Operations Manual

Thermal Jet Ink Jet System

![SoloSeries 45 and SoloSeries 90 units]

SoloSeries *45*   **SoloSeries** *90*

FXJET®
AN ITW COMPANY

5780-329
Revision H

Thermal Jet
Ink Jet System
Operations Manual

Ink Cartridge: The SoloSeries has been engineered and designed to work with Foxjet ink cartridges. The SoloSeries' **Smart Level Ink Detection System**, which provides ink level monitoring to ensure complete ink usage and product safety, will not be functional if used with non-Foxjet ink cartridges.

Warranty:

The SoloSeries Thermal Jet system, including all components unless otherwise specified, carries a limited warranty.

The inks and conditioners used with the SoloSeries Thermal Jet system carry a limited warranty.

For all warranty terms and conditions, contact Foxjet an ITW Company for a complete copy of the Limited Warranty Statement.

SoloSeries *Thermal Jet*

SoloSeries *Thermal Jet*

SoloSeries *Thermal Jet*

Section 1: Safety and Ink Cartridge Usage

Following is a list of safety symbols and their meanings, which are 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.)

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 the equipment.

It is extremely important to:
- Clean up all spills with the appropriate solvents 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 solvents under the recommended conditions found on the MSDS (Material Safety Data Sheet).
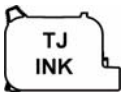
Ink Cartridge: The SoloSeries has been engineered and designed to work with Foxjet ink cartridges. The SoloSeries' **Smart Level Ink Detection System**, which provides ink level monitoring to ensure complete ink usage and product safety, will not be functional if used with non-Foxjet ink cartridges.

Section 2: Quick Start

OPTIONAL Marksman Duo
CONTROLLER

TYPICAL INSTALLATION
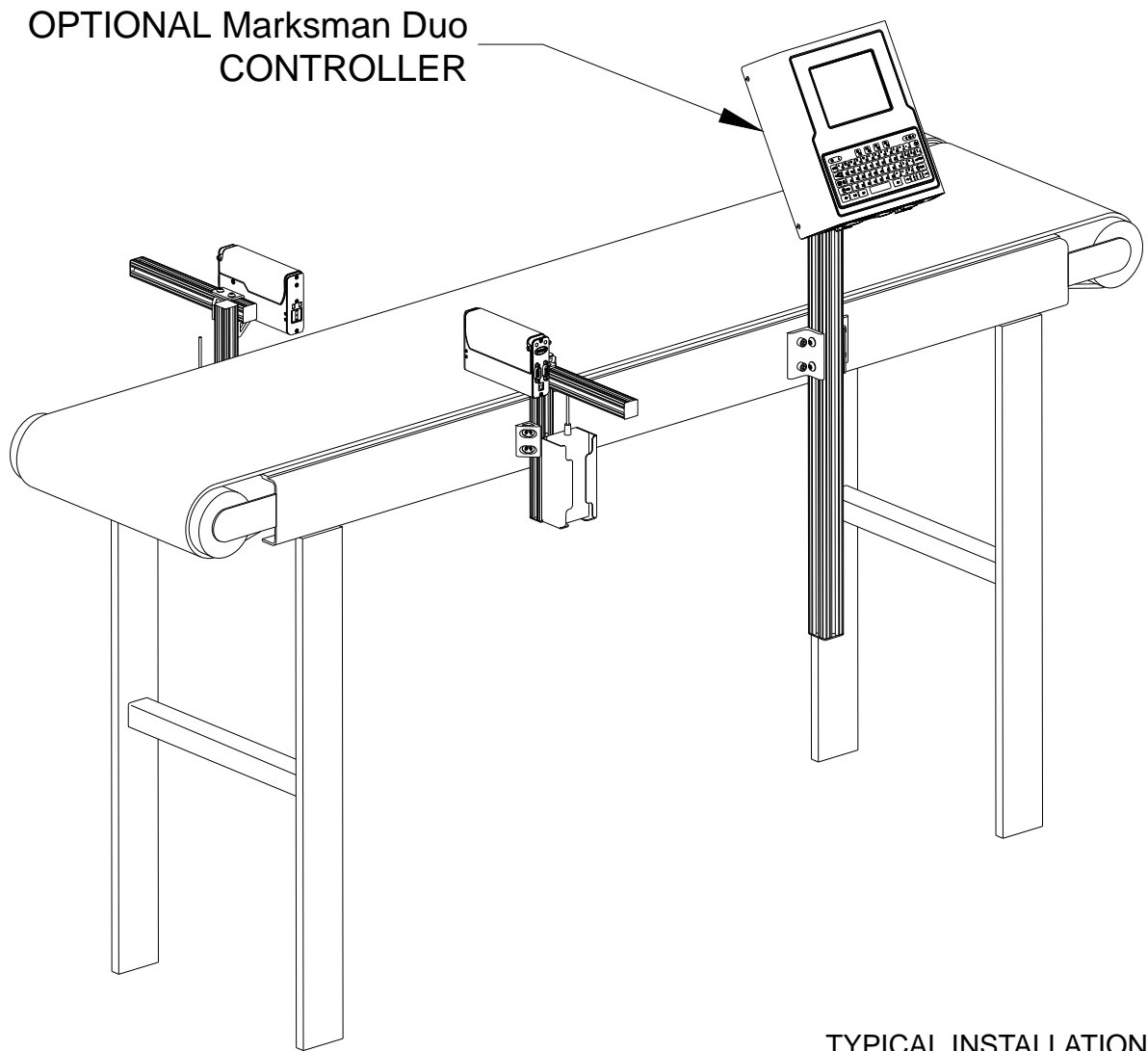
Contents:

- SoloSeries Print Head
- Bracketry Kit
- Power Supply, 15 V
- Power Supply Bracket
- Power Cord
- Software CD

Step 1: Assemble Bracketry
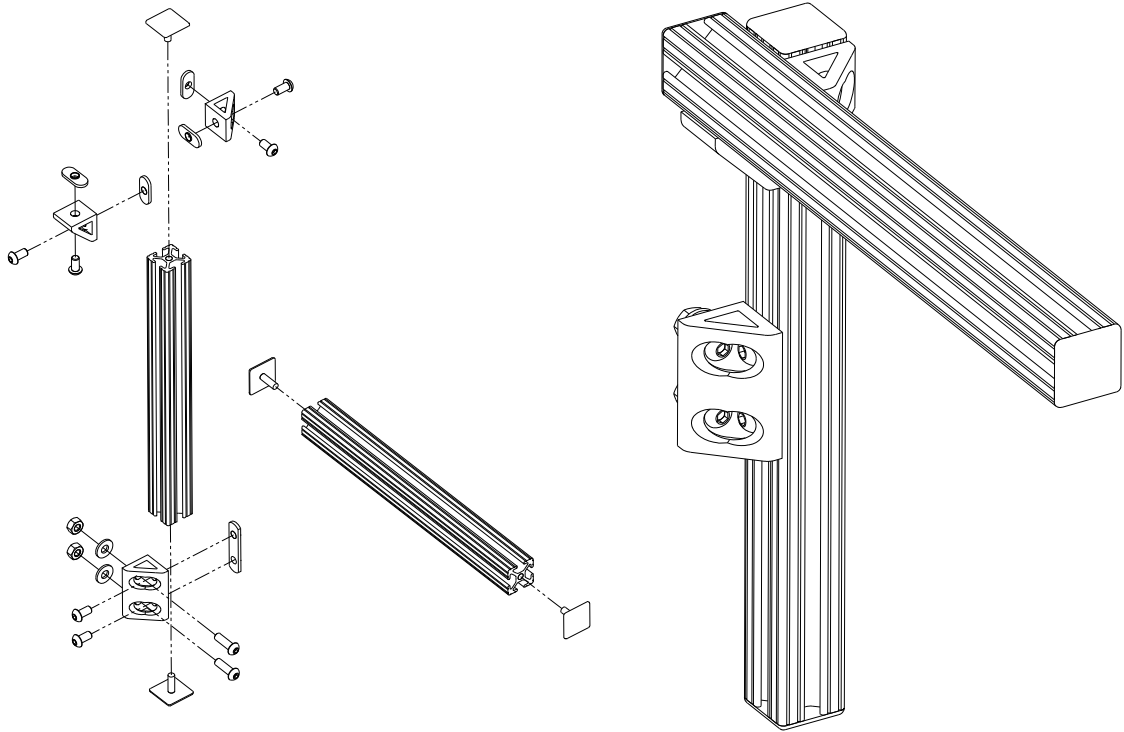
Step 2: Assemble Bracketry to Conveyor
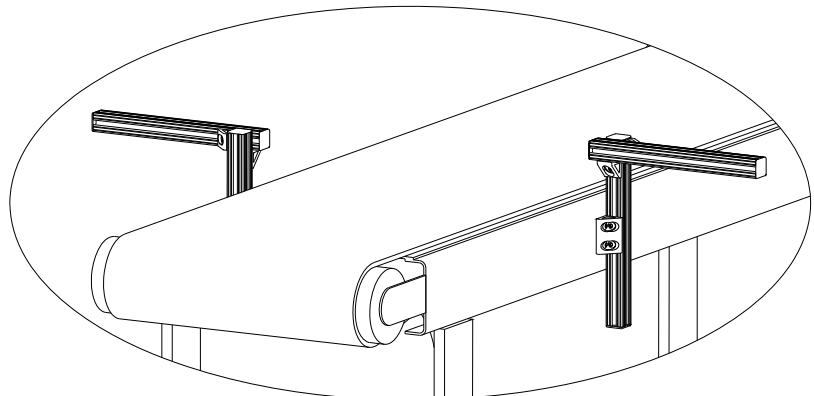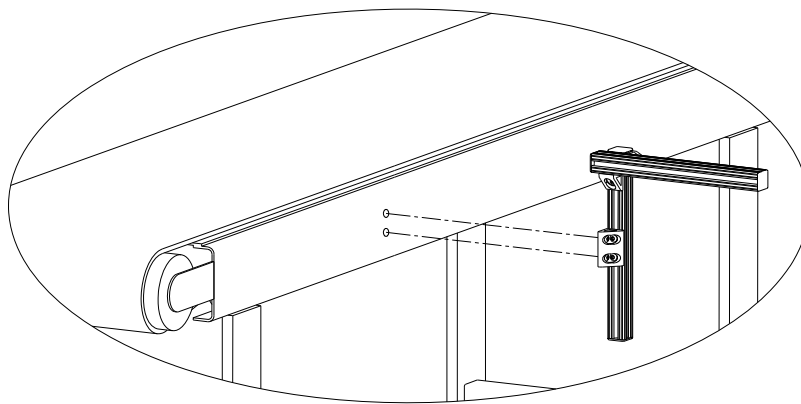
Step 3: Assemble SoloSeries Print Head and Power Supply to Bracketry

Ensure bar is
behind front
face of print head
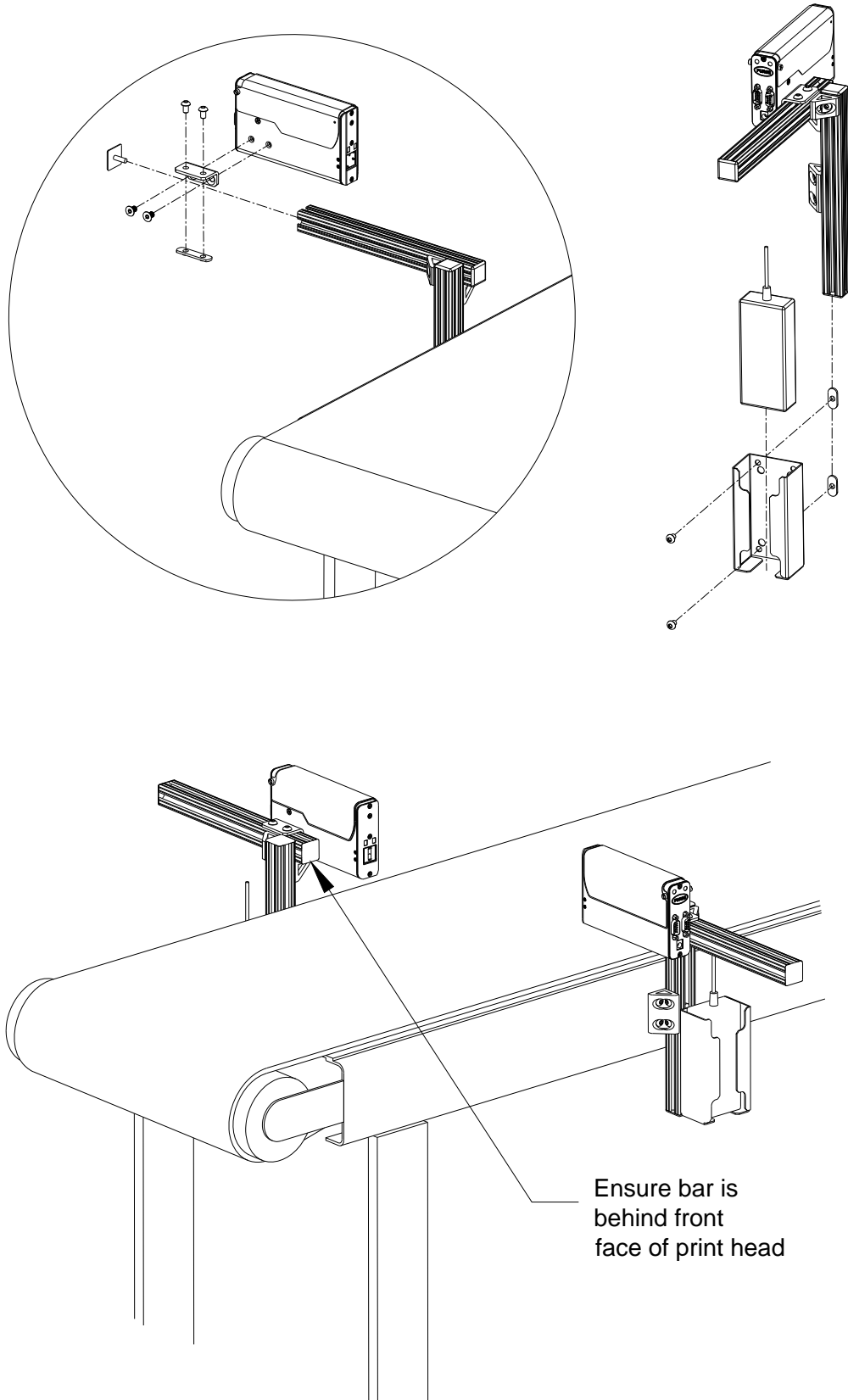
Step 4: Adjust SoloSeries Print Head to Substrate

Adjust SoloSeries print head vertically to meet requirement.

ADJUST
VERTICALLY
WITH EITHER
OF THESE TWO
BRACKETS
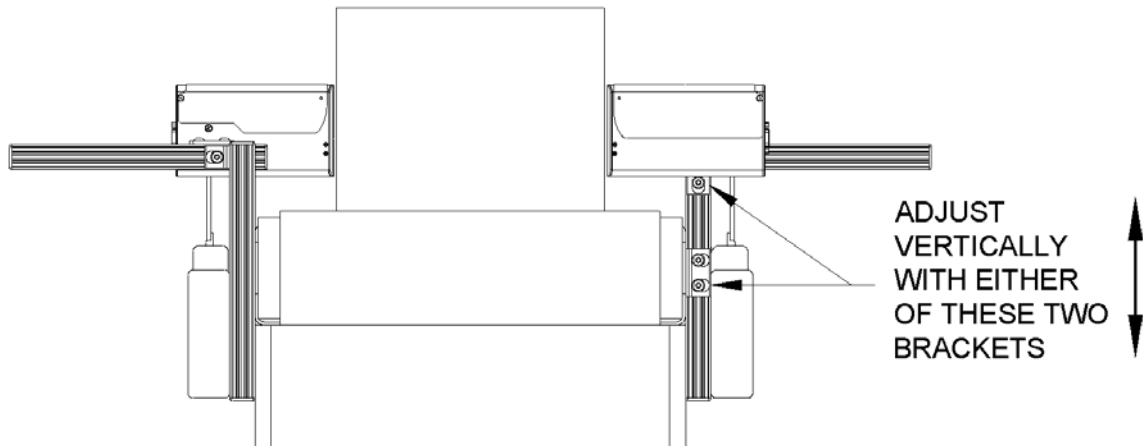
Adjust SoloSeries print head horizontally to set print gap.

.1" (2.5mm) GAP
RECOMMENDED

ADJUST THE PRINT
HEAD TO THE
SUBSTRATE WITH
THIS BRACKET
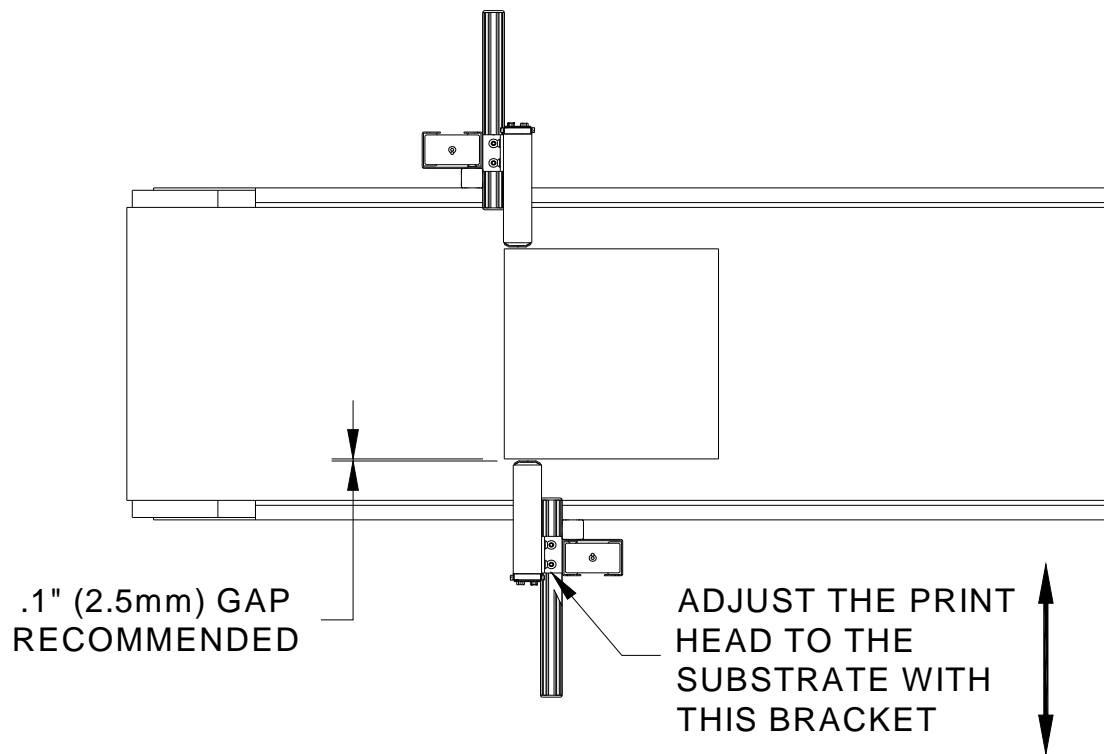
Step 5: Insert Cartridge Pen into Print Head

Rotate Cover
Open
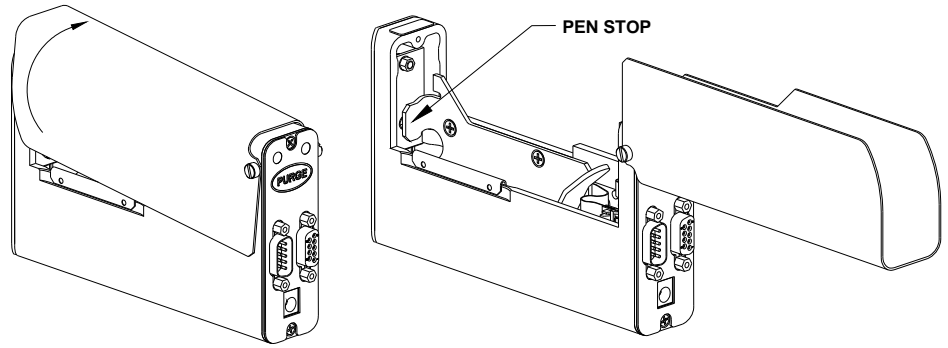
PEN STOP

Insert Pen Cartridge at an angle up to
Pen Stop
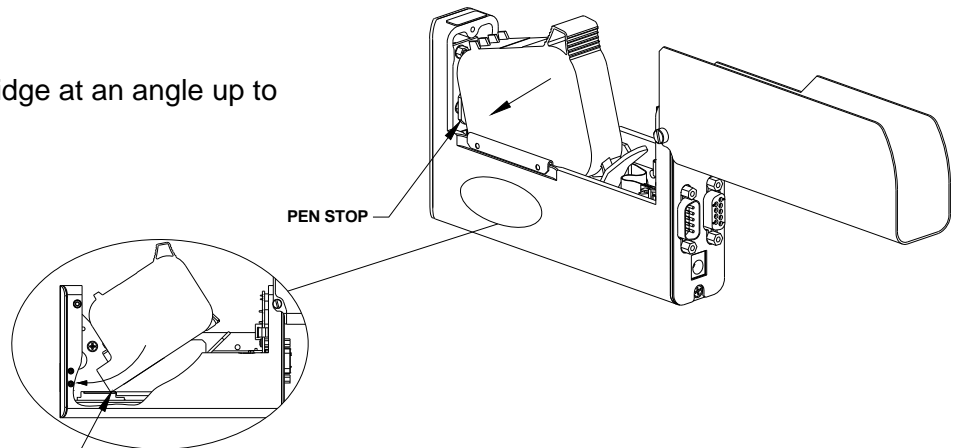
PEN STOP

**When inserting cartridge, aim nose at an
angle towards black pogo pin component.
Slide pen cartridge up to Pen Stop.**

Rotate Pen Cartridge
down until it snaps in
place

NOTE: The pen is
released by pressing
down on the Finger
Release Tab and pull-
ing up on the rear of
the cartridge.

FINGER RELEASE TAB

FINGER RELEASE TABS

Close Cover

**After pen cartridge
is installed**
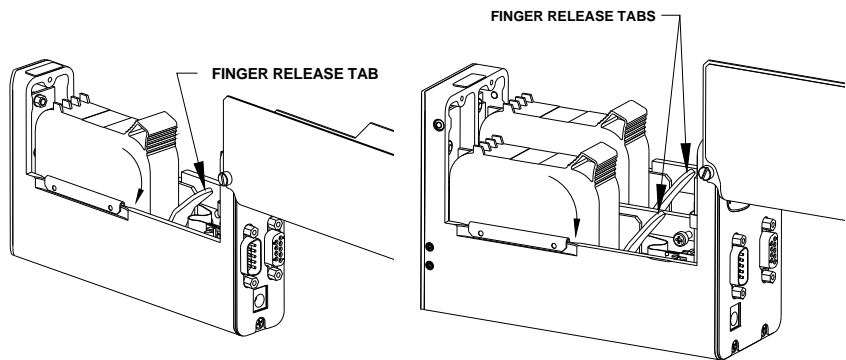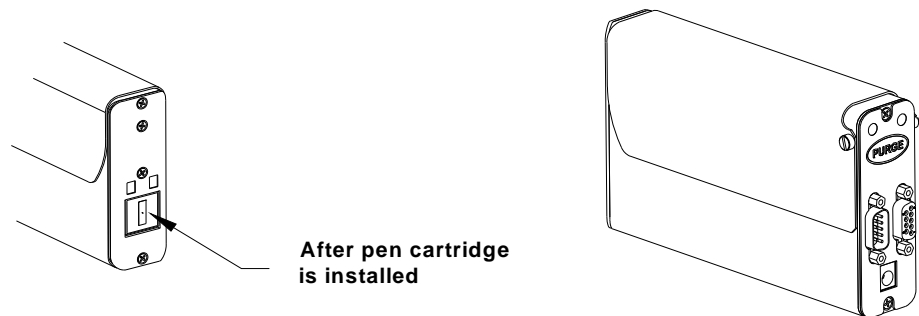
Step 6: Cabling, Power, and Serial Port Setup

Cabling

CAUTION: Power should be disconnected from the print head prior to connecting or disconnecting any external devise, including: PC, handheld, controller or print head daisy chain cables. Electrical arcing may occur if external cabling is connected or disconnected while power is supplied to the unit.

Connect the included serial cable between a computer or an Marksman Duo COM port to the input port of the first SoloSeries print head in the daisy chain. Connect up to four total SoloSeries45 or two SoloSeries90 print heads (per COM port) with their included serial cables in a daisy chain from the output port of the first SoloSeries print head to the input port of the next SoloSeries print head and so on.

PC OR LAPTOP

COM PORT

Marksman Duo

OUTPUT PORT
(TO ADDITIONAL
HEADS)

INPUT PORT
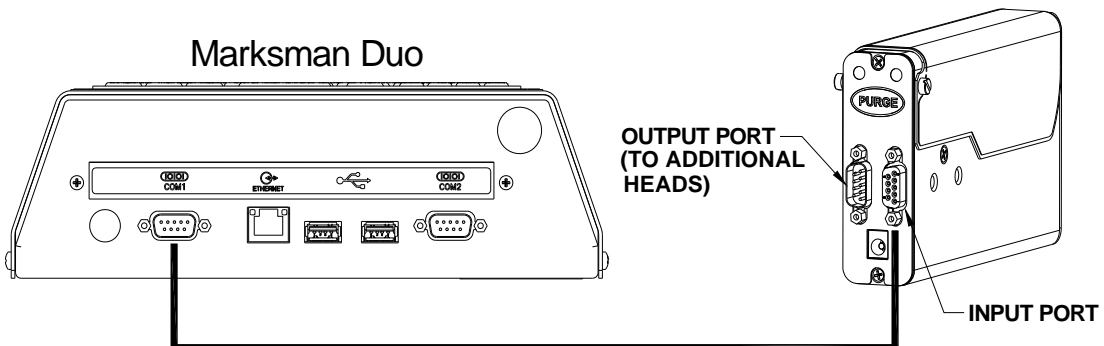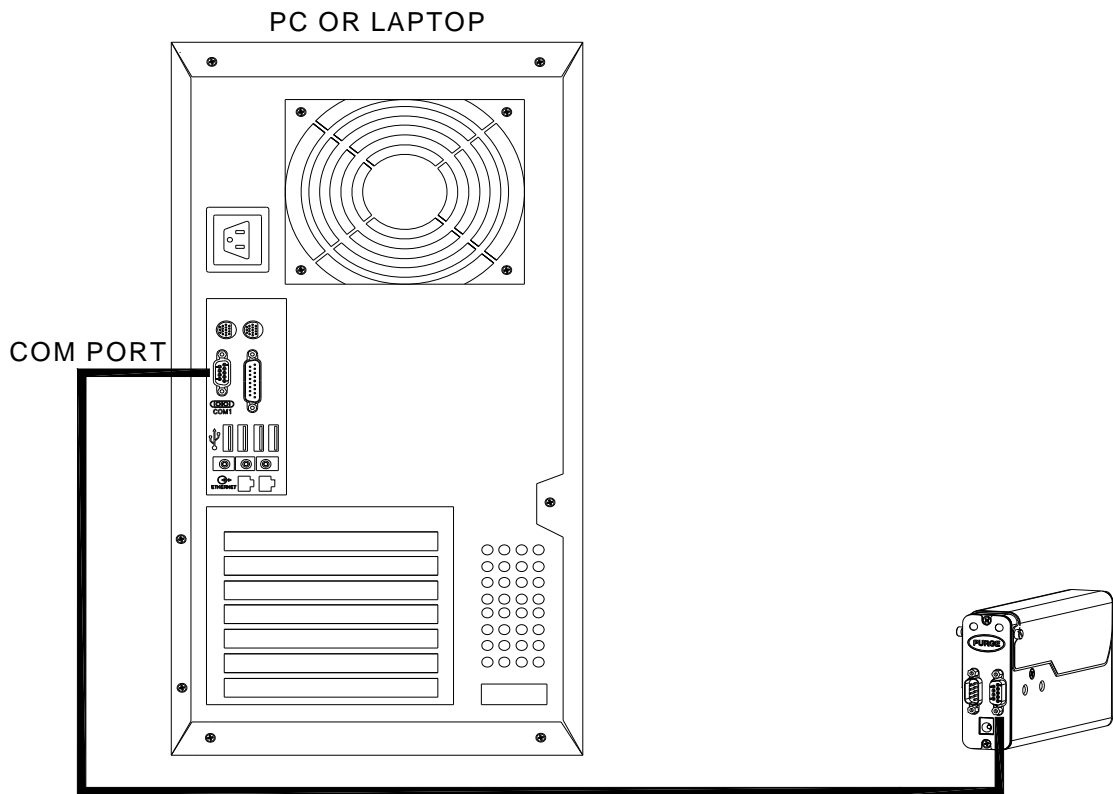
Power

CAUTION: Power should be disconnected from the print head prior to connecting or disconnecting any external devise, including: PC, handheld, controller or print head daisy chain cables. Electrical arcing may occur if external cabling is connected or disconnected while power is supplied to the unit.

Install the power plug from the previously mounted power supply into the power jack on the rear of each SoloSeries print head.

Press and hold the "PURGE" button on the rear of the SoloSeries print head while slowly moving a piece of paper, cardboard, or comparable material in front of the SoloSeries print cartridge. Print several purge images and validate that all channels are printing. If not, refer to "Section 4: Maintenance & Shutdowns" on page 21.
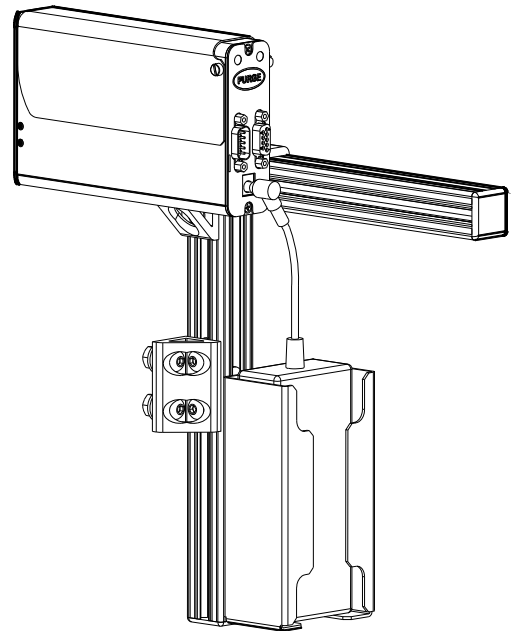
NOTE: Do not rub the ink cartridge face with the print sample material as this will scratch the orifice array and affect print quality.

At this point, the power supply for the Marksman Duo or the computer may be installed.

Serial Port Setup

NOTE: Depending on GUI / Marksman Duo status, this step may already be complete.

If a computer will be used, install the SoloSeries / Marksman Duo GUI PC software using the CD included with the print head. Follow the installation prompts, and at this prompt, select "Interface 1 Serial Print Head".
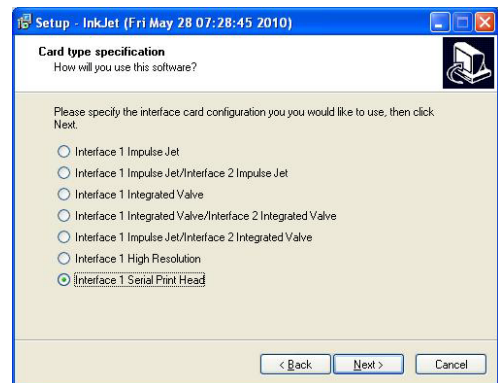
After the GUI program has been installed, launch the program.

Ensure the home screen menu is present via the **Hide Menu** / **Show Menu** button, and then press the **Control Panels** button.
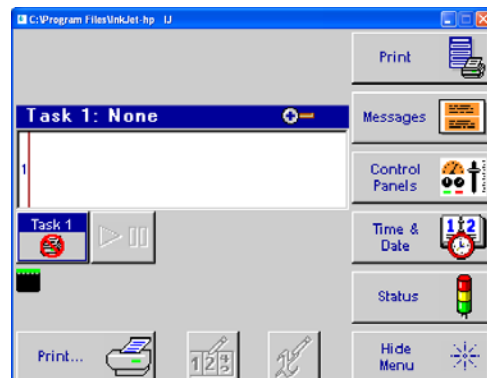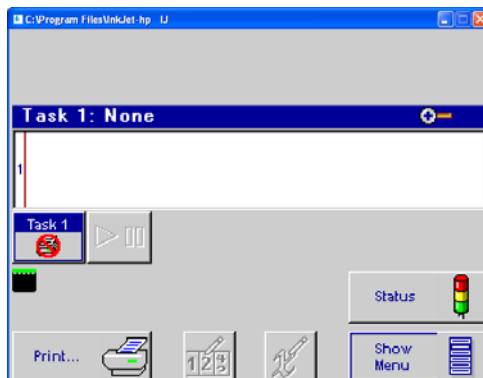
Press the **System Setup** button, and then the **Serial Ports** tab.
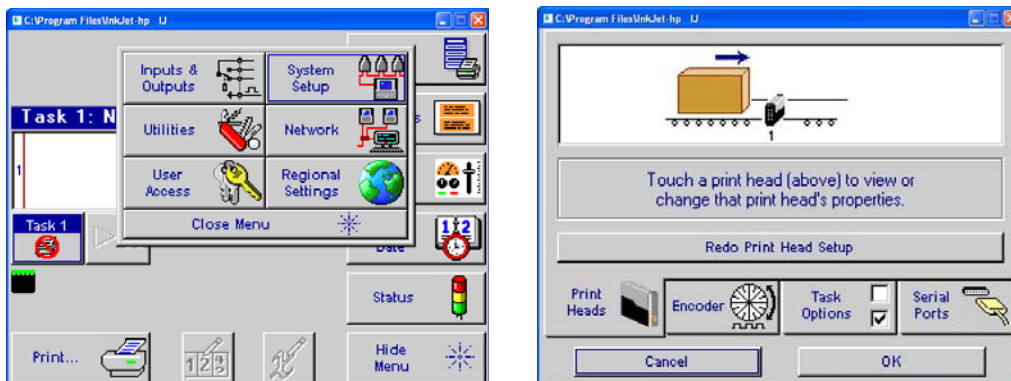
To ensure the baud rate is set for **57600,** press the button beneath the **Port/Baud** column and adjust if necessary. Press the **OK** button to exit the **Serial Port Setup** screen.
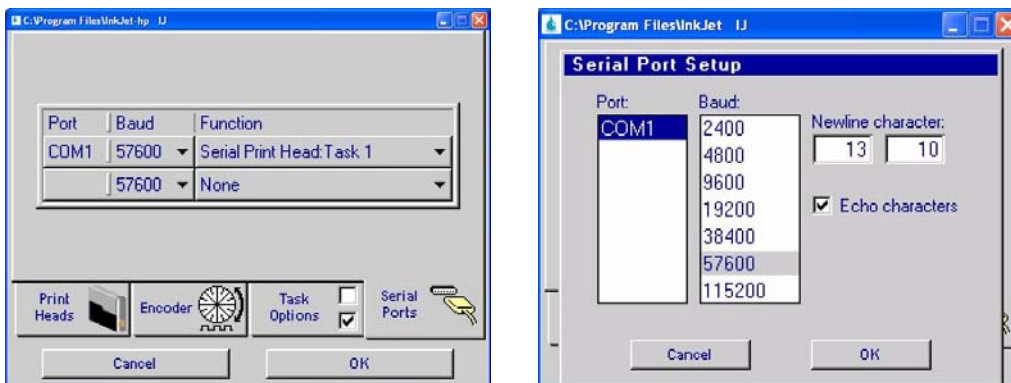
If the word "none" appears beneath the **Function** column, press it and select the **Serial Print Head** option. Press the **OK** button to exit the **COM 1 Function** screen.
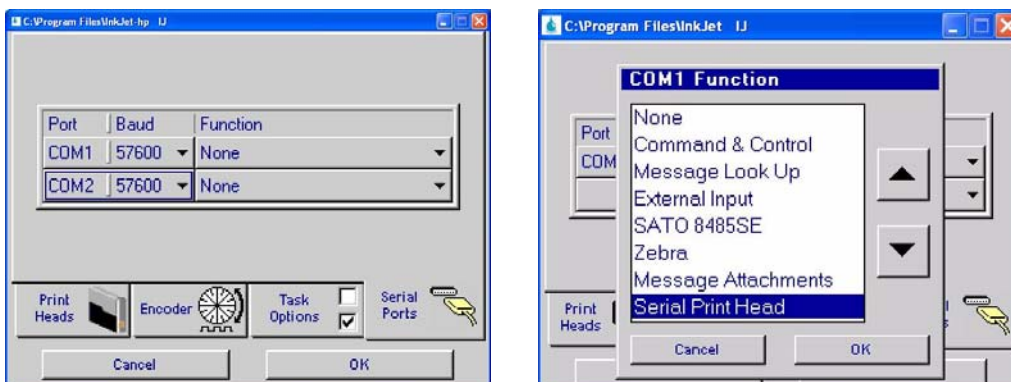
Step 7: Configure the Print Head

Press the **Print Heads** tab and then the **Redo Print Head Setup** button. Select the desired direction.
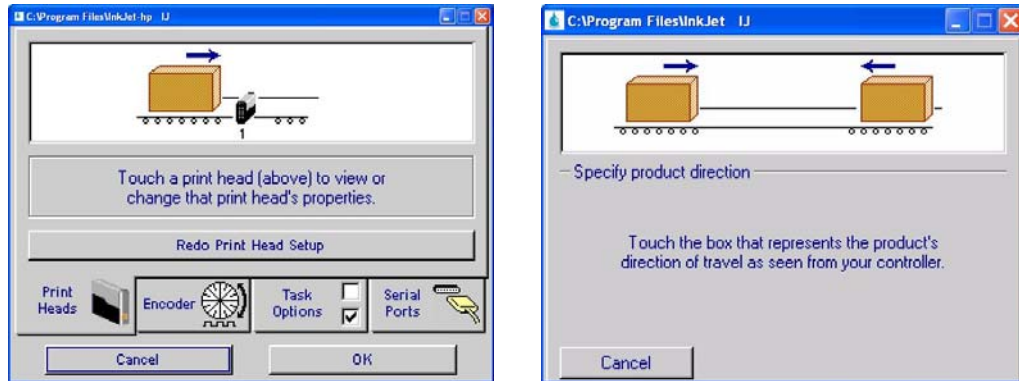
Select the number of print heads, identify the first in the daisy chain, and select the appropriate print head type by touching each one and then the drop down box.
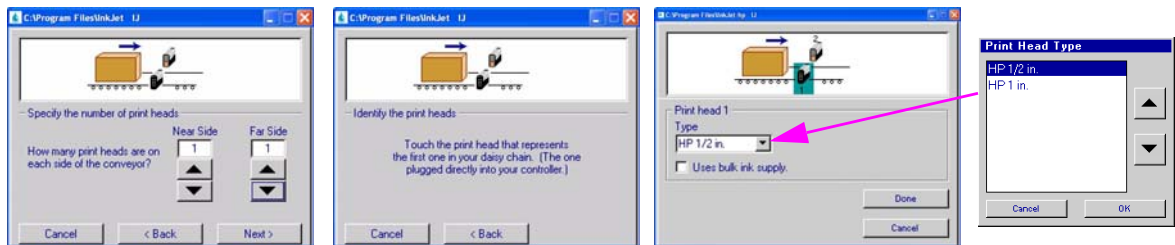
Print head setup complete. Next, select the Encoder tab, and choose the desired encoder type.

External Encoder:
Line speed measured by an externally mounted encoder and connected to the last SoloSeries print head in the daisy chain

Auto Speed Detect:
Line speed automatically detected via SoloSeries photocells

Fixed Speed:
User types in the desired line speed
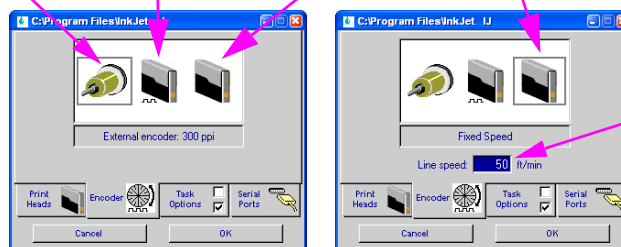
Touch this box, then type in the desired speed

Step 8: Create a Message

From the home screen, select the **Messages** button and then the **New** button to enter the message editor.

Create and save the message, and then exit the message editor.

Quick Save

Product Setup

Product Side

Zoom

File Menu

Message Display Area

Field Selection

Font Selection

Barcode

Field Coordinates

Logo

Variable Field

Count Code

Date Code

Time Code

Alpha / Numeric

SoloSeries *Thermal Jet*   Section 2: Quick Start
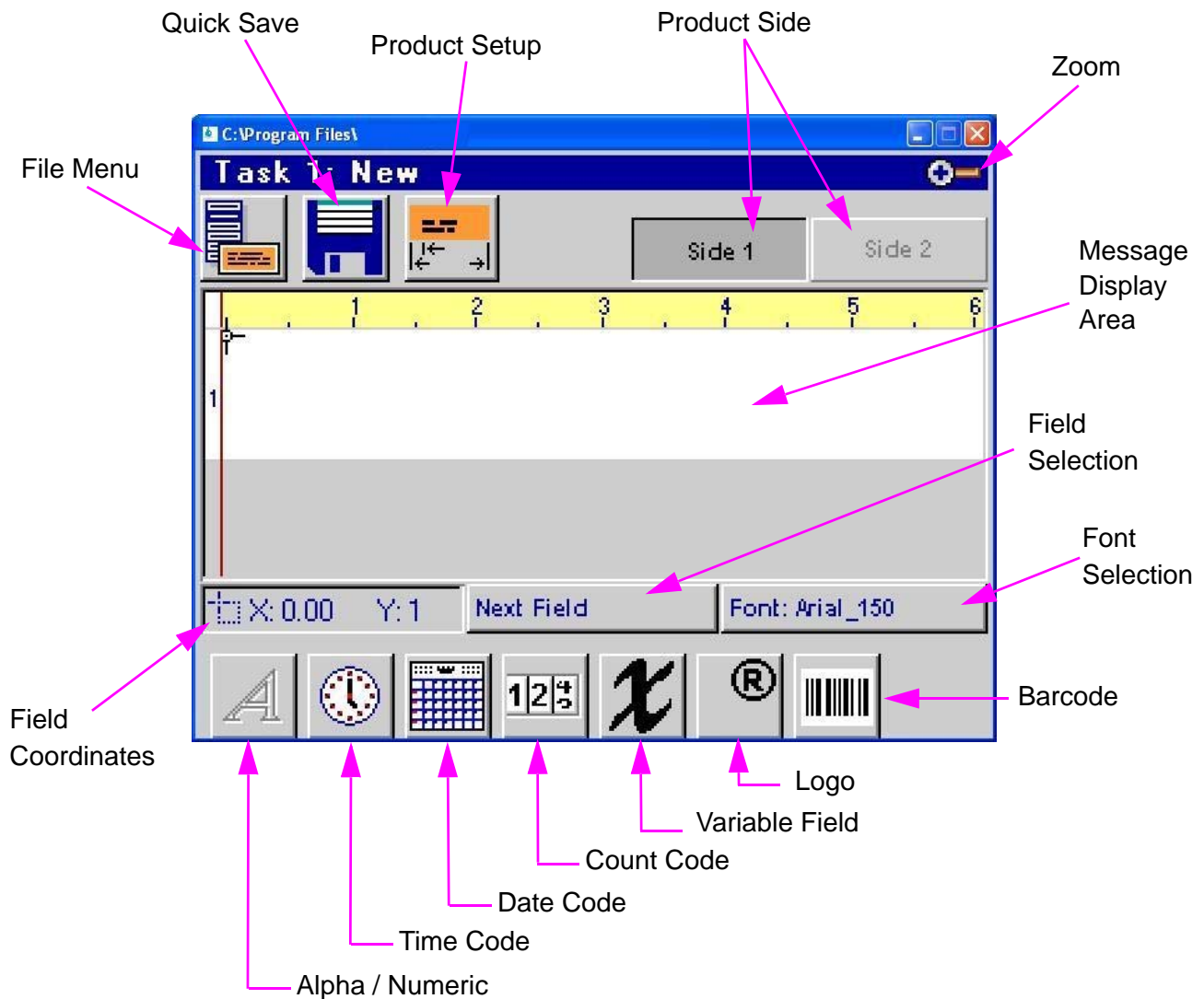
Step 9: Print a Message

From the home screen, push the **Print** button.
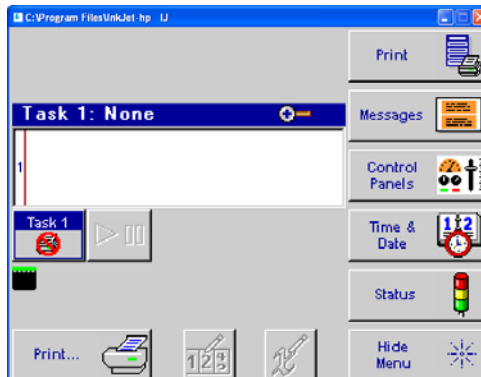
Select the desired message to print, and push the **Print It** button.
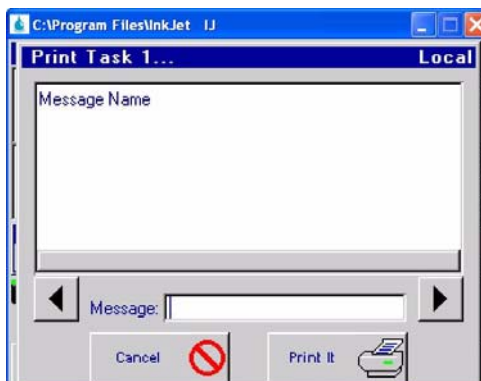
The message will print on the next photocell trigger.

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Section 3: Marksman Duo or GUI Functionality

Keypad or Keyboard
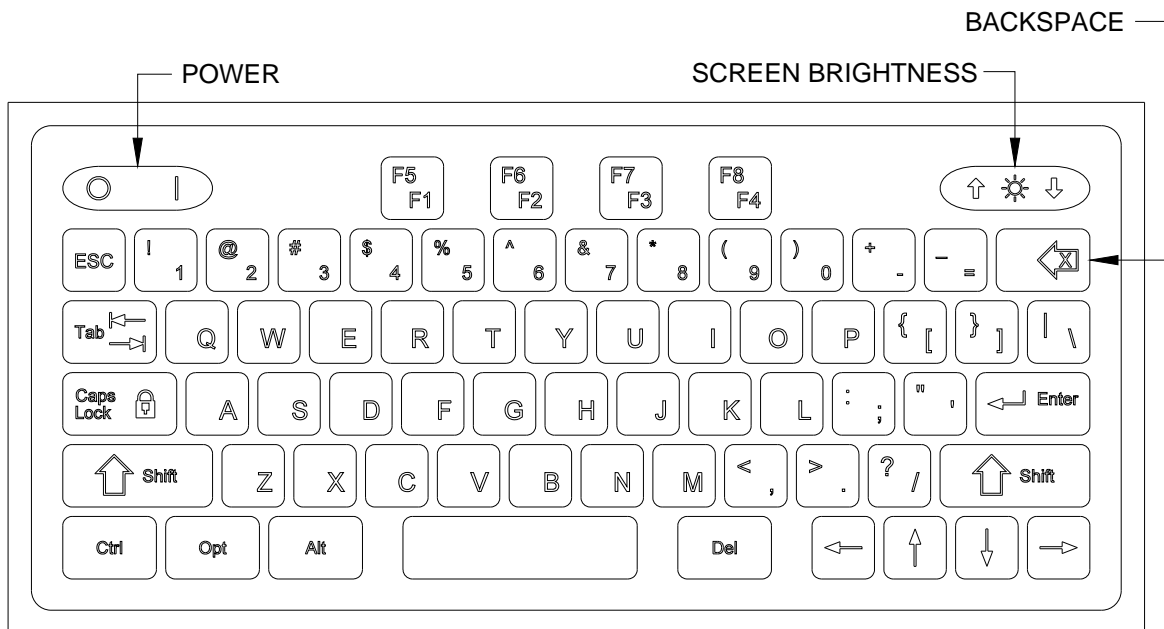
ESC (Escape):

- Closes the current window, a dialog box, or menu.
- Restores the original contents of any input entry box, if **Enter** has not been pressed.

Arrow Keys:

- Shifts focus between screen controls.
- Moves highlighted fields or the cursor around in the Message Editor.

Tab:

- Shifts focus between screen controls.
- Shifts focus between fields in the Message Editor.

Backspace in Message Editor:

- Normal functionality as QWERTY keyboard.
- Deletes a highlighted field.

Ctrl (Control) in Message Editor:

- Amplifies the movement of the arrow keys.
- Holding the Ctrl key while pressing the Enter key at the end of a text line enables paragraph functionality.

F4/F8:

The **F4**/**F8** key pulls up the extended characters dialog.

Home Screen

Print Head Daisy Chain Identifier

Message Window

Task 1 Select Button

Task 1 & Task 2 Ink Status

Task 1 Print / Pause Button

Quick Print Menu Button

Counter Button

Variable Field Button

Zoom Button

Task 2 Select Button

Task 2 Print / Pause Button

Status Screen Access Button

Show / Hide Main Menu Button

C:\Program Files\InkJet IJ

Task 1: 0 line

Thermal Jet

Ink Jet

Task 1

Task 2

Status

Print...

Show Menu

Message Window:

- Displays the current print message.
- Updated approximately every seven seconds, so it likely will not show each print.
- Long print messages can be viewed by using the **F1** and **F2** keys to scroll the message left and right, respectively.
- White or beige bars represent a print head in the daisy chain and are identified by their respective numbering.
- The header displays the task number and file name of the message being printed. If no message is loaded to print, "**None**" is displayed.

Task Select Button:

Task 1

- Places focus on the selected task. This allows one to view what is being printed on either task in the home screen. Additionally, items in the main menu vary from one task to the other.

Task Print / Pause Button:

Play State

- Starts and Stops print after an operator response to a confirmation dialog popup box.
- If a message is currently printing, pressing the Pause button will discontinue printing after the message completes printing.
- If the Play button is pushed, print will resume on the next product detected.

Pause State

Confirmation

? Pause printing?

Cancel   OK

Confirmation

? Begin printing?

Cancel   OK
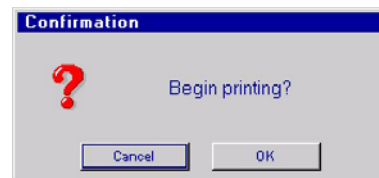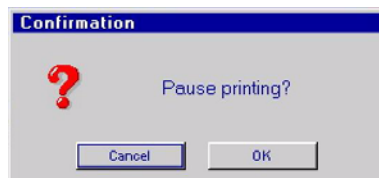
Quick Print Menu Button:

- Allows one to access the Print Menu directly even with Restricted User Access enabled.
- Simply select the desired message and press the Print It button. The message will print after the next photocell trigger.
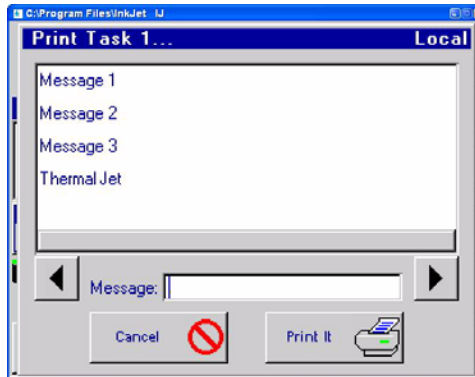
Zoom:

- Expands the message window to full screen and magnifies the print message so that fine details may be seen.
- **F1, F2, F5** and **F6** keys, or the **Arrow** keys, scroll the message left, right, up and down.
- **Zoom** button or the **ESC** key to zoom back out.

Counter:

- Count codes are allowed, but one must select the "Print" button to adjust the count.

Variable Field:

- Variable information fields are allowed, but one must select the "Print" button to change the information being printed.

SoloSeries *Thermal Jet*

Main Menu

Main Menu Collapsed   **Main Menu Expanded**
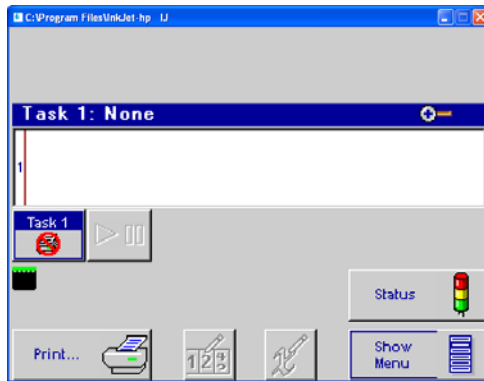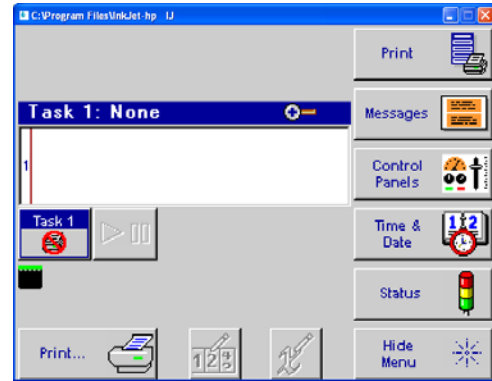
Print Menu
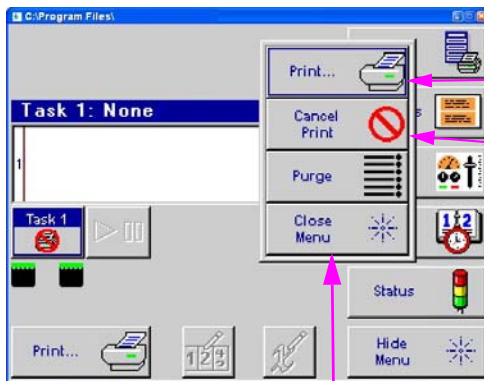
Print Menu Button

Cancels print immediately after a confirmation dialog popup box

Fires all jets for a short period of time on the selected Solo-Series print head

Closes this menu immediately

NOTE: The Variable Field button is not available. In order to update a variable field, reselect the message to Print.

Returns to Home

Messages Menu & Editor

Message Menu
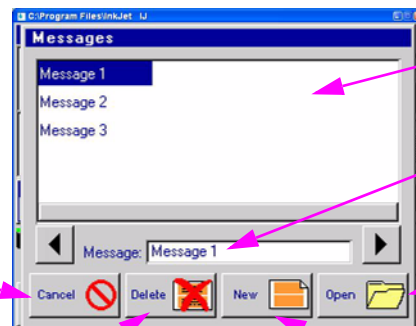
Message List

Selected Message

Opens Selected Message in the Editor

Returns to Home Screen

Deletes Selected Message

Starts a new message in the Editor

Message Editor:

Reverts message to the last saved

Clears contents of message editor

Calculates estimated ink usage for the contents of the editor

Exits the editor to the Home screen

Prints the contents of this editor on the next photocell trigger

File Menu

Revert	New
Clear	Open
Ink Usage	Save As...
Exit	Test Print
Close Menu	

Quick save of current message

Product Setup
Length — 12.00 in.
Left margin — 1.00 in.
Panel Setup / Print Options
Cancel / OK

Product Setup
Print options
- Side 2 = side 1.
- Task 2 = task 1.
- Cancel after one print.
- Repeat print at 12.00 in. intervals.
Panel Setup / Print Options
Cancel / OK

Zoom

Message Display Area

C:\src\ij3k\win32   IJ
Task 2 PRODUCT NAME
Side 1 / Side 2

PROD 03/19/09 COUNT 14:58 000358

Moves between fields in the display area

Field Coordinates

Text field properties - inactive

X: 0.00   Y: 1   Next Field   Font: Arial_150

Insert Time Code
Time code format:
- HH
- MM TIME
- SS TIME
- HHMM
- HHMMSS
- HH:MM
- HH:MM:SS
OK / Cancel

Fonts
- Arial_150
- Arial_30
- Arial_300
- Arial_75
Cancel / OK

Insert Date Code
Date code formats:
- DD
- Julian (001 - 366)
- MM
- MON
- MON YY
- DD/MM/YY
- DDMMYYYY
- MM/DD/YY
- MM DD YY
- MMDDYY
Date offset: 0 ⦿ Days ○ Months
OK / Cancel

Insert Logo
Preview: test.bmp
Select Logo...
Cancel / OK

Insert Bar Code
Bar code data
Bar code type: GTIN-12 (UPC-A)   Data source: Fixed
Cancel / OK

Insert Count
Start at: 1   Stop at: 999999
Cancel / OK

Select Logo...
test.bmp
Cancel / OK

Insert Variable Field
Variable data source
User
Field name
Maximum field length: 0.00 inches
OK / Cancel

In order to update the data source, the message must be reselected to print from the Home Screen.

Data Source
- Fixed
- User
- COM1
- COM2
- Data 1
- Data 2
- Data 3
- Data 4
Cancel / OK

Control Panels Menu

I/O feature not available on Marksman Duo

System Utilities menu for miscellaneous controller tools and file management

Security Access

Controls print head and ancillary equipment configuration

Configures network connectivity via the Ethernet port

Language and unit of measure configuration

Closes this menu immediately

System Setup:

NOTE: This option is only available if the External product sensor is selected on the Task Options tab. In addition, External encoder or Fixed Speed must be selected on the Encoder tab.
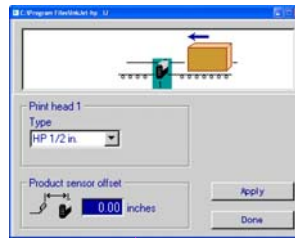
Allows configuration change of the print head direction and quantity

System Setup Screen
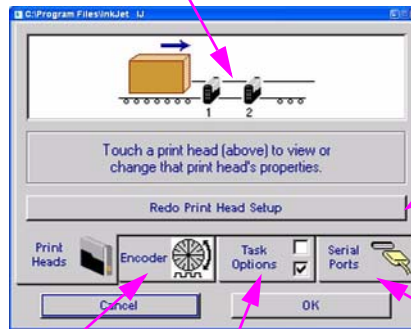
External Encoder:
Line speed measured by an externally mounted encoder and connected to the last SoloSeries print head in the daisy chain

Auto Speed Detect:
Line speed automatically detected via Solo-Series photocells (disables the External product sensor)
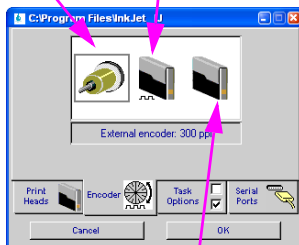
Optional externally mounted photocell connected to the last SoloSeries print head in the daisy chain (disables Auto Speed Detect)

Fixed Speed:
User types in the desired line speed
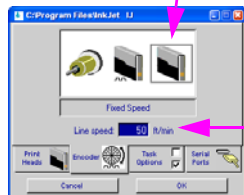
Miscellaneous options for COM port configuration
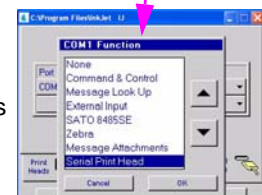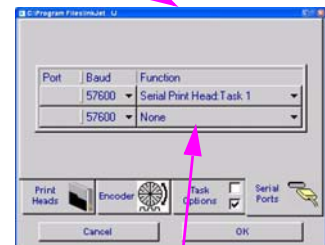
Network:
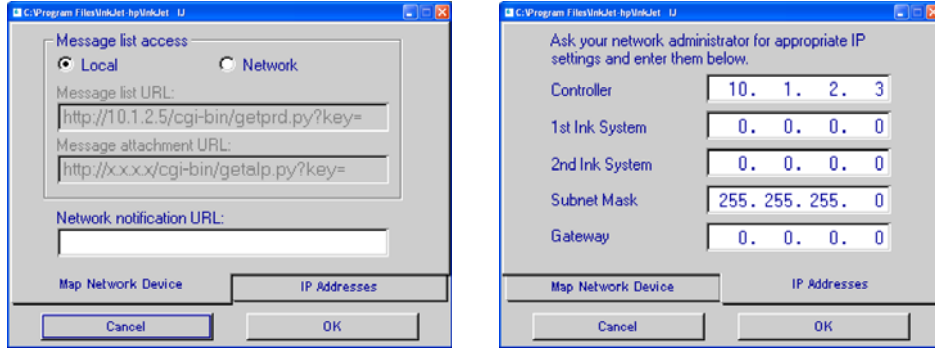
Regional Settings:
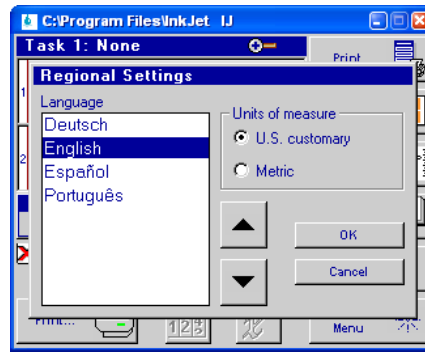
User Access:
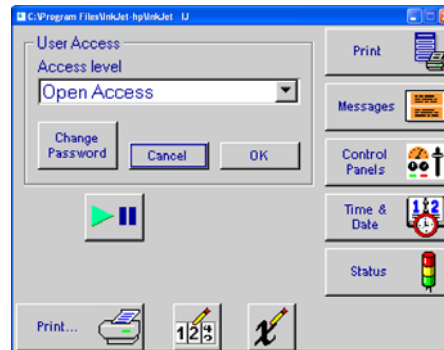
Utilities:

After performing the "Restore default configuration" function, the serial port must be reconfigured for a serial print head.
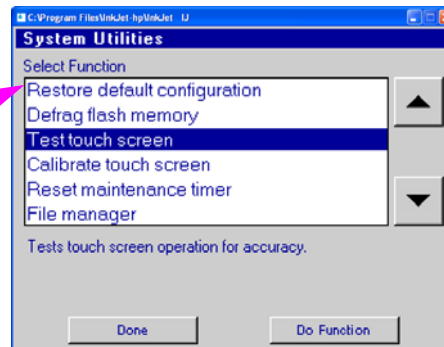
Time & Date Setting Screens
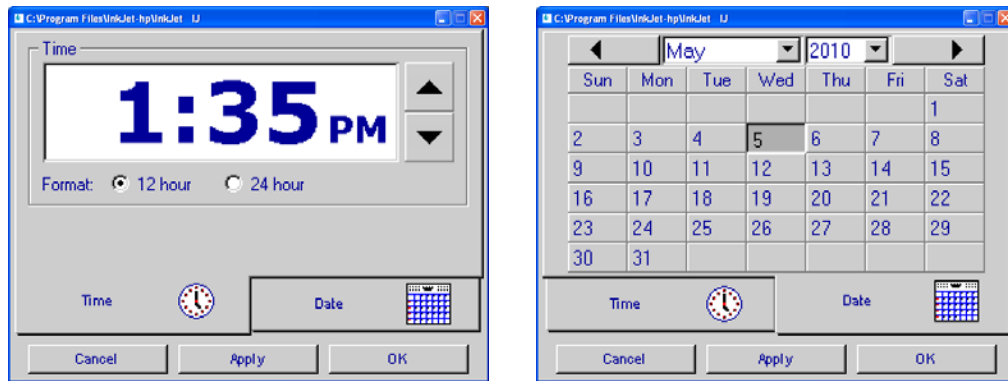
Status Screen

Note: This set of status screens represents two print heads setup in a daisy chain. The first print head (Head 1) is properly connected and detected. The second print head has not been properly connected to the daisy chain.

Indicates head number in daisy chain

Ink cartridge status - OK

Controller / GUI Version

Right hand photocell covered and the left is not

Print head firmware version

The system is currently printing

Head 2 is not connected

Cartridge not detected indicator

Section 4: Maintenance & Shutdowns

Daily Maintenance, Ink Cartridge

Prior to shift startup, the cartridge orifice array should be cleaned of any debris build up.

Requirements:
- Deionized or distilled water (DO NOT USE TAP WATER) for **POROUS INK ONLY**
- Sponge Swabs (Foxjet p/n: 5760-832)

Procedure:

1. For **POROUS INK ONLY** cartridges, lightly dampen sponge swab with deionized water.
2. For **NON-POROUS INK ONLY** cartridges, hold sponge swab against orifice array of cartridge. Press and hold the purge button on the rear of the print head for at least ten seconds. This will fire all channels of the ink cartridge and dampen the swab with ink. The ink will act as its own solvent for cleaning.
3. Rub up and down across the orifice face with light force several times with one side of the sponge swab.
4. Turn the swab over and make one final light rub stroke top to bottom.
5. Immediately press and hold the PURGE button on the rear of the print head for 5-10 seconds to reprime the orifices. Because ink will eject during the channel purging, a piece of paper, cloth, or comparable material can be held in front of the orifice array.

Do NOT hold the ink catch material against the orifice array as print quality will be degraded.

6. If print quality has become unsatisfactory during any shift, then this procedure may be repeated.

Before cleaning   After cleaning
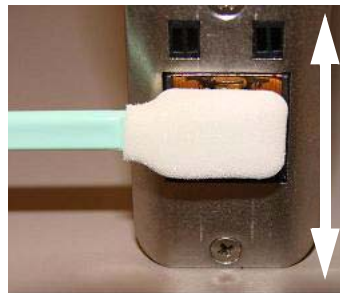
Wipe pen cartridge face up and down several times. Immediately press and hold the purge button for 5-10 seconds.

Weekly to Monthly Maintenance, Print Head

Debris and ink build up on the print head enclosure / cover can be removed using a soft cloth lightly dampened with deionized water.

Take care NOT to wipe the cartridge orifice array.

Shutdowns Less Than 3 Days

The ink cartridge can remain in the print head uncapped. When restarting the print head, follow the Daily Maintenance procedure.

Shutdowns More Than 3 Days

For extended shutdowns, follow the Daily Maintenance procedure, remove the ink cartridge from the print head and store in the optional Cartridge Boot Cap (Foxjet Kit p/n: 5780-208).

PEN CARTRIDGE

CARTRIDGE BOOT CAP
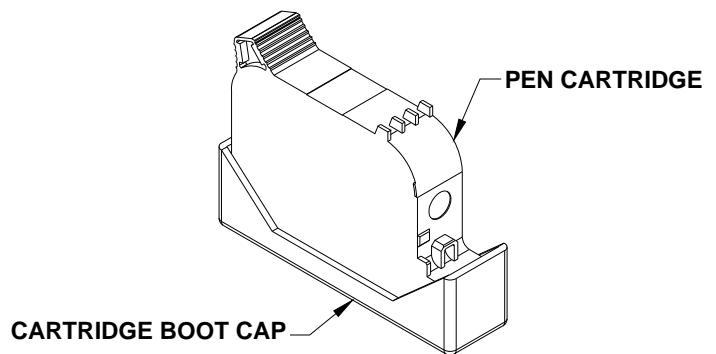
Section 5: Troubleshooting

NO PRINT

| System Symptom	Possible Cause	Actions
No print head power / green LED on rear of print head	• Power Supply • AC Source	• Check power supply light indicator. • Check for AC power source between power supply input limits.
PURGE button on rear of head does not appear to work	• Ink cartridge is damaged or empty • Print head Board	• Replace with new cartridge and repeat PURGE. • Replace print head printed circuit board or print head.
Print head purges but won't print desired message	• Loose or missing cables • Controller or PC software not configured for Serial Print Head • Encoder Malfunction • Product not triggering photocell.	• Tighten or install all cables. • Ensure print heads are configured as serial. See "Section 2: Quick Start", "Step 6: Cabling, Power, and Serial Port Setup" on page 7. • Ensure encoder is installed and plugged into the last print head in the daisy chain. • Ensure the product is within 1/4" of the front face of the print head. • If an external photocell is installed, then validate the setting from the Control Panels, System Setup, Task Options Tab.

POOR PRINT QUALITY

System Symptom	Possible Cause	Actions
Print is foggy or light	• Print head is mounted greater than an 1/8" away from the substrate • There are large air currents near the print head	• Adjust the print head according to "Section 2: Quick Start", See "Step 4: Adjust SoloSeries Print Head to Substrate" on page 5. • Locate print head in an area where there are minimal currents or provide wind barriers.
Print image is missing channels or has multiple fractures	• Pen cartridge face is dirty • Pen cartridge face is damaged at the orifice array • Pen cartridge is not properly seated in the print head	• Clean the pen face per "Section 4: Maintenance & Shutdowns" on page 21. • Replace damaged pen cartridge with new. • Remover cartridge and reinsert according to "Section 2: Quick Start", "Step 5: Insert Cartridge Pen into Print Head" on page 6.

SoloSeries PRINT HEAD LED FUNCTIONALITY

System Symptom	Possible Cause	Actions
Red LED on steady	• Ink Cartridge level is low.	• Ready the next pen cartridge for installation.
Red LED is flashing slowly	• Pen cartridge level is out of ink and significant print degradation is imminent. • A non-Foxjet cartridge is installed.	• Prepare to install a new pen cartridge. • Install an original Foxjet cartridge.
Red LED is flashing fast	• Pen cartridge is missing from print head stall. • Print head is calibrating a new cartridge. • Print head is in thermal protection mode.	• Install or re-install the appropriate pen cartridge. • Allow the print head up to 30 seconds to calibrate a new pen cartridge. • Print cartridge is out of ink and the print head is self-protecting against excessive heating. Replace the appropriate pen cartridge.

Appendix A: Specifications

SoloSeries45:
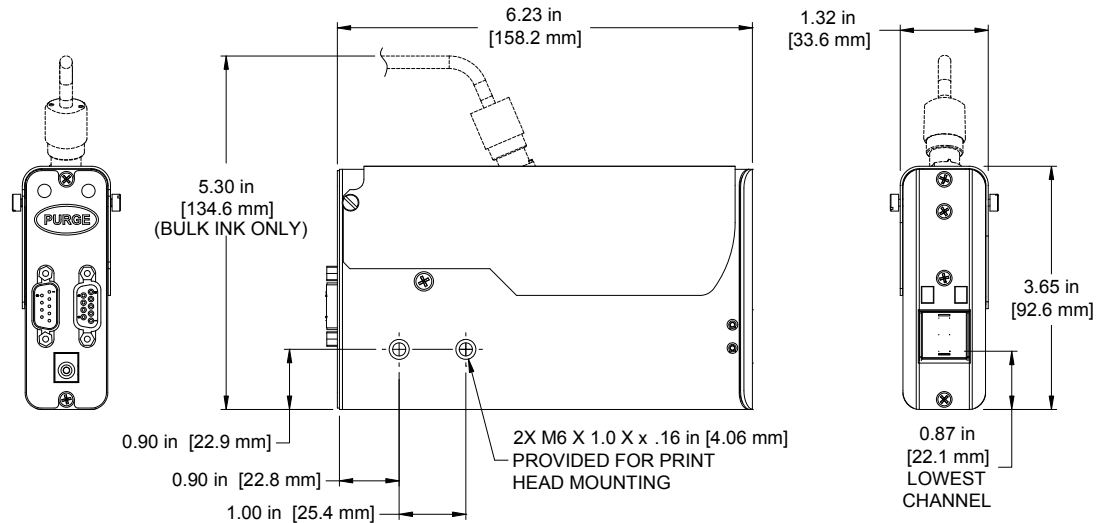
Weight
1.3 lbs (.6 kg)
Enclosure
Anodized Aluminum and Stainless Steel
Electrical
15 VDC from power supply to print head
Power Supply: 90-260 VAC, 50/60 Hz, 1.5 A max. (per power supply)
Print Speed
200 fpm, 300 dpi continuous
Print Resolution
300 dpi
Throw Distance

	Porous Ink	Non-Porous Ink
Recommended Gap:	.1 in (2.5 mm)	.08 in (2.0 mm)
Maximum Gap:	.25 in (6.3 mm)	.15 in (3.8 mm)

Print Direction
Between horizontal and downwards
Print Head Tilt
+/-45° from vertical
Maximum Number of Vertical Fields
5 per print cartridge
File Storage
Twenty-seven storage file slots per stall can be formatted as either a font or bitmap.
Three factory installed fonts: Arial 30, 75, 150, and 300 (.1 in / 2.54 mm, .25 in / 6.35 mm, and .5 in / 12.7 mm).
Bitmap files: 150 dots tall max (.5 in / 12.7 mm) and a max file size of 256 kilobytes per file slot.

PRINT HEAD TILT

Environment
Ambient operating temperature: 50°F to 104°F (10°C to 40°C)
Operating Humidity: 10% - 80% RH
Ink Type
Dye, Pigmented, or Solvent base hp 45 cartridges

Ink Cartridge: The SoloSeries has been engineered and designed to work with Foxjet ink cartridges. The SoloSeries' **Smart Level Ink Detection System**, which provides ink level monitoring to ensure complete ink usage and product safety, will not be functional if used with non-Foxjet ink cartridges.

SoloSeries90:

6.20 in
[157.4 mm]

2.43 in
[61.8 mm]

5.81 in
[147.5 mm]
(BULK INK ONLY)

4.13 in
[104.9 mm]

1.38 in
[35.2 mm]

0.90 in
[22.8 mm]

1.00 in
[25.4 mm]

2X M6 X 1.0 X.16 in [4.06 mm]
PROVIDED FOR PRINT
HEAD MOUNTING

0.87 in [22.1 mm]
LOWEST
CHANNEL

Weight
2.1 lbs (1.0 kg)
Enclosure
Anodized Aluminum and Stainless Steel
Electrical
15 VDC from power supply to print head
Power Supply: 90-260 VAC, 50/60 Hz, 1.5 A max. (per power supply)
Print Speed
200 fpm, 300 dpi continuous
Print Resolution
300 dpi
Throw Distance

	Porous Ink	Non-Porous Ink
Recommended Gap:	.1 in (2.5 mm)	.08 in (2.0 mm)
Maximum Gap:	.25 in (6.3 mm)	.15 in (3.8 mm)

Print Direction
Between horizontal and downwards
Print Head Tilt
+/-45° from vertical

Maximum Number of Vertical Fields
5 per print cartridge, 10 total
File Storage
Twenty-seven storage file slots per stall can be for-
matted as either a font or bitmap.
Four factory installed fonts: Arial 30, 75, 150, and
300 (.1 in / 2.54 mm, .25 in / 6.35 mm,
.5 in / 12.7 mm, and 1.0 in / 25.4mm).
Bitmap files: 300 dots tall max (1.0 in / 25.4 mm)
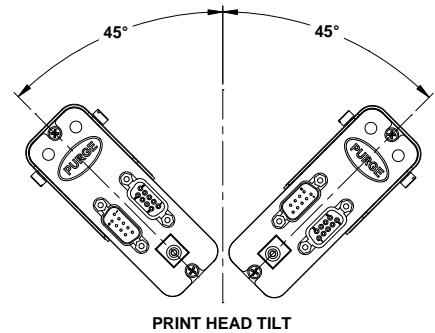and a max file size of 256 kilobytes per file slot.
Environment
Ambient operating temperature: 50°F to 104°F (10°C to 40°C)
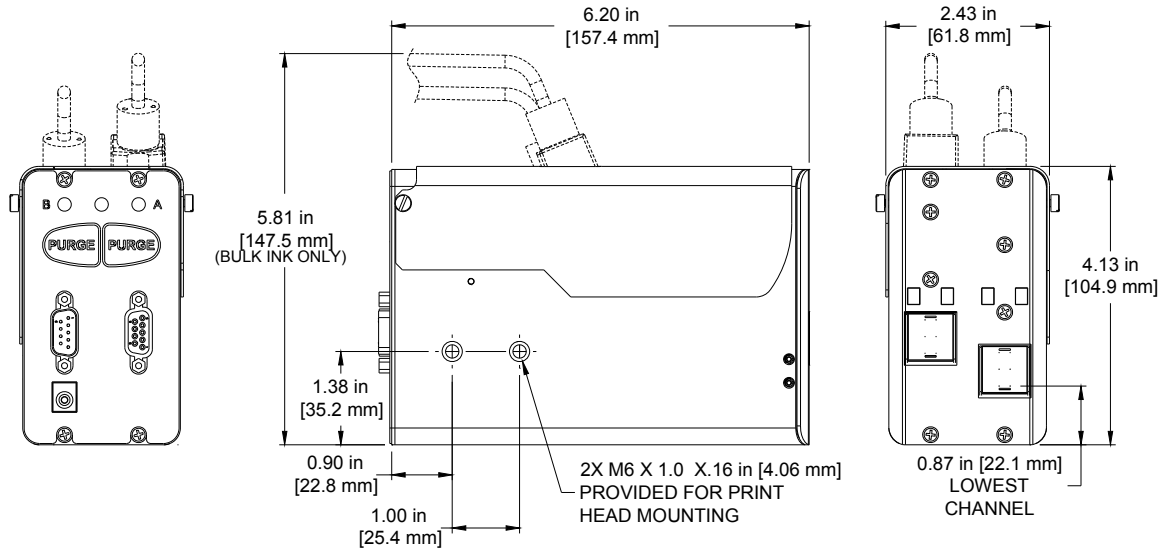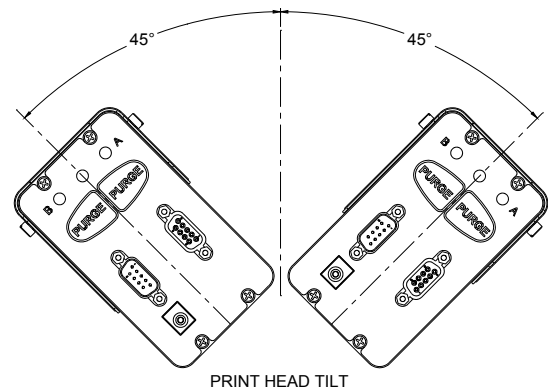Operating Humidity: 10% - 80% RH
Ink Type
Dye, Pigmented, or Solvent base hp 45 cartridges

45°   45°

PRINT HEAD TILT

TJ
INK

Ink Cartridge: The SoloSeries has been engineered and designed to work with Foxjet ink cartridges. The
SoloSeries' **Smart Level Ink Detection System**, which provides ink level monitoring to ensure complete ink
usage and product safety, will not be functional if used with non-Foxjet ink cartridges.

SoloSeries IS:

11.68 in [296.6 mm]
11.00 in [279.4 mm]
1.00 in [25.4 mm]
5.89 in [149.7 mm]
.44 in [11.3 mm]
3.75 in [95.3 mm]
1.00 in [25.4 mm]
3.50 in [88.9 mm]
6.00 in [152.4 mm]

15 V

3X M6 X 1.0 X x .20 in [5.1 mm]
PROVIDED FOR INK SUPPY MOUNTING

Weight

4.2 lbs (1.9 kg) without ink cartridge

5.4 lbs (2.5 kg) with ink cartridge

Enclosure

Powder-coat painted steel

Mounting

Modular brackets included

Electrical

15 VDC from power supply to print head

Power Supply: 90-260 VAC, 50/60 Hz, 1.5 A max. (per power supply)

Normal Operating Pressure Range

4 psi to 5 psi

Cable Ports

(1) 15 VDC power supply jack

(1) RS-232 port

Plumbing Port

(1) Pressurized ink outlet to print heads

Environment

Ambient operating temperature: 50°F to 104°F (10°C to 40°C)

Operating Humidity: 10% - 80% RH

Tubing Limitations
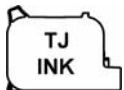
Maximum horizontal tube length = 10 ft (3 m)

Maximum vertical tube length = 3 ft (1 m)

Print Head Limitations

Up to 4 print head cartridge stalls (eg: 2-SoloSeries45 with 1-SoloSeries90; 4-SoloSeries45; 2-SoloSeries90)

Ink Type

Dye base

Ink Cartridge: The SoloSeries has been engineered and designed to work with Foxjet ink cartridges. The Solo-Series' **Smart Level Ink Detection System**, which provides ink level monitoring to ensure complete ink usage and product safety, will not be functional if used with non-Foxjet ink cartridges.

Marksman Duo:

Weight
6.6 lbs (3.0 kg)

User Interface
Type: Graphical User Interface

Keyboard: 70-key, QWERTY style, elasto-meric keyboard

5.7" Display: 320 X 240 color LCD with touch screen, 5.7" diagonal

Fonts
Arial 30, 75, 150, and 300 (.1in / 2.5 mm, .25 in / 6.3 mm, .5 in / 12.7 mm, and 1 in / 25.4mm).

Storage
16 MB flash memory

Print Speed
Up to 200 fpm

Maximum Field Length
Up to 52 characters long per field

Maximum Number of Vertical Fields
5 per print cartridge

Maximum Product Length
108 inches (2743 mm)

Maximum Repeat Print Distance
108 inches (2743 mm)

Maximum Number of Print Heads Per Controller
Up to 4 print cartridges per COM port in any combination (eg: 2-SoloSeries45 with 1-SoloSeries90; 4-SoloSeries45; 2-SoloSeries90)

2 - COM ports allow for a total of 8 print cartridges per controller

Ports
(2) RS-232 ports, (1) 10/100Base-T Ethernet port, (2) USB port

Electrical
15 VDC from power supply to controller
Power Supply: 90-260 VAC, 50/60 Hz, 1.5A max. (per power supply)

Environment
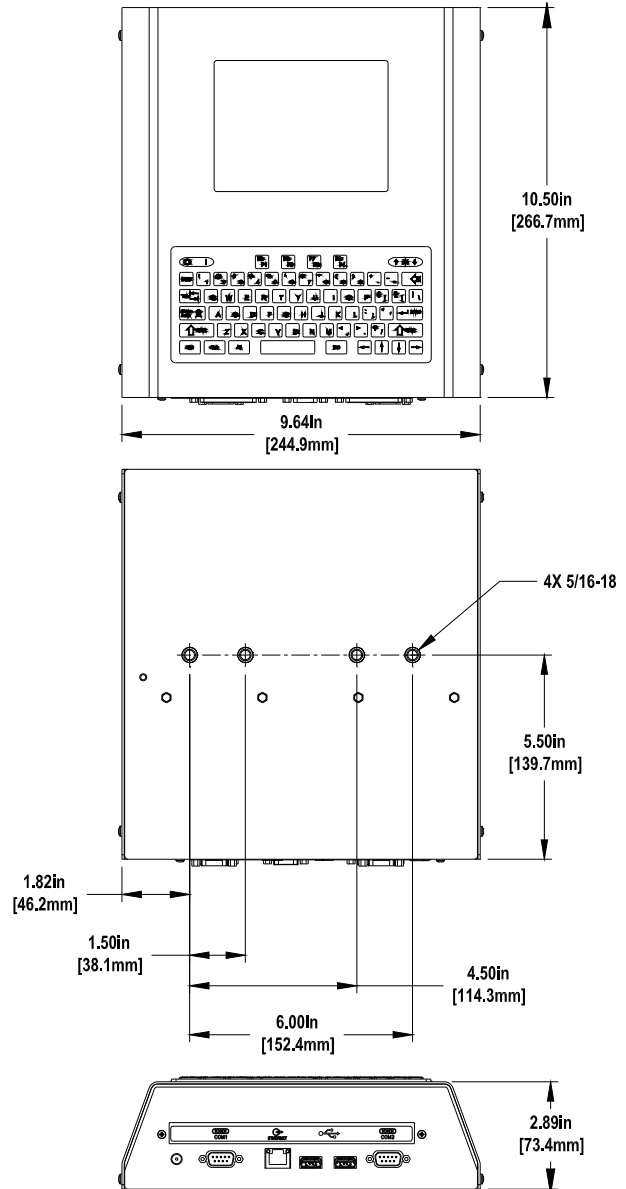Ambient operating temperature: 40°F to 104°F (5°C to 40°C)

Operating humidity: 10% - 90%, non-condensing

Maximum Distance Between Controller and Farthest Print Head in Daisy Chain
100 feet (30.5 m)

Bar Codes Supported
GTIN-12 (UPC-A)

Appendix B: Theory of Operation

SoloSeries Print Heads

TIJ Technology

The SoloSeries print head is a form of Thermal Ink Jet (TIJ) based on the hp® 45A cartridge. TIJ technology works on the principle of rapidly heating ink at any particular addressable channel. As the ink is heating, it ejects from the orifice of any combination of channels. Because channel orifice sizes are very small, many more orifices can be compacted in the same amount of space as conventional print technologies. With more orifices per vertical inch / millimeter, a much higher resolution image can be produced.

SoloSeries Inkjet Similarities and Differences

The SoloSeries print head can print as a stand-alone printer or as part of a daisy chain. Up to four SoloSeries45 or two SoloSeries90 print heads can be daisy chained. A message can be sent down to the SoloSeries print head via the optional Marksman Duo controller, the included GUI software interface program for a computer, or an optional hand-held device. Additionally, the SoloSeries can be programmed to print up to five lines of print, and any combination of alpha / numeric, date / time, count, variable, logo, or UPC-A barcode fields. Logo bitmap files can not be larger than one megabyte. Variable fields can only be changed when the message is selected to print.

The difference between the SoloSeries and other Foxjet inkjet technologies is its ability to store the message information locally on each print head. Therefore, the Marksman Duo controller or GUI interface computer can be disconnected from the print head daisy chain while printing; however, status information to the controller / GUI will be lost until reconnected. Essentially the Marksman Duo controller / GUI interface provides the initial setup and message information. After the operator sends the print command, the SoloSeries print head takes over and the Marksman Duo / GUI only reports status information.

Ink Cartridge Ink Status

Each ink cartridge contains approximately 42 mL of ink and has been programmed at Foxjet so as to make full use of ink level status. When a new cartridge is snapped into a SoloSeries print head, it is identified and ink level is monitored. As the ink depletes to 10% ink remaining, Ink Low, the red LED on the rear of the print head turns on steady. The red LED changes to slow flashing, Ink Out, when there is minimal ink remaining, and significant print degradation is imminent. Ink status is reported back to the Marksman Duo or GUI software as long as they are connected to the print head daisy chain.

Marksman Duo

Functional Description

The Marksman Duo Ink Jet System prints text, autocodes (such as product counts or time and date stamps), bar codes, 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. 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.

Controller Features

The Marksman Duo Controller has a graphical user interface consisting of a color LCD, touch screen, and 70-key QWERTY keypad. Also housed in the controller are a CPU Board, and a Display Interface Board.

Power

One 15VDC desktop power supply provides power to the Marksman Duo.

Battery Backup - A 3V battery on the CPU Board (BT1) maintains the contents of system SRAM and keeps the real time clock running during power outages or when the Marksman Duo is not plugged into a power outlet.

Please note that power is applied to the Marksman Duo even when it is "turned off." When turned off using the OFF button on the keyboard, the Marksman Duo enters a sleep mode where it responds to nothing but the ON button. All voltages are present while sleeping. The only way to completely remove power is to unplug the unit.

CPU Board

The CPU Board has a microcontroller, flash, SDRAM and SRAM memory, a touch screen controller, a real time clock/calendar, an Ethernet port, two USB 2.0 ports, two serial ports, 12V, 5V, 3.3V and 1.8V regulators, a 3V battery, PC/104 connectors and connectors for attaching the system display and keyboard assemblies.

The microcontroller (U20) is the Marksman Duo's central processing unit (CPU). It executes the system program from flash (U16, U18) and SDRAM (U15, U17). The CPU also directly controls the keyboard, detecting and processing key closures. The CPU's on-board LCD controller reads display data from the display memory (part of the SDRAM), formats it and sends it to the LCD with all necessary control signals. Display data is written into the display memory by the CPU.

The touch screen controller (U27) senses when the screen is touched, and sends screen coordinate data to the CPU for processing.

The real time clock/calendar (U21) keeps system time.

The 3V battery (BT1) preserves system data and keeps the clock running during power outages or when the Marksman Duo is not plugged into a power outlet.
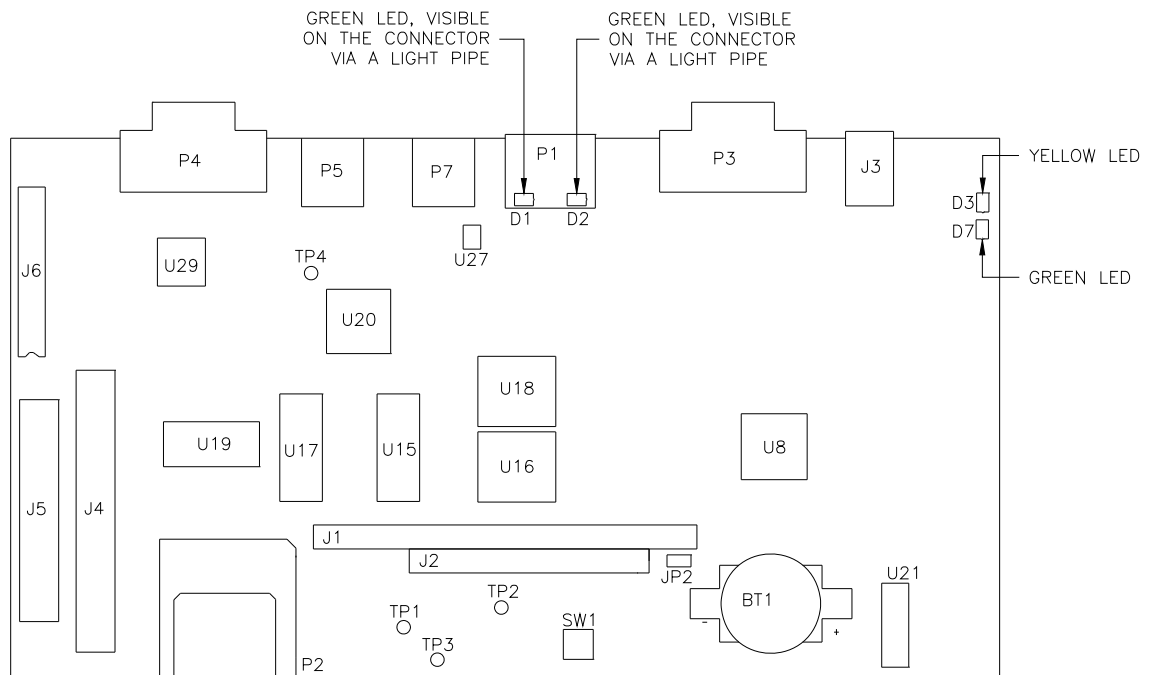
Test Points: TP1:   12VDC, power for display backlight. Turns on/off with soft power switch.

TP2:   5VDC, power for 5V logic. Also supplies the input voltage to the 3.3V regulator.

TP3:   3.3VDC, power for 3.3V logic. Also supplies the input voltage to the 1.8V regulator.

TP4:   1.8VDC, power for the CPU core.

LEDs: D1:   Ethernet connector, Green. Flashes to indicate network traffic.

D2:   Ethernet connector, Green. Indicates valid network connection.

D3:   Yellow, flashes when the CPU is running.

D7:   Green, indicates 3.3V is present.

Interconnect Diagram

Marksman Duo Controller CPU Diagram
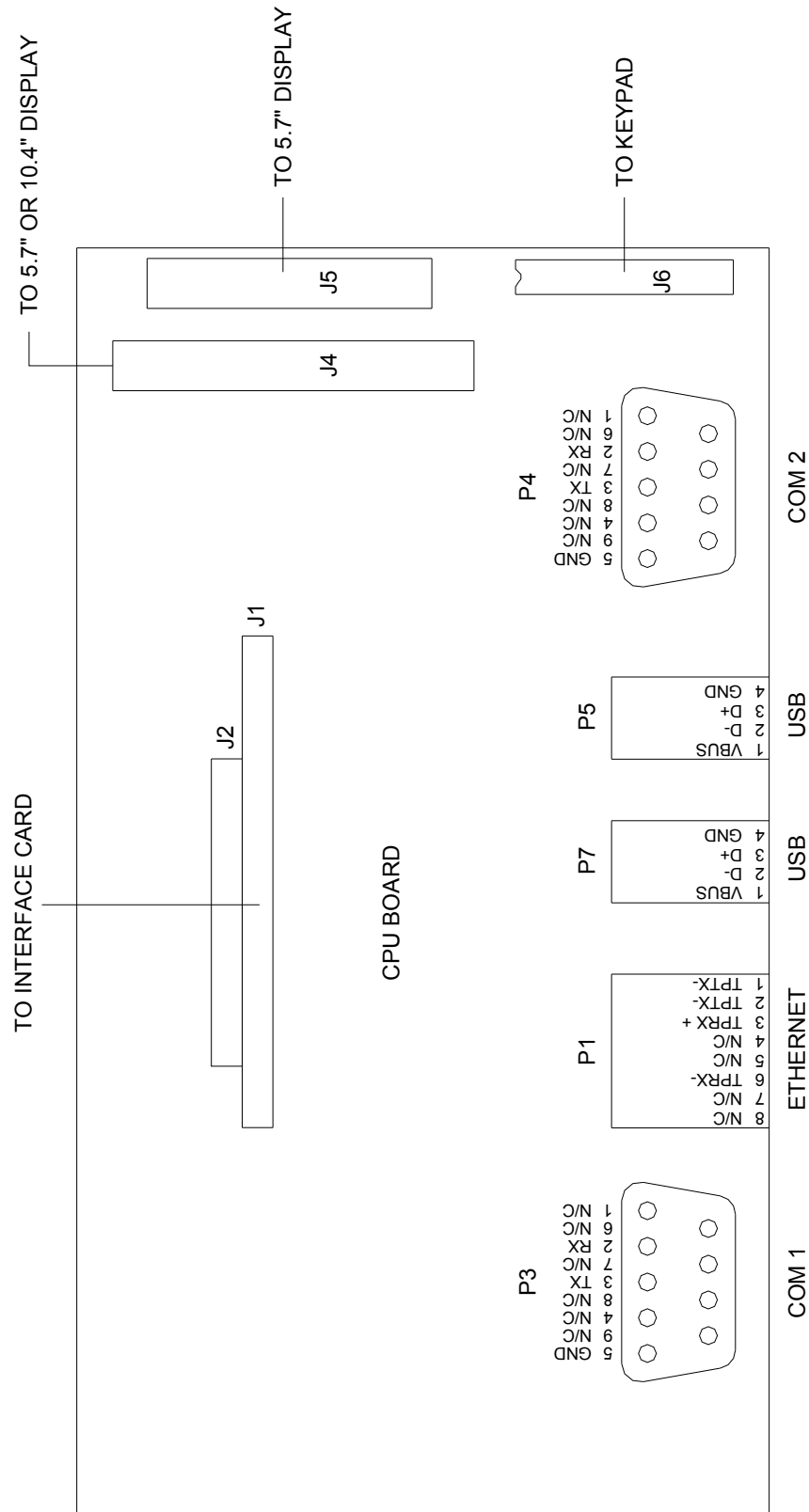
Appendix C: Part Numbers - Consumables and Service Parts

Consumables

Ink Cartridge: The SoloSeries print head has been engineered and designed to work with Foxjet ink cartridges. The SoloSeries' **Smart Level Ink Detection System**, which provides ink level monitoring to ensure complete ink usage and product safety, will not be functional if used with non-Foxjet ink cartridges.

Porous Media Ink

Part No.	Description	Package	Shelf Life
5780-201FX	Solo 100 Porous Media, Black	5 cartridges	1 year
5780-201FXR	Solo 100 Porous Media, Red		
5780-202FX	Solo 200 Porous Media, Black, Extended Decap		
5780-212FX	Solo 300NP Non-Porous Media, Black		
5780-235FX	Solo 200, Barcode, Porous Media, Black		

Service Parts

SoloSeries45

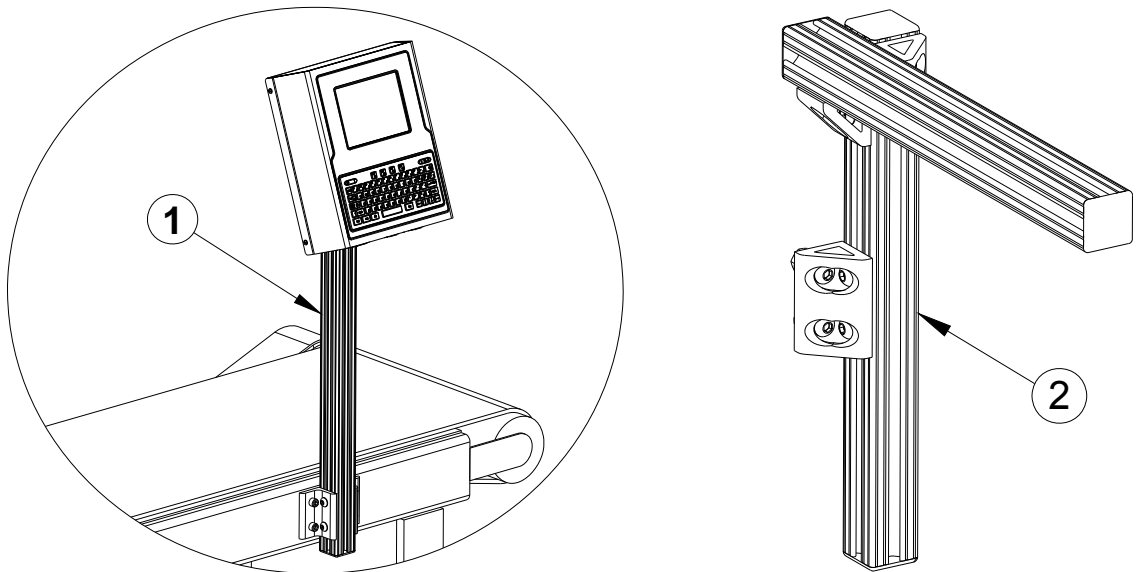| Item	Kit No.	Description
1	5760-302	Power Supply, Print Head
2	5780-002FX	SoloSeries45 Complete Print Head Kit with Mounting Bracketry, Power Supply, Data Cable, & PC Software
3	5780-203FX	Cover, Enclosure
4	5780-226FX	PCB Replacement Set
5	5780-205FX	Print Head Replacement
6	5780-208	Boot, Cartridge Cap
7	5780-319-10	Cable, Print Head, 10'
8	2464-182-25	Extension Cable, Print Head, 25' (not shown)
9	2464-182-50	Extension Cable, Print Head, 50' (not shown)
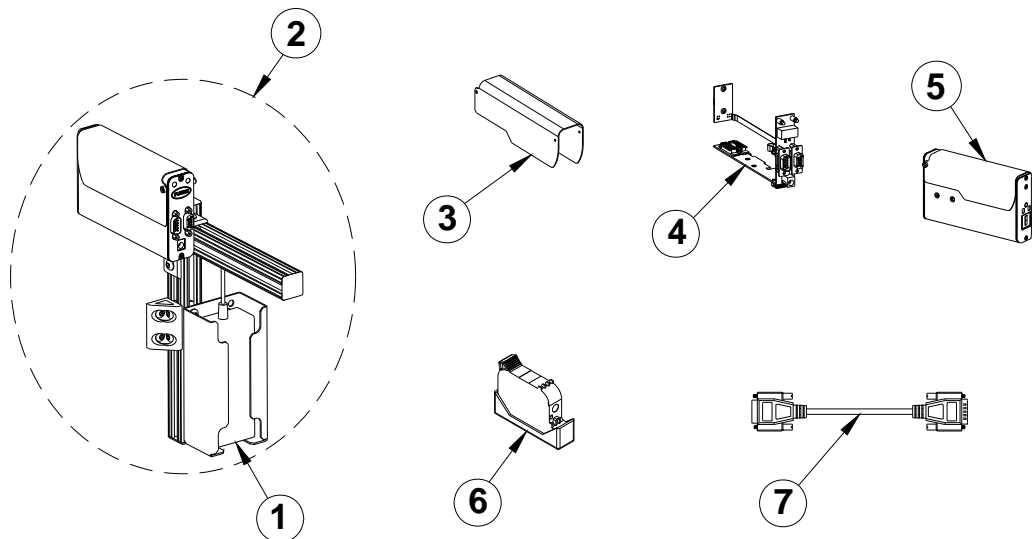
SoloSeries90

Item	Kit No.	Description
1	5760-302	Power Supply, Print Head
2	5780-007FX	SoloSeries90 Complete Print Head Kit with Mounting Bracketry, Power Supply, Data Cable, & PC Software
3	5780-225FX	Cover, Enclosure
4	5780-221FX	PCB Replacement Set
5	5780-215FX	Print Head Replacement
6	5780-208	Boot, Cartridge Cap
7	5780-319-10	Cable, Print Head, 10'
8	2464-182-25	Extension Cable, Print Head, 25' (not shown)
9	2464-182-50	Extension Cable, Print Head, 50' (not shown)
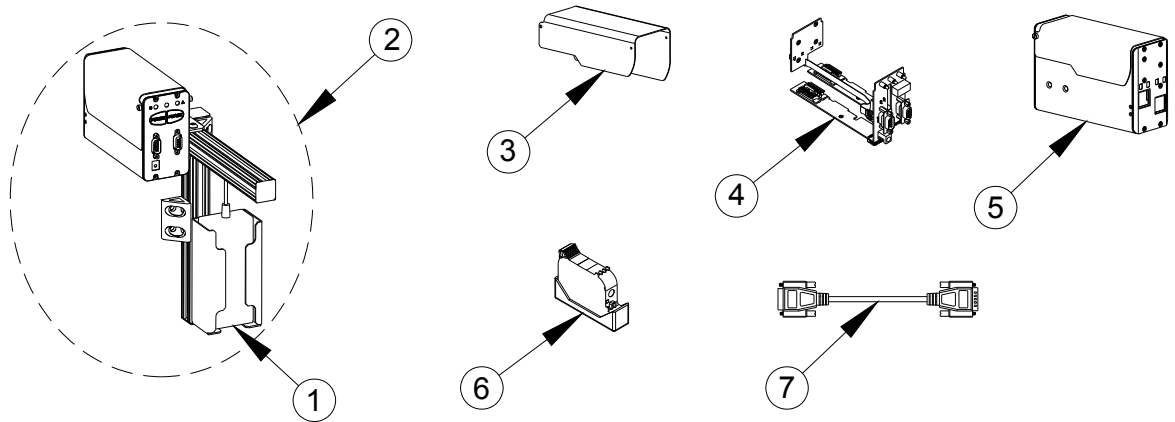
Marksman Duo

Item	Kit No.	Description
1	5760-122	Battery, CPU, (Type: CR2032)
2	5760-746	Cable, Display to CPU PCB, 40 Conductor
3	5765-001DSS	Marksman Duo Controller
4	5765-201	Keyboard Replacement
5	5765-202	CPU PCB Replacement
6	5765-205	Color Display Replacement
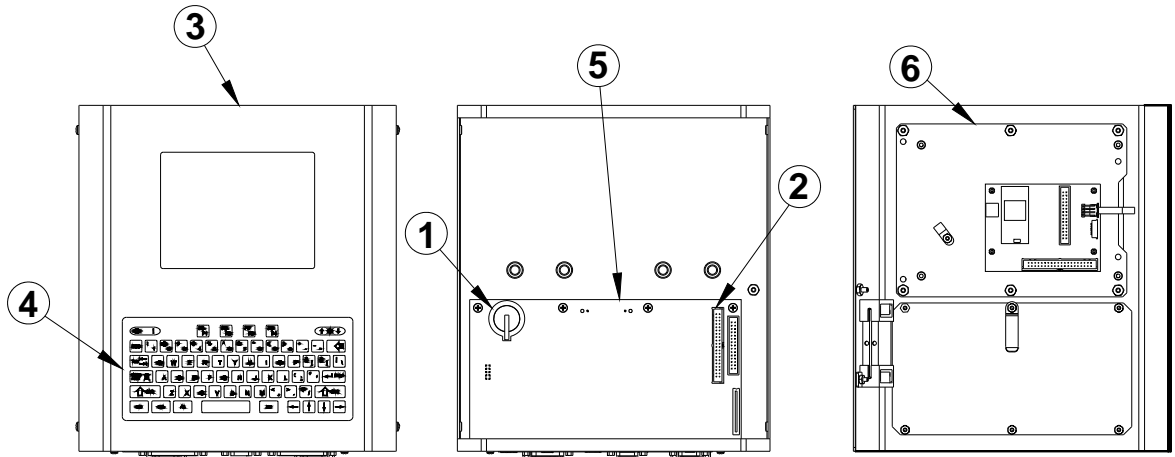
Bracketry

Item	Kit No.	Description
1	5765-200	Bracketry, Marksman Duo Mounting
2	5780-200	Bracketry, SoloSeries Print Head Mounting

Optional Equipment

Encoder, Photocell, Accessory Hub, and Beacon

Item	Kit No.	Description
1	5760-820-IJ	Encoder Assembly with Mounting Bracket & 25' Cable
2	5765-206	Encoder O-ring Replacement
3	5760-383	Photocell
4	5780-010	Accessory Hub with Power Supply
5	5780-214	Beacon
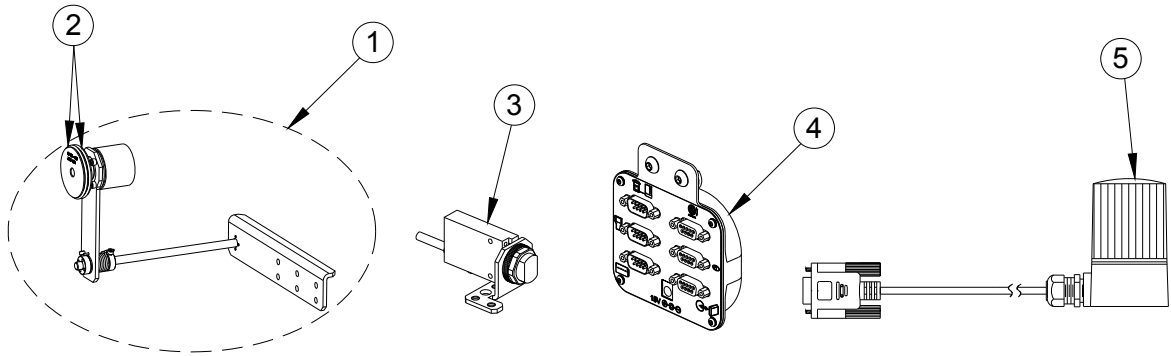
TYPICAL ENCODER MOUNTING ON OPEN AREA OF CONVEYOR BELT
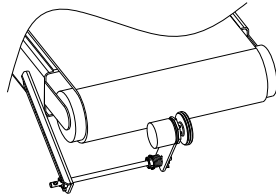
TYPICAL PHOTOCELL MOUNTING
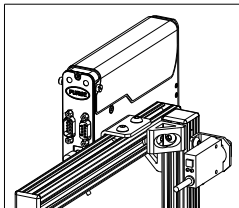
BRACKETRY MOUNTING
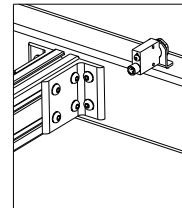
CONVEYOR MOUNTING
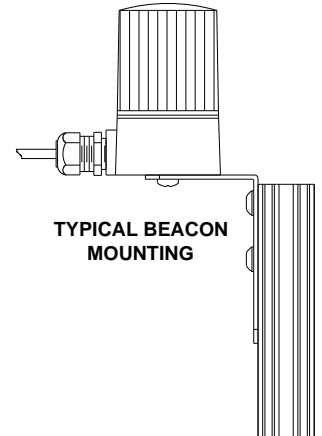
TYPICAL BEACON MOUNTING

ACCESSORY HUB CONNECTIVITY

HAND HELD

INK STATUS BEACON

ENCODER

PHOTOCELL

ONLY OPERATES WITH 1/2" (12.7 mm) PRINT HEADS

ACCESSORY HUB

PRINT HEAD

TYPICAL ACCESSORY HUB MOUNTING

BULK INK SUPPLY

POWER SUPPLY

CONTROLLER OR PC
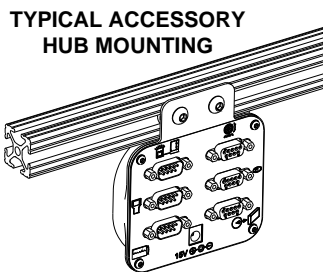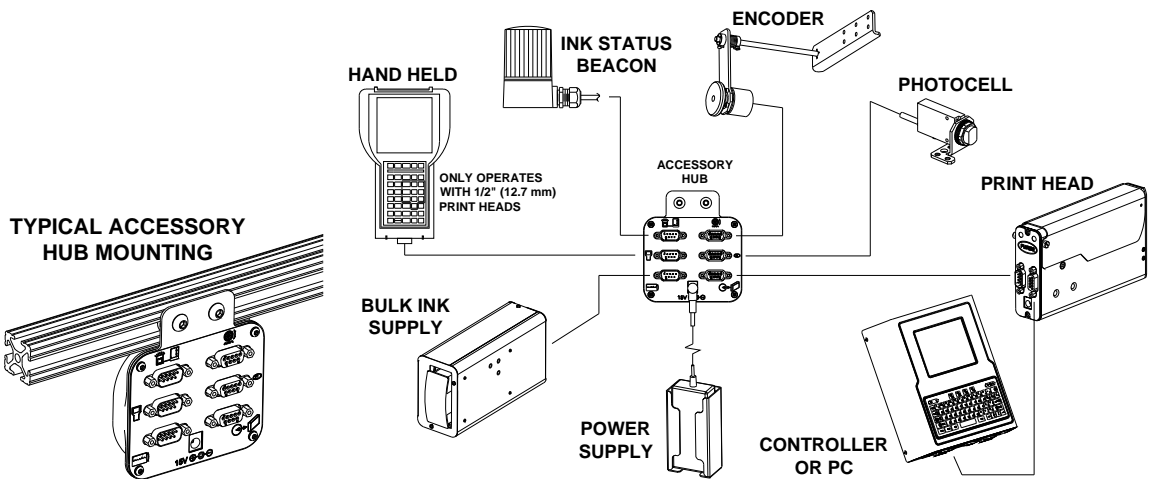
Roller & Retractor Bracketry

Item	Kit No.	Description
1	5780-206	Roller Bracket Only
2	5780-207	Roller and Retractor Bracket
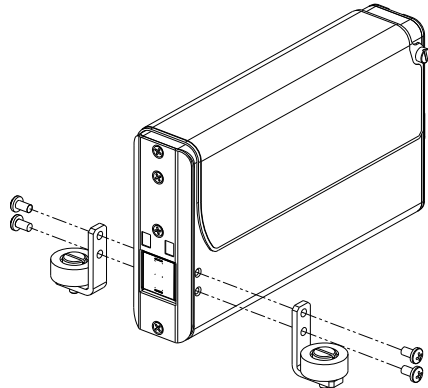
Roller Bracket Only
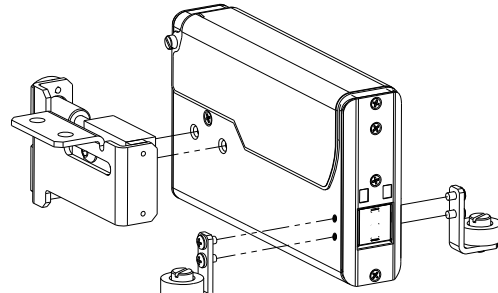
Roller & Retractor Bracketry

Maintenance

| Item	Kit No.	Description
1	1901-398	Hand Cleaner, Reduran
2	5760-832	Sponge Swabs, Qty. 100
3	X30001-001	Lint-free Wipe Cloths

Appendix D: File Backup and Restore

Use these procedures for making archival copies of the system configuration and print message files, and for preserving the system's configuration and print messages during firmware upgrades. File types saved during a backup are .cfg, .prd, .bmp and .alp. These are the system configuration files, message files, logo files and label files, respectively.

These instructions assume the Marksman Duo Controller is already connected, via Ethernet, to a PC. If not, please refer to *"Appendix E: Configuring a PC to Communicate with the Marksman Duo" on page 40*.

1. Obtain the Marksman Duo Controller's IP address. Most Marksman Duo controllers have an IP address of **10.1.2.3**. It may be different if the controller is networked with other Marksman Duo's or other devices. If the IP address is unknown, go to the controller, and from the **Home Screen**:
- Touch the **Control Panels** button to open the Control Panels Menu.
- Touch the **Network** button on the Control Panels Menu to open the Network Setup Screen.
- Touch the **IP Addresses** tab to display the system's IP addresses.
- Record the Marksman Duo's IP address (it's the top one).

2. On the PC, start Microsoft Internet Explorer (must be version 3.2 or higher) or another web browser.

3. In the browser's address box type in "http://", followed by the controller's IP address. See the illustration below:
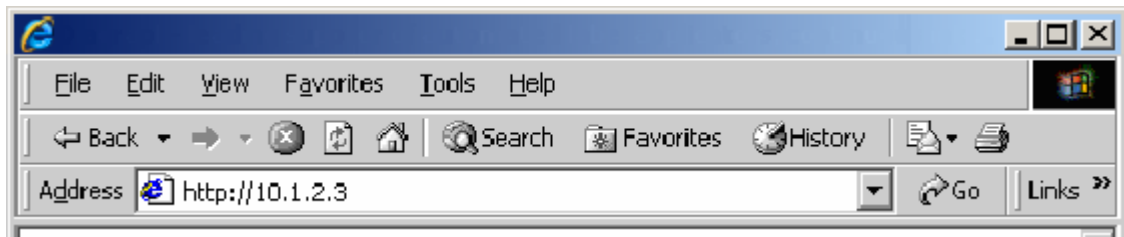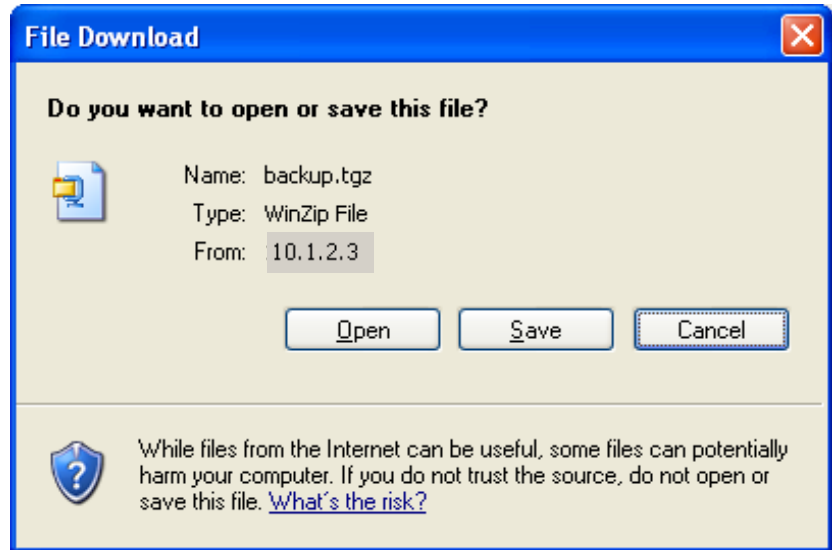

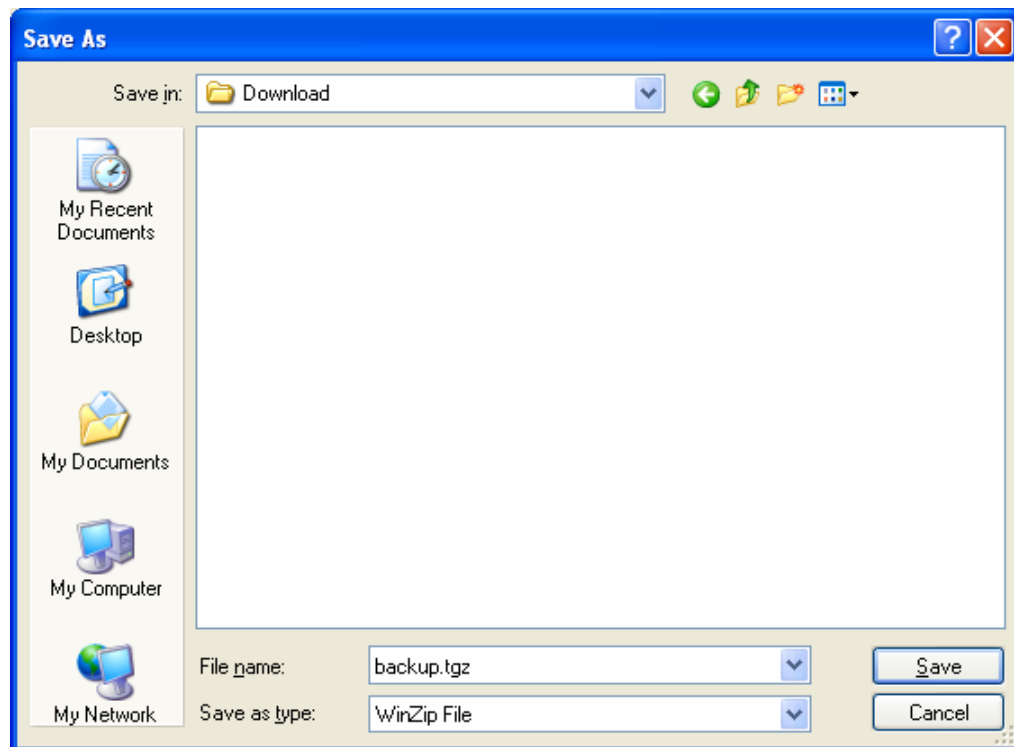4. Press **Enter**. The web page shown below should appear.
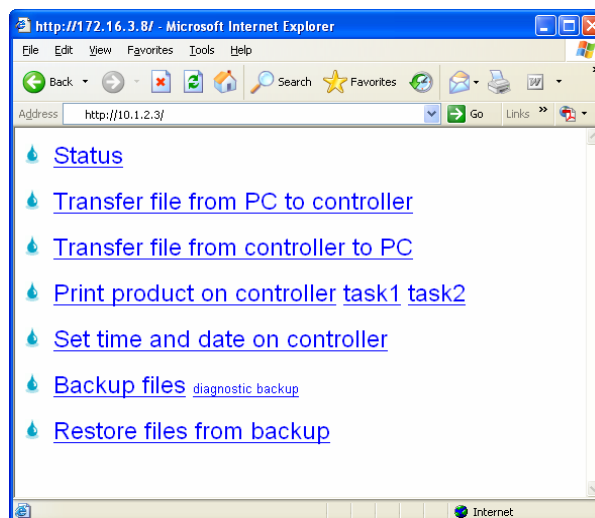
File Backup

To backup the system files, click the **Backup files** link. The dialog box shown at right (or a similar dialog box) will appear.

Click the **Save** button. A **Save As** dialog appears.

The Marksman Duo files backed up are compressed and put into a single file, and are given the default name and file extension **backup.tgz**. Following normal Windows® conventions, the backup file may be renamed and given any extension, and saved in any folder desired. To save the backup file with an extension other than .tgz, open the **Save as type** combo box and select **All Files**.

Restoring Backed-Up Files

To restore the controller's backed up system files, click the **Restore files from backup** link. The web page shown below appears.
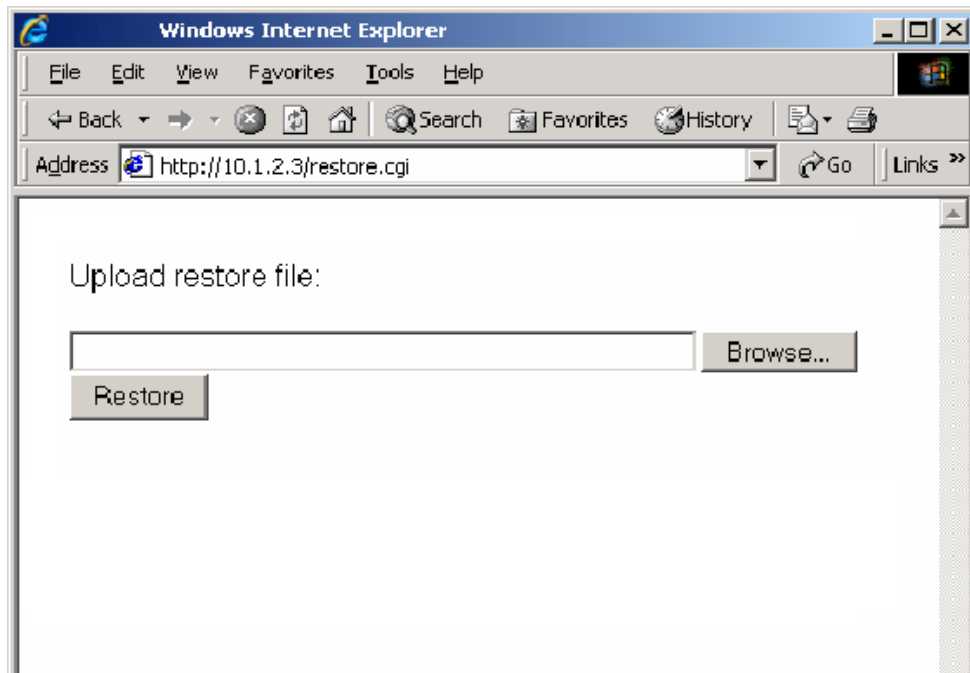
Click the **Browse...** button to locate and select the backup file to be sent to the controller.

Click the **Restore** button to send the file to the controller. If the file transfer is successful, the web page shown below will be displayed.
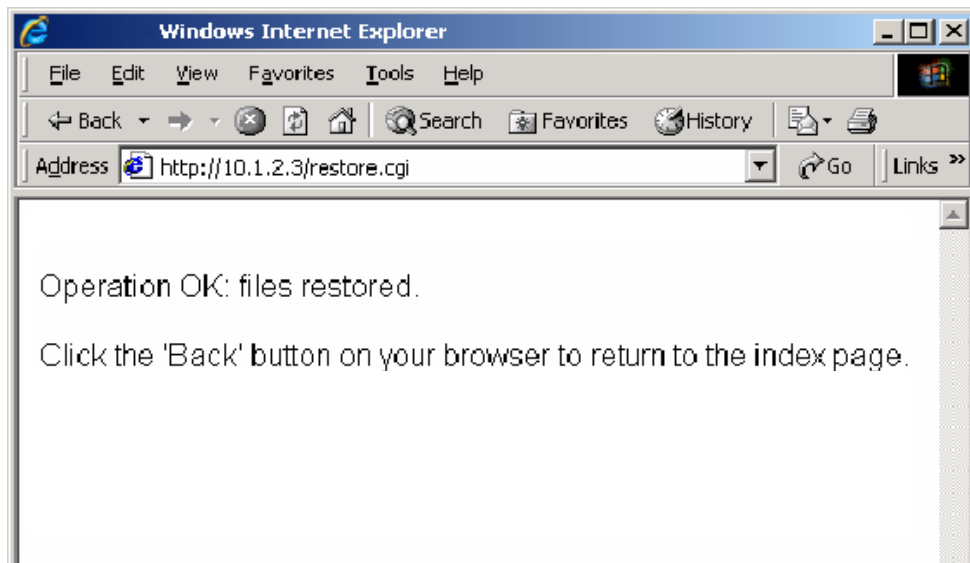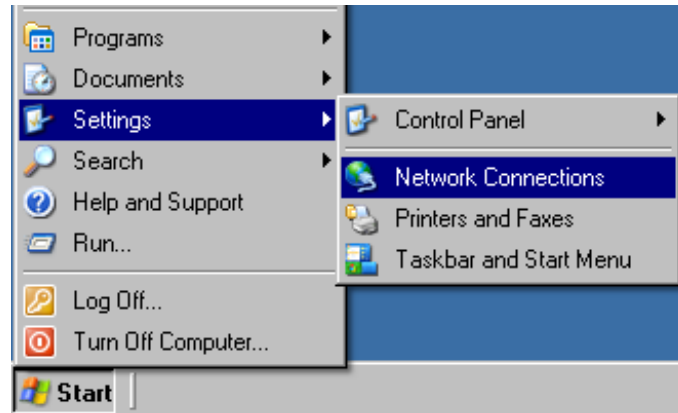
## Appendix E: Configuring a PC to Communicate with the Marksman Duo

This appendix has instructions for setting the IP address and subnet mask of the PC so it can communicate with the Marksman Duo Controller. Included are instructions for Windows XP®, Windows 2000®, Windows 98®, and Windows 95®.
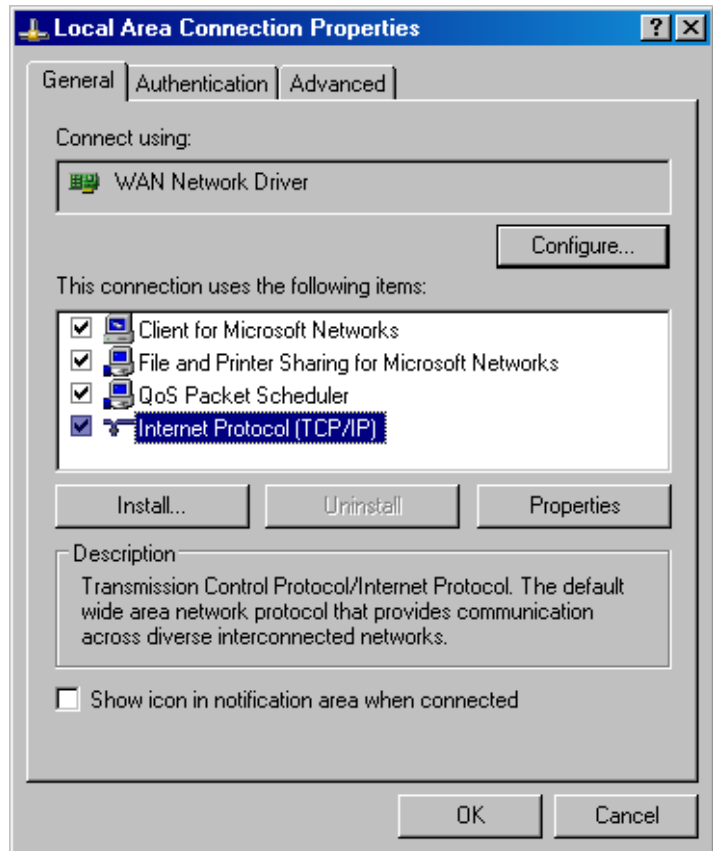
Windows XP®

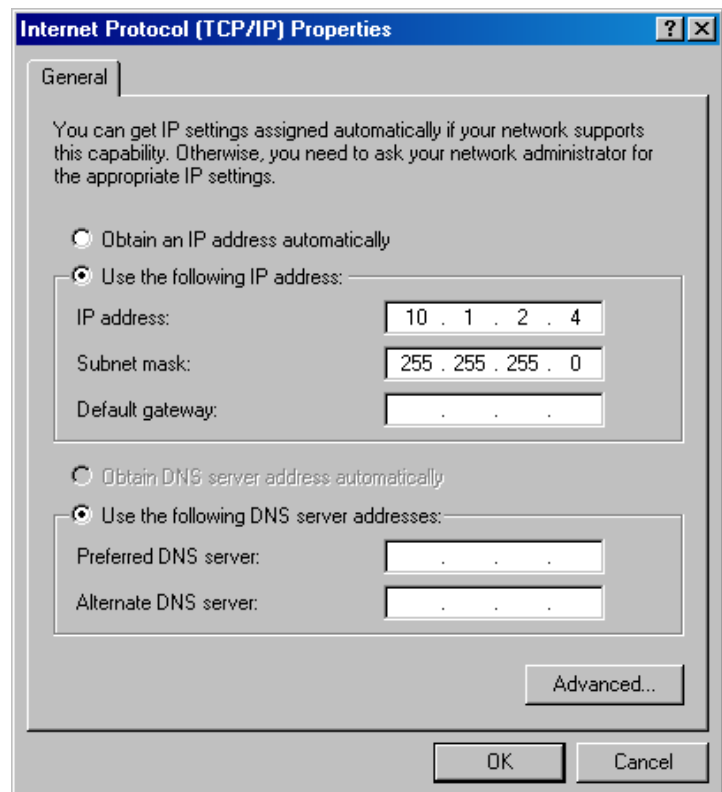1. Open the **Start** menu; select **Settings**, then **Network Connections**.

2. Click **Local Area Connection**, then open the **File** menu and select **Properties**.
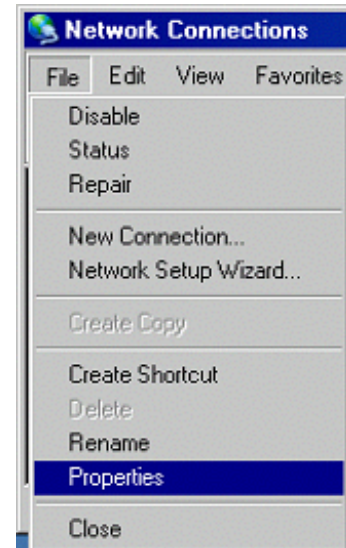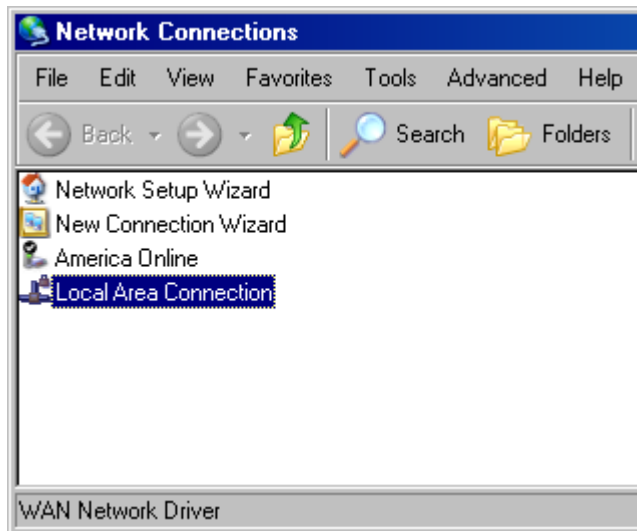
3. Select **Internet Protocol (TCP/IP)** then click the **Properties** button.
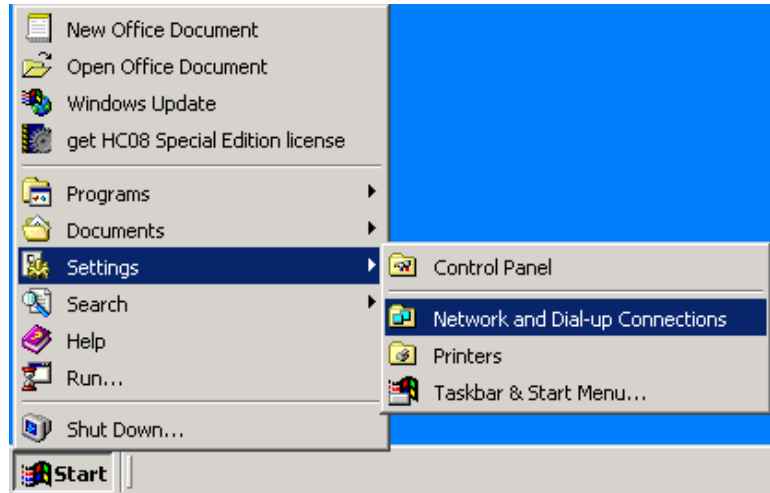

4. Click the **Use the following IP address** radio button. Enter an IP address of **10.1.2.4**, a subnet mask of **255.255.255.0**, and click the **OK** button.
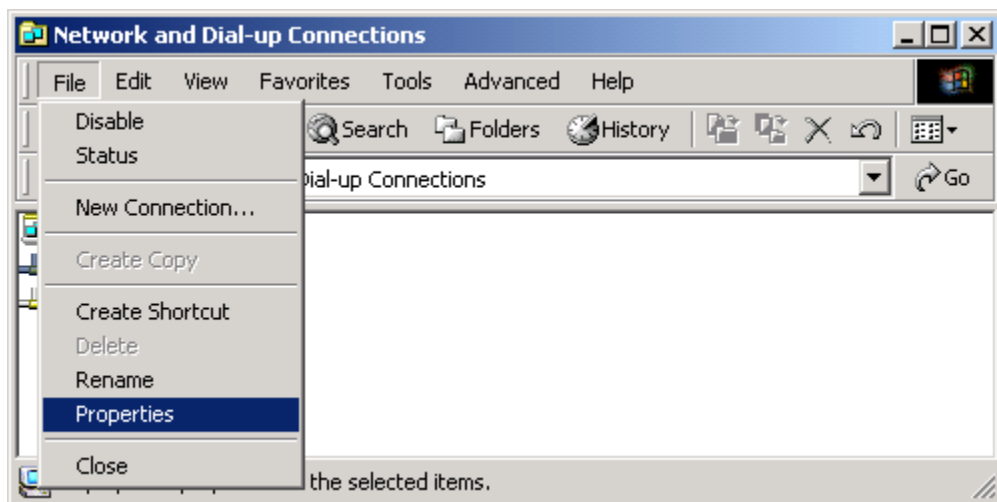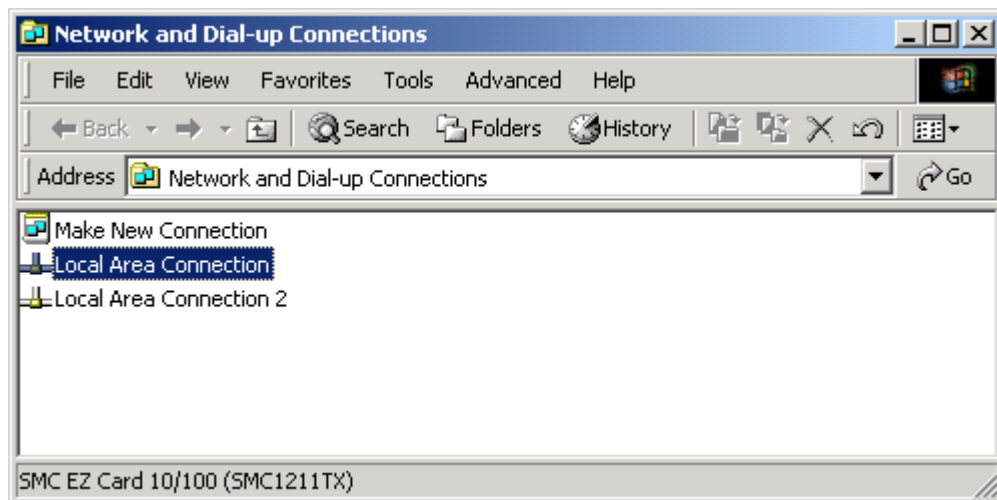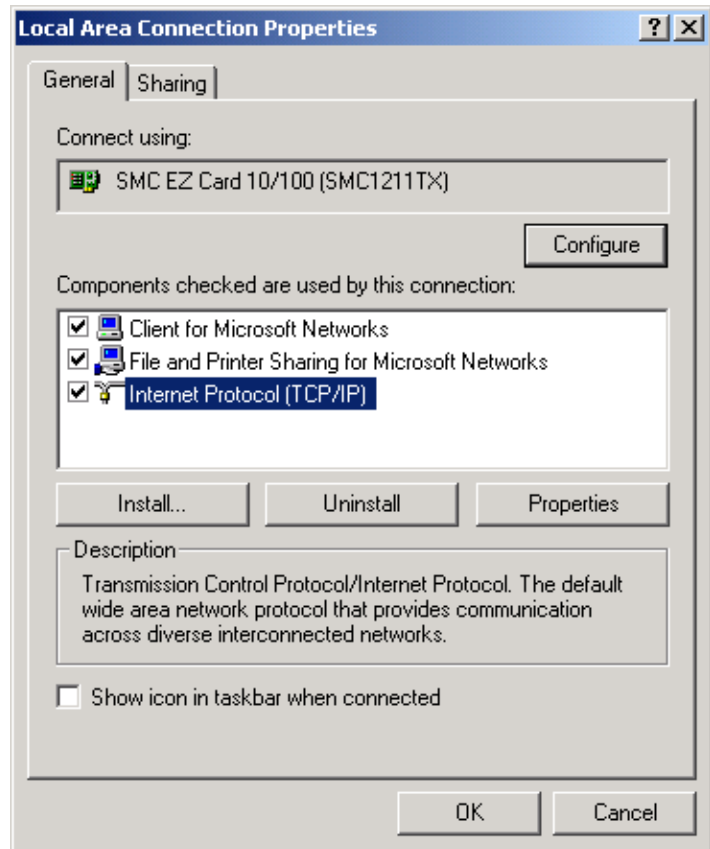
Windows 2000®

1. Open the **Start** menu; select **Settings**, then **Network and Dial-up Connections.**
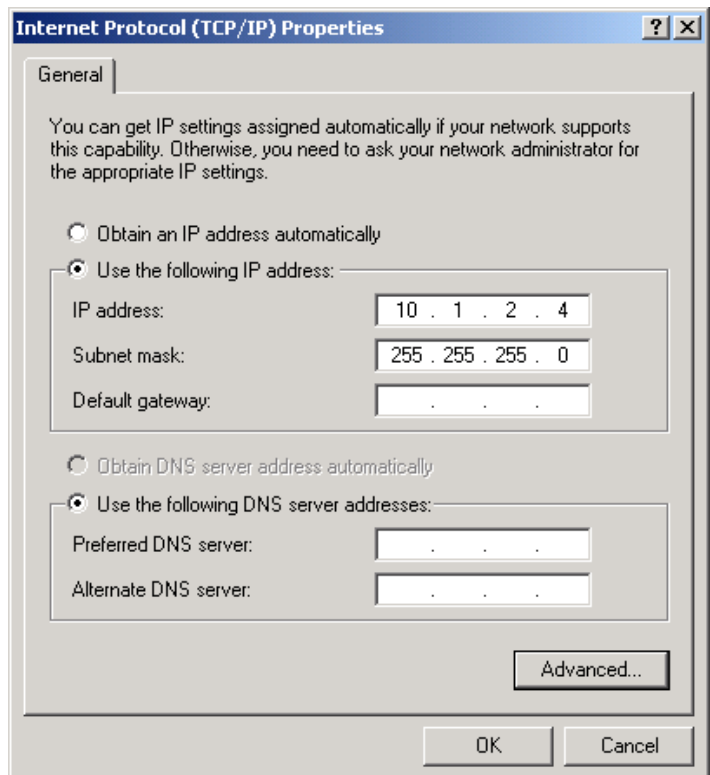

2. Click the desired connection, then open the **File** menu and select **Properties**.

3. Select **Internet Protocol (TCIP/IP)** then click the **Properties** button.

4. Click the **Use the following IP address** radio button. Enter an IP address of **10.1.2.4**, a subnet mask of **255.255.255.0,** and click the **OK** button.

Appendix F: Font Samples

Arial 30 - 1/10 in (2.54 mm):

AaBbCcDdEeFf
1234567890

Arial 75 - 1/4 in (6.35 mm):

AaBbCcDdEeFf
1234567890

Arial 150 - 1/2 in (12.7 mm):

AaBbCcDdEeFf
# 1234567890

Arial 300 - 1 in (25.4 mm):

For best results printing this font, use an external encoder. The top image was printed with an external encoder. The lower image was printed using the "Auto Speed Detect" mode (without external encoder) from the controller or GUI software.

AaBbCcDd
# AaBbCcDd

Appendix G: Creating Logo Files

Open **Paint** from a PC by selecting **Start, Programs, Accessories,** and then **Paint.**
Bring up the **Attributes** dialog box by selecting **Image** and then **Attributes**.
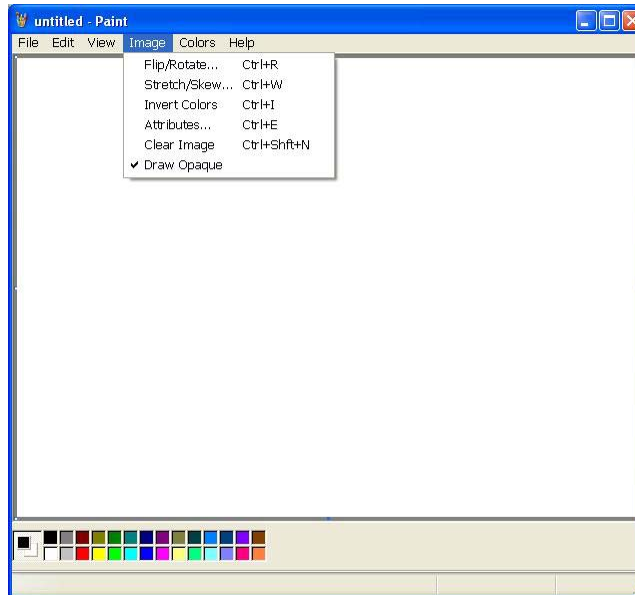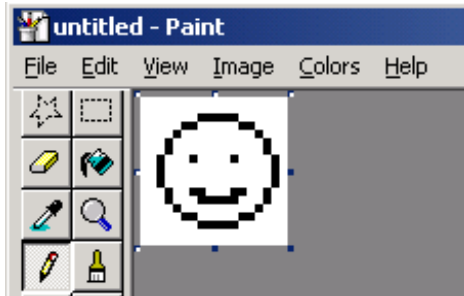

Enter the **Width** and **Height** of the logo in **Pixels**. The maximum logo height is 150 pixels.
The width (logo length) is limited by the maximum product length, see "Marksman Duo:" on
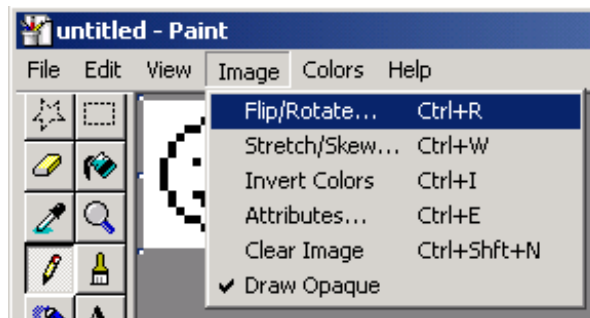page 27. Select **Black and white** for the Colors.
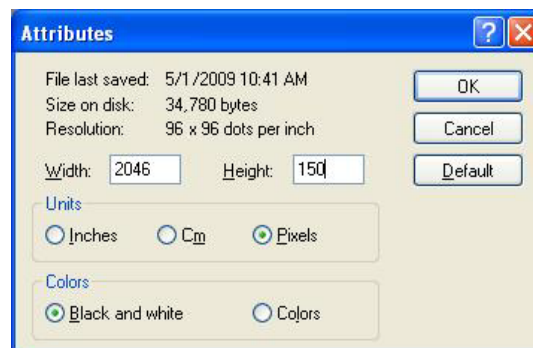
Choose **Yes** at the screen prompt to convert to black and white if applicable.
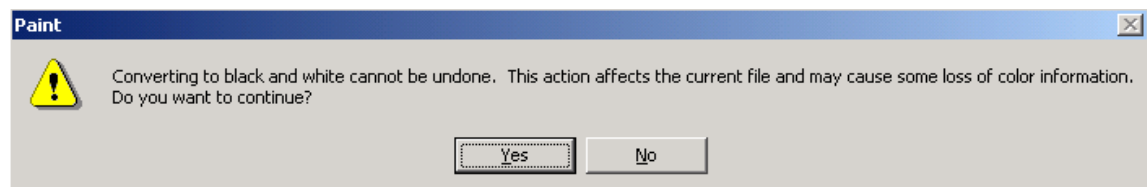
Define the pixels of the logo using the drawing tools…

Bring up the **Flip and Rotate** dialog by selecting **Image**, **Flip/Rotate**.

Select **Rotate by angle**, then **270°**. Click **Ok**.
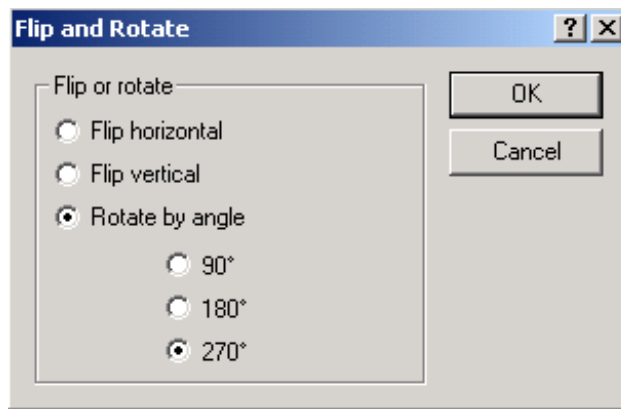
From the **File Menu**, select **Save As** and save in a directory location that you will remember.

NOTE: If a PC is being used instead of a stand-alone controller, then navigate to the "bmps" directory inside of the installation directory. Save the file inside the "bmps" directory.

Appendix H: Uploading Files to the Print Head and File Management

CAUTION: Power should be disconnected from the print head prior to connecting or disconnecting any external devise, including: PC, handheld, controller or print head daisy chain cables. Electrical arcing may occur if external cabling is connected or disconnected while power is supplied to the unit.

NOTE: Files can **not** be transferred while thermal jet print heads are printing. Pause print first.

Font and bitmap files are uploaded to the print head via the controller or PC Inkjet Demo software on a computer through the System Utilities File Manager. In addition to uploading files, the File Manager also allows removal of files from the print heads; however, files cannot be copied from a print head. During the upload process, files are simultaneously added to or removed from all print heads on the daisy chain being addressed. Operations on an individual print head are possible only when it is the sole head on the daisy chain.

NOTE: A BMP or FNT file must reside on the controller and print head in order to select it for message creation and print, respectively. Refer to "Appendix D: File Backup and Restore" on page 37, step 4. Select the "Transfer file from PC to controller" option. Browse the PC and locate the BMP. Select Ok to transfer the file to the controller.

To access the File Manager utility:

1. Touch the **Control Panels** button on the **Home** screen.
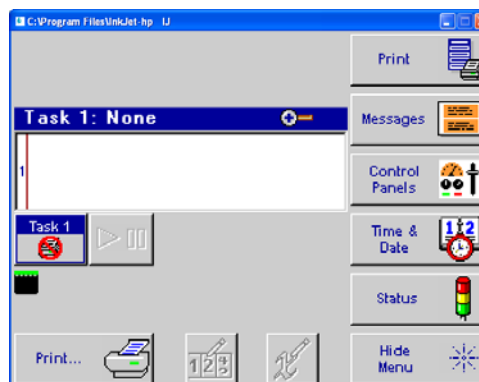
2. Touch the **Utilities** button; the **System Utilities** screen is displayed.
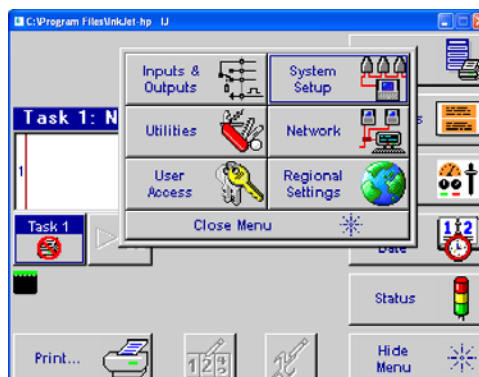
3. Scroll to the bottom of the utilities list and select **File manager**.
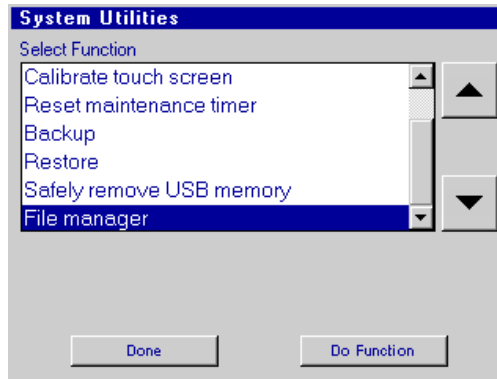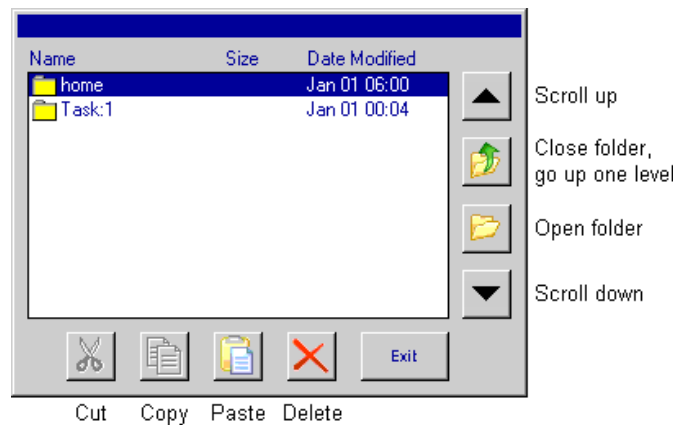

4. Touch the **Do Function** button; the **File Manager** screen is displayed.

The **home** folder contains all folders and files related to IJ3000 operation; task folders, **Task:1** and **Task:2** (not shown), contain the font and logo files present on the print heads on their respective task. Task folders are present only when one or both of the controller's serial ports are configured for serial print heads. Not shown above are folders **usb0** and **usb1**, which are displayed when USB drives are plugged into the one or both of the controller's USB ports. USB folders are not displayed when running the PC InkJet Demo program.

Adding Logo and Font Files

So that they may be correctly selected, displayed, and printed, logos and fonts must be stored on both the controller and the print head(s).

On the controller, logos are stored in the folder /home/bmps, and fonts are stored in the folder /home/fnts. Files are automatically placed in the correct folders when transferred to the controller from a PC using a web browser; they must be manually placed in the correct folder when being transferred from a USB drive using the copy-and-paste method.

Uploading a file to a print head loads the file on all print heads on the task. A step-by-step example of uploading a logo file to task 1 print heads follows. The example assumes the file being uploaded is already on the controller.

1.   Open the **home** folder. The display shows the available folders and files:
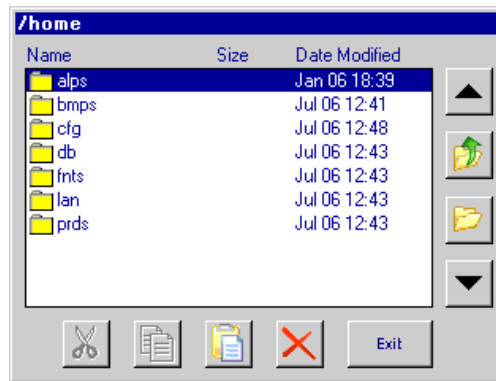
2.   The display shows a list of available files. Highlight **bmps** folder with the up / down arrows and open it:
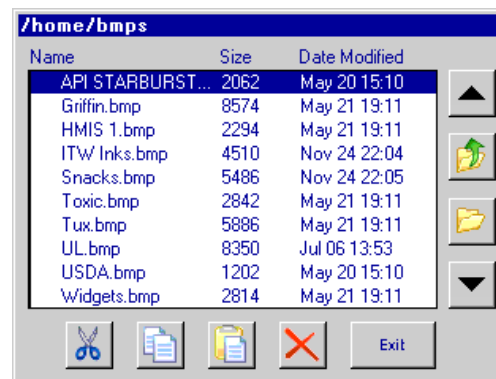
3.   Select the file to be uploaded to the print head(s), and then touch the Copy button.
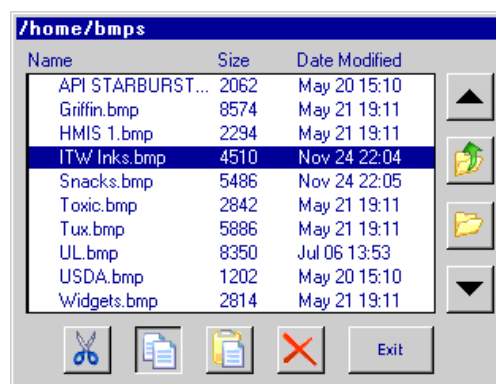
Close folder, go up one level

Copy

4.   Close the **bmps** folder, returning to the **home** folder level.

5.   Close the **home** folder, returning to the top level.

6. Select and open the **Task:1** folder. The display shows a list of all files on print head #1 only, and assumes that all print heads have the same files.
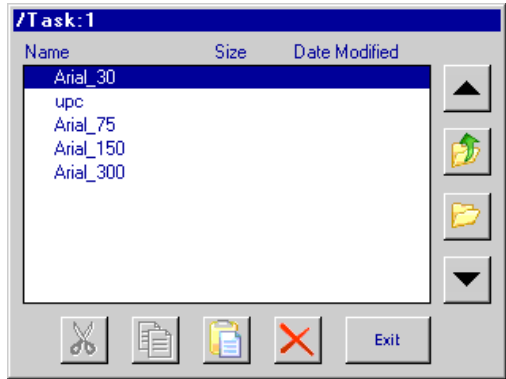
Open

7. Touch the Paste button. The file is uploaded to all print heads on the task, after which the file list is updated, showing the newly added file.
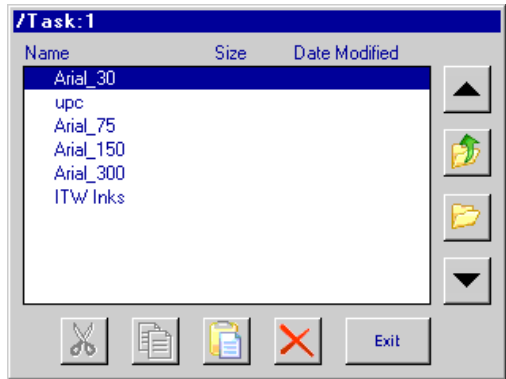
Paste

While the file is uploading an hourglass is displayed, and the red LED on the back of each print head on the task blinks.

Removing a File

To remove a file from all print heads on a task:

1. Select and open the task folder.

Open
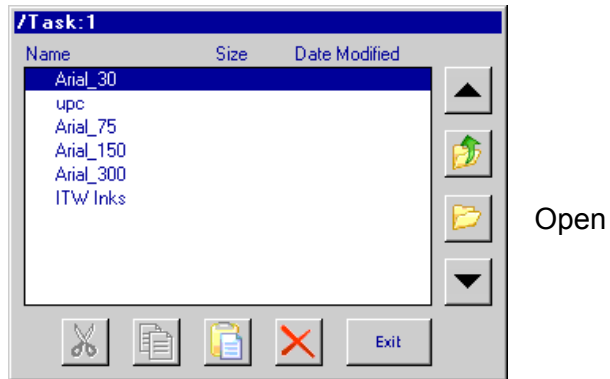
2. Select the file to be deleted, and then touch the Delete button.
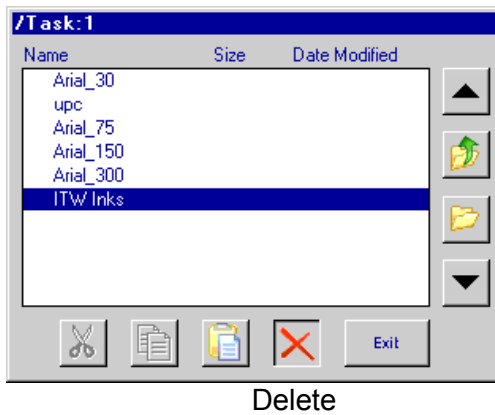
Delete

3. The file is deleted and the file list updated:
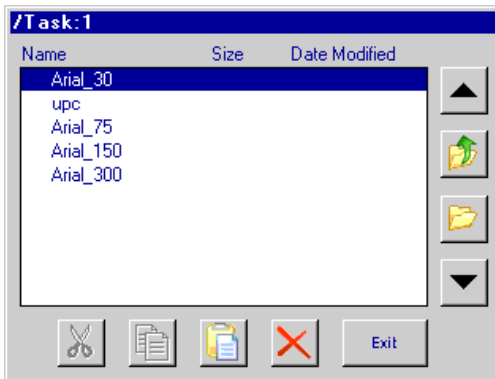
Appendix I: Communicating Directly to the Print Head

The 1/2" (12.7 mm) and 1" (25.4 mm) print heads can be controlled by direct serial communication. Refer to the serial protocol document 5780-316N when communicating directly to the print head without the use of a controller or the pc GUI software interface.

Appendix J: Aligning the 1" (25.4 mm) Print Head

NOTE: This procedure assumes that the user has already installed the equipment per the installation procedure (See "Section 2: Quick Start" on page 2). In addition, an encoder should be used for the best horizontal alignment between both print cartridges.

1. Ensure the front face of the print head is perpendicular to the substrate being printed.

2. Create a message using the Arial 300 font and run a print sample with the actual product.

3. Observe the vertical overlap or gap between the two cartridges. If there is significant overlap, loosen the mounting screws and rotate the print head bracketry counter-clockwise. If there is a gap between the halves, rotate the bracketry clockwise.

4. Snug the mounting screws and run another print sample. If the overlap or gap is not acceptable, then repeat the previous step.

5. Repeat the previous two steps until the two cartridges are matched vertically.

6. Fully tighten the mounting hardware.

7. Now observe the horizontal alignment of the characters.

8. Horizontal misalignment can be compensated electronically through the controller or GUI software program by navigating to the **Control Panels** from the **Home Screen**, pressing **System Setup**, and then touching the print head in question.

9. An adjustment box, labeled as **A to B offset adjustment,** is available to compensate for any horizontal misalignment. Increase or decrease the number in the box and press **Apply**. The next print will have adjusted the alignment one way or the other. Repeat this step until the desired horizontal alignment is achieved.

LOOSEN THESE SCREWS
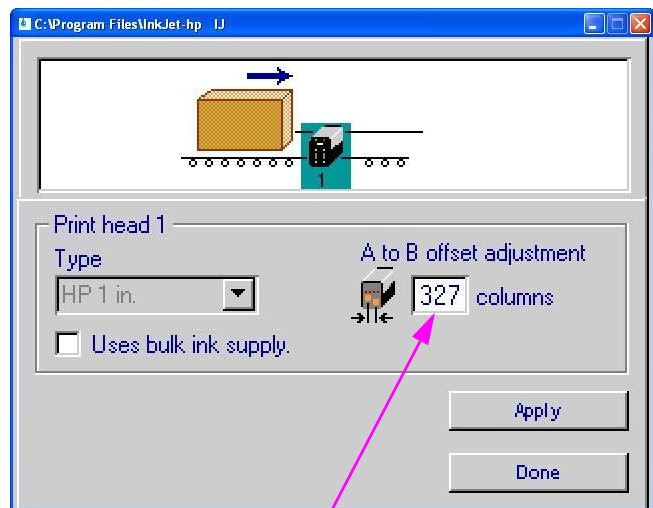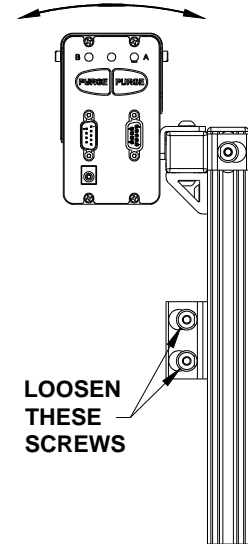
Press on this box to highlight, and then type in an adjustment value

Appendix K: Bulk Ink Supply

Wear safety goggles when working with industrial inks or solutions!

WARNING: Disconnect power during installation.

WARNING: Sudden impact to the installed print head (caused by moving the conveyor with the print system attached or moving the print system from one location to another) can cause ink to seep out the front of the print cartridge. To keep this from happening disconnect septum fitting, remove print cartridge, and depressurize the bulk ink supply before moving the print system.
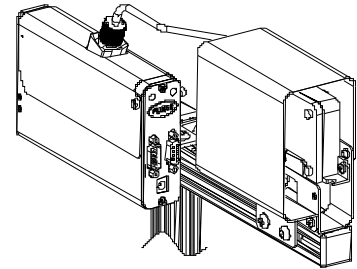
Note: Failure to properly bleed the air from the ink lines before connecting the septum fitting to the print cartridge could damage the print cartridge.

<u>System Components</u>
- Print Head
- Regulator
- Bulk Ink Supply
- Controller or PC (Hand held controller is not compatible with the bulk ink system)
- Beacon (optional)
- Hub (optional)

<u>Installation</u>
1. Mount the print head(s), bulk ink supply, and controller (if applicable). Note: The bulk ink supply can be a maximum of three feet above or below the print head(s). The regulator must be mounted on the same horizontal bar as the print head. See sheet 4 for print down application.

Regulator

Print Head   1-1/4"±1/8"
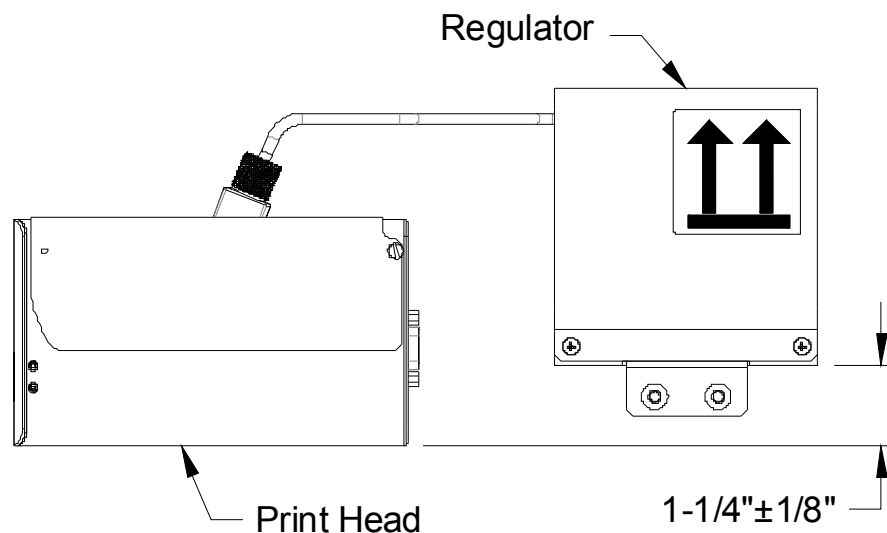
For the system to function properly it is critical that the regulator be positioned appropriately in relation to the print head as shown.

2. Make ink line connections from the bulk ink supply to the regulator per diagram below. Trunk line to be made as short as practical. (CAUTION: Do not connect septum fitting to the print cartridge at this time.)

Tubing, 1/8" ID x 3/16" OD (1303-563)

Orient as shown

Fitting assembly, septum to 1/8" barb (5780-393)

Bulk Ink cartridge

Bulk Ink Print head 1

Regulator (5780-105)

Bulk Ink Print head 2

3' Maximum vertical rise from bulk ink supply to print head

15 V

Tubing, 3/32 ID x 5/32 OD (1303-564)

Fitting, tee, reducer, 1/8" to 3/32" (5361-349)

Bulk Ink Supply

Valve, QD to 1/8" barb (1900-757)

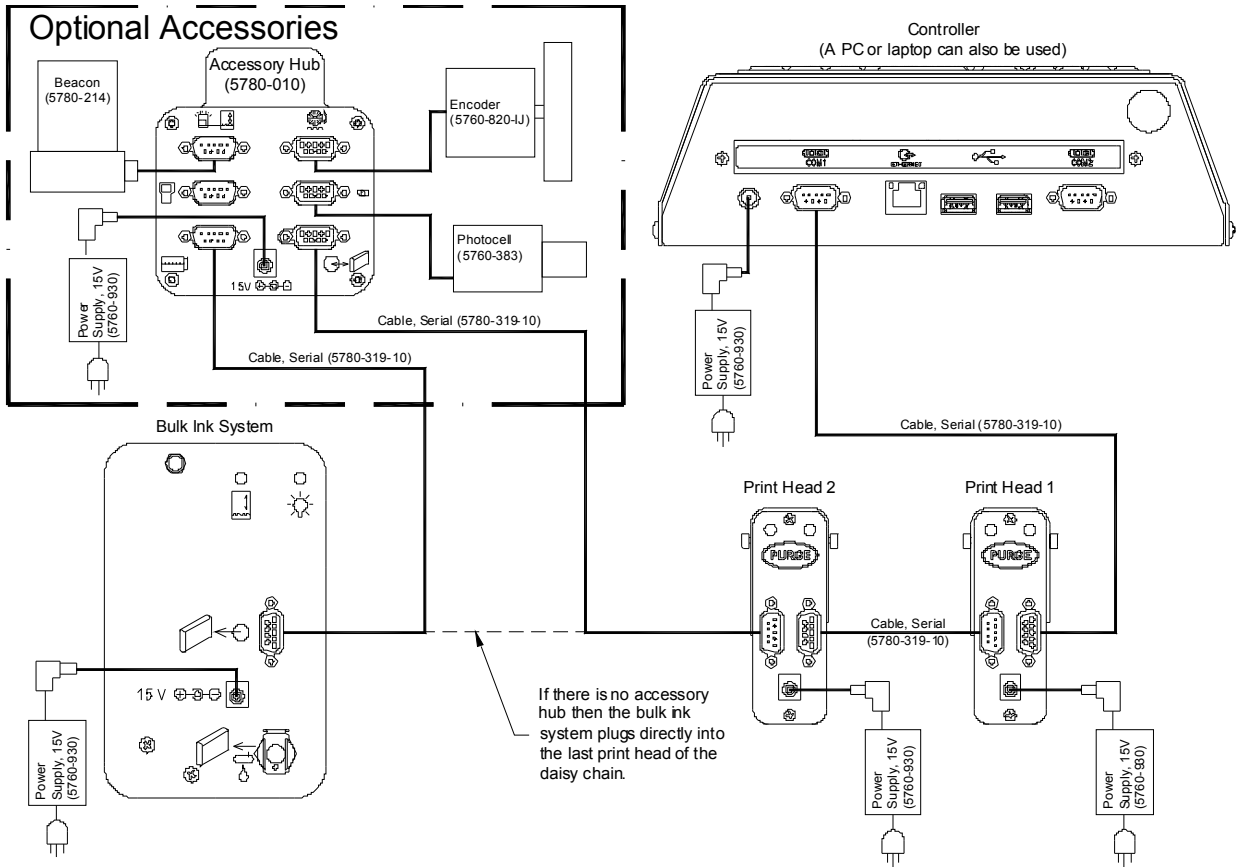Trunk line
Tubing, 1/8" ID x 1/4" OD (1301-468)

Ink service port (1900-757)

10' Maximum horizontal separation between Bulk Ink Supply and furtherst Print Head

TUBING DIAGRAM

3. Make all electrical connections as shown, including all power connections per diagram below.

Optional Accessories

Controller
(A PC or laptop can also be used)

Beacon (5780-214)

Accessory Hub (5780-010)

Encoder (5760-820-IJ)

COM1   ETHERNET   USB   COM2

Power Supply, 15V (5760-930)

15V

Photocell (5760-383)

Power Supply, 15V (5760-930)

Cable, Serial (5780-319-10)

Cable, Serial (5780-319-10)

Cable, Serial (5780-319-10)

Bulk Ink System

Print Head 2

Print Head 1

PURGE

PURGE

15 V

Cable, Serial (5780-319-10)

If there is no accessory hub then the bulk ink system plugs directly into the last print head of the daisy chain.

Power Supply, 15V (5760-930)

Power Supply, 15V (5760-930)

Power Supply, 15V (5760-930)

4. Insert print cartridges into the print heads and a 350 ml ink cartridge in the bulk ink supply.

5. Bleeding air out of the ink lines:

   a) At the ink service port of the trunk line, depress the valve of the fitting in short spurts into a rag or trash can. Continue this until all air has been bled out of the main trunk line.
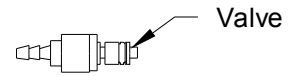
   b) Connect the syringe (2466-166, supplied with the bulk ink system) to the septum fitting. While holding the syringe and tubing above the regulator, slowly draw the air out of the ink line. Once all of the air is out of the ink line and a small amount of ink is drawn into the syringe, disconnect the syringe and plug the septum fitting into the print cartridge. Repeat for each regulator.
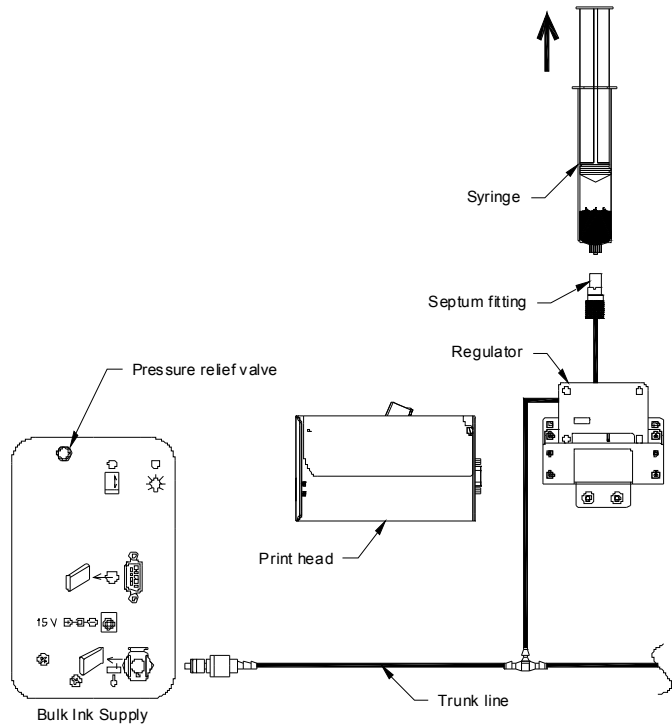

Configuring system for bulk ink supply

At the controller (or PC software) in the print head setup, select the "Uses bulk ink supply" check box for each print head in the daisy chain.
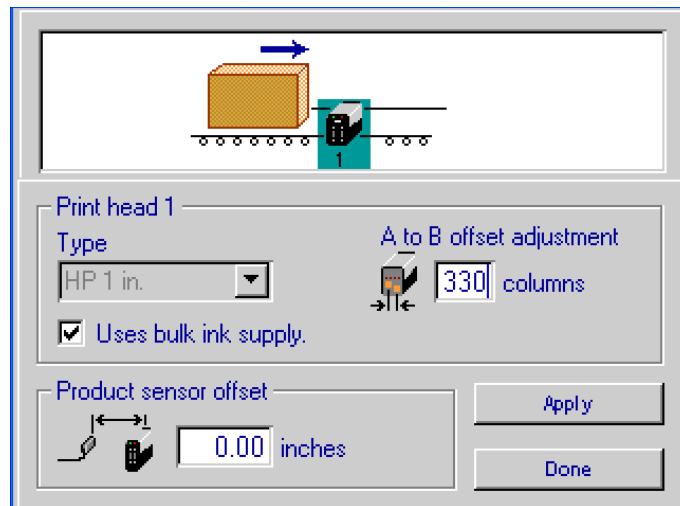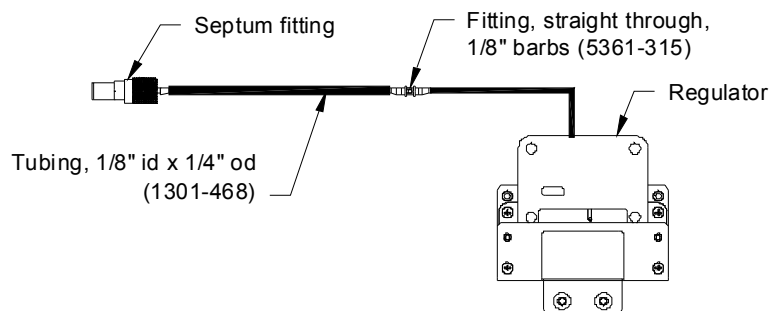
Setup for print down application

The bracketry that comes standard with the print head does not accommodate a print down setup. A separate bracket kit (5780-227) is available to allow for a print down setup. This kit includes tubing and fittings for extending the tubing between the regulator and print head. If only the tubing and fittings are needed then tubing kit 5780-211 can be used. This kit includes enough tubing and fittings to accommodate five half inch print heads or two one inch print heads.
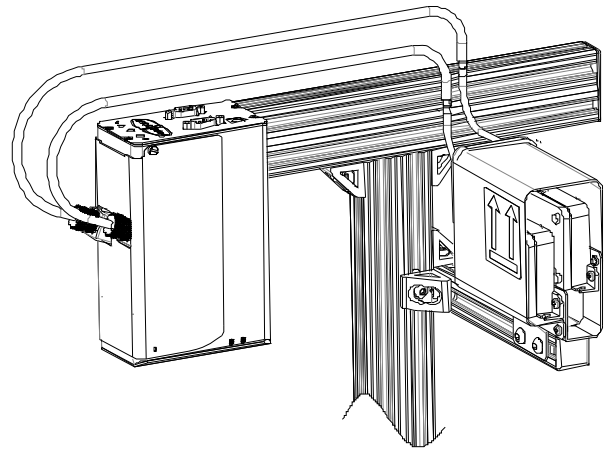
1. Mount the print head and regulator. The regulator must be positioned appropriately in relation to the print head (see figure). If the regulator is positioned too high with respect to the print head then ink may seep out of the print head. If this occurs simply lower the regulator until it is positioned properly.

Print head
Regulator
5/16"±1/2"
Carton being printed on
Conveyor
5-1/4"±1/2"
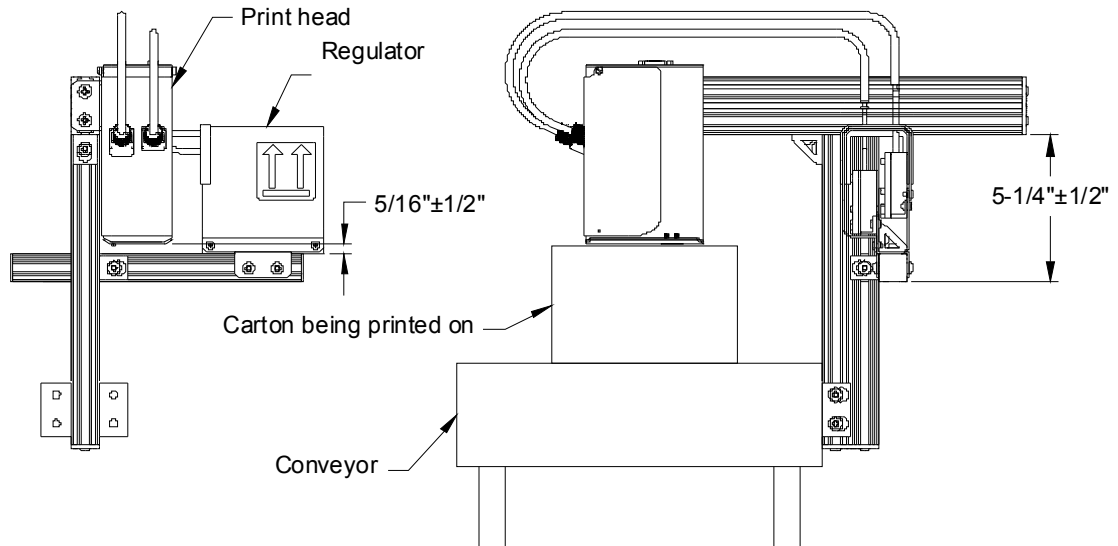
2. It will be necessary to splice in a length of tubing between the regulator and print head (see image below). This should be done before bleeding air out of the ink lines.
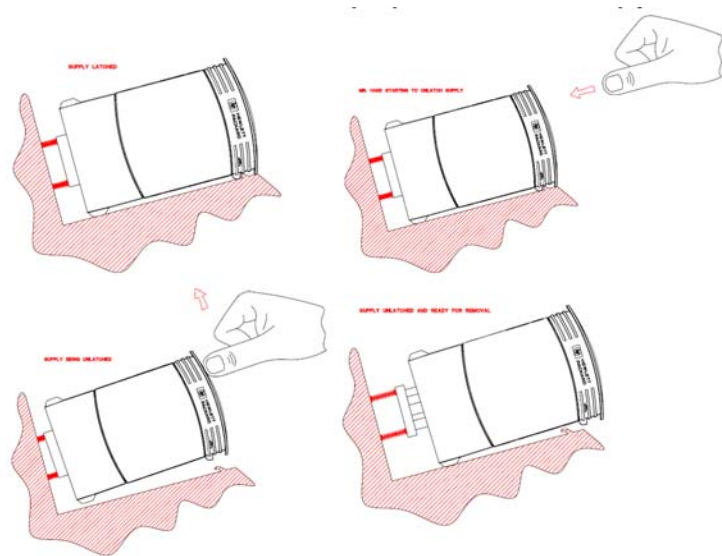

Septum fitting
Fitting, straight through, 1/8" barbs (5361-315)
Regulator
Tubing, 1/8" id x 1/4" od (1301-468)

<u>Operation</u>

- Operation pressure of the bulk ink supply is 4-5 psi. Once pressure drops below 4 psi the air pump will turn on and pressurize the ink supply up to 5 psi.
- Once the pump can no longer achieve 5 psi the system will go into an "Ink Low" state (beacon will turn on solid) indicating the 350 ml ink cartridge is empty. The print head will continue to print because there is still ink in the print head cartridges; this allows ample time to change the 350 ml ink cartridge.
- Changing the 350 ml bulk ink cartridge:
  - Depress the pressure relief valve on the back of the bulk ink system until the system has been completely depressurized.
  - Push in and up slightly on the cartridge to get it to release from the bulk ink supply.
  - Insert the new cartridge. The system will recognize a new cartridge has been installed and begin pressurizing automatically.
- Maximum print heads per bulk ink system is two 1" print heads, four ½" print heads, or one 1" print head and two ½" print heads.