Operations Manual

Integrated Valve Print System

5770-018
Revision B
**Integrated Valve**

**Warranty:**

The Valve Jet System, including all components unless otherwise specified, carries a limited warranty.

The inks and conditioners used with the Valve Jet System carry a limited warranty.

For all warranty terms and conditions, contact the manufacturer for a complete copy of the Limited Warranty Statement.
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Section 1: Safety and Ink 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).
Integrated Valve

Section 2: Quick Start

Contents:

• Print Head, 12 Dot Integrated Valve
• Handheld Controller
• Pressurized Ink Can Delivery System
• Bracketry Kit
• Power Supply, 15 V
• Power Supply Bracket
• Power Cord
• Serial Cable
• Tubing
• Software

(Ink sold separately.)
Integrated Valve

Section 2: Quick Start

Step 1: Assemble Bracketry

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

Ensure bar is behind front face of print head
Step 4: Install Pressurized Ink Can Supply and Controller

CAUTION: DO NOT INSTALL PRESSURIZED INK CAN YET. All tubing connections must be made first.
**Step 5: Adjust Print Head to Substrate**

Adjust print head vertically to meet requirement.

Adjust print head horizontally to set print gap.
Step 6: Install Tubing

CAUTION: DO NOT INSTALL PRESSURIZED INK CAN YET. All tubing connections must be made first.

1. Install / route tubing per diagram.
2. Insert quick-disconnect fittings at each open end of the tubing. One quick-disconnect fitting is supplied with the pressurized ink can system, and an additional fitting is supplied with each print head.
3. Remove plug from the exit port of the regulator.
4. Insert the tube / quick-disconnect fitting into the appropriate open ports on the ink supply and print head(s).

Remove shipping plug on exit port of regulator. Install quick-disconnect fitting only after the opposite end has been installed into the tubing.

Route tubing under conveyor

Route tubing back up to the print head. Ensure there is enough tubing to make a stress-free loop back to the print head. Fully insert the quick-disconnect fitting into the tubing. Insert the fitting into the rear inlet port of the print head.

If this is a multi-print head system, install a tee fitting as shown. Ensure the fitting is fully inserted into the tubing. Again route the tubing back up to the print head with a stress-free loop.
Step 7: Electrical Connections

**CAUTION:** Power should be disconnected from the controller prior to connecting or disconnecting any external device, including print head daisy chain cables or ancillary cables for a photocell, encoder, etc. Electrical arcing may occur if external cabling is connected or disconnected while power is supplied to the unit.

After making all other electrical connections, connect the included Power Supply to the AC mains (100V - 240 VAC). The controller will turn on and an LED light will show up on all print heads. After power and boot up, the controller will start on the Home screen.
Step 8: Bleed Ink Lines and Print Heads

**CAUTION:** Ensure that the shutoff valve on the effluent bottle system is closed prior to connecting to the last print head in the daisy chain.

**Bleed Steps:**

1. Insert effluent bottle system quick-disconnect fitting into the exit (bleed) port of the last print head in the daisy chain.
2. Crack open the shutoff valve and observe ink flow through the ink lines from the pressurized ink supply. Ink will fill the lines.
3. When ink passes through this print head and out of the bleed port and into the effluent bottle, close the shutoff valve. Note that upstream print heads will not be bled.
4. Disconnect the effluent bottle system and connect to the next print head upstream in the daisy chain.
5. Again, crack open the shutoff valve until ink flows into the effluent bottle.
6. Repeat the print head bleed steps to all remaining print heads.
7. Hold an absorbent towel over the orifice plate at the front of any print head and press the **Purge** button on the rear of the print head until ink is observed on the towel.
8. Repeat step 7 on all other print heads.
**Integrated Valve**

**Section 2: Quick Start**

**Step 9: Serial Port Setup**

NOTE: Depending on the controller configuration, this step may already be complete.

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

On the **Apps** screen, press the **Serial Ports** button.
On the Ports Setting screen, press the **COM1 Function** button, select **Serial Print Head- IV**, and press **OK**. Press **OK** again to exit the Port Settings screen.

If using a PC, press the **COM1 Settings** button to open 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.
Step 10: Configure the Print Head


Set the number of print heads, identify their positions relative to the controller, and select the appropriate task options.
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

**Fixed Speed:**
User enters the desired line speed

Touch this box, then enter the desired speed
Step 11: 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.
**Step 12: Print a Message**

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

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

The message will print on the next photocell trigger.
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.
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:
  - The Pause/Continue 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.
  - Current Date and Time, as reported by the selected print head's clock.
  - Print head firmware version number.
  - Ink Level Indicator (Green = Good, Yellow = Low, Red X = Out).
More... Menu Button:

- **Turn Off**
- **Apps**
- **Disconnect**
- **Purge**
- **Product Counts**
- **Task Settings**

(See “The Apps Screen” on page 32.)

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

(See “Step 10: Configure the Print Head” on page 17.)

 Displays count of all products printed.

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

Returns to Home Screen
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.
Time, Date, and Count Codes

Expands and collapses Count Options
User Defined Time Codes

When User Defined is selected, Define Time Code button appears.

Tabular format: codes printed taken from table. Use default codes (default Hour codes shown) or edit table to suit your requirements.

Sequential format: minute code shown. Minute 00 = AA, 01 = AB, 02 = AC, etc.

Periodic format: example 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.
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.

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.

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.
Product Counts, Variable Fields, Logos

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.

Scroll through logo images or select from list.
Lines, Product setup, & Menu

- Reverts message to the last saved
- Clears contents of Message Editor
- Calculates estimated ink usage for the contents of the Message Editor
- Exits the Message Editor to the Home screen
- Quick save of current message
- Prints the contents of the Message Editor on the next photocell trigger

Enter line height and width

Horizontal or Vertical Selection
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.
The Apps Screen

See “Time, Date, and Rollover Time Screen” on page 33

Return to the Home screen

See “User Access” on page 33

Select Background color

See “Step 9: Serial Port Setup” on page 15
**Time, Date, and Rollover Time Screen**

Set the controller’s time and time format

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

Press OK to return to the Apps screen

**User Access**

The factory set password is **Manager**.

Passwords are case sensitive.

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.

*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: Print Head Functionality

Home Screen:

Pressure Screen:
- Pressing the Enter button from the Home screen displays the ink pressure in psi on the inside of the print head (e.g. 7.0 psi)
- After 30 seconds, the display returns to the Home screen.

Print Head Purge:
- Press and hold the Purge button to fire all print channels.
- If the Enter button is pushed from the Pressure screen, then an individual channel is displayed (e.g. channel 1).
- Individual channels can be selected using the up and down arrows. Pressing the Purge button will only eject ink for the individual channel selected.
- To return to the Home screen, press the down arrow until the Pr (Pressure) screen is reached, and then press the Enter button.
Pulse Width (Printed Dot Size) Adjustment:

- From the **Home** or **Pressure** screen, simultaneously press the Up an Down arrows. The last active channel will display (e.g. channel 1).
- Select the desired channel to change the pulse width using the Up and Down arrows.
- Press the **Enter** button.
- The current pulse width value is displayed (e.g. 41).
- Use the Up and Down arrows to increase or decrease the pulse width.

Press the **Enter** button to save the change. If the **Enter** button is not pressed within 30 seconds, then the pulse width is not changed.
Section 5: Maintenance & Shutdowns

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

**System Maintenance**

**Intermittent (as required):**
1. Be sure the photosensor is clean and free of debris.
2. Be sure the O-rings on the encoder wheel are present and not worn (cracked and/or chipped).
3. Be sure the nuts and bolts holding the bracketry in place remain tight.
4. Equipment may be cleaned utilizing the appropriate conditioner for the ink. See “Consumables” on page 56.

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

**Annually:**
1. Replace encoder O-rings (refer to “Optional Equipment” on page 58).
2. Recalibrate Touch Screen.
Print Head Maintenance

Daily Startup

Wear safety goggles when working with industrial inks or solutions!

1. Clean print head faceplates with the appropriate conditioner for your ink system. Spray conditioner on a lint-free wipe and wipe the faceplate in a circular motion to remove ink from the orifices. Maintenance sprays are conveniently packaged in pressurized cans. See “Consumables” on page 56.
2. Inspect lines and connections for leaks. Make repairs if needed.
3. Inspect all electrical connections and cabling for damage, and replace as necessary.

Preventative Maintenance at 2000 Hours

- Thorough cleaning of print head.
- Solenoid and pulse-width adjustment for optimal dot size.

Shutdowns of Seven Days or Longer

For extended shut down periods, it is recommended that the print head(s), regulator(s) and the optional ink delivery system be thoroughly flushed with appropriate conditioner. In order to perform this procedure, an adequate supply of conditioner and an additional cap assembly for the optional ink delivery system are required. Refer to “Consumables” on page 56.
1. Remove the ink.
2. Install the can of conditioner / solvent.
3. Connect an effluent bottle system as discussed in “Step 8: Bleed Ink Lines and Print Heads” on page 14.
### Section 6: Troubleshooting

#### NO PRINT

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>No print head power / red LED on rear of print head</td>
<td>• Power Supply</td>
<td>• Check power supply light indicator.</td>
</tr>
<tr>
<td></td>
<td>• AC Source</td>
<td>• Check for AC power source between power supply input limits.</td>
</tr>
<tr>
<td>Pressure is low indicated by an &quot;Ink Low&quot; or &quot;Ink Out&quot; on the controller</td>
<td>• Ink can is empty</td>
<td>• Replace with new can of ink.</td>
</tr>
<tr>
<td></td>
<td>• Regulator is set low or malfunctioning</td>
<td>• Refer to &quot;Ink Regulator Adjustment&quot; on page 39.</td>
</tr>
<tr>
<td>Print head purges but won’t print desired message</td>
<td>• No print message on print head</td>
<td>• Ensure the desired print message appears on the controller home screen. If not, reselect message to print.</td>
</tr>
<tr>
<td></td>
<td>• Controller or PC software not configured for Serial Print Head</td>
<td>• Configure task to serial print head. Refer to &quot;Step 9: Serial Port Setup&quot; on page 15.</td>
</tr>
<tr>
<td></td>
<td>• Encoder Malfunction</td>
<td>• Ensure encoder is installed and plugged into the last print head in the daisy chain.</td>
</tr>
<tr>
<td></td>
<td>• Product not triggering photocell.</td>
<td>• Ensure the product is within 1/4” of the front face of the print head.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If an external photocell is installed, validate the setting from the Control Panels, System Setup, Task Options tab.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ensure print head photocells are clean.</td>
</tr>
</tbody>
</table>

#### POOR PRINT QUALITY

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Print is splattered or excessive satellites</td>
<td>• Print head is mounted too far away from the substrate</td>
<td>• Adjust the print head to within specifications. See &quot;Step 5: Adjust Print Head to Substrate” on page 11.</td>
</tr>
<tr>
<td></td>
<td>• Pulse width(s) set too high</td>
<td>• See &quot;Print Head Purge:&quot; on page 34.</td>
</tr>
<tr>
<td></td>
<td>• Print head pressure set too high</td>
<td>• Refer to &quot;Ink Regulator Adjustment&quot; on page 39.</td>
</tr>
<tr>
<td>Dot columns are out of alignment</td>
<td>• Product speed and print speed are not matched</td>
<td>• From the controller Home screen, press the Control Panels button, System Setup button, Encoder tab, and then make sure the Fixed Speed matches the actual line speed.</td>
</tr>
<tr>
<td></td>
<td>• External encoder malfunction</td>
<td>• Ensure the encoder wheel is properly tracking the belt and not bouncing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ensure encoder o-rings are not worn, cracked, or broken.</td>
</tr>
<tr>
<td>Dot size variation or missing dots</td>
<td>• Regulator is set low or malfunctioning</td>
<td>• Refer to &quot;Ink Regulator Adjustment&quot; on page 39.</td>
</tr>
<tr>
<td></td>
<td>• Pulse width set too high or low</td>
<td>• Refer to &quot;Pulse Width (Printed Dot Size) Adjustment:&quot; on page 35.</td>
</tr>
<tr>
<td></td>
<td>• Clogged or covered orifices</td>
<td>• Clean the orifice plate (See “Daily Startup” on page 37), and broach any orifice as necessary. See “Tools &amp; Maintenance” on page 58 for broach kit.</td>
</tr>
<tr>
<td>Static seepage (ink seeping out of orifices when not printing)</td>
<td>• High ink pressure</td>
<td>• Refer to &quot;Ink Regulator Adjustment&quot; on page 39.</td>
</tr>
<tr>
<td></td>
<td>• Incorrect pre-load</td>
<td>• See &quot;Adjusting Solenoid Pre-load&quot; on page 40.</td>
</tr>
<tr>
<td>Dynamic seepage (ink seeping out of orifices during print)</td>
<td>• Pulse width set too low</td>
<td>• Refer to “Pulse Width (Printed Dot Size) Adjustment:” on page 35.</td>
</tr>
<tr>
<td></td>
<td>• Low ink pressure</td>
<td>• Refer to &quot;Ink Regulator Adjustment&quot; on page 39.</td>
</tr>
<tr>
<td></td>
<td>• Incorrect pre-load</td>
<td>• See “Adjusting Solenoid Pre-load” on page 40.</td>
</tr>
<tr>
<td></td>
<td>• Expired ink</td>
<td>• Replace ink and bleed new ink through system (see “Step 8: Bleed Ink Lines and Print Heads” on page 14).</td>
</tr>
</tbody>
</table>
Ink Regulator Adjustment

**NOTE:** The regulator installed inside the pressurized ink can system comes from the factory adjusted to the correct pressure. However, occasionally it may need to be adjusted for a change in pressure or has drift issues. DO NOT adjust the regulator for the purpose of increasing any or all dot sizes. The regulator should always be set to 7.0 +/- .3 PSI while not printing.

1. Remove the controller from the Pressurized Ink Can enclosure and place on a nearby stable object so it won’t be damaged.
2. Remove the four screws holding the enclosure cover in place. The regulator is now exposed. Loosen the screw locking the regulator cap in place.
3. Connect an effluent system bottle to a nearby print head bleed port (see “Step 8: Bleed Ink Lines and Print Heads” on page 14) and ensure the shutoff valve is closed.
4. Open the shutoff valve and immediately turn the regulator knob clockwise fully (regulator full pressure).
5. Immediately turn the regulator knob counterclockwise fully until flow is shutoff.
6. Repeat steps 4 through 5 two more times.
7. Close the shutoff valve and remove the effluent bottle.
8. Adjust the operating pressure to 7.0 +/- .3 psi. Press the Purge button on the rear of the print head. Observe the pressure on the rear of the print head after it has stabilized.
9. Make small adjustments until the correct operating pressure is achieved. The Purge button must be pushed after each regulator adjustment.
10. If the regulator pressure never stabilizes, then it must be replaced. Refer to “Appendix I: Part Numbers” on page 56.
**Adjusting Solenoid Pre-load**

1. If any of the orifices are seeping statically (not printing) or dynamically (while printing), then the appropriate channel pre-load may need to be adjusted.
2. Ensure the print head is powered and ink line connected.
3. Remove the enclosure cover, exposing the solenoid mounting block and adjustment nuts.
4. The regulator pressure should be set to 7.0 +/- .3 psi while not printing. Refer to the previous section, “Ink Regulator Adjustment” if it is not.
5. Thoroughly clean the orifice plate with a clean non-abrasive cloth and maintenance spray, and then dry.
6. Hold a clean and absorbent cloth up to the front face of the print head and press the **Purge** button until all channels fire.
7. Wipe the orifice plate with a clean cloth and maintenance spray. Dry the orifice plate.
8. Observe the orifice plate for ink seepage over 30 seconds. Per the below diagrams, identify which orifice is leaking and its associated solenoid adjustment nut.
9. Turn the solenoid nut a very small amount counterclockwise (more pre-load) with a solenoid adjustment tool (see “Appendix I: Part Numbers”).
10. Repeat steps 6 through 9 until the seepage stops.
11. If there are any nuisance valves that do not stop seeping, then the print head will have to be returned to the factory for refurbishment.
System
A typical system consists of:
• Controller
• Print Head
• Pressurized Ink Can System
• Power Supply and Mounting Bracketry
• System Mounting Bracketry
(Ink purchased separately)

NOTE: The system mounting bracketry is shown in a typical configuration. Bracketry and print head orientation is left to the user to fit the application.

Typical Print Head and Bracketry
Print Head

Weight
2.3 kg [5.1 lb]

Enclosure
Anodized Aluminum and Stainless Steel

Operating Pressure
7.0 psi (48.3 kPa)

Electrical
15 VDC input from controller

Print Speed (Print Resolution Dependent)
Up to 650 ft/min (200 m/min)

Vertical Print Resolution
24 dpi

Horizontal Print Resolution
Varies up to 33 dpi

Throw Distance
Recommended Gap: .1 in (2.5 mm) or less
Maximum Gap: .5 in (12 mm)

Print Head Orientation
Any

Environment
Ambient operating temperature: 50°F to 104°F (10°C to 40°C)
Operating humidity: 10% - 90% non-condensing

Ink Type
Porous (Water Based)
Non-Porous (Solvent Based)

Number of Print Fields
Maximum 2 lines of print per print head at any given point. Each print line may have at least three 52-character print fields; number of fields per line increases as the number of characters per field decreases.

File Storage
Sectors: Twenty-seven 256 kB sectors per print head are available for font and logo file storage. Files larger than 256 kB use multiple sectors. Factory installed fonts occupy 9 of the 27 sectors.

Fonts: Nine factory installed; 5s (5 dot tall single), 7sf (7dot tall single, fixed character spacing), 7b (7 dot tall bold), 9s (9 dot tall single), 9b (9 dot tall bold), 9bf (9 dot tall bold, fixed character spacing), 12s (12 dot tall single), 12b (12 dot tall bold), and 18b (18 dot tall bold).

Bitmap (logo) files: 12 dots tall max (.5 in / 12.7 mm); 5000 columns (dots) wide max (200 in / 5.1 m at 25 dpi).
**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, 50/60 Hz, 1.5A max.

**Environment**
- Ambient operating temperature: 40°F to 104°F (5°C to 40°C)
- Operating humidity: 10% - 90%, non condensing
System Interconnect Diagram

Handheld Controller CPU Board
Pressurized Ink Can System

**Weight**
1.2 kg [2.7 lb]

**Enclosure**
Stainless Steel

**Mounting Orientation**
3 sides

**Ink Capacity**
13 fl oz (385 mL) screw top cans

**Regulator**
Factory set to 7.0 psi (48.3 kPa)

**Maximum Number of Print Heads**
4

NOTE: For more print heads, an optional pumping ink delivery system is available. See “Appendix I: Part Numbers” on page 56.
Print Head PCB Diagram

PRESSURE SENSOR, 15 PSI

TO NEXT PRINT HEAD IN DAISY CHAIN

BOARD STACK

TO COM PORT
Appendix B: File System 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 C: Configuring a PC to Communicate with the Handheld Controller” on page 51.

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 (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 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 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 will be displayed.

Operation OK: files restored.

Click the ‘Back’ button on your browser to return to the index page.
**From a Controller**

**Backup**
1. Insert a USB jump drive into the USB port on the controller.
2. From the home screen, touch the Apps button, 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.

**Restore**
6. Insert a USB jump drive into the USB port on the controller.
7. From the home screen, touch Apps button 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 C: Configuring a PC to Communicate with the Handheld Controller

Configuring a PC to communicate to 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 D: 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 less than 15 characters long.

1. If logo or font files are to be transferred, place them on a portable USB storage device and insert it into the controller USB port.
2. Touch the **Apps** button on the **Home** screen, then select the **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 the 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.

**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; however, files are not allowed to be copied from any task (print heads).
Appendix E: Creating & Transferring Logo Files

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.

Enter the **Width** and **Height** of the logo in **Pixels**. For practical purposes, the maximum height of a logo is 12 pixels if the logo is printed with a single print head. Maximum logo width is 5000 pixels, or print columns (200 in / 5.1 m when printed at 25 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.

*NOTE:* If this logo was imported from another document or software, make sure that the first step taken is to **Save As a Monochrome Bitmap (bmp)** and then **Resize** to the appropriate height.

Next, click the **Rotate** button; **Rotate Left 90° (CCW 90°).*
**Transferring Logo and Font Files**

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

1. As shown in the “File Manager” section, make sure a 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, Go Up One Level button until the File manager selection screen is present.
5. Select the home folder, press the Open Folder button, select the bmps folder and press the Open Folder button.

6. Press the Paste button. The logo (bmp file) will appear in the bmps folder.
7. Because the file is still resident in memory, it can be easily transferred to the print head(s). Navigate back to the File Manager selection screen. Select the Task:1 or Task:2 folder and press the Open Folder button.
8. Finally, press the Paste button, and the file appears on Task:1 or Task:2. If the file is desired on the opposite task, navigate back and repeat the process. Note that the available fonts are listed in the Task folder, too.
9. When all desired file transfers are complete, press the Exit button.
10. From the System Utilities menu, press the Safely remove USB memory button, and then Done.
11. The file is now available for message creation in the Message Editor.
Appendix F: Communicating Directly to the Print Head

The 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 InkJet Demo software running on a PC.

Appendix G: Updating the Controller and Ink Delivery System via USB or Ethernet

For instructions on updating the controller and ink delivery system via USB or Ethernet, please refer to document 5765-390N.

Appendix H: InkJet Demo Software for Windows

For information on the InkJet Demo Software for Windows, please refer to document 5765-388N.
## Appendix I: Part Numbers

### System

#### Major Components

<table>
<thead>
<tr>
<th>Item</th>
<th>Kit No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5770-010P</td>
<td>Pressurized Ink Can System for Porous Inks</td>
</tr>
<tr>
<td>2</td>
<td>5770-010NP</td>
<td>Pressurized Ink Can System for Non-Porous Inks</td>
</tr>
<tr>
<td>3</td>
<td>5770-012P500</td>
<td>Integrated Valve Print Head with Bracketry, Plumbing, and Serial Cable for Porous Inks</td>
</tr>
<tr>
<td>4</td>
<td>5770-012N500</td>
<td>Integrated Valve Print Head with Bracketry, Plumbing, and Serial Cable for Non-Porous Inks</td>
</tr>
<tr>
<td>5</td>
<td>5780-017SV</td>
<td>Handheld Controller</td>
</tr>
<tr>
<td>6</td>
<td>5780-236D</td>
<td>Power Supply and Bracketry</td>
</tr>
</tbody>
</table>

#### Consumables

**Inks, Conditioners, and Maintenance Sprays**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
<th>Package</th>
<th>Shelf Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>5750-242</td>
<td>Conditioner Flush, Porous, Cans</td>
<td>2 / case</td>
<td>1 year</td>
</tr>
<tr>
<td>5750-243</td>
<td>Ink, Porous, Black, Cans</td>
<td>6 / case</td>
<td></td>
</tr>
<tr>
<td>5750-249</td>
<td>Maintenance Spray, Porous, Cans</td>
<td>2 / case</td>
<td></td>
</tr>
<tr>
<td>5750-650</td>
<td>Conditioner Flush, Non-Porous, Cans</td>
<td>2 / case</td>
<td></td>
</tr>
<tr>
<td>5750-651</td>
<td>Ink, Non-Porous, Black, Cans</td>
<td>6 / case</td>
<td></td>
</tr>
<tr>
<td>5750-657</td>
<td>Maintenance Spray, Non-Porous, Cans</td>
<td>2 / case</td>
<td></td>
</tr>
</tbody>
</table>

* Optional inks available with optional bulk ink supply.

#### Service Parts

**12 Dot Integrated Valve Print Head**

<table>
<thead>
<tr>
<th>Item</th>
<th>Kit No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5770-239P500</td>
<td>Print Head Replacement, Porous Ink</td>
</tr>
<tr>
<td>2</td>
<td>5770-239N500</td>
<td>Print Head Replacement, Non-Porous Ink</td>
</tr>
<tr>
<td>3</td>
<td>5770-242P</td>
<td>PCB Replacement for Porous Print Heads (all boards included)</td>
</tr>
<tr>
<td>4</td>
<td>5770-242N</td>
<td>PCB Replacement for Non-porous Print Heads (all boards included)</td>
</tr>
<tr>
<td>5</td>
<td>5770-243</td>
<td>Internal Tubing and Fitting Replacement (not shown)</td>
</tr>
<tr>
<td>6</td>
<td>5770-451-010</td>
<td>Cable, Print Head, 10&quot;</td>
</tr>
</tbody>
</table>
### IJ4000-HH

<table>
<thead>
<tr>
<th>Item</th>
<th>Kit No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5780017SV</td>
<td>IJ4000-HH Controller</td>
</tr>
<tr>
<td>2</td>
<td>5765-227</td>
<td>Kit, Replacement Display, IJ4000-HH, 7”</td>
</tr>
<tr>
<td>3</td>
<td>5765-228</td>
<td>Kit, Replacement CPU, IJ4000-HH</td>
</tr>
<tr>
<td>4</td>
<td>5780-626</td>
<td>Battery (CR1220)</td>
</tr>
</tbody>
</table>

### Bracketry

<table>
<thead>
<tr>
<th>Item</th>
<th>Kit No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2464-561</td>
<td>X-Y Linear Print Head Adjustment, Tool-less</td>
</tr>
<tr>
<td>2</td>
<td>5760-821</td>
<td>Print Head, Pressurized Ink Can, and Power Supply Mounting</td>
</tr>
</tbody>
</table>
## Optional Equipment

### Encoder, Photocell, Accessory Hub and Beacon

<table>
<thead>
<tr>
<th>Item</th>
<th>Kit No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5760-820-IJ</td>
<td>Encoder Assembly with Mounting Bracket &amp; 25’ Cable</td>
</tr>
<tr>
<td>2</td>
<td>5765-206</td>
<td>Encoder O-ring Replacement</td>
</tr>
<tr>
<td>3</td>
<td>5760-383</td>
<td>Photocell</td>
</tr>
<tr>
<td>4</td>
<td>5770-019DP</td>
<td>Ink Delivery System, Domestic (115 VAC), Porous Inks</td>
</tr>
<tr>
<td>5</td>
<td>5770-019DN</td>
<td>Ink Delivery System, Domestic (115 VAC), Non-Porous</td>
</tr>
<tr>
<td>7</td>
<td>5770-019EN</td>
<td>Ink Delivery System, International (230 VAC), Non-Porous</td>
</tr>
<tr>
<td>8</td>
<td>5701-502</td>
<td>Regulator Assembly, Porous</td>
</tr>
<tr>
<td></td>
<td>5701-501</td>
<td>Regulator Assembly, Non-Porous</td>
</tr>
<tr>
<td>9</td>
<td>5780-339</td>
<td>Adapter Cable, Encoder &amp; Photocell</td>
</tr>
</tbody>
</table>

## Tools & Maintenance

<table>
<thead>
<tr>
<th>Item</th>
<th>Kit No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1901-398</td>
<td>Hand Cleaner, Ink (not shown)</td>
</tr>
<tr>
<td>2</td>
<td>5770-244</td>
<td>Broach, Orifice</td>
</tr>
<tr>
<td>3</td>
<td>5750-503</td>
<td>Effluent Bottle Kit</td>
</tr>
<tr>
<td>4</td>
<td>5770-201</td>
<td>Solenoid Pre-load Adjustment</td>
</tr>
</tbody>
</table>