge is a charge generated by separating or rubbing together two non-conductive materials. ESD can result in print problems or even damage to the ink jet system.

ESD Protection - Wrist straps, floor mats, and other devices used when handling electronic components to minimize ESD.

Ethernet Port Server - A communications standard; connects asynchronous serial ports to an unshielded twisted pair (UTP) 10BASE-T ethernet connection at a baud rate of 230 Kbps.

Extra Dots - Dots printed outside the designated dot columns.

Font - A complete set of characters - alphabetic, numeric, and punctuation - in one typeface. The font used in this glossary is Arial.

IDS - The Ink Supply consists of a number of components working together to transfer ink from the ink pail to the printed product.

Ink Filter - A 100-micron filter located in the ink line to remove any impurities from the ink before it reaches the print head.

Ink Regulator - This component is located in the ink line close to the print head and, in conjunction with the ink pressure gauge, can be adjusted to regulate ink pressure to the print head.

Interface Board - The power entry point for the VxJet, and connection point for the print head daisy chain, photosensor, and encoder. A second interface board is optional.

Internal Dot Size Variation - Dots are different in size at the intersection of a dot column and a dot row.

Jumper - A small plug or wire that alters a hardware configuration by connecting different points in an electronic circuit.

LED - Light Emitting Diode. There are several LEDs in the VxJet system, and they either illuminate or extinguish to indicate various operating conditions.

MSDS - A Material Safety Data Sheet contains federally mandated safety, environmental and disposal information about an ink or other potentially hazardous material.

Off Target Printing - One or more dots not printed in the expected location in the character.

Photosensor -- A device that emits a beam of light, and sends a print signal to the controller when light is reflected back to it by a product passing on a conveyor.

Potentiometer - A variable voltage resistor that can be adjusted with a small screwdriver to effect voltage changes in print head solenoids.

Pressure Gauge - This can be attached to the ink line and used to measure ink pressure, aiding the operator in making adjustments to improve print quality.

Print Indentation -The sum of two measurements: The distance from the photosensor to the center of the print head, plus the distance from the leading edge of the product to the start of printing.

Print Head -- A solenoid-activated mechanism that propels ink droplets onto a moving surface.

Printstation - One or more print heads set up to mark a given product in a specified location.

psi - Pounds per Square Inch, a measure of air pressure.

Pulse Width - The amount of time a print head solenoid is on, one of the factors controlling the size of a printed dot.