Operations Manual

Thermal Jet System

5780-649FX
Revision D

Thermal Jet
Ink Jet System
Operations Manual

5780-649FX

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.

The information contained in this manual is correct and accurate at the time of its publication. ITW reserves the right to change or alter any information or technical specifications at any time and without notice.

Thermal Jet

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 the manufacturer for a complete copy of the Limited Warranty Statement.

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 SDS (Safety Data Sheet).

Section 2: Quick Start

Contents:

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

OPTIONAL HAND
HELD CONTROLLER

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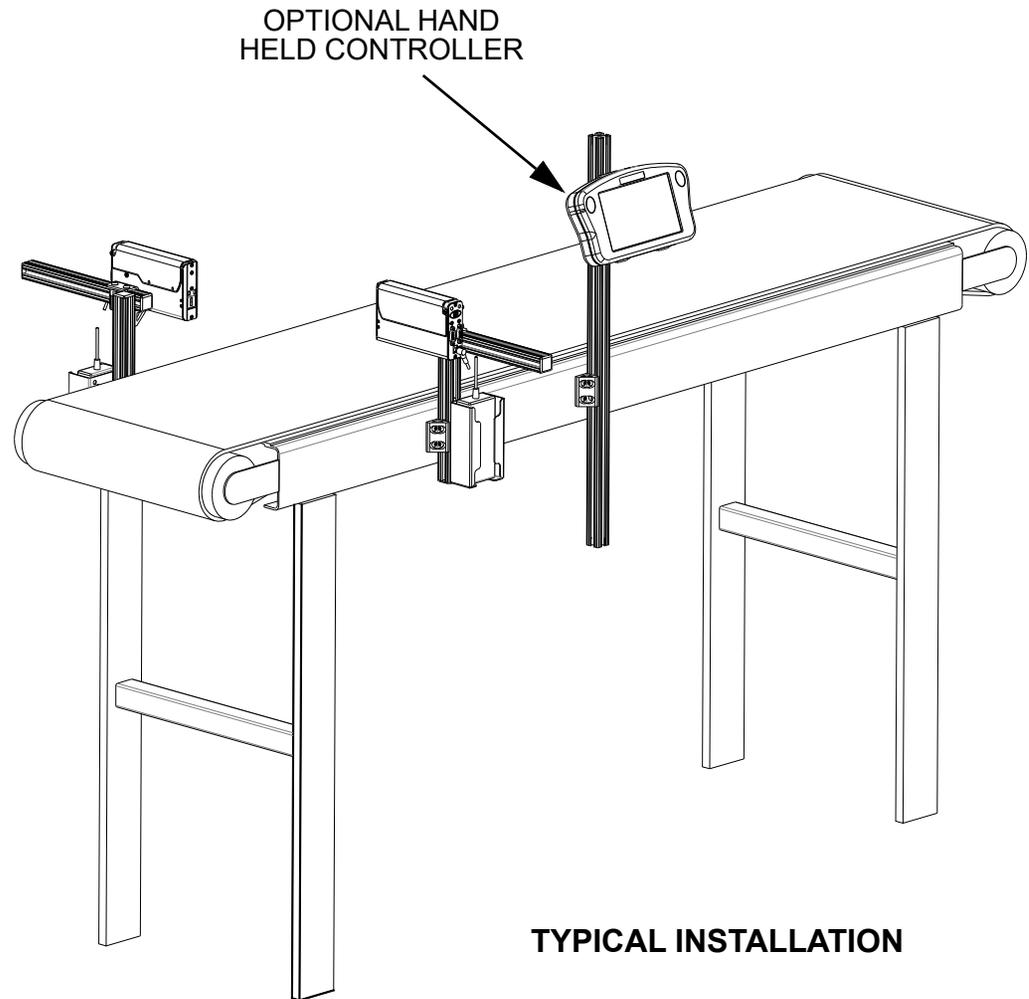
Step 1: Assemble Bracketry
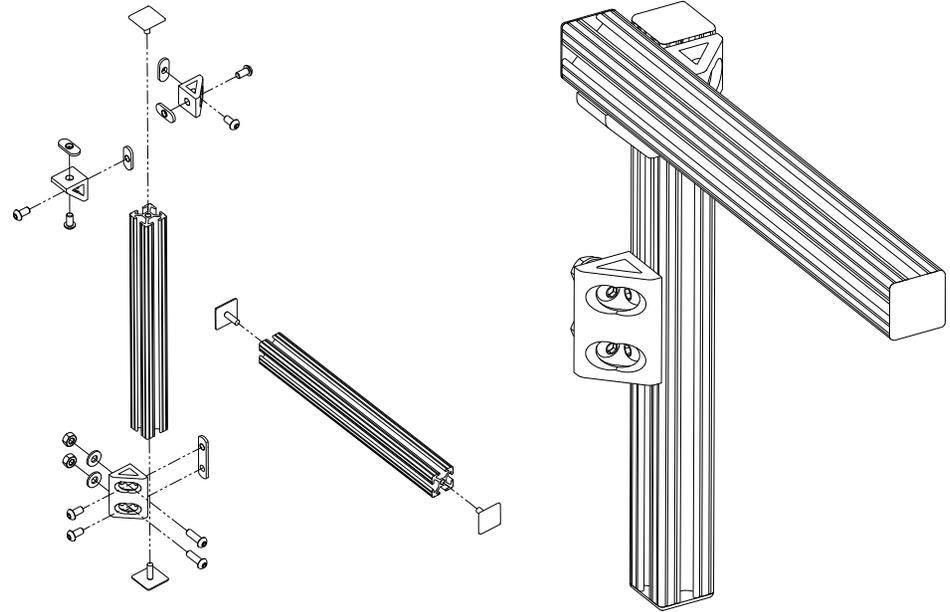
Step 2: Assemble Bracketry to Conveyor
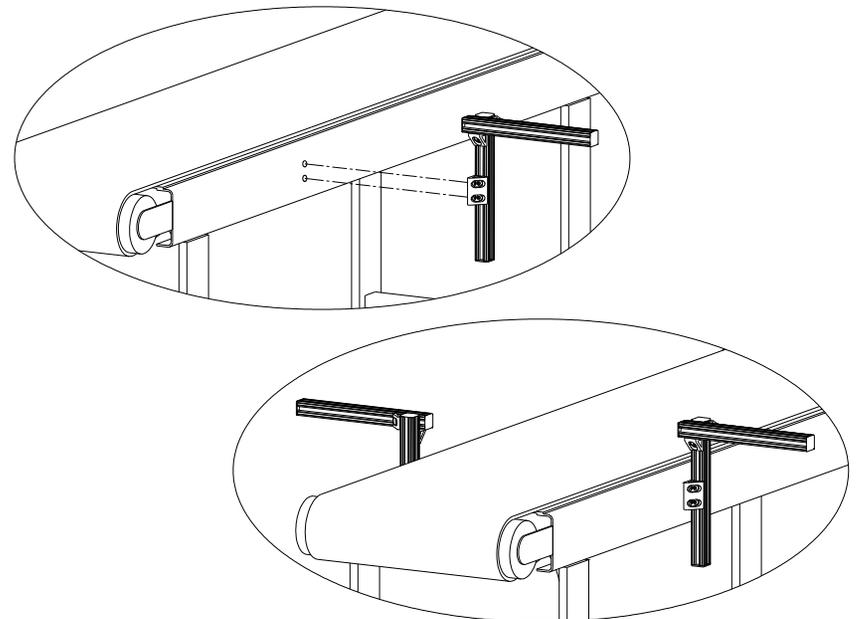
Step 3: Assemble Print Head and Power Supply to Bracketry

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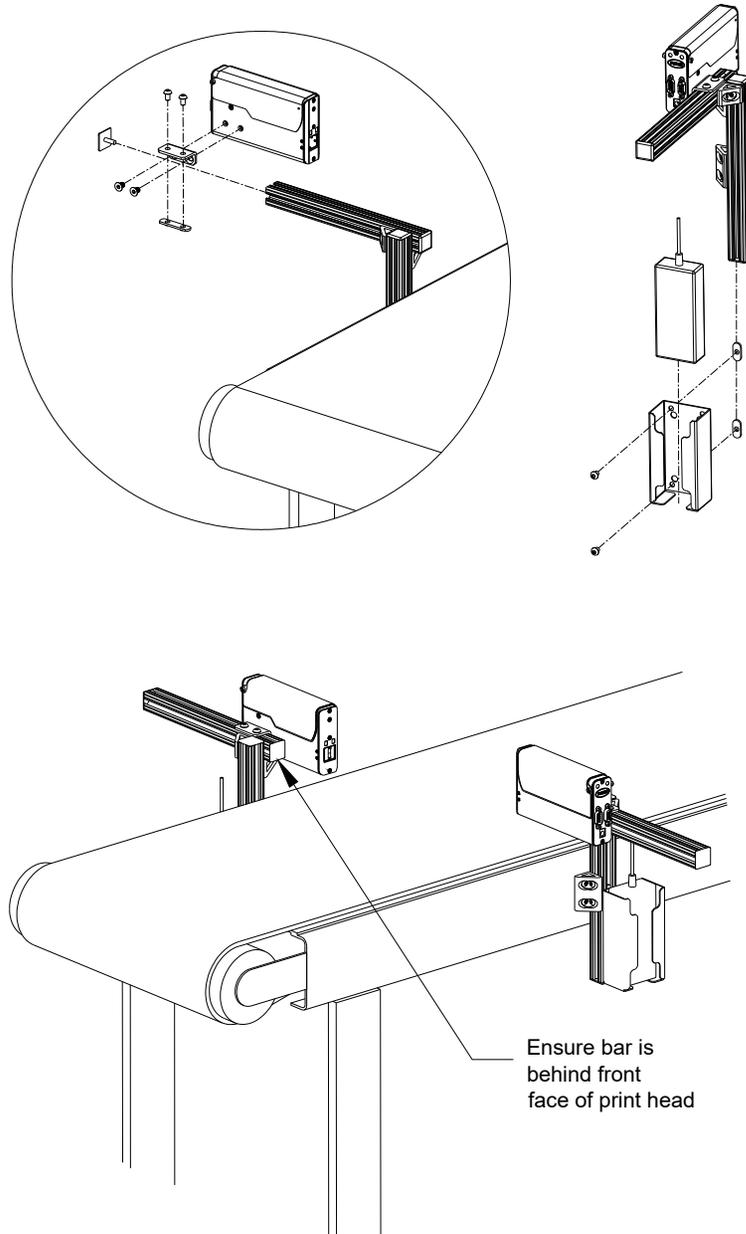
Step 4: Adjust Print Head to Substrate

Adjust print head vertically to meet requirement.

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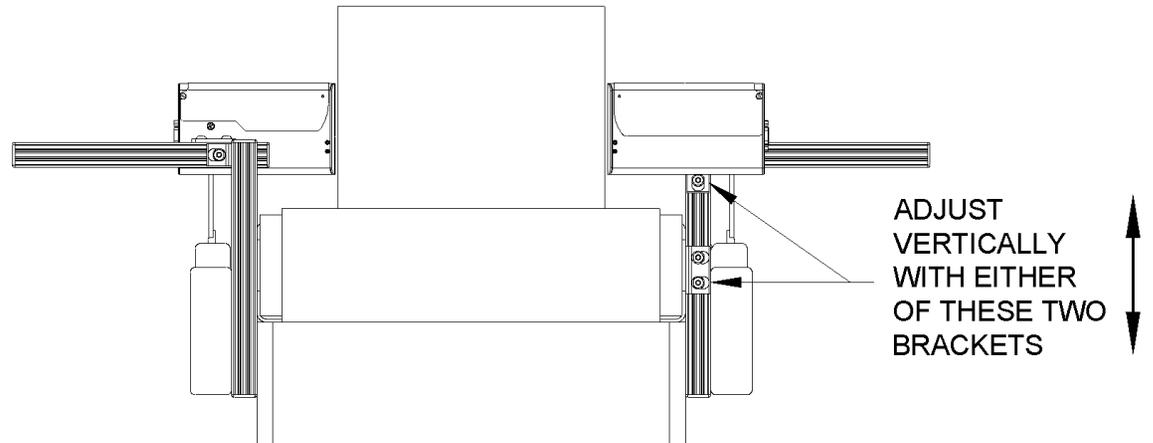
Adjust print head horizontally to set print gap.

.1" (2.5mm) GAP RECOMMENDED

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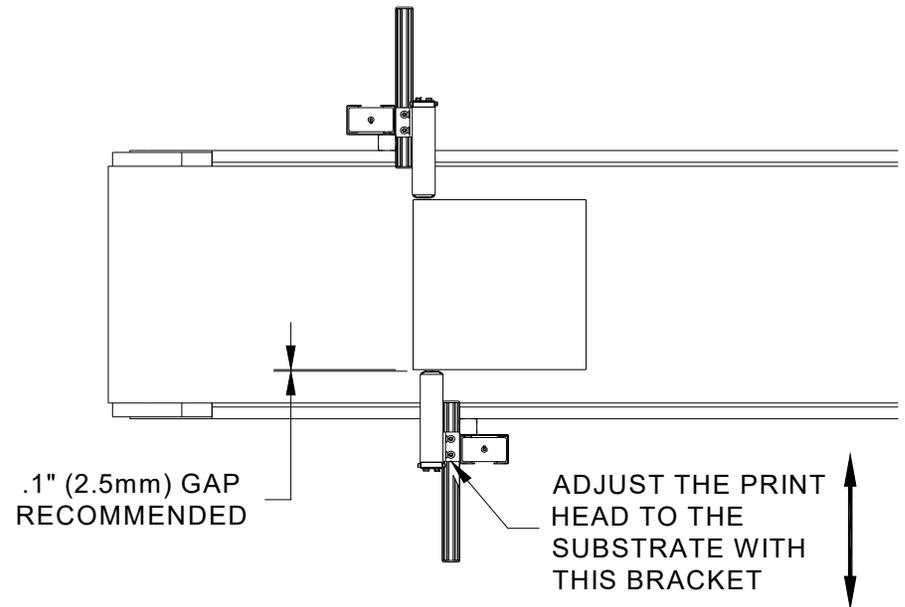
Step 5: Insert Pen Cartridge into Print Head

1. Rotate Cover Open
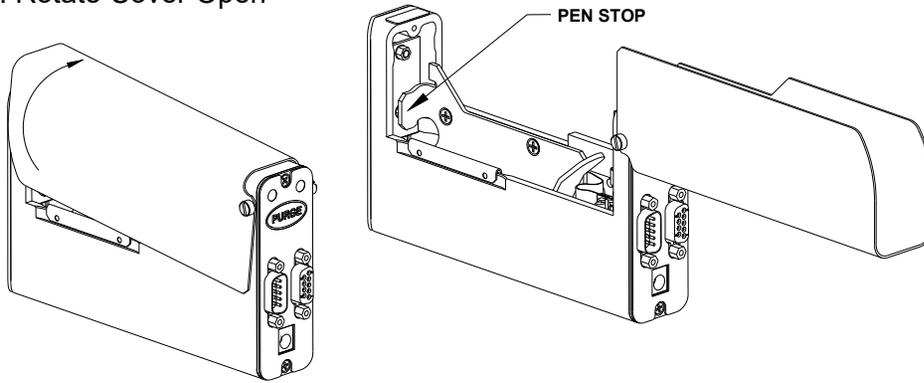
PEN STOP

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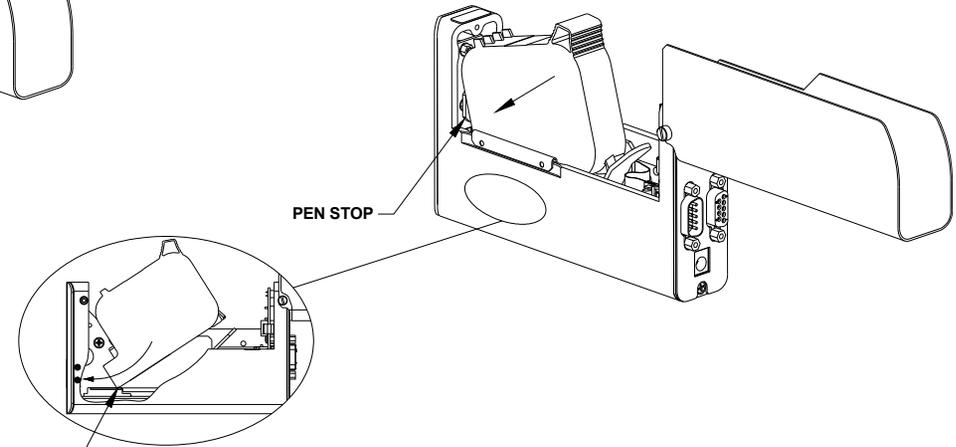
PEN STOP

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

3. Rotate Pen Cartridge down until it snaps in place.

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

FINGER RELEASE TAB

FINGER RELEASE TABS

4. Close Cover

After pen cartridge is installed

Thermal Jet
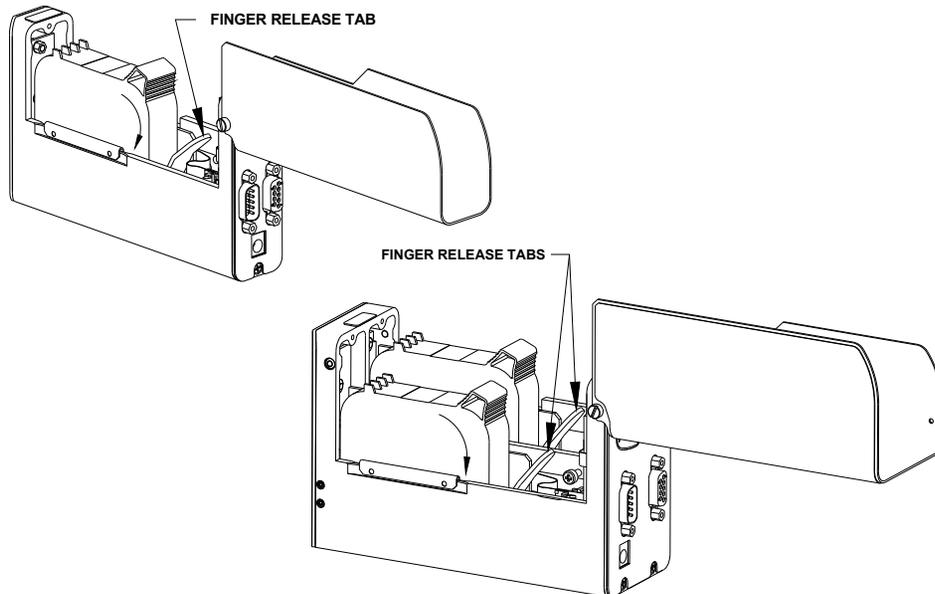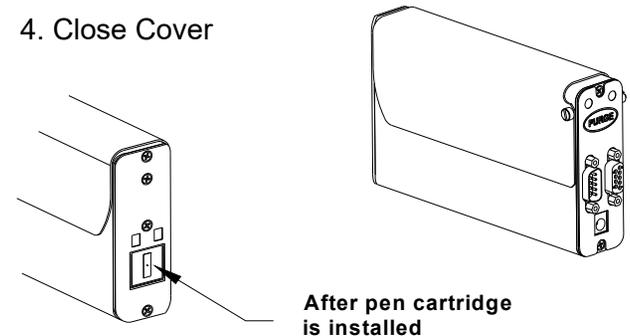
Step 6: Cabling, Power, and Serial Port Setup

Cabling

CAUTION: Power should be disconnected from the print head prior to connecting or disconnecting any external device, including: PC, 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.

Print heads are controlled via a COM port from a PC or a Hand Held Controller. One com port can control up to eight 1/2" print heads, four 1" print heads, or any combination of the two totaling eight print cartridges. Using the supplied serial cables, connect the print heads daisy chain style by connecting the output port of one print head to the input port of the next. Then connect the COM port of the PC or Hand Held Controller to the daisy chain. A PC connects to the input port of the first head in the daisy chain, while a Hand Held Controller connects to the output port of the last.

PC OR LAPTOP

COM PORT

Print Head Cable
5780-319-10
DB9 M-F

HH Controller Cable
5780-616-06
DB9 F-F
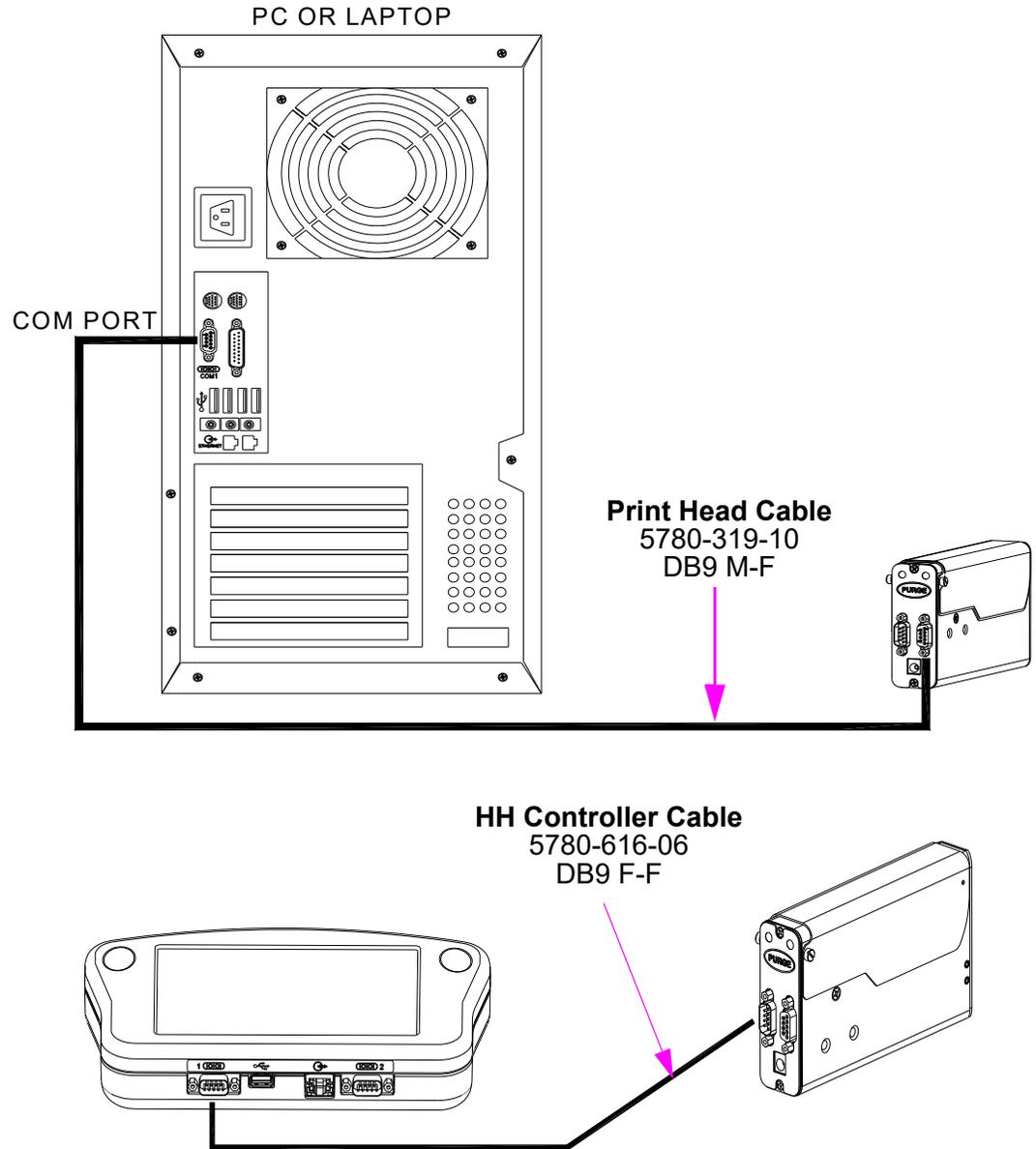
Power

CAUTION: Power should be disconnected from the print head prior to connecting or disconnecting any external device, including: PC, 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 print head.

Press and hold the "PURGE" button on the rear of the print head while slowly moving a piece of paper, cardboard, or comparable material in front of the print head. Print several purge images and validate that all channels are printing. If not, refer to "Section 4: Maintenance & Shutdowns" on page 30.
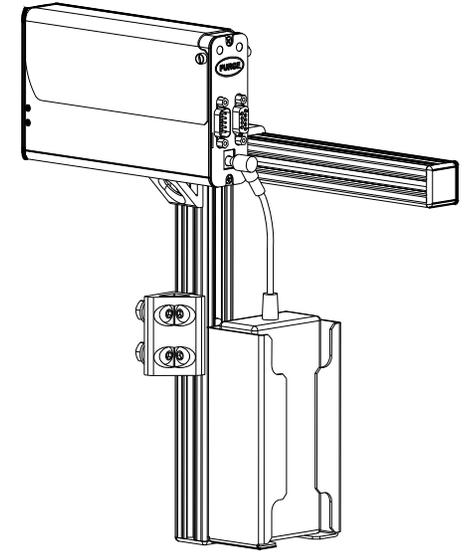
NOTE: Do not rub the print cartridge face with the print sample material as this will scratch the orifice array and affect print quality.

The power supply for the controller or the computer may now be installed.

Serial Port Setup

NOTE: Depending on the InkJet Demo software or controller configuration, this step may already be complete.

If a computer will be used, install the InkJet Demo software included with the print head. Follow the installation prompts, and launch the program after it has been installed.

On the **Home** screen press the **Menu** button, then the **Apps** button.

Menu Button

Apps Button

Thermal Jet
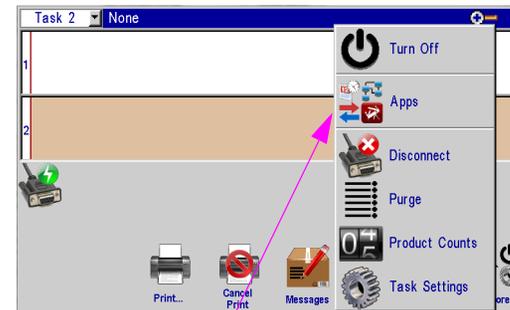
On the **Apps** screen, Press the **Ports** button.

Home Button →

Ports Button

On the Ports Setting Screen press the **COM1** Function Button, select **Serial Print Head- HP**, and press OK. Press OK again to exit the Port Settings Screen.

Port Settings

Port	Baud	Function
COM1	57600	None
COM2	57600	None

Cancel   OK

COM1 Function

None
Command & Control
Message Look Up
External Input
SATO 8485SE
Zebra
Message Attachments
Serial Print Head - HP

Cancel   OK
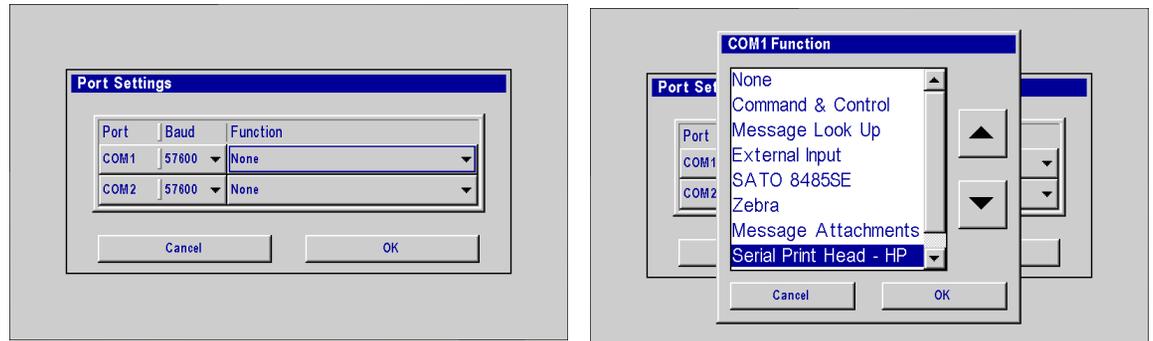
If using a PC, pressing OK after selecting Serial Print Head-HP opens the Serial Port Setup dialog box. Select the desired COM port (only those ports available are listed) and press OK. Press OK again to exit the Port Settings Screen.
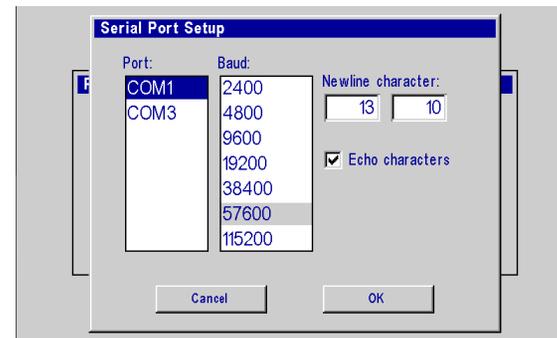
Press the Home Button to return to the Home Screen.

Serial Port Setup

Port: Baud:
COM1   2400
COM3   4800
            9600
            19200
            38400
            57600
            115200

Newline character:
13   10

☑ Echo characters

Cancel   OK

Step 7: Configure the Print Head

On the home screen, press the **More** button, and then press **Task Settings**.

On the **Print Heads** page, press the **Setup Wizard** button. Select the desired direction.

Set the number of print heads, identify their positions relative to the controller, and select the appropriate print head type by touching each one and then the drop down box. If using an external photocell, set the offset.

Thermal Jet
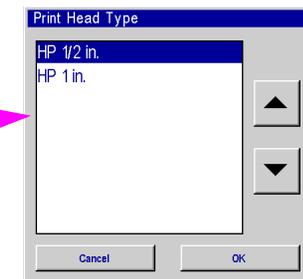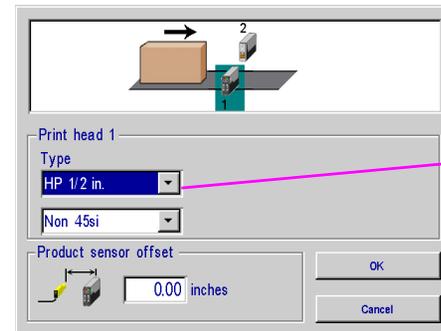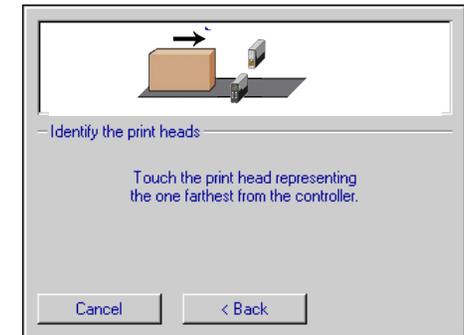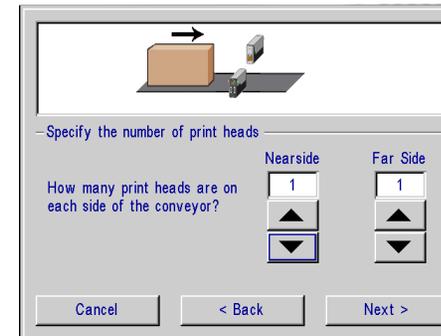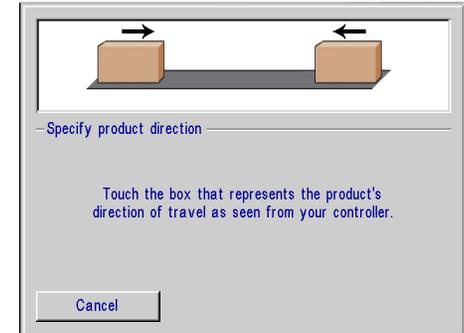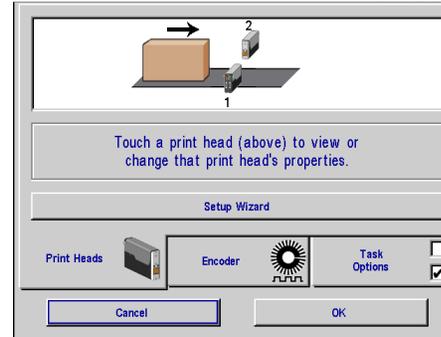
When the 45si cartridge is selected, a drop down listing of ink types becomes available. The drive pulse for each ink type is shown. The "Ink Type Number" is printed on the cartridge label to aid in selecting the correct ink type. Ink 1 is the default ink type when SI cartridge is selected.
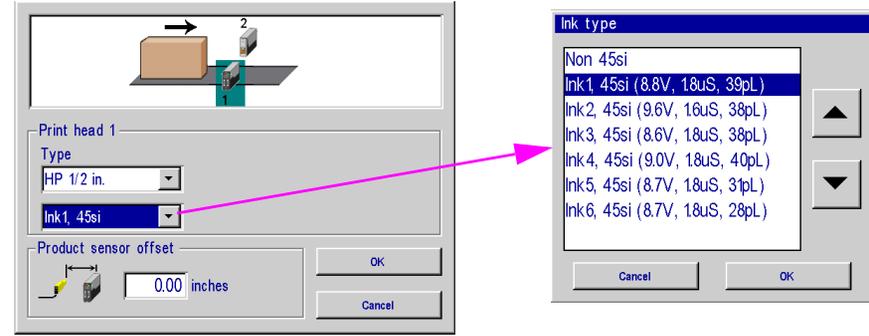
Print head setup complete. Next, select the **Encoder** tab and choose the desired encoder type.

External Encoder:
Line speed measured by an externally mounted encoder connected to the last print head in the daisy chain
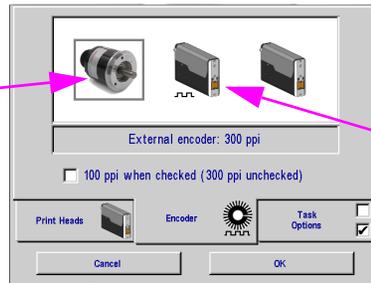
Auto Speed Detect:
Line speed automatically detected via print head photo cells.
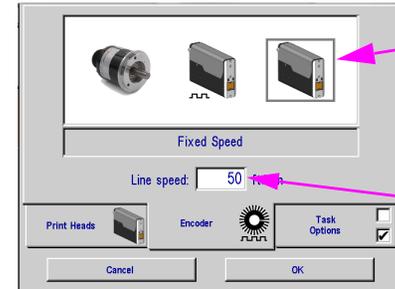
Fixed Speed:
User enters the desired line speed

Touch this box, then enter 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.
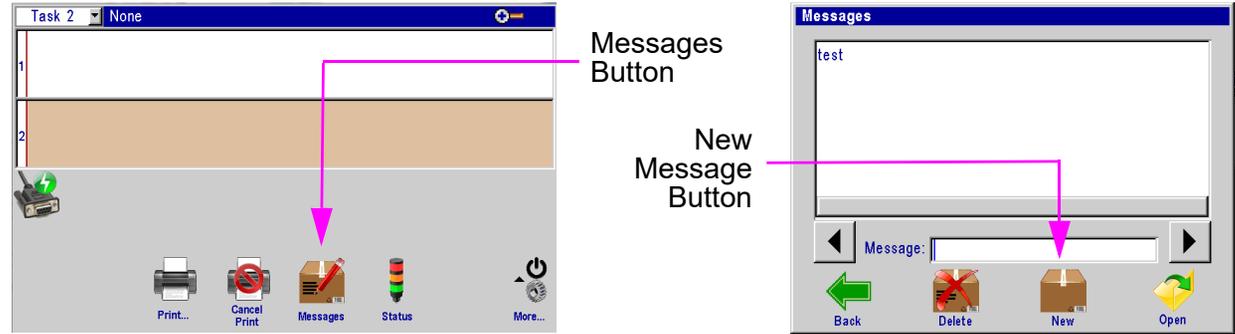
Create and save the message, and then exit the message editor.

Messages Button

New Message Button

Message Display Area

Carton Ruler

Date Code

Next Field Button

Time Code

Field Properties

Message Info

Font Selection

Cursor

Cursor or Field Coordinates

Zoom

On-screen Keyboard

Text

Delete Button

Quick Save

Line Field

Menu

Product Setup

Product Side

Count Code

Bar Codes

Variable Field

Logo
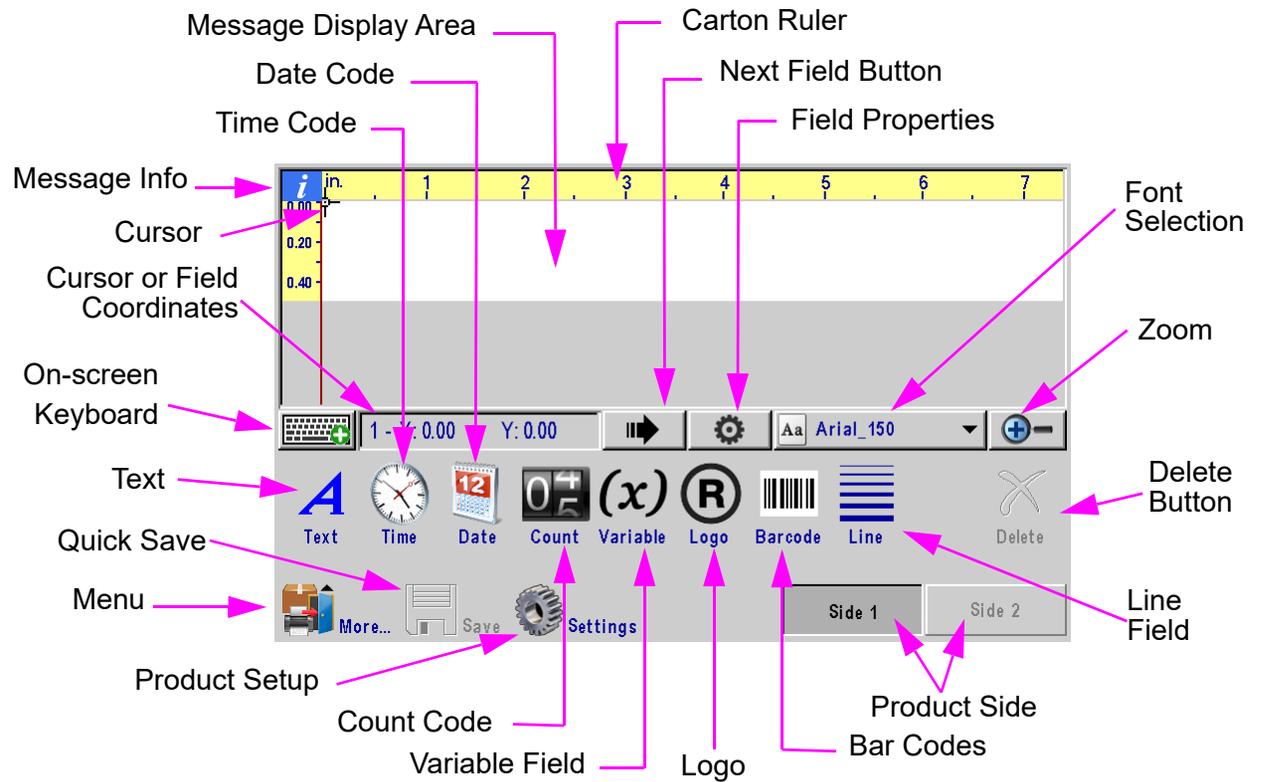
Step 9: Print a Message

From the **Home Screen**, press the **Print** button.

Print Button

Select the desired message to print, and press the **Print** button.

Print Button

The message will print on the next photocell trigger.

Section 3: User Interface

On-Screen Keyboards & Numeric Keypads

Keyboard Button:
- Edit Screen only: Press once to show the keyboard; press again to hide it.
- All other screens and dialogs: Keypad or keyboard appears when text or numeric input box is touched.

Layer Select:
- Pressing the **Layer Select** button cycles through letters, numbers & symbols, and extended characters.

Language Select Button:
- Changes keyboard layout to that of the language selected. Changes keyboard layout only; user interface language does not change.

ESC (Escape):
- Undoes any changes made to any input entry box. If no changes made, hides the keypad or keyboard.
- Edit screen full keyboard: always hides the keyboard.

Arrow Keys:
- Moves highlighted fields or the cursor around in the Message Editor.

Tab:
- Shifts focus between fields in the Message Editor.

Backspace:
- Deletes the character to the left of the cursor.
- On the edit screen, deletes a highlighted (red) field.

Ctrl (Control) in Message Editor:
- Amplifies the movement of the arrow keys.
- Press **Ctrl-Enter** to insert a new line in a text field.

Shift:
- Press **Shift** once to make the next character upper case.
- Press **Shift** twice for shift lock. Press **Shift** again to exit shift lock.
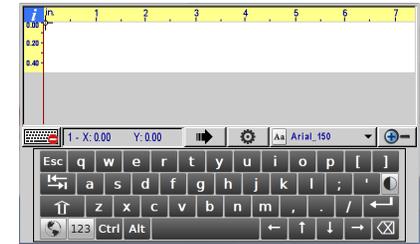
Letters

Extended Characters

Keyboard Button

Numbers & Symbols

Layer Select

Language Select Button

Thermal Jet

Home Screen:
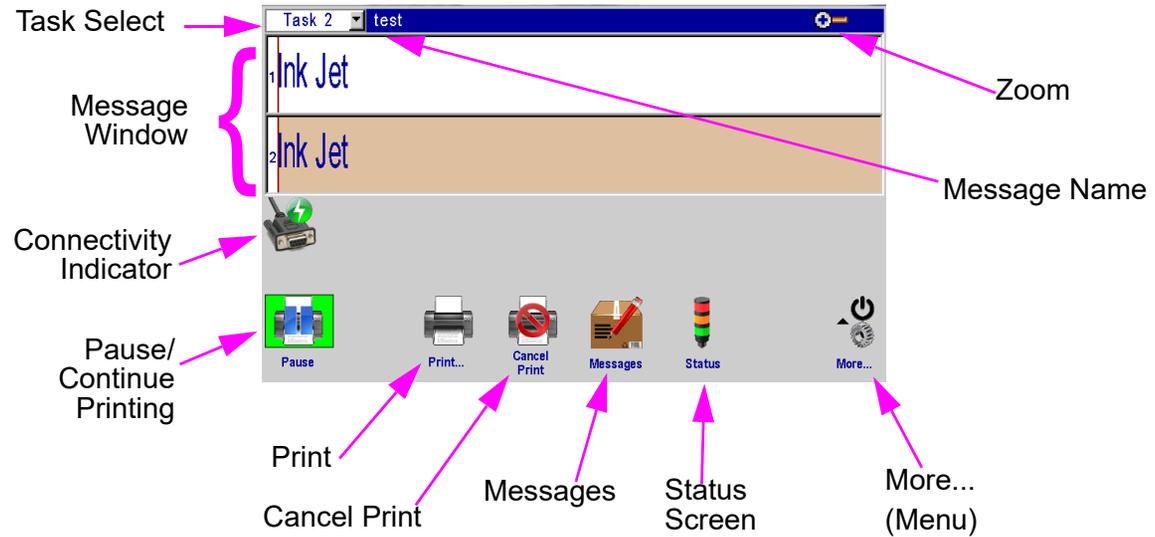
Message Window:
- Displays the current print message
- Updated approximately every seven seconds, so every print may not be displayed.
- Touch and swipe the **Message Window** to scroll the message.
- White or Beige bars represent the print heads. The numbers in the left margin correspond to the numbers assigned to the print heads during system setup.
- The window header displays the task number and the file name of the message being printed. **"None"** is displayed when no message is being printed.
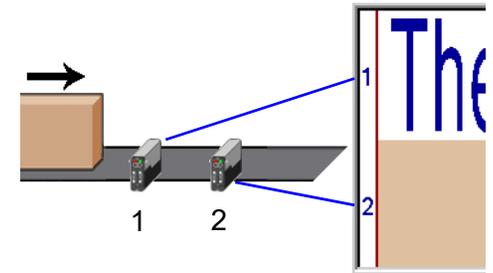
Task Select Drop Down List:
- On dual task systems, switches controller operation from one task to another.

Pause/Continue Button:
- Button appears only when a print message is displayed in the Message Window.
- Press **Pause** to halt printing. Any message being printed will finish before printing is halted.
- Press **Continue** to resume printing. Print will resume on the next photocell trigger.

Print Button:
- Press **Print** to select a message to print.
- Select the desired message and press the **Print** button. The message will print at the next photocell trigger.

Cancel Print Button:
- Press the **Cancel Print** button to remove the current message from the print head(s) and stop print.

Connectivity Indicator:
- Indicates the controller is electronically connected to and communicating with the print heads.

- Indicates the controller is electronically disconnected and is not communicating with the print heads.

Status Button:
- Press the **Status** button to display the **Status Screen**.
  The Status Screen displays:
  - Controller firmware version number.
  - Fonts and Logos present on the selected print head.
  - Product Detect status.
  - Printing status. Indicates the presence of a print message on the selected print head.
  - Ink Type, if applicable.
  - Ink Level. (If Print Head Firmware version is 10.4 or lower, the bar will not be displayed.)
  - Current Date and Time, as reported by the selected print head's clock.
  - Print head firmware version number.

Current Print Head selected

Controller Firmware Version. Press version number to display detailed version information.

Product Detect

Print Status

Ink Type

Ink Level

Date & Time

Selected Task

Fonts and Logos

Return to Home Screen

Print Head Firmware Version
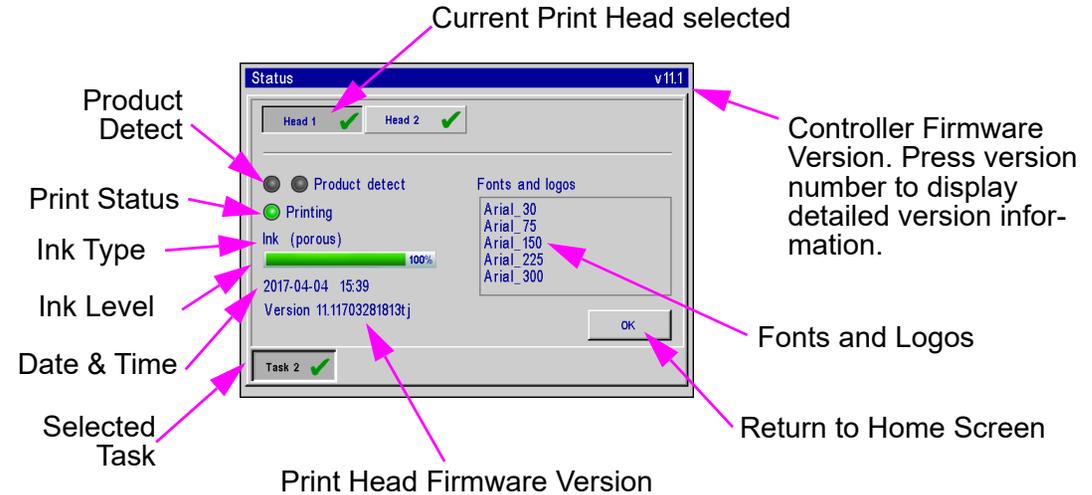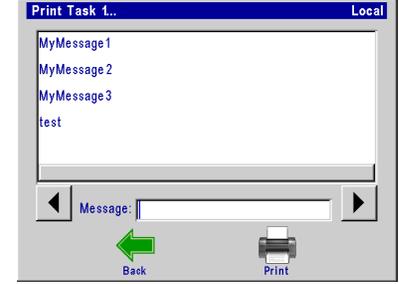
Zoom:
- Expands the message window to full screen and magnifies the print message so that fine details may be seen.
- Press once to zoom in; press again to zoom out.

More... Menu Button:

Turn Off

Apps   (See "The Apps Screen" on page 28.)

Disconnect

Purge

Product Counts

Task Settings

Shut Down?   :01

Shut down the controller?

No   Yes

To turn the controller on, touch anywhere on the touchscreen.

Confirmation

Disconnect from print heads?

Cancel   OK

Fires all jets for a short period of time on the selected print head.

Purge Task 1

Purge

Exit

Returns to **Home Screen**

(See "Step 7: Configure the Print Head" on page 13.)

Task 2 Product Counts

Total Count of All Products Printed

0   Reset

OK

Displays count of all products printed.

Thermal Jet
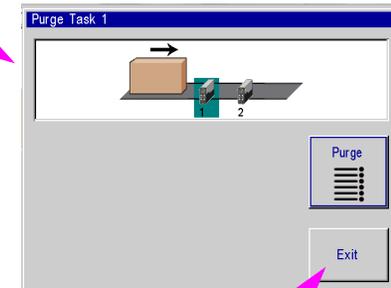
Message Editor

Message Button:
- Press the **Message** button on the **Home Screen** to bring up the message screen.
- To create a new message press the **New** button.
- To edit an existing message, select the message and then press the **Open** button.
- Both editing a message and creating a new message will bring up the message editor.

Thermal Jet
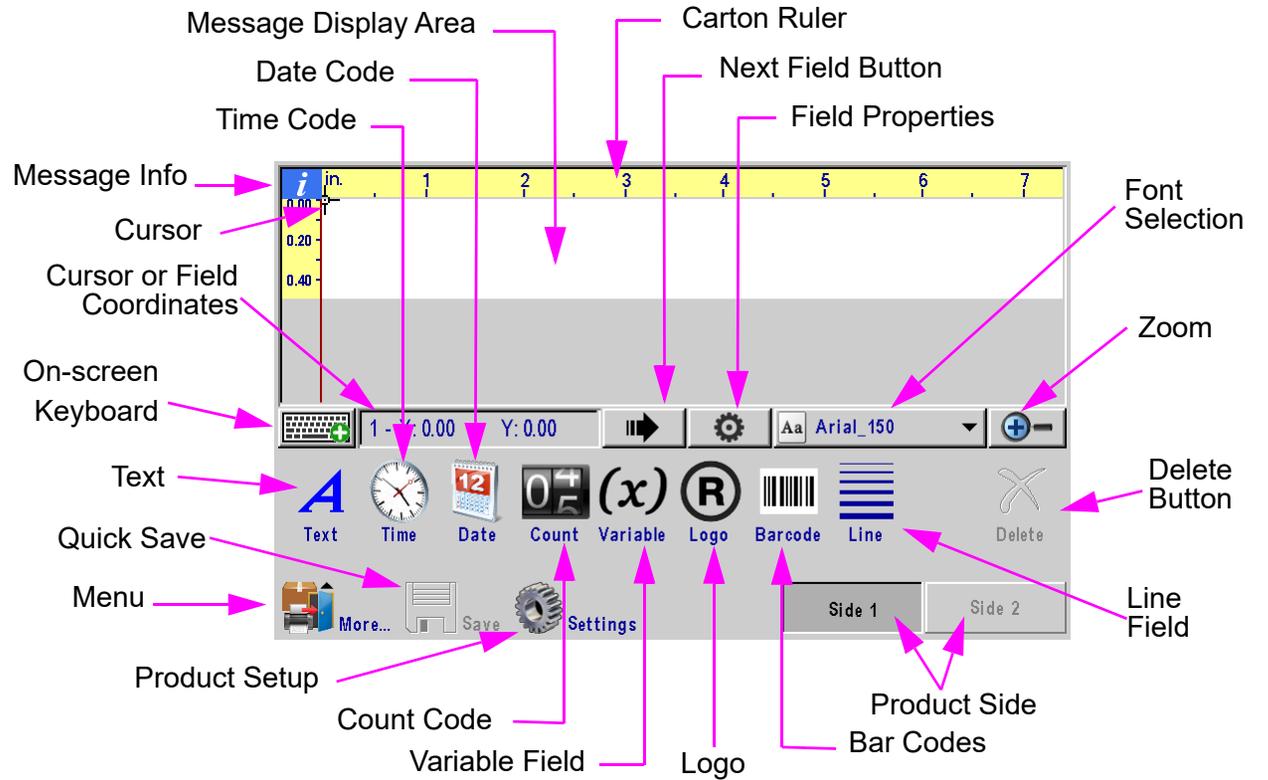
Time, Date, and Count Codes

Insert Time Code

Time code formats:
- HH
- MM TIME
- SS TIME
- HHMM
- HHMMSS
- HH:MM
- HH:MM:SS
- User Defined

Properties...
OK
Cancel

Field Properties

- ☐ Print upside down.
- ☐ Print draft mode.

Cancel   OK

13:58:56 AUG15 001

1 - X: 2.32   Y: 0.00   Arial_150

| A Text | Time | Date | Count | (x) Variable | ® Logo | Barcode | Line | ✗ Delete |

More...   Save   Settings

Side 1   Side 2

Insert Date Code

Date code formats:
- DD
- Julian (001 - 366)
- MM
- MON
- MON YY
- DD/MM/YY
- DD.MM.YY
- DD.MM.YYYY
- DDMMYYYY
- MM/DD/YY

Date offset
0 Days

Based on
Current date

Properties...
OK
Cancel

0 Days

0   ● Days   ○ Months

Close

Current date
- Current date
- 1st day of fortnight
- Monday's date

Insert Count

Start at: 1   Stop at: 999999   Properties...

Options
- ☐ Pallet count   Items per pallet: 50
- ☐ Alpha count
- ☑ Print leading zeros

Count by: 1   Options

Cancel   OK

Expands and collapses Count Options

Field Properties

- ☐ Print upside down.
- ☐ Print draft mode.

Cancel   OK

User Defined Time Codes

When **User Defined** is selected, **Define Time Code** button appears.
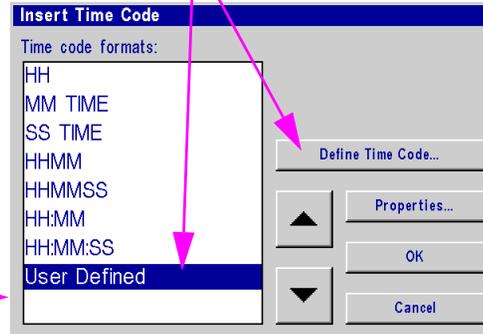
Sequential format: minute code shown. Minute 00 = AA, 01 = AB, 02 = AC, etc.
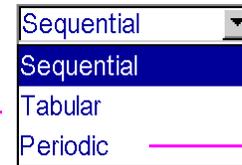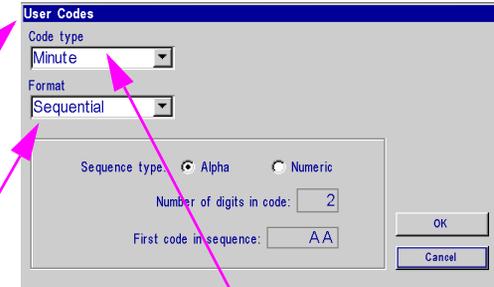
Tabular format: codes printed taken from table. Use default codes (default Hour codes shown) or edit table to suit your requirements.
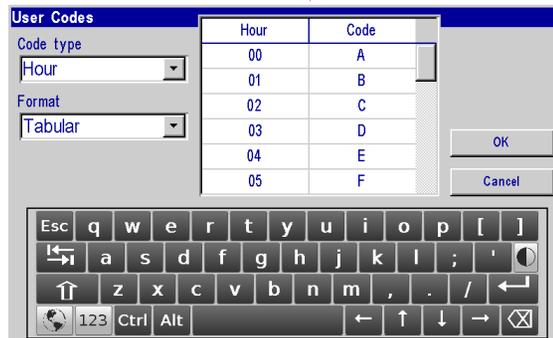
Periodic format: example above illustrates a shift code implemented by using a periodic quarter hour code. 'A' prints from 23:30 -06:59, 'B' from 07:00 - 15:29, and 'C' from 15:30 - 23:29.

Thermal Jet
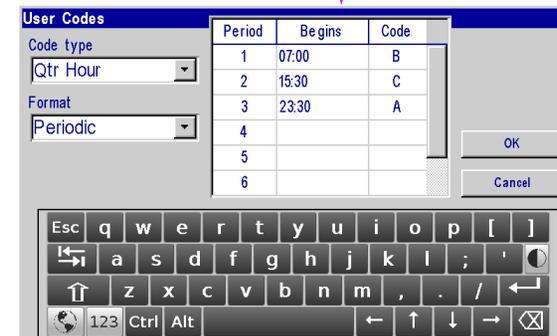
User Defined Date Codes

When **User Defined** is selected, **Define Date Code** button appears.
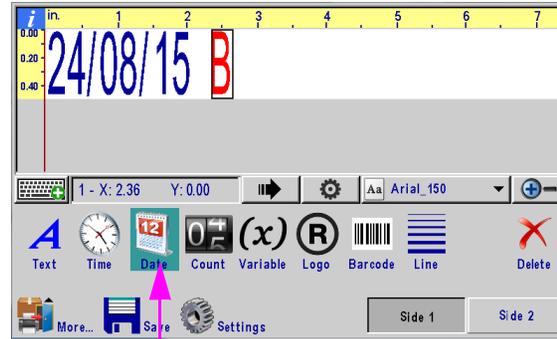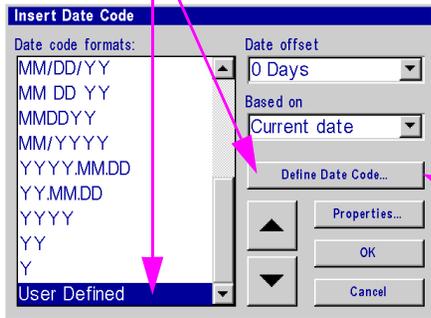
Sequential format: minute code shown. Day 1 = A, Day 2 = B, Day 3 = C, etc.
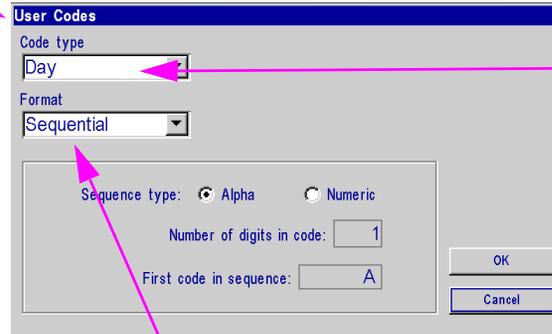
The Fortnight code type is available for the Tabular format only.
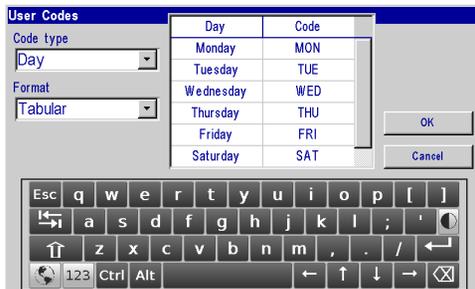
Tabular format: codes printed taken from table. Use default codes (default Day codes shown) or edit table to suit your requirements.
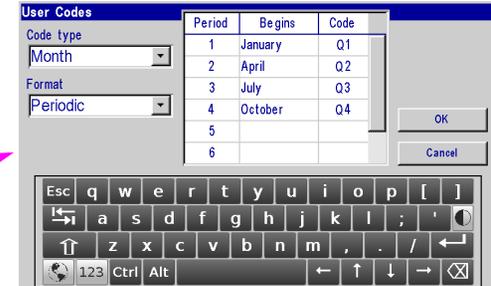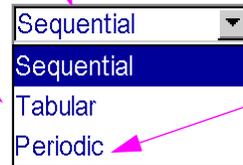
Periodic format: example above illustrates a quarter year code implemented by using a periodic month code. 'Q1' prints from Jan 1 - Mar 31, 'Q2' from Apr 1 - Jun 30, etc.

Thermal Jet

Product Counts, Variable Fields, Logos

Variable

Logo

Logo

Variable

Scroll through logo images or select from list
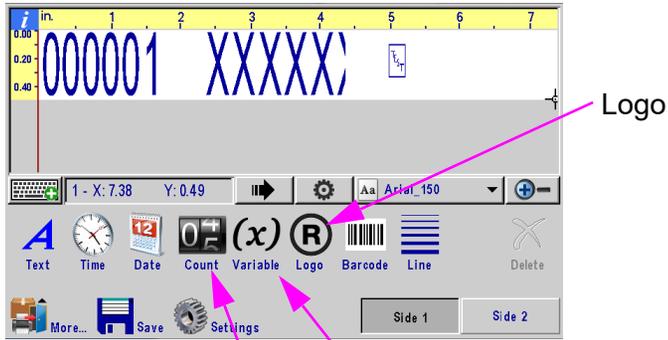
Maximum 9-digit count
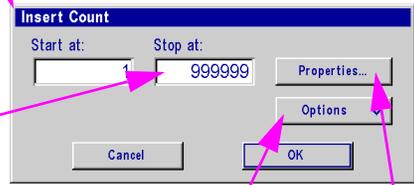
Incrementing Count

Count increments when the 'Start at' value is less than the 'Stop at' value.

Decrementing Count

Count decrements when the 'Start at' value is greater than the 'Stop at' value.
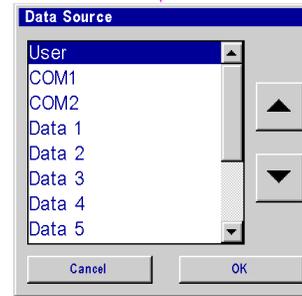
Variable Field Data Source

User: Print data entered when print message containing the variable field is selected to print.

COM1, COM2: Data is received through COM1 or COM2 serial port. Data must be received before the message is selected to print.

Data 1-10: Data is retrieved from corresponding system variable. User has the option to change the data when the message is selected to print.
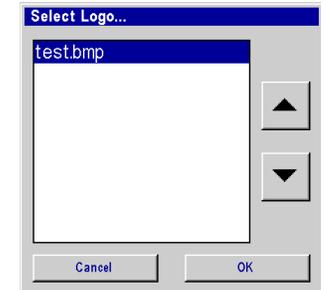
Barcodes, Lines, Product setup, & Menu

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 the editor on the next photocell trigger

Quick save of current message

Select: Horizontal, Vertical or Rectangle

Enter dimensions or select standard width

Increase or decrease value of selected property

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

Insert Block or Line
Dimensions (in.)
0.10
2.00
Cancel | OK

Insert Block or Line
Dimensions (in.)
0.00
0.00
Cancel | OK

Text | Time | Date | Count | Variable | Logo | Barcode | Line | Delete
More... | Save | Settings | Side 1 | Side 2

1 - X: 4.68 Y: 0.47 Arial_150

Insert Bar Code
Code Type | Data Source | Insert
Bar code data
12345678901
GTIN-12 (UPC-A) | Source: Fixed
Cancel | OK | Properties...

Bar Code Type
GTIN-12 (UPC-A)
UPC-E
GTIN-13 (EAN-13)
GTIN-8 (EAN-8)
Code 39
GTIN-14 (ITF-14)
GTIN-14 (UCC-128)
Code 128
Cancel | OK

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

Product Setup
Length | Left margin
12.00 in. | 0.00 in.
Panel Setup | Print Properties | Print Options
Cancel | OK

Product Setup
Character width
100 %
Character spacing (columns)
3 columns
Panel Setup | Print Properties | Print Options
Cancel | OK

Product Setup
☐ Side 2 = side 1.
☐ Task 2 = task 1.
☐ Print upside down.
☐ Repeat print at 12.00 in. intervals.
☐ Print n times: ○ 1 ○ Prompt
Panel Setup | Print Properties | Print Options
Cancel | OK

Bar Code Properties
20 | 115 | 0 | 0 | 5
Select a property above.
– | +
Human readable Arial 30
Cancel | OK

Thermal Jet

Message Info Box

Task number & message name

Estimated prints per ink cartridge

Product length & left margin settings

Zoom

- • Increases message size

- • Returns message to original size

Delete Button

- • Deletes the selected field.

Direct Entry of Cursor or Field Position

Direct Entry Box

Field: selecting the Direct Entry Box while having a field selected will allow the user to manually input the X & Y location of the selected field

Cursor: When no fields are selected the Direct Entry Box will allow the user to manually input the X & Y location of the cursor

Print Head Number

The Apps Screen

See "Time, Date, and Rollover Time Screen" on page 29

Time

04:07

Format: ○ 12 hour ● 24 hour

Time | Date | Rollover Time

Cancel | Apply | OK

Message list access
○ Local ○ Network
Message list URL:
http://x.x.x.x/cgi-bin/getprd.py?key=
Message attachment URL:
http://x.x.x.x/cgi-bin/getalp.py?key=
Network notification URL:

Map Network Device | IP Addresses
Cancel | OK

Ask your network administrator for appropriate IP settings and enter them below.

Controller | 10. 1. 2. 3
1st Ink System | 0. 0. 0. 0
2nd Ink System | 0. 0. 0. 0
Subnet Mask | 255. 255. 255.
Gateway | 0. 0. 0. 0

Map Network Device | IP Addresses
Cancel | OK

Network Settings

Return to the Home Screen

Regional Settings

Language
Deutsch
English
Español
français
Nederlands
Português
Русский

Units of measure
● U.S. customary
○ Metric

OK
Cancel

Select Background color

OK
Cancel

Port Settings

Port | Baud | Function
COM1 | 57600 | Serial Print Head - HP: Task 1
 | 57600 | None

Cancel | OK

Back | Time & Date | Network | Serial Ports | Regional Settings

User Access

Access level
Open Access

Change Password | Cancel | OK

Pause | Print... | Cancel Print | Messages | Status | More...

User Access | Background Color | Utilities

System Utilities

Select Function
Restore default configuration
Calibrate touch screen
Backup
Restore
Safely remove USB memory
File manager

Restarts the system and restores it to its default configuration.

Exit | Do Function

See "User Access" on page 29

Time, Date, and Rollover Time Screen

Set the controller's time and time format

NOTE: The 12 hour/24 hour format option applies to <u>controller</u> functions; it does not apply to time codes in print messages.

04:07

Time   Date   Rollover Time

Cancel   Apply   OK

Press "OK" to return to the Apps Screen

Rollover Time
Rollover time is the time that day- and date- type auto codes "rollover" from one day to the next.

00:00

Time   Date   Rollover Time

Cancel   Apply   OK

User Access

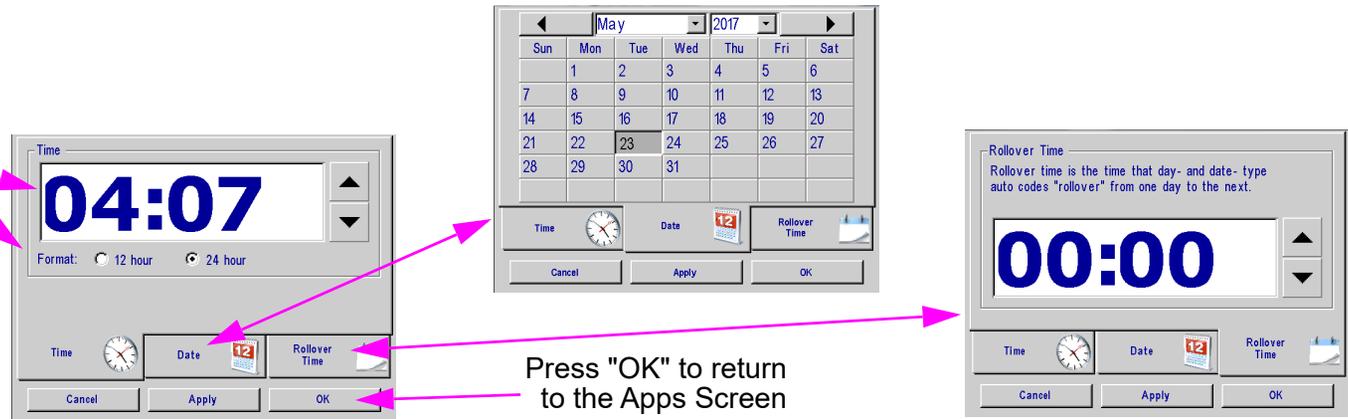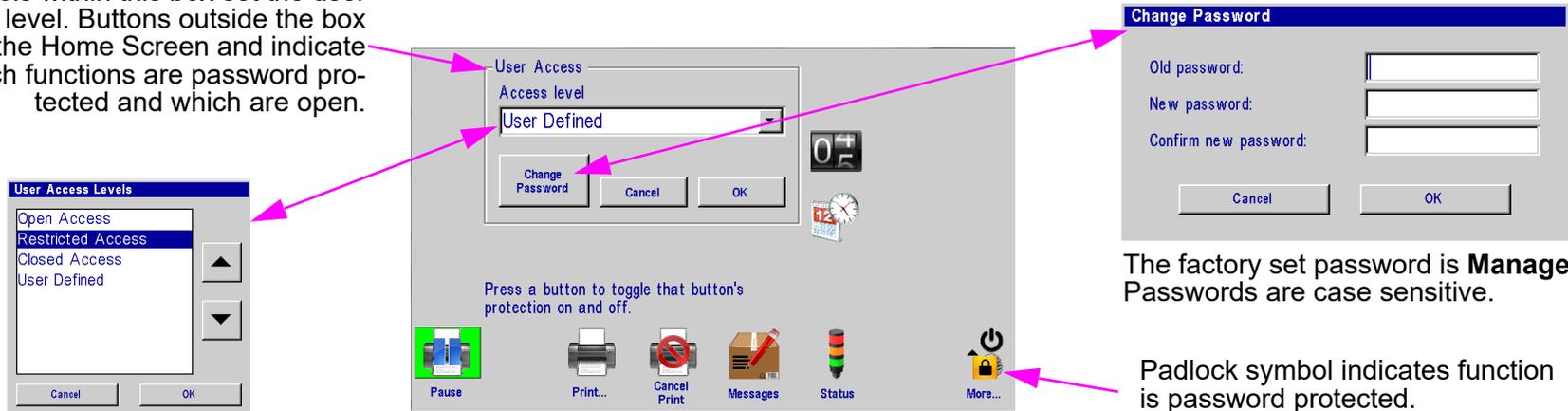Controls within this box set the user access level. Buttons outside the box mirror the Home Screen and indicate which functions are password protected and which are open.

User Access Levels
Open Access
Restricted Access
Closed Access
User Defined

Cancel   OK

User Access
Access level
User Defined

Change Password   Cancel   OK

Press a button to toggle that button's protection on and off.

Pause   Print...   Cancel Print   Messages   Status   More...

Change Password

Old password:

New password:

Confirm new password:

Cancel   OK

The factory set password is **Manager.** Passwords are case sensitive.

Padlock symbol indicates function is password protected.

Note: Users can either select a pre-defined access level from the list, or they can select "User Defined" and customize their permissions by touching icons on the User Access screen.

Section 4: Maintenance & Shutdowns

Pen Cartridge Maintenance

Porous Inks:

- **Daily Maintenance:** Prior to shift startup, the cartridge orifice array should be cleaned of any debris or ink build up. See Daily maintenance procedure.

- **Shutdowns of <u>one day</u> or more:** for extended shutdowns, follow the daily maintenance procedure, remove the pen cartridge from the print head and store in a cartridge boot cap (5780-208).

Non-Porous Inks:

- **Daily maintenance:** prior to shift startup, the cartridge orifice array should be cleaned of any debris or ink build up. See Daily Maintenance procedure.

- **Shutdowns of one hour or more:** For short term or extended shutdowns, follow the daily maintenance procedure, remove the pen cartridge from the print head and store in a cartridge boot cap (5780-208).

- **Leading edge print quality:** Poor print quality on the leading edge of print can be a result of the fast drying qualities of non-porous ink. This is caused by the shortened decap time associated with non-porous ink. To resolve this issue two or more primer bars (lower case L's) should be placed at the leading edge of the print message. This will prime the print cartridge so the necessary message content has acceptable print quality.

Daily maintenance procedure

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

Before cleaning

After cleaning

Procedure:
- For **POROUS INK ONLY**, lightly dampen sponge swab with deionized water.
- For **NON-POROUS INK ONLY**, 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.
- Rub up and down across the orifice face with light force several times with one side of the sponge swab.
- Turn the swab over and make one final light rub stroke top to bottom.
- Immediately press and hold the PURGE button on the rear of the print head for 5-10 seconds to re-prime 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.

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

PEN CARTRIDGE

CARTRIDGE BOOT CAP

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

- If print quality becomes unsatisfactory during any shift repeat this procedure.
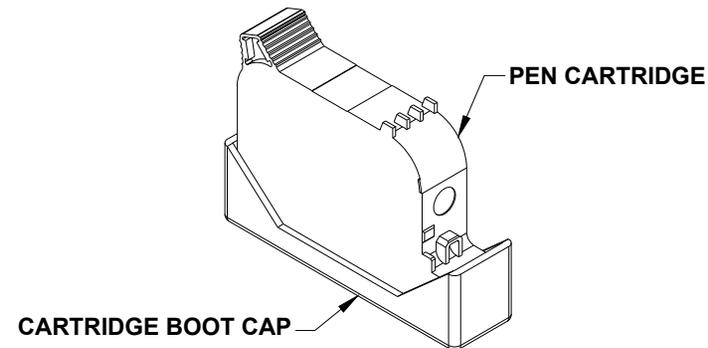
Section 5: Troubleshooting

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 10. • 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 Print Head to Substrate" on page 8. • 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 "Daily maintenance procedure" on page 31. • Replace damaged pen cartridge with new. • Remove cartridge and reinsert.
Print that appears smeared and/or debris is building up on the pen cartridge.	• Carton rubbing across the front of the print head	• Adjust print head distance or/and use roller retracting bracketry to insure print head maintains proper distance to prevent damage to pen cartridge.
Unable to recover missing channels and print quality.	• Damaged cartridge • Poorly seated pen cartridge. • Inadequate cartridge maintenance.	• Replace pen cartridge. • Remove pen cartridge, clean pads of pen cartridge and pogo pins in print head. Re-insert cartridge. • When a cartridge is not properly cleaned or capped during down times the solvent in the nozzles evaporate and can create a hard plug. Once a hard plug has formed it is impossible to clear and the cartridge needs to be replaced.

Thermal Jet

PRINT HEAD LED FUNCTIONALITY

System Symptom	Possible Cause	Actions
Red LED on steady	• Pen cartridge ink level is low.	• Ready the next pen cartridge for installation.
Red LED is flashing slowly	• Pen cartridge is out of ink and significant print degradation is imminent. • A non-recognized cartridge is installed.	• Prepare to install a new pen cartridge. • Install an original recognized 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. • Pen cartridge is out of ink and the print head is self-protecting against excessive heating. Replace the appropriate pen cartridge.

Appendix A: Specifications

1/2" Print Head

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:
Recommended Gap:
Porous: .1 in (2.5 mm)
Non-Porous: .08 in (2.0 mm)

Maximum Gap:
Porous: .25 in (6.3 mm)
Non-Porous: .15 in (3.8 mm)

Print Head Orientation: From horizontal to straight down.

Print Head Tilt:
+/- 45° from vertical for standard print cartridge

Number of Print Fields:
Maximum 5 lines of print per print cartridge at any given point. Each print line may have at most three (3) 52-character print fields; number of fields per line increases as the number of characters per field decreases.

File Storage:
Twenty-seven 256kB sectors per print head are available for font and logo file storage. Files larger than 256kB use multiple sectors. Factory installed fonts occupy 8 of the 27 sectors.
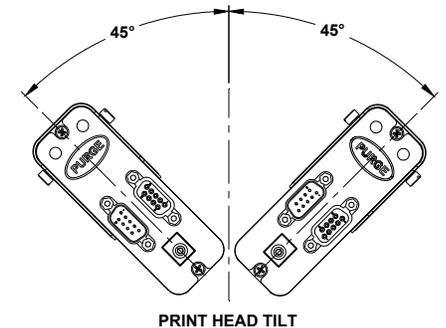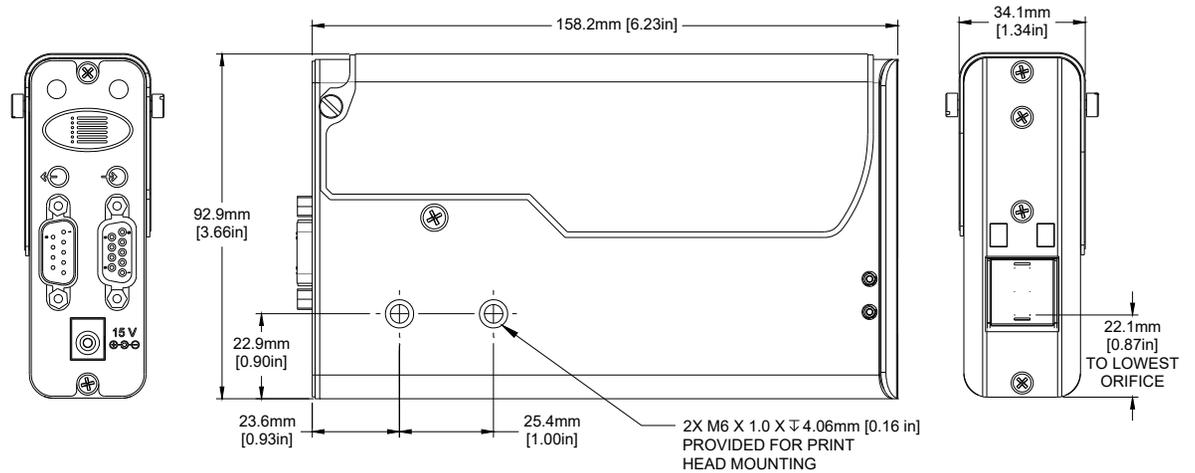Five factory installed fonts: Arial 30, 75, 150, 225, and 300 (0.1 in / 2.54 mm, 0.25 in / 6.35 mm, 0.5 in / 12.7 mm, 0.75 in / 19.05 mm, 1.0 in / 25.4 mm).
Bitmap (logo) files: 150 dots tall max (.5 in / 12.7 mm); 32,767 columns wide max (109 in / 2.79 m at 300 dpi).

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

PRINT HEAD TILT

1" Print Head:

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:
Recommended Gap:
 Porous: .1 in (2.5 mm)
 Non-Porous: .08 in (2.0 mm)

Maximum Gap:
 Porous: .25 in (6.3 mm)
 Non-Porous: .15 in (3.8 mm)

Print Head Orientation: Horizontal to straight down.

Print Head Tilt:
+/- 45° from vertical for standard print cartridge

Number of Print Fields:
Maximum 5 lines of print per print cartridge, 10 total for the print head, at any given point. Each print line may have at most three (3) 52-character print fields; number of fields per line increases as the number of characters per field decreases.

File Storage:
Twenty-seven 256kB sectors per stall are available for font and logo file storage. Files larger than 256kB use multiple sectors. Factory installed fonts occupy 8 of the 27 sectors.
Five factory installed fonts: Arial 30, 75, 150, 225, and 300 (0.1 in / 2.54 mm, 0.25 in / 6.35 mm, 0.5 in / 12.7 mm, 0.75 in / 19.05 mm, 1.0 in / 25.4 mm).
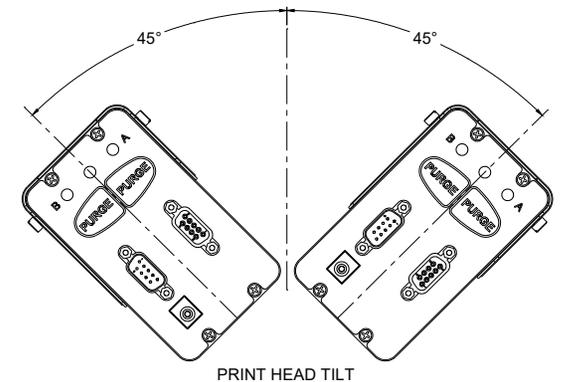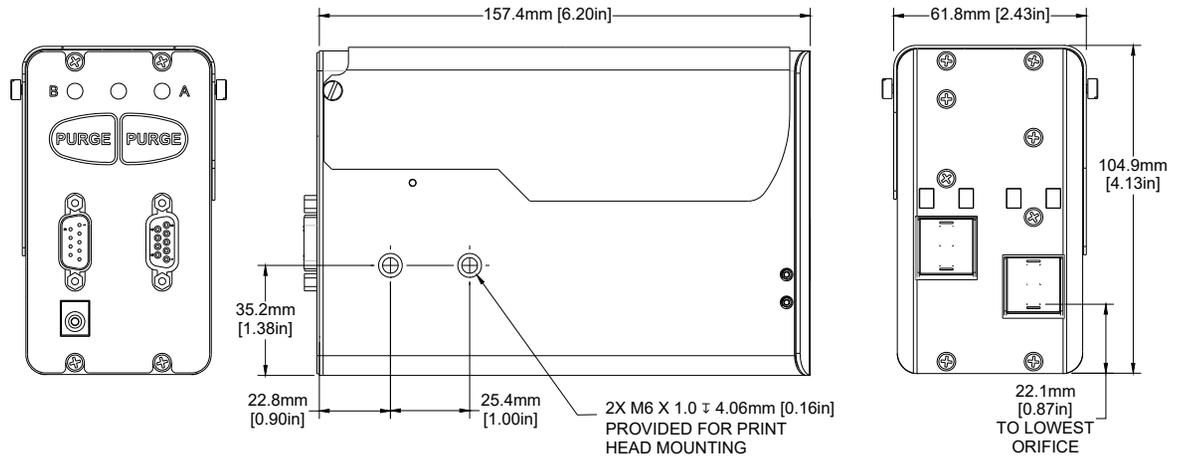Bitmap (logo) files: 300 dots tall max (1.0 in / 25.4 mm); 32,767 columns wide max (109 in / 2.79 m at 300 dpi).

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

PRINT HEAD TILT

Thermal Jet

Handheld Serial Controller

Size

Weight: .50kg [1.1lb]
Height: 133.4mm [5.25in]
Width: 240.0mm [9.45in]
Depth: 39.4mm [1.55in]

Enclosure

Black ABS Plastic

User Interface

Type: Graphical User Interface
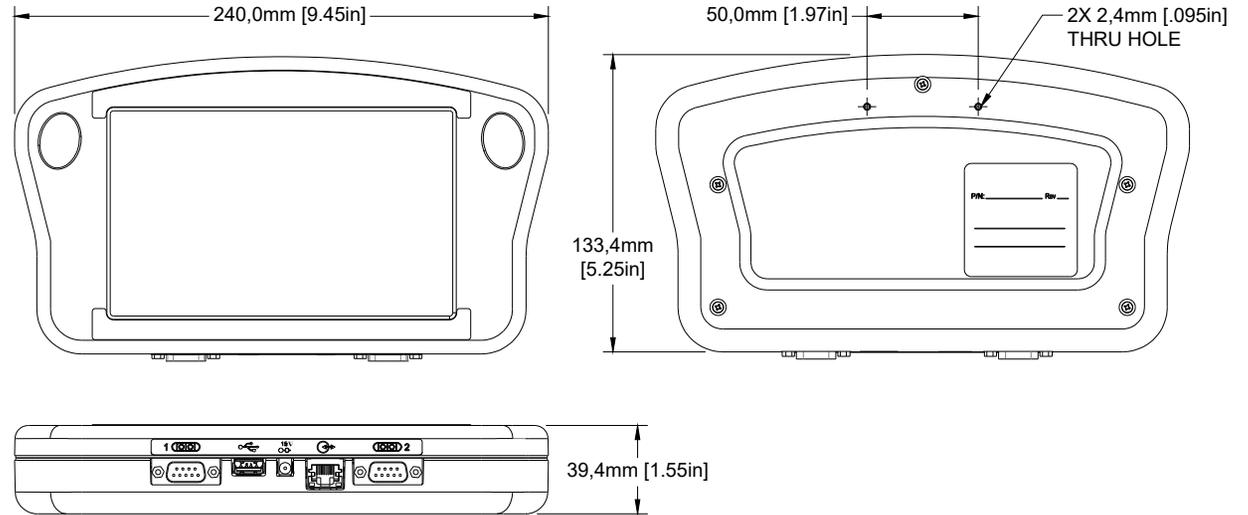keyboard: on screen QWERTY

Display

7in [178mm] LCD with touch screen,
800 X 480 pixels

Fonts

Unicode

Ports

(2) RS-232 Ports, (1) USB Port
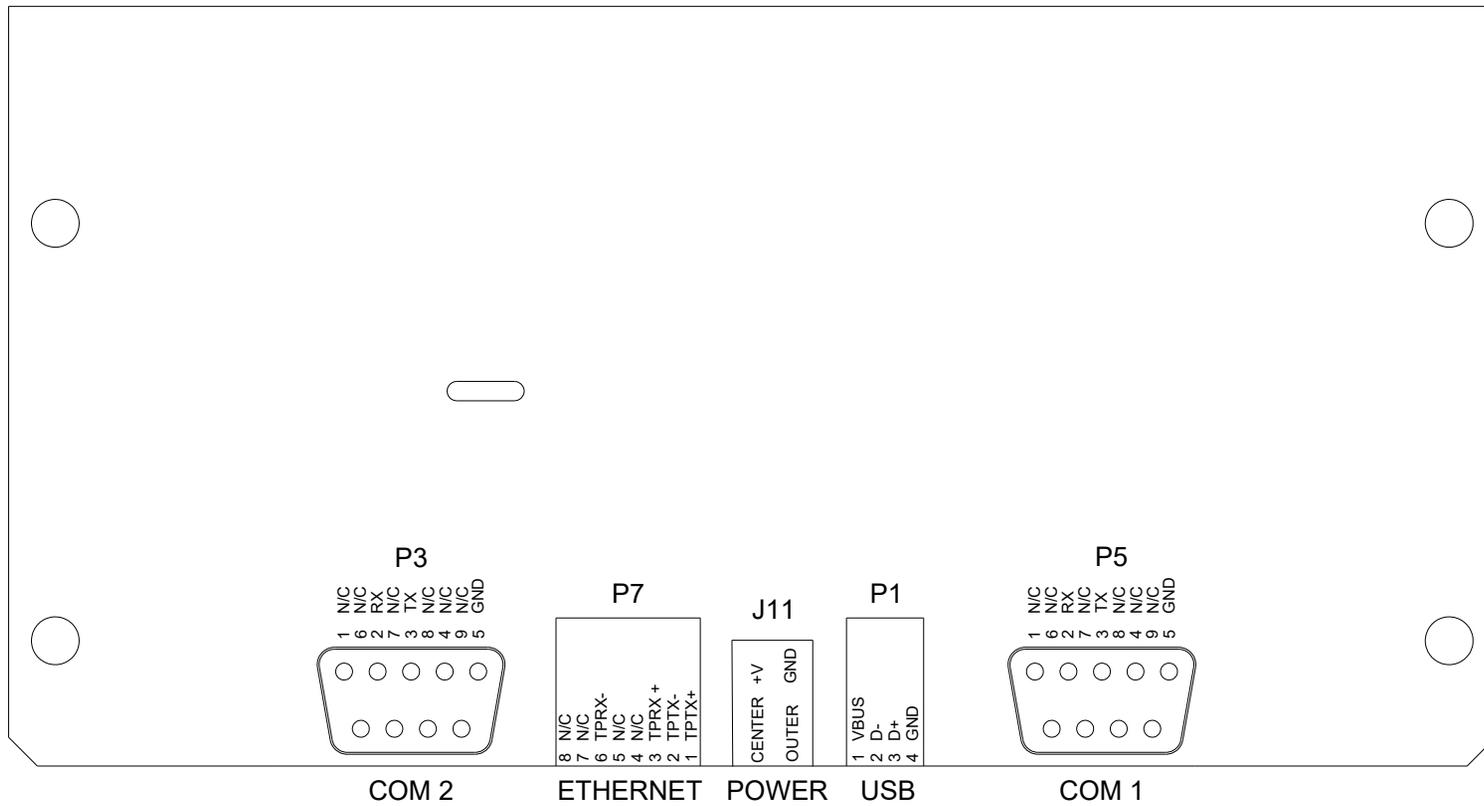(1) 100 base-T Ethernet Port

Electrical

15 VDC Supplied from print head power
supply: 90-260 VAC, 50/0 Hz, 1.5A max.

Environment

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

Operating humidity: 10% - 90%, non con-
densing

Handheld Controller CPU Board

P3

Pin	Signal
1	N/C
6	N/C
2	RX
7	N/C
3	TX
8	N/C
4	N/C
9	N/C
5	GND

P7

Pin	Signal
8	N/C
7	N/C
6	TPRX-
5	N/C
4	N/C
3	TPRX +
2	TPTX-
1	TPTX+

J11

Signal
CENTER +V
OUTER GND

P1

Pin	Signal
1	VBUS
2	D-
3	D+
4	GND

P5

Pin	Signal
1	N/C
6	N/C
2	RX
7	N/C
3	TX
8	N/C
4	N/C
9	N/C
5	GND

COM 2   ETHERNET   POWER   USB   COM 1

Appendix B: Theory of Operation

Thermal Jet Print Heads

TIJ Technology

The print head uses Thermal Ink Jet (TIJ) technology as implemented on the hp® 45A and 45si cartridges. TIJ technology works by rapidly heating the ink. As the ink heats it expands and is ejected from the print cartridge orifices. Because the individual orifices are very small, many more 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.

Similarities and Differences

A print head can operate stand-alone or in concert with other print heads connected one to another in a daisy chain configuration. Up to eight 1/2" print heads or four 1" print heads can be daisy chained. Print heads can be controlled by the Handheld controller, from a PC or laptop using the included InkJet Demo software interface program, or by a user developed application.

Print heads can print up to five lines of print, using any combination of the various print field types supported, including fixed text, date/time codes, product counts, variable fields, logos, and a variety of bar codes, including Data Matrix and QR 2-D codes.

Unlike other inkjet technologies, these print heads store and process the currently printing message internally. This allows the print heads to be disconnected from the controlling device and operate "stand alone" once the print information has been uploaded to the heads. However, print head and print message status is unavailable to the the controlling device once the print heads are disconnected.

Ink Cartridge Ink Status

Each ink cartridge has been programmed to make full use of the **Smart Level Ink Detection System**. When a new cartridge is snapped into a print head it is given an identity code so that its ink level may be monitored. As the ink depletes to 10% ink remaining, an "Ink Low" condition occurs and the red LED on the rear of the print head turns on steady. The red LED changes to slow flashing, indicating "Ink Out", when there is minimal ink remaining, and significant print degradation is imminent. Ink status is reported back to the Handheld controller or InkJet Demo software as long as they are connected to the print head daisy chain.

Handheld Controller

Functional Description

The Handheld and Thermal 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. Print speed is controller by a conveyor mounted encoder or a built-in fixed speed encoder. Products are detected using a photosensor. A graphical user interface with color LDC, touch screen, and on-screen keypads provides for easy and intuitive system operation.

Power

The Handheld Controller draws its power through either one of its two serial port connectors from the print head directly attached to the connector, or from the hub in applications where the optional accessory hub is used.

Battery Backup - A 3V battery on the CPU Board maintains the contents of system SRAM and keeps the real time clock running during power outages or when the Handheld controller is not plugged into a power source.
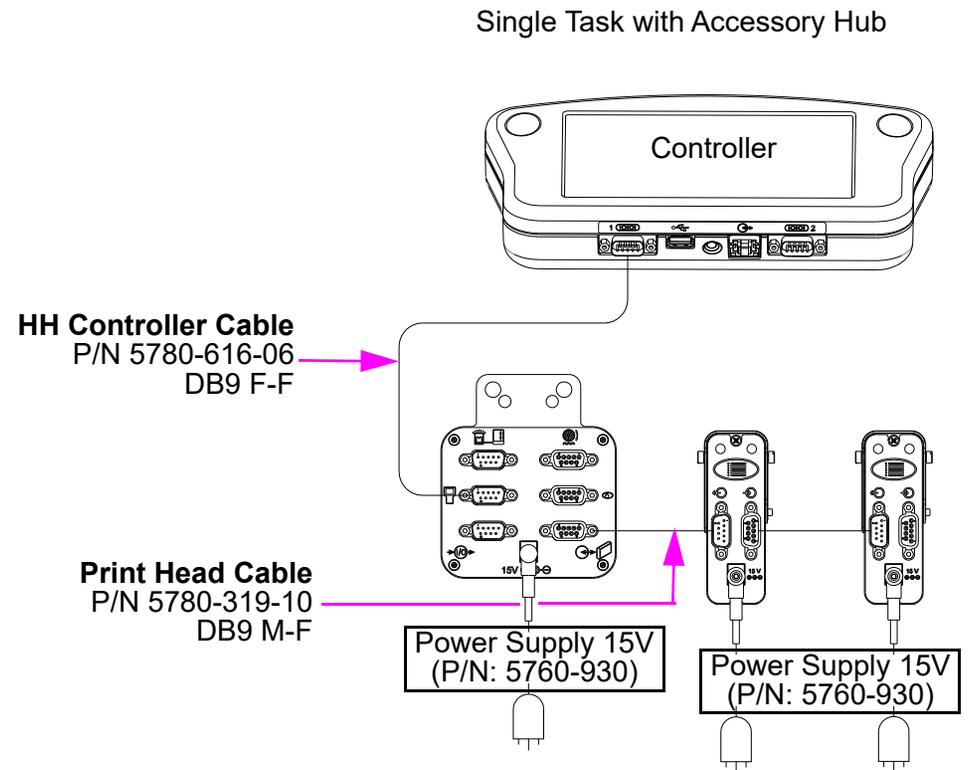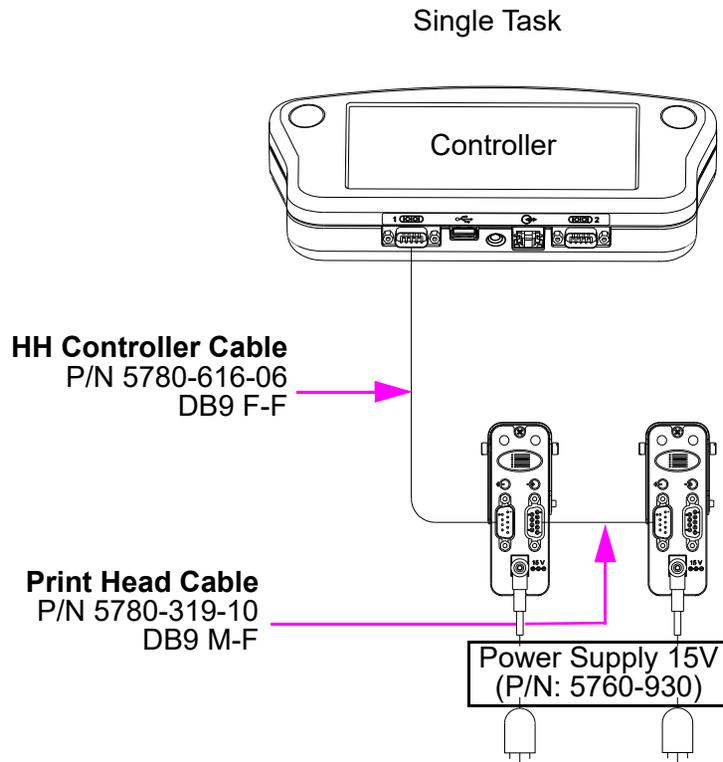
Please note that power is applied to the Handheld even when it is "turned off." When turned off, the controller enters a sleep mode where it responds to nothing but a touchscreen touch. All voltages are present while sleeping. The only way to completely remove power is to unplug the unit.

Handheld Controller Power & Cabling Diagrams

Single Task: The Handheld controller draws its power from the print head, and the COM1 port is connected to the output connector of the last head in the daisy chain.

Single task with accessory hub: The Controller draws its power from the accessory hub, and is plugged into the 'handheld' connector on the accessory hub; the accessory hub is plugged into the output connector of the last print head in the daisy chain.

.

Single Task

Single Task with Accessory Hub

Controller

Controller

HH Controller Cable
P/N 5780-616-06
DB9 F-F

HH Controller Cable
P/N 5780-616-06
DB9 F-F

Print Head Cable
P/N 5780-319-10
DB9 M-F

Print Head Cable
P/N 5780-319-10
DB9 M-F

Power Supply 15V
(P/N: 5760-930)

Power Supply 15V
(P/N: 5760-930)

Power Supply 15V
(P/N: 5760-930)

Appendix C: File Backup and Restore

From a PC

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 Handheld Controller is already connected, via Ethernet, to a PC. If not, please refer to "Appendix D: Configuring a PC to Communicate with the Handheld Controller" on page 45.

1. Obtain the Controller's IP address. Most controllers have an IP address of **10.1.2.3**. It may be different if the controller is networked with other Handhelds or other devices. If the IP address is unknown, go to the controller, and from the **Home Screen**:
   - Open the menu and touch the **Apps** button to go to the Apps Screen.
   - Touch the **Network** button on the Apps Screen to open the Network Setup Screen.
   - Touch the **IP Addresses** tab to display the system's IP addresses.
   - Record the Controller'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.
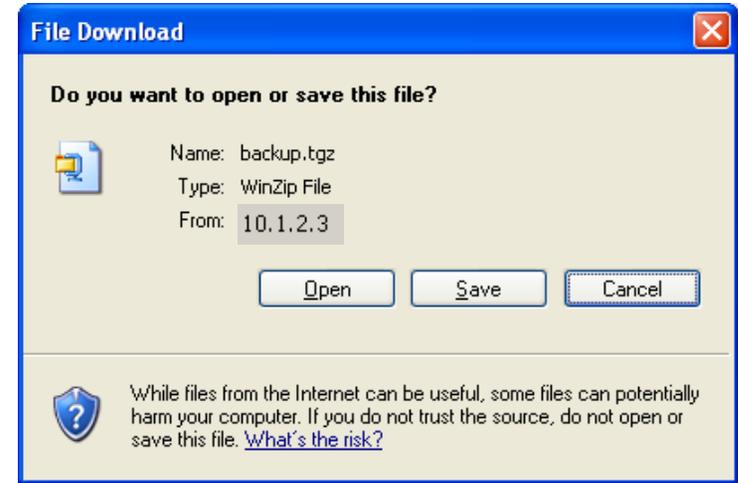

4. Press **Enter**. The web page shown at right should appear.
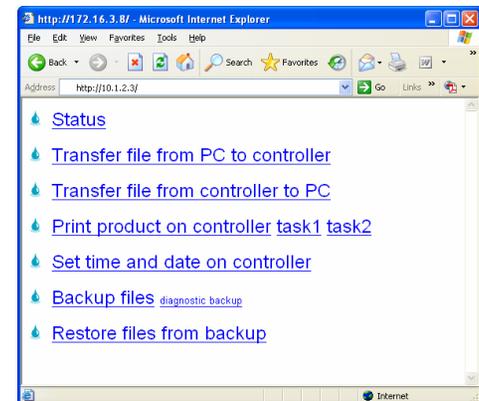
File Backup

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 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**.
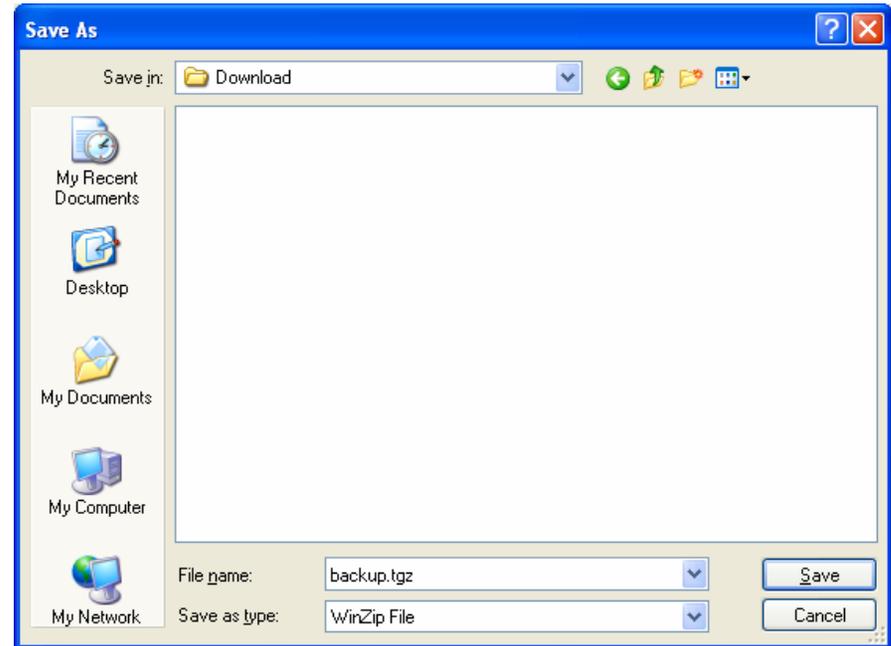
Restoring Backed-Up Files

To restore the controller's backed up system files, click the **Restore files from backup** link. The web page shown at right 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 at right will be displayed.

Thermal Jet
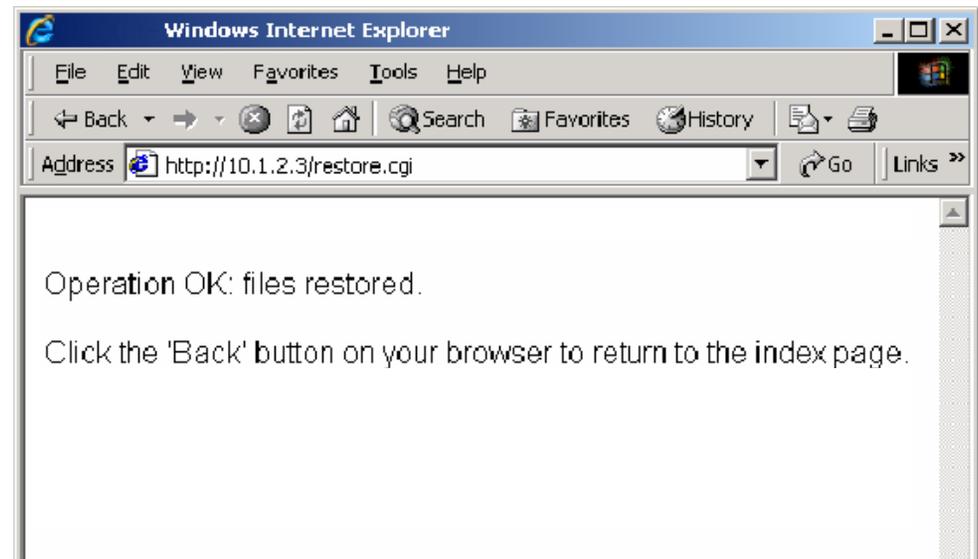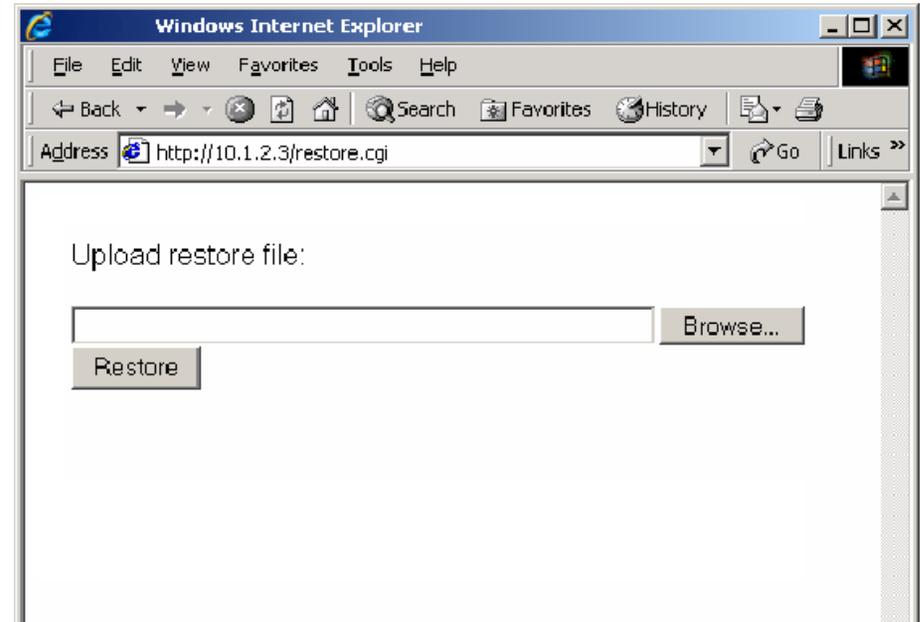
From a Controller

Backup

1. Insert a USB jump drive into the USB port on the controller.
2. From the **Home** screen touch **Apps**, then **Utilities**.
3. From the **Utilities** screen select **Backup**.
4. Enter a file name at the **Backup** dialog popup ("Backup" is the default name) and press **Save**.
5. From the **System Utilities** screen select **Safely remove USB memory**.

Apps Button
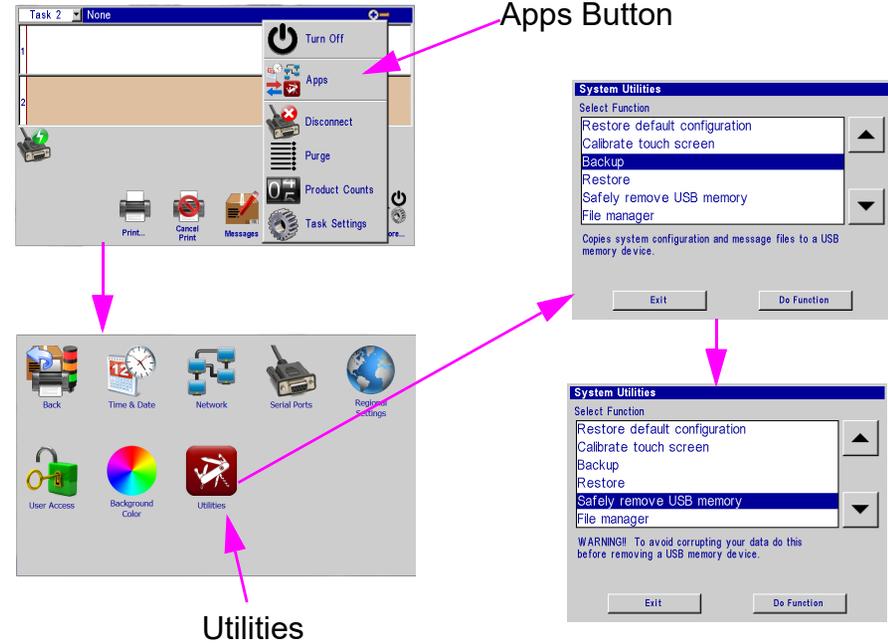
Utilities

Restore

6. Insert a USB jump drive into the USB port on the controller.
7. From the **Home** screen touch **Apps**, then **Utilities**.
8. From the **Utilities** screen select **Restore**.
9. Select the appropriate backup file from the **Restore** dialog popup and press **Open**.
10. From the **System Utilities** screen select **Safely remove USB memory**.
11. Restart controller for new settings/backup to take effect.
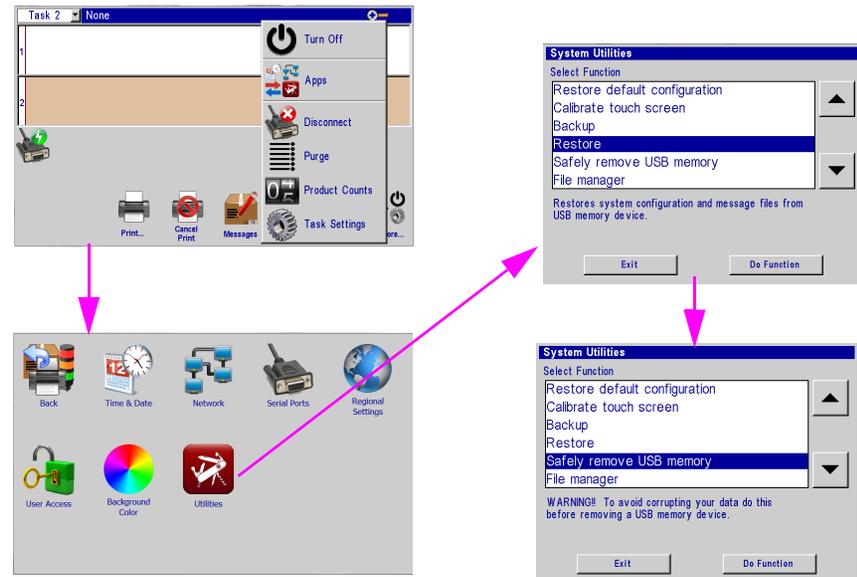
Appendix D: Configuring a PC to Communicate with the Handheld Controller

Configuring a PC to communicate with the Handheld controller requires configuring the PC's network adapter settings. The network adapter should be configured with a **static** IP address of **10.1.2.4** and a subnet mask of **255.255.255.0**. The network adapter configuration procedure is dependent upon the operating system. Contact your network administrator to configure your network adapter.

Appendix E: 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

For best results printing the next two fonts, use an external encoder. The top images were printed with an external encoder. The lower images were printed using the "Auto Speed Detect" mode (without external encoder) from the controller or InkJet Demo software.

Arial 225 - 3/4 in (19.05 mm):

AaBbCcDdEe
AaBbCcDdEe

Arial 300 - 1 in (25.4 mm):

AaBbCcDd
AaBbCcDd

Appendix F: Creating Logo Files

Open **Paint** from a PC by selecting **Start**, **All Programs**, **Accessories**, and then **Paint**.

Navigate to the **Image Properties** dialog box via the drop down menu.

<u>**Thermal Jet:**</u> Enter the Width and Height of the logo in Pixels. For practical purposes the maximum height of a logo is 150 pixels if the logo is prined with a 1/2" print head, and 300 pixels if printed with a 1" print head. The absolute maximum logo height is 1200 pixels, but logos that cross print head boundaries will likely exhibit registration problems when printed. Maximum logo width is 32,767 pixels, or print columns (109.22 in / 2,774 mm when printed at 300 dpi.)

Select **Black and white** for the Colors.
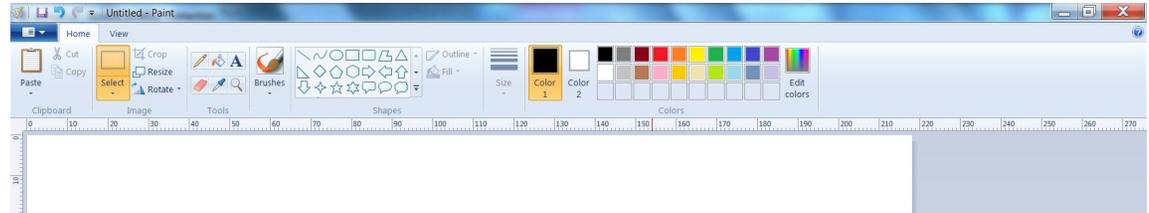
Draw the pixels of the logo using the drawing tools. See the example at right.

From the **File Menu**, select **Save As** and save the logo with a convenient name and directory location.

Next, click the **Rotate button; Rotate <u>L</u>eft 90°** (CCW 90°).

NOTE: If this logo is imported from another document or software, make sure that the first step taken is to <u>Save As</u> a <u>Monochrome Bitmap (bmp)</u>, and then <u>Resize</u> to the appropriate height.
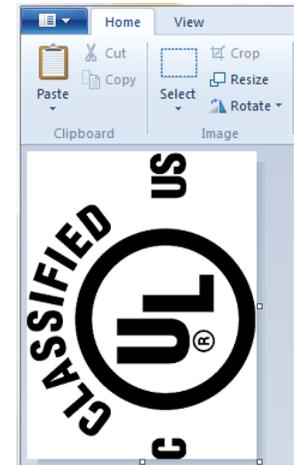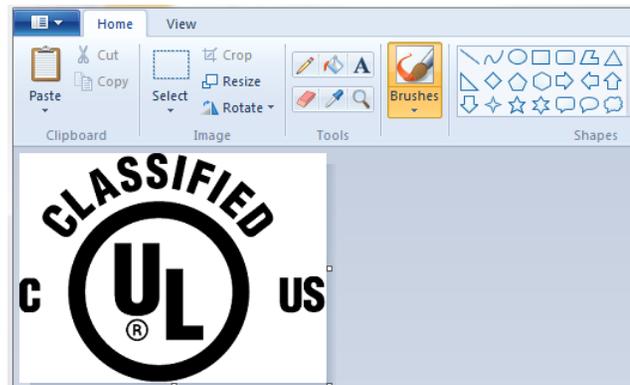
Appendix G: Controller and Print Head File Management

File Manager

NOTE: A .bmp (logo) or .fnt (font) file must reside on both the controller and print head(s) to be correctly selected, displayed, and printed. Ensure the file names are <u>less than 15 characters long</u>.

1. If logo or font files are to be transferred, place them on a portable USB storage device in a convenient location and insert it into the controller USB port.

2. Touch the **Apps** button on the **Home** screen menu, and then select the **Utilities** button.
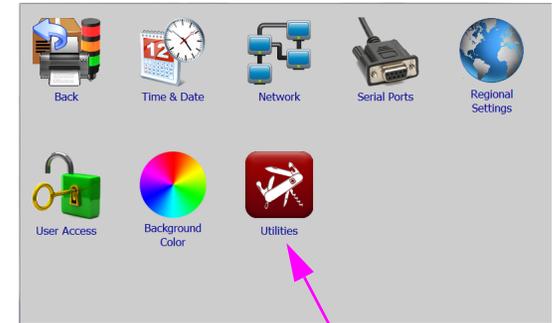
Utilities Button

3. Scroll to the bottom of the **Select Function** list and select **File manager**. Press the **Do Function** button; the **File manager** screen is displayed.

The **home** folder contains all folders and files related to controller operation.

The **Task:1** and / or **Task:2** folders contain all font and logo files resident on the print head(s) in that daisy chain.

The **usb0** folder contains all folders and files resident on the USB storage device.
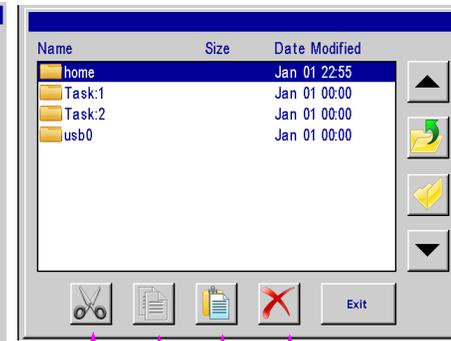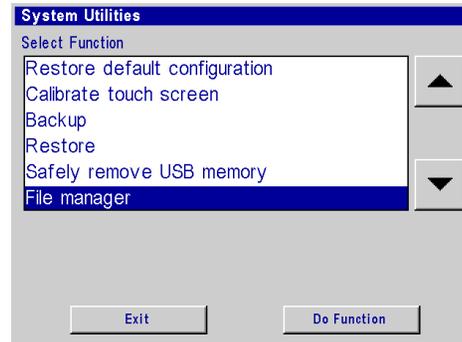
Scroll Up

Close Folder, Go Up One Level

Open Folder

Scroll down

Cut Copy Paste Delete

NOTE: Cut, Copy, Paste, and Delete function the same way as any software. Navigate to any file in any of the folders and perform the desired function. In addition, however, files are <u>not allowed</u> to be copied from any task (the print heads).

Transferring Logo and Font Files

NOTE: Files cannot be transferred to the print head while printing. Pause print first.

On the controller, logos are stored in the **/home/bmps** folder, and fonts are stored in the **/home/fnts** folder. 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.

1. As shown in the "File Manager" section, make sure USB storage device is installed and the **File manager** selection screen is present on the controller.

2. Select the **usb0** folder and press the **Open Folder** button.

3. Navigate to a previously saved file, highlight the file and press the **Copy** button. The file is now stored in temporary memory. In this example, a logo file will be transferred.

4. Press the **Close Folder** button, then the **Go Up One Level** button until the **File manager** selection screen is present.

5. Select the **home** folder, press the **Open Folder** button, and select the **bmps** folder. Store logos in the **bmps** folder:
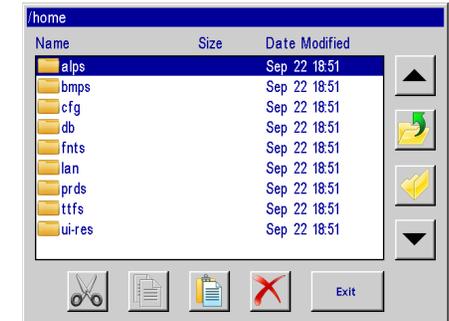
6. The display shows a list of available files. Select and open the **bmps** folder:
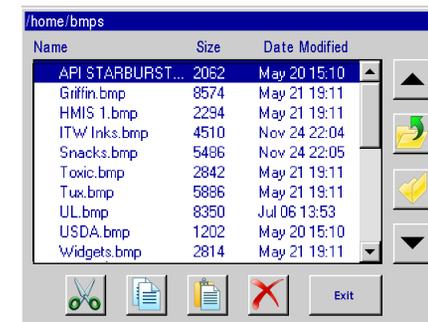
7. Select the file to be uploaded to the print head(s) and then touch the **Copy** button.
8. Close the **bmps** folder, returning to the **home** folder level.
9. Close the **bmps** folder, returning to the top level.
10. Select and open the **Task:1** folder. The display shows a list of all files on print head #1 only; it is assumed that all print heads have the same files.
11. 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.
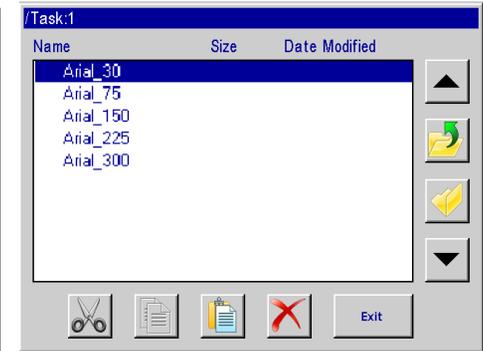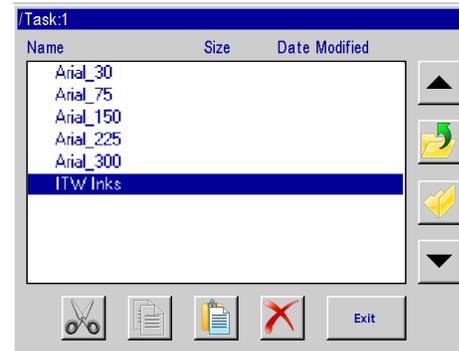
    While the file is uploading, an hourglass is displayed, and the red LED on the back of each of the print heads on the task's daisy chain blinks.
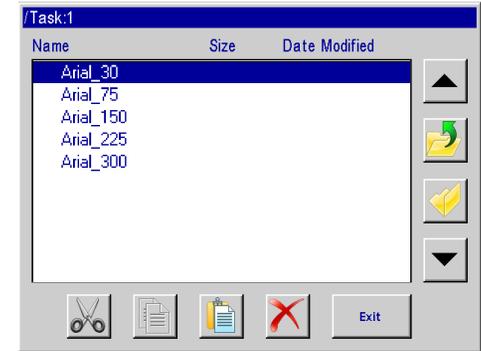
Removing a File

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

1. Select and open the **Task:1** folder.
2. Select the file to be deleted, then touch the **Delete** button.
3. The file is deleted and the file list updated.

Appendix H: 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 5.) 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 InkJet Demo software program by navigating to **Task Settings** (System Setup Screen) 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**. Valid settings are 310 to 350. 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
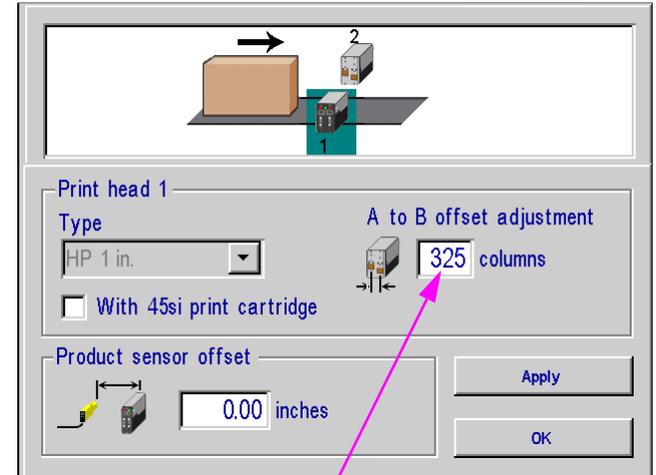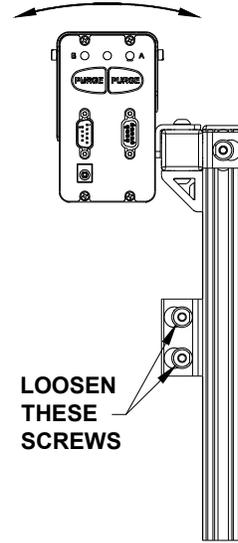
Press on this box to highlight, and then enter an adjustment value

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 InkJet Demo software interface.

Appendix J: Print Head Firmware Upgrade

For instructions on upgrading firmware on a Thermal Jet Serial Print Head, please refer to document **5765-392N**.

Appendix K: Updating the Controller via USB or Ethernet

For instructions on updating the Controller via USB or Ethernet, please refer to document **5765-390N**.

Appendix L: InkJet Demo Software for Windows

For information on InkJet Demo Software, please refer to document **5765-388N**.

Appendix M: Language Support

The following languages are supported by the User Interface and/or Print Messages.

User Interface (via Regional Settings)	Print Messages (via Message Editor)
(not available)	Arabic
中文 (Chinese)	中文 (Chinese)
Deutsch (German)	Deutsch (German)
English	English
Español (Spanish)	Español (Spanish)
Français (French)	Français (French)
(not available)	עברית (Hebrew)
Italiano (Italian)	Italiano (Italian)
한국어 (Korean)	한국어 (Korean)
Nederlands (Dutch)	Nederlands (Dutch)
Português (Portuguese)	Português (Portuguese)
Русский (Russian)	Русский (Russian)
Svenska (Swedish)	Svenska (Swedish)
(not available)	Türk (Turkish)

Appendix N: Part Numbers

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.

TJ INK

Inks

Part No.	Description	Package	Shelf Life
5780-201FX	Solo 100 Porous Media, Black	5 Cartridges	1 year
5780-201FX-R	Solo 100 Porous Media, Red		
5780-202FX	Solo 200 Porous Media, Black, Extended Decap		
5780-212FX	Solo 300NP Non-Porous Media, Black		
5780-261FX	Solo 450NP Non-Porous, Black, Extended Decap		6 months
5780-235FX	Solo 200 Porous Media, Barcode, Black		1 year

Service Parts

SoloSeries45

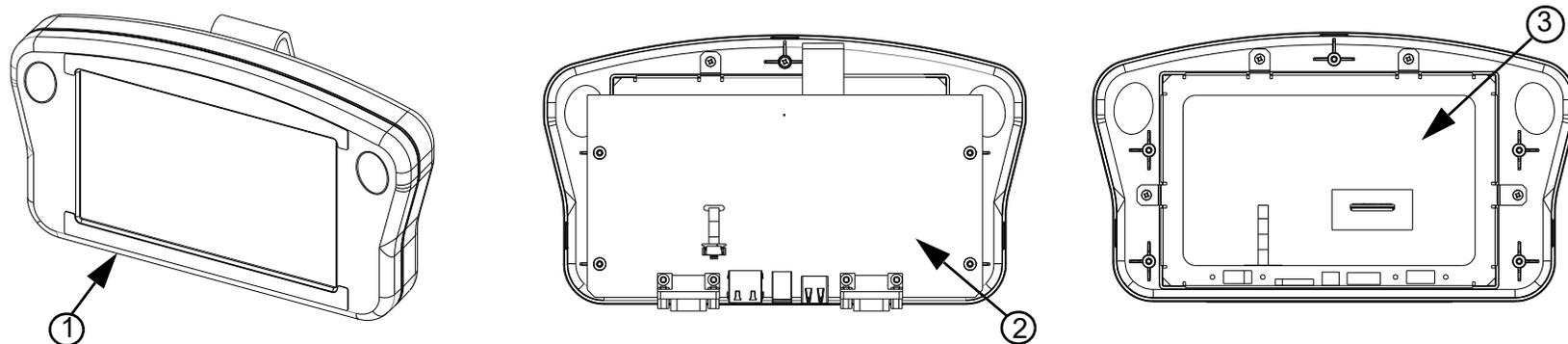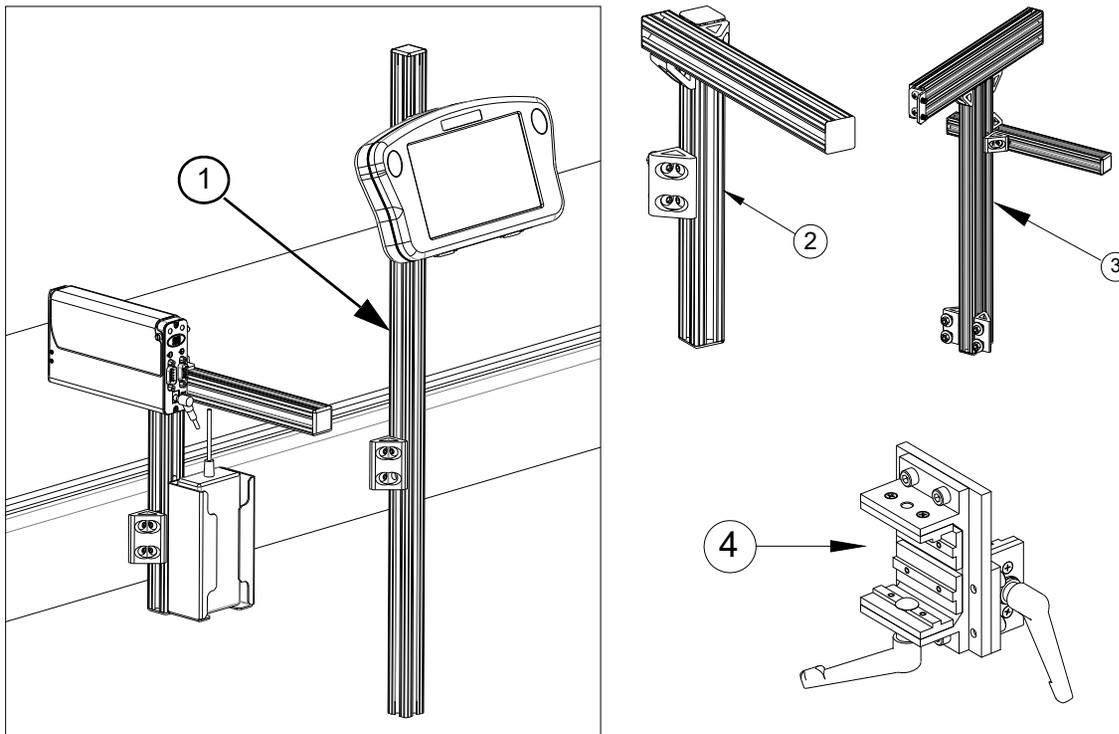| Item	Kit No.	Description
1	5760-302	Power Supply, Print Head
2	5780-002FX	SoloSeries45 Complete Print Head Kit with Mounting Bracketry, Power Supply, Data Cable, & PC Software
3	5780-203FX	Cover, Enclosure, SoloSeries45 Print Head, Standard
4	5780-226FX	PCB Replacement Set
5	5780-205FX	Print Head Replacement, Standard
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)

Thermal Jet
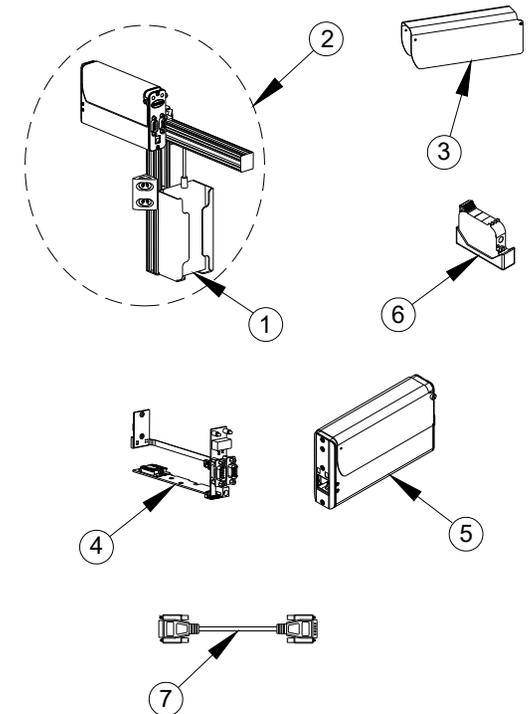
SoloSeries90

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, SoloSeries90 Print Head, Standard
4	5780-221FX	PCB Replacement Set
5	5780-215FX	Print Head Replacement, Standard
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)
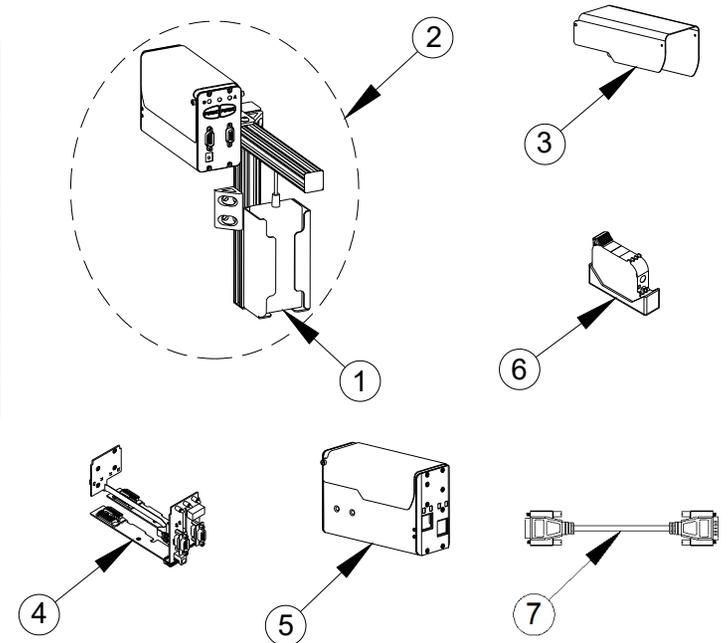
Hand-Held Controller

Item	Kit No.	Description
1	5780-017FX	Marksman HHI Plus Controller
2	5765-228	Kit, Replacement CPU, Marksman HHI Plus
3	5765-227	Kit, Replacement Display, Marksman HHI Plus
4	5780-626	Battery (CR1220) (not shown)

Bracketry

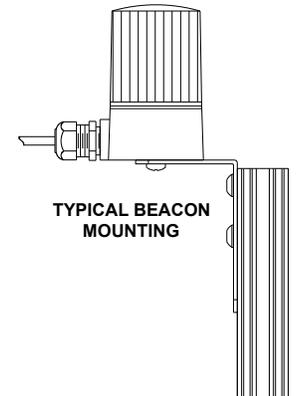| Item	Kit No.	Description
1	5780-234	Bracketry, Marksman HHI Mounting
2	5780-200	Bracketry, SoloSeries Print Head Mounting
3	5780-227	Bracketry, Print Down
4	5780-230	Bracket, Linear, Tool-less

Optional Equipment

Encoder, Photocell, Accessory Hub and Beacon

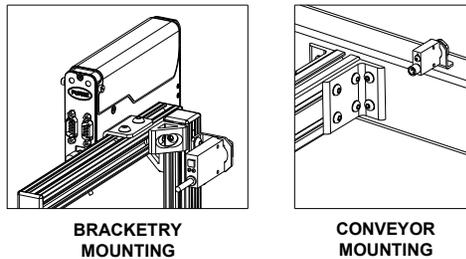| Item	Kit No.	Description
1	5760-820-IJ	Encoder Assembly with Mounting Bracket & 25' Cable
2	5765-206	Encoder O-ring Replacement
3	5760-383	Photocell
4	5780-010FX	Accessory Hub with Power Supply
5	5780-214	Beacon

TYPICAL ACCESSORY HUB MOUNTING

TYPICAL BEACON MOUNTING
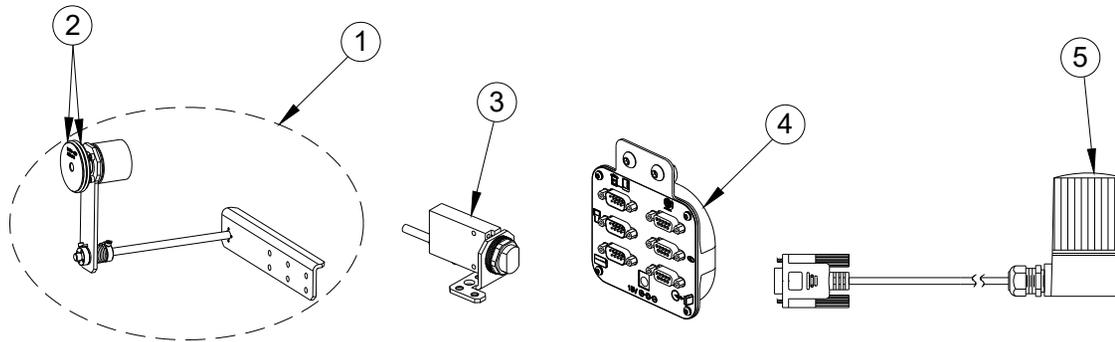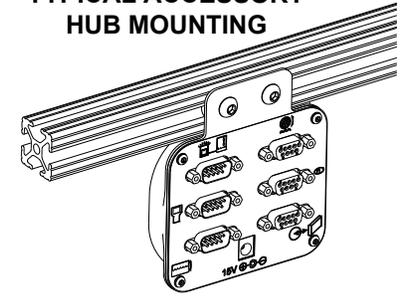
TYPICAL ENCODER MOUNTING ON OPEN AREA OF CONVEYOR BELT
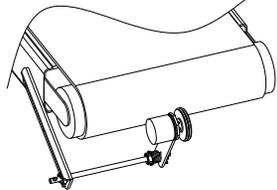
TYPICAL PHOTOCELL MOUNTING

BRACKETRY MOUNTING

CONVEYOR MOUNTING

ACCESSORY HUB CONNECTIVITY

INK STATUS BEACON

ENCODER

PHOTOCELL

ACCESSORY HUB

HANDHELD CONTROLLER

PRINT HEAD

POWER SUPPLY
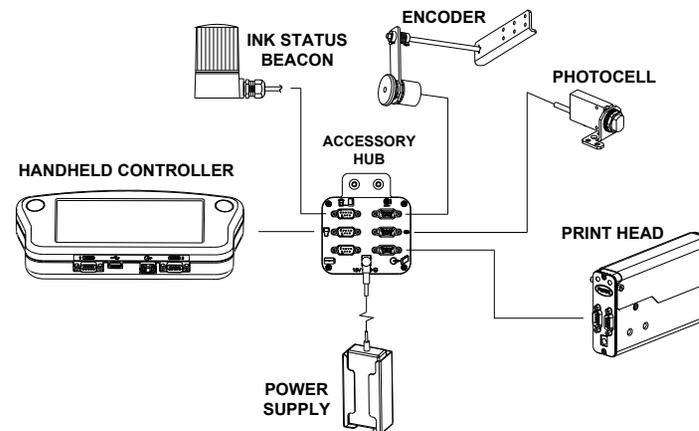
Roller & Retractor Bracketry

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

Roller Bracket Only

Roller & Retractor Bracketry
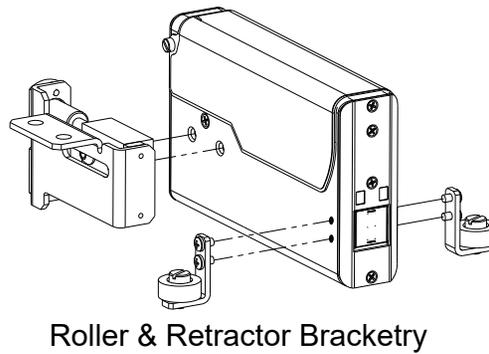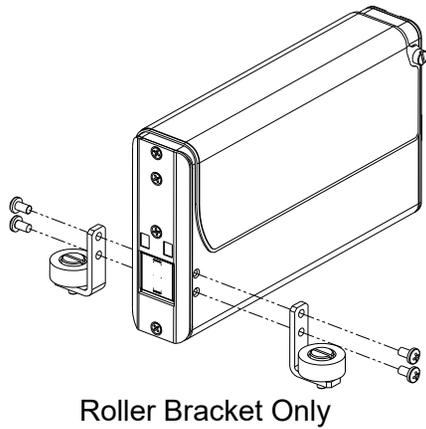
Maintenance

Item	Kit No.	Description
1	1901-398	Hand Cleaner
2	5760-832	Sponge Swabs, Qty. 100
3	6600-171	Lint-free Wipe Cloths