



## Basic Operator's Guide

T1000 Printer



**efi** print to win.

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## **EFI Inkjet Solutions**

### **United States**

One VUTEK Place

Meredith, New Hampshire 03253 USA

Tel 603-279-4635

Fax 603-279-6411

Technical Support, 24 Hours 603-677-3111

<http://w3.efi.com/Vutek/Products>

<http://w3.efi.com/WideFormat/Products>

### **Europe/Middle East**

Ikaros Business Park

Ikaroslaan 9

B-1930

Zaventem, Belgium 1930

Tel 32.2.749.9420

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# Introduction

*The T1000 Basic Operator's Manual describes how the T1000 printer operates and provides information about daily printing procedures and maintenance requirements. This chapter contains links to documentation, training, and support materials.*

## Welcome

Congratulations! You have purchased the finest wide format digital ink jet printing system in the world. EFI T1000 printers are premium digital ink jet printers with vivid full color and white printing on a variety of sheet media. EFI wants you to get the best possible images from your printer, and wants your printing experience safe and profitable.

## Additional Documentation

EFI provides a number of resources to help you operate and maintain your printer. Customers have resources available to troubleshoot and repair problems as they arise.

### Customer Support Web Site

- EFI's customer support website, <http://www.vuteksupport.com/index.php>, contains technical and advisory bulletins, user and maintenance guides, software and test images, as well as Material Safety Data Sheets (MSDS). Customers should log onto the EFI-VUTEK Support site regularly to get current information or advisories affecting each printer or accessories.

### Customer Reference Guides (Site Prep and Installation Guides)

- North America - <http://www.vuteksupport.com/doc.php?doc=681>
- Rest of the World - <http://www.vuteksupport.com/doc.php?doc=1092>

### Printer Safety Guide (EFI Family of Products)

- All customers – <http://www.vuteksupport.com/doc.php?doc=683>

## Training

Operator training is an essential part of printer installation and operation. EFI-VUTEK provides an educational support system that assists new and experienced operators to develop and maintain skills. Refer to <http://www.vuteksupport.com/doc.php?doc=1128> for class information.

## Additional Support

If you have any questions about your printer or other EFI-VUTEK products, see [EFI-VUTEK](#) for contact information.

# General Safety

This chapter describes how to safely use your EFI T1000 printer. Please review and adhere to all safety precautions and attend a Basic Operator Training Class before operating the printer.

## Introduction

Before operating this printer, please read and understand the EFI Ink Jet Printer Safety Guide, <http://www.vuteksupport.com/doc.php?doc=683>. Operators must read and sign the UV Safety Acknowledgement Form. The Safety Guide and the Basic Operator's Guide outline and explain safety-related symbols and their location on the printer. **Learn to recognize these symbols and the risks they signify.**

## Print Carriage Motion Warnings

Prior to moving the gantry or carriage, the printer emits a beep indicating that it is in the process of moving.

**Warning:** Keep hands, clothing, jewelry, and hair away from the print gantry and carriage during printer operation. The print gantry and carriage moves quickly and forcefully.

- Before and during printing, check to ensure the vacuum table, carriage and gantry assembly are clear of any foreign objects.
- Keep hands, clothing, and any objects clear of the carriage and gantry path to avoid personal injury and prevent damage to the printer.
- Climbing on any part of the printer or placing any weight on the carriage could result in personal injury and damage to the printer.

## Printer-specific Safety

In addition to general safety outlined in the EFI Printer Safety Guide, <http://www.vuteksupport.com/doc.php?doc=683>, the T1000 has the following printer-specific safety considerations.

### Carriage Drive Belt

The printer carriage drive belt contains sharp edges and presents an entanglement and cutting hazard. Keep hands, loose clothing, long hair, and other items away from the carriage drive belt at all times.



## Emergency Stops

In case of an emergency, immediately press an **Emergency Stop** push button to stop the printer.

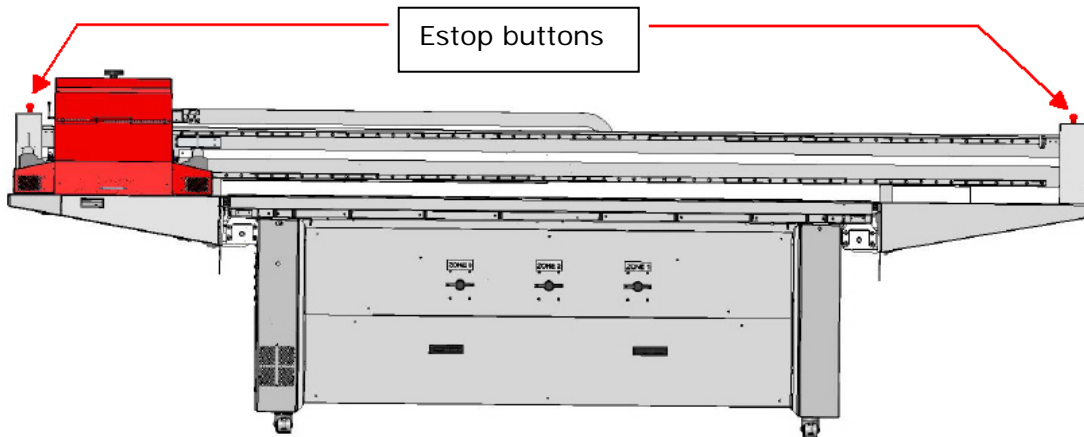
When pressed, an emergency stop push-button does the following:

- **Shuts off the UV lamps**
- **Stops all printer mechanical movement**
- **Displays an E-Stop error message in the GUI**

**Note:** Before operating the printer, familiarize yourself with the location and operation of the four emergency stop push-buttons.

See [Figure 1](#) for locations of the emergency stop push-buttons.

**Figure 1: Emergency Stop Locations**



The emergency stop buttons do not disconnect power from the printer or its electronics.

**Note:** Never use the emergency stop push-buttons as an alternative to powering down the printer. The emergency stop push buttons are for your personal safety, as well as to avoid printer damage during extraordinary circumstances.

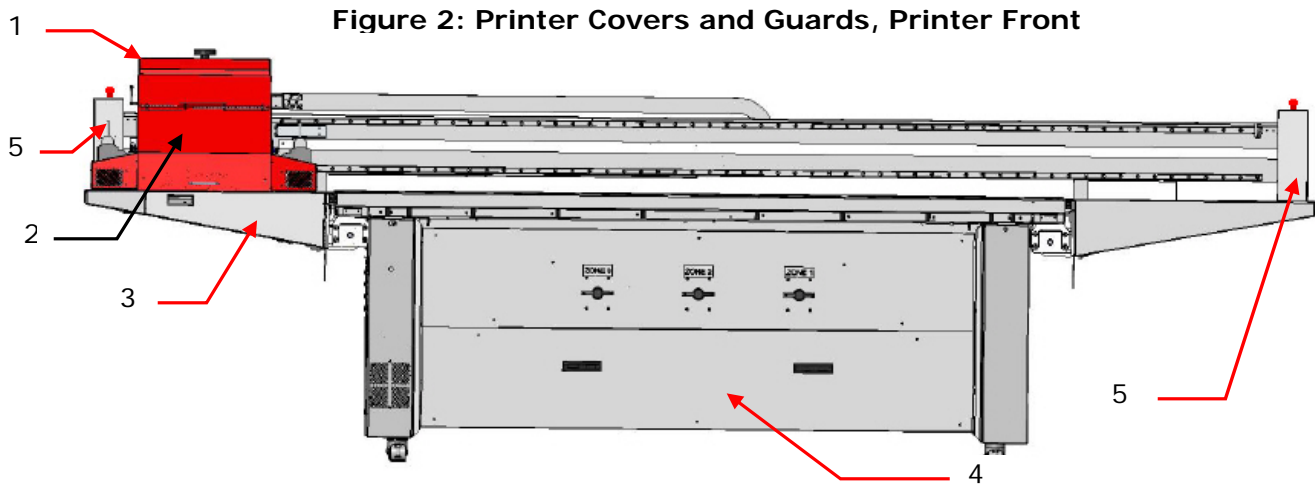
## Restarting after an Emergency Stop

If an e-stop is pressed, follow the instructions in [Restarting from an Emergency Stop](#).



## Safety Covers and Guards

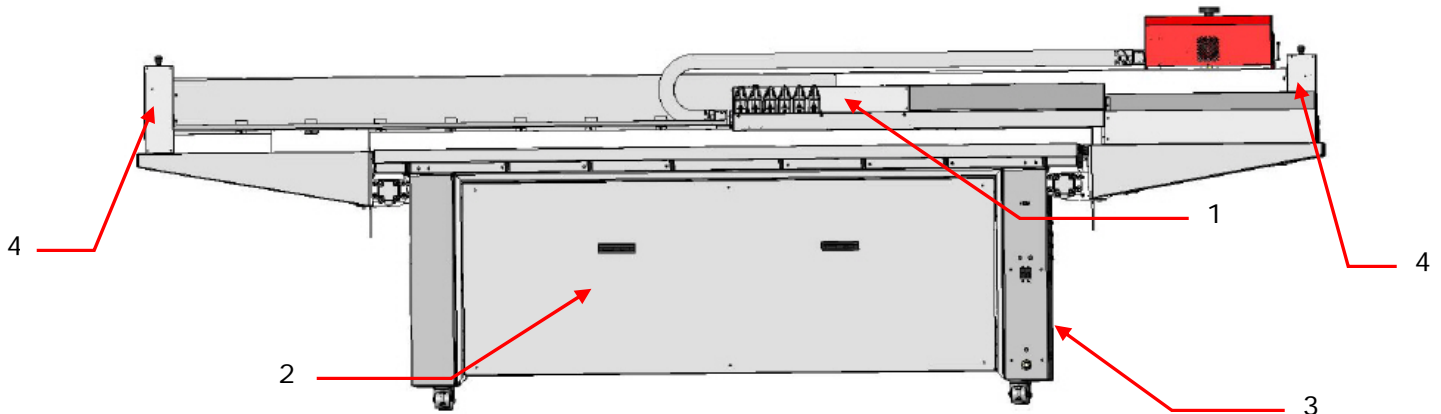
The printer contains covers and guards to protect the printer and operator.



- 1 Carriage cover
- 2 Jet Pack cover
- 3 Purge tray cover
- 4 Front cover
- 5 Carriage drive belt guard/E-Stop cover (2)

**Caution:** Keep all safety covers and guards in place and in working order. Do not operate printer with covers or guards removed or safety devices disabled or bypassed.

**Figure 3: Printer Covers and Guards, Printer Rear**



- 1 Ink pumps cover
- 2 Rear cover (vacuum pump)
- 3 Electronics cover, left side of printer
- 4 Carriage Drive Belt/E-Stop cover

## Ink or Solvent Emergencies

If an emergency situation involving inks or solvents arises, contact local emergency services and have a copy of the MSDS available for emergency service personal.

MSDSs are provided with ink shipments. If no MSDSs are available, contact Technical Support for copies.

## UV Light Exposure

*The printer's UV Lamps emit UV light during printing.*

**Note:** UV light exposure is hazardous to eyes and skin. Please observe all safety precautions when servicing printer components. Operators are required to read, understand, and sign the UV Safety Acknowledgement form at: <http://www.vuteksupport.com/doc.php?doc=1033>

# Printer Overview

This chapter covers the basic printer components, including electronics, controls, ink, carriage components, and operator controls.

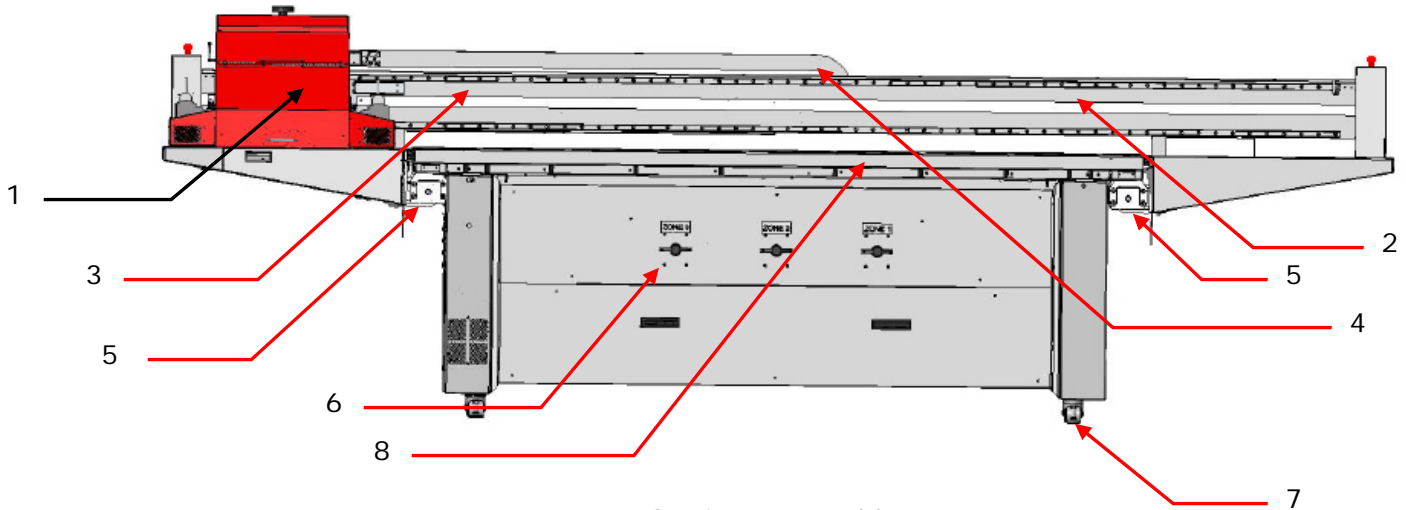
## Components

The following sections indicate the location of basic printer components referenced in this guide.

### Front View

The Operator Station side is the Front of the printer

Figure 4: T1000 Printer – Front View



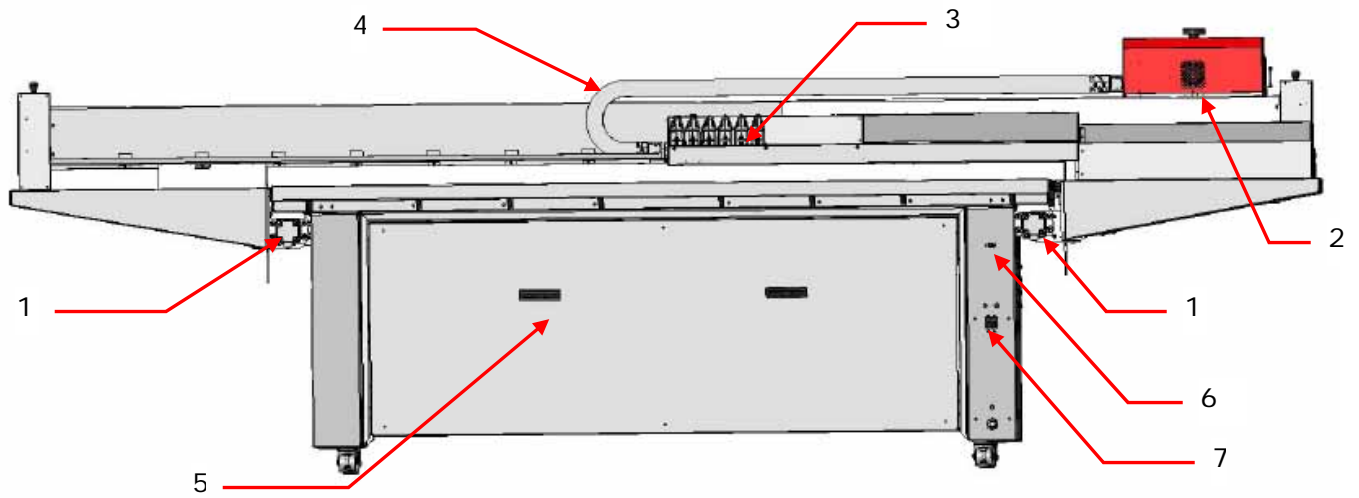
- 1 Carriage Assembly
- 2 Gantry\*
- 3 Carriage Beam Assembly
- 4 Umbilical Assembly
- 5 Gantry Drive Assembly
- 6 Vacuum Table controls (3 total)
- 7 Leveling Feet, 4 total
- 8 Vacuum table

**\*Note:** The Gantry consists of the Carriage, Umbilical, and Carriage Beam Assemblies and moves together as one unit.

## Rear View

The following paragraphs and figures describe the compartments and/or components on the rear and sides of the T1000 Printers

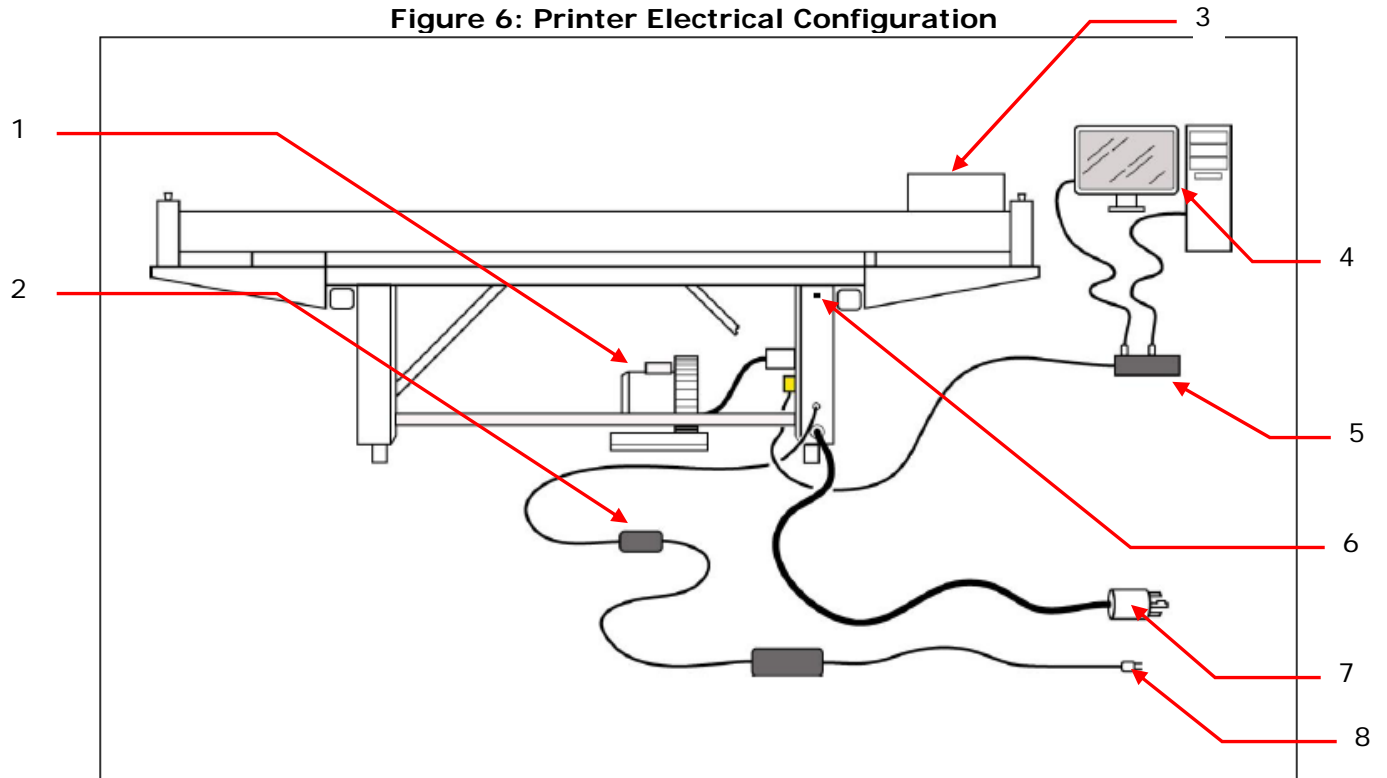
Figure 5: T1000 Printer – Rear View



- 1 Gantry drive motors (2)
- 2 Carriage assembly
- 3 Ink bottles
- 4 Umbilical Assembly
- 5 Vacuum motor cover
- 6 USB Connection
- 7 Main AC Breaker

## Electrical Configuration

This section contains the recommended printer electrical configuration.



- 1 Blower
- 2 AC Adaptor
- 3 Carriage
- 4 Monitor and Computer
- 5 Auxiliary power strip for Monitor and CPU
- 6 USB Connection
- 7 Dedicated 230V
- 8 UPS (Optional) – 115V

## Main AC Breaker

*The Main AC Breaker controls power to the printer components.*

The Main AC Breaker is located on the right rear of the printer. This switch allows users to control power to the printer components. See <http://www.vuteksupport.com/doc.php?doc=683>, the *Printer Safety Guide*, for complete safety information relating to electrical power.

**Figure 7: Main AC Breaker – On position**



## Auxiliary Power Switch

*The Auxiliary Power Switch controls power to the printer components.*

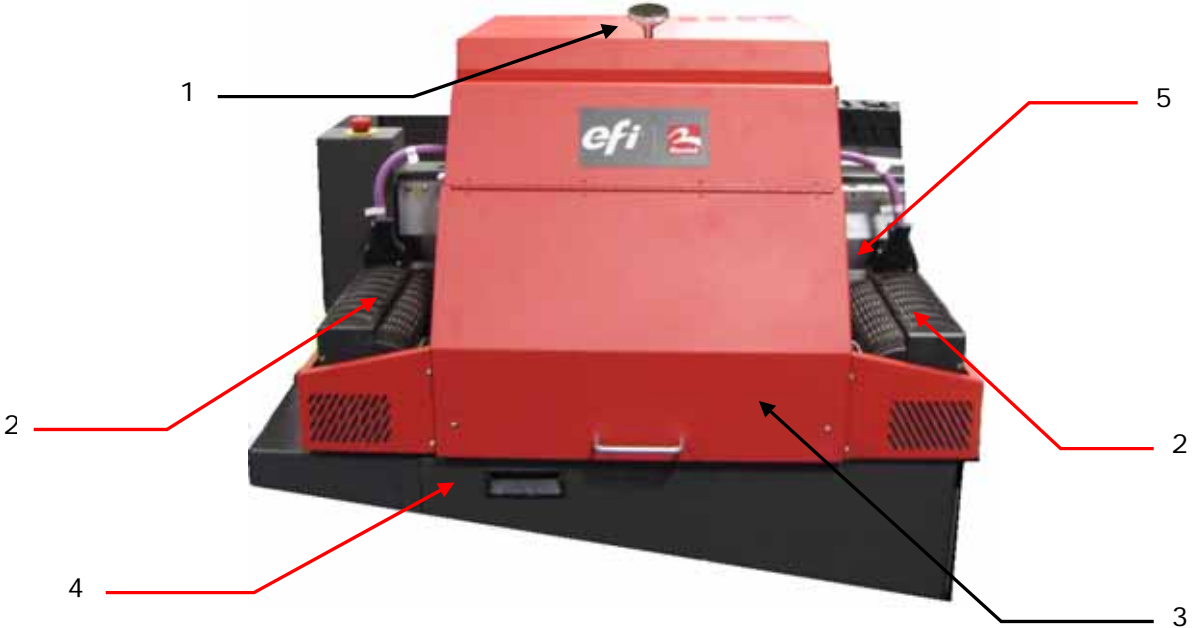
**Figure 8: Auxiliary Power Switch – On position**



# Carriage Assembly Components

The Carriage Assembly is comprised of the following components. Detailed descriptions are in subsequent sections.

Figure 9: Carriage Assembly Components



- 1 Carriage lift knob
- 2 UV Lamps
- 3 Print head cover
- 4 Purge tray (waste) cover
- 5 Lamp lift screw or adjustable lamps

## UV Lamp Height Adjustments

T1000 printers contain two possible UV Lamp Adjustment mechanisms: a screw adjustment or a three level adjustment plate.

Figure 10: UV Lamp Height Adjustment mechanisms



- 1 Screw adjustment
- 2 Three level plate adjustment plate

## Carriage Assembly – Interior

The Carriage Assembly – Interior is comprised of the following components.

Figure 11: Carriage Interior Components



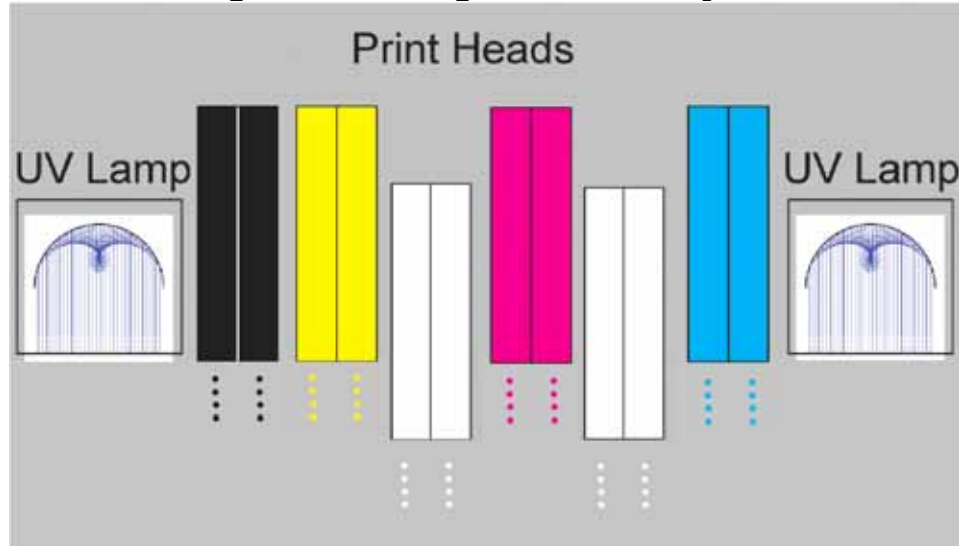
- 1 Print head assembly – two jet packs per assembly
- 2 Jet plate
- 3 Ink line luer fitting for flushing jet packs
- 4 Purge tube
- 5 Thermal stabilization fluid lines



## Print Head Layout

The following diagram displays the carriage print head and lamp layout

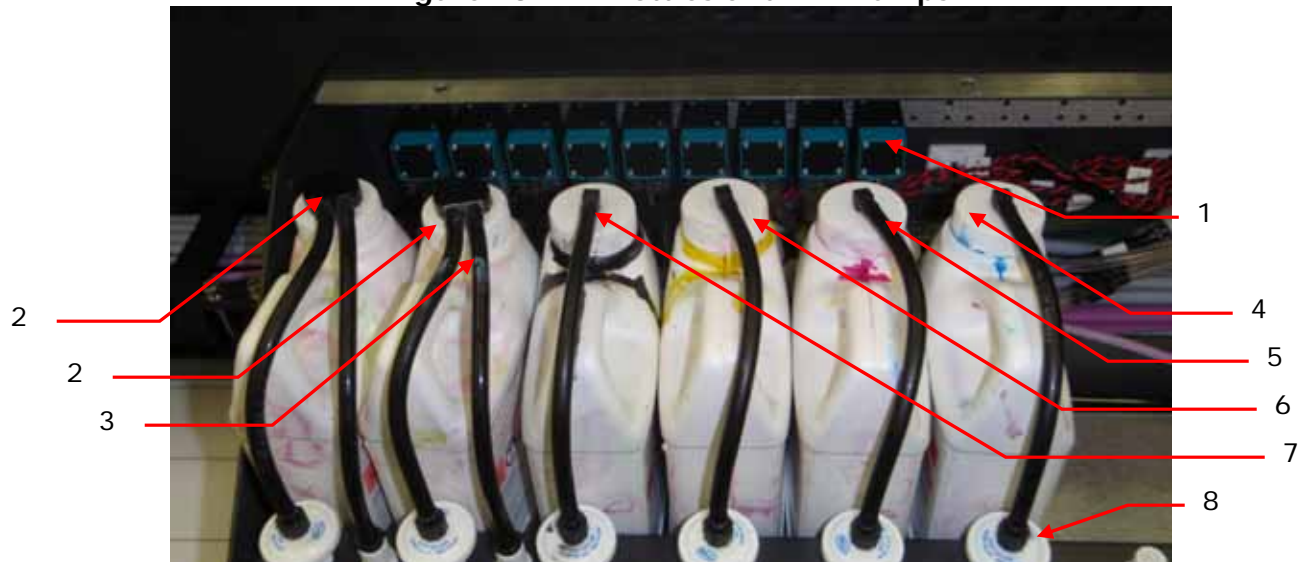
Figure 12: Carriage Print Head Layout



## Ink Bottles and Ink Pumps

The ink bottles are located at the rear of the machine on the gantry; the ink pumps are located behind the ink bottles beneath a protective cover, removed here for display purposes.

Figure 13: Ink Bottles and Ink Pumps



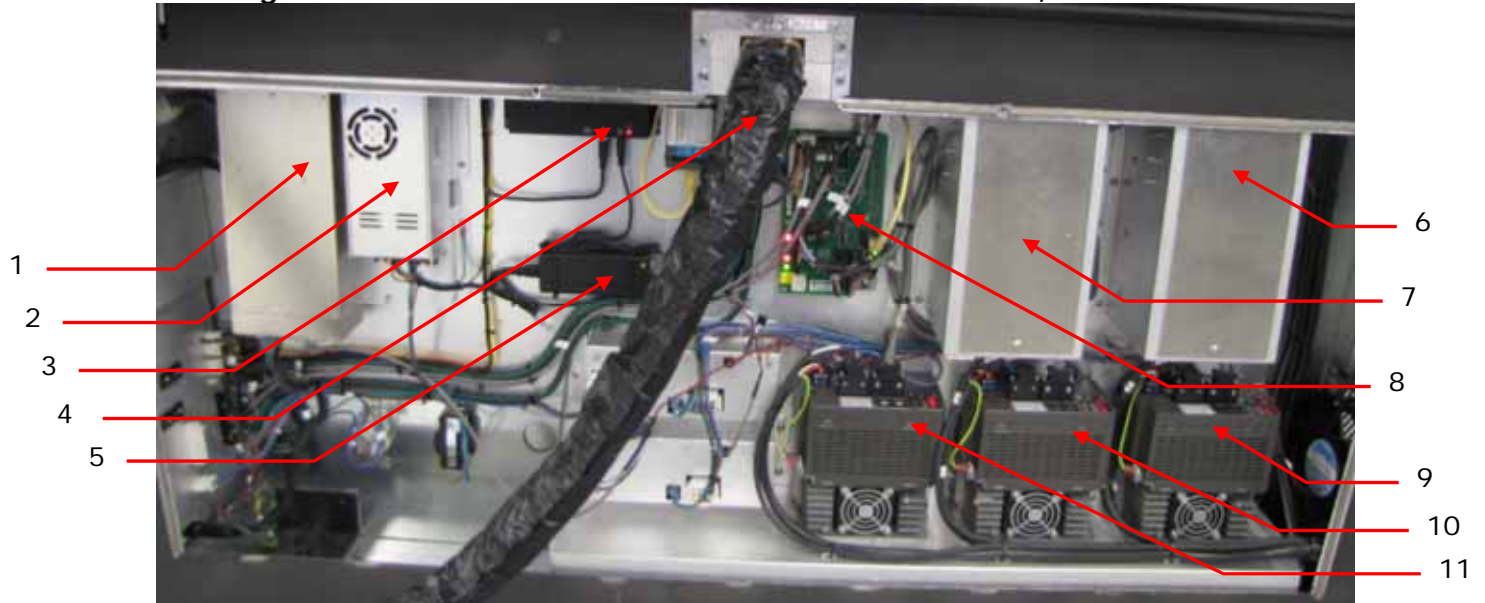
- 1 Set of ink and vacuum pumps
- 2 White ink bottles
- 3 White ink recirculation line
- 4 Cyan ink bottle
- 5 Magenta ink bottle

- 6 Yellow ink bottle
- 7 Black ink bottle
- 8 Ink filter

## Electronics and Power Distribution Cabinet

There is one cabinet on the left side of the printer containing printer electronics and power distribution components.

Figure 14: Electronics and Power Distribution Cabinet, cover removed



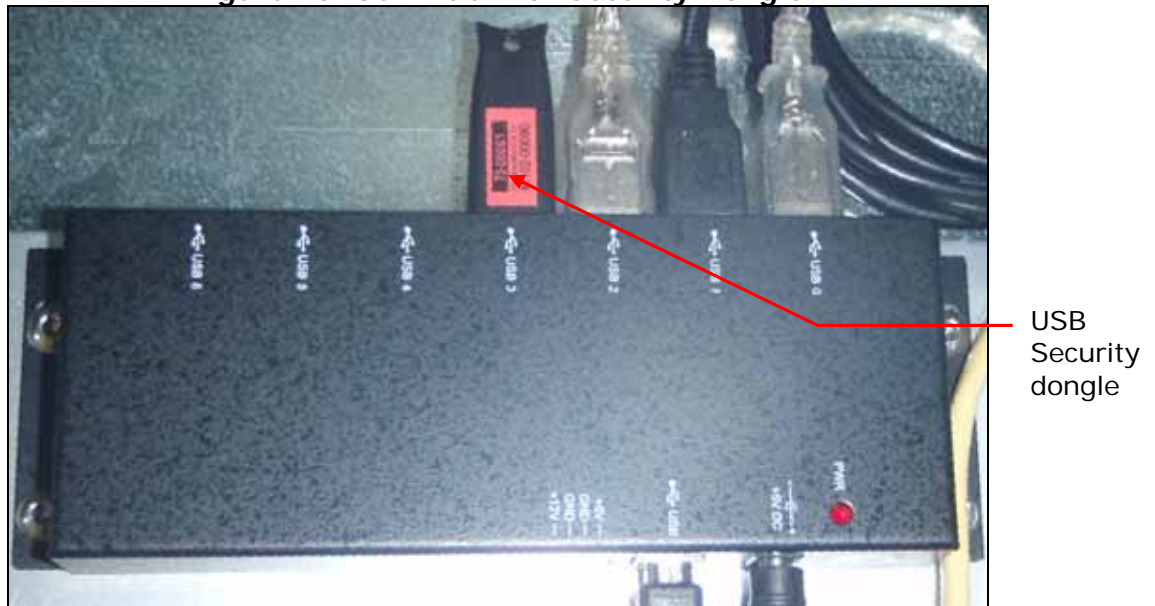
- 1 Power supply
- 2 Power supply
- 3 USB Hub
- 4 Main AC Power connection
- 5 USB power supply
- 6 UV Lamp Ballast Right
- 7 UV Lamp Ballast Left
- 8 Printer Interface board
- 9 Servo controller, Y axis
- 10 Servo controller, X Axis
- 11 Servo controller, Carriage

## USB Hub

The USB Hub controls functions to many printer systems and controls printer security through a removable USB dongle.

The USB must have the security dongle plugged in to operate the printer. Remove the dongle to prevent unauthorized access to the printer.

Figure 15: USB Hub with Security Dongle



**Note:** Never modify the USB configuration; moving USB cables may disable printer functionality.

## Negative Pressure Backup System

The T1000 ships with a 24V adaptor that connects to an auxiliary jack on the printer and provides dedicated power to the carriage vacuum system.

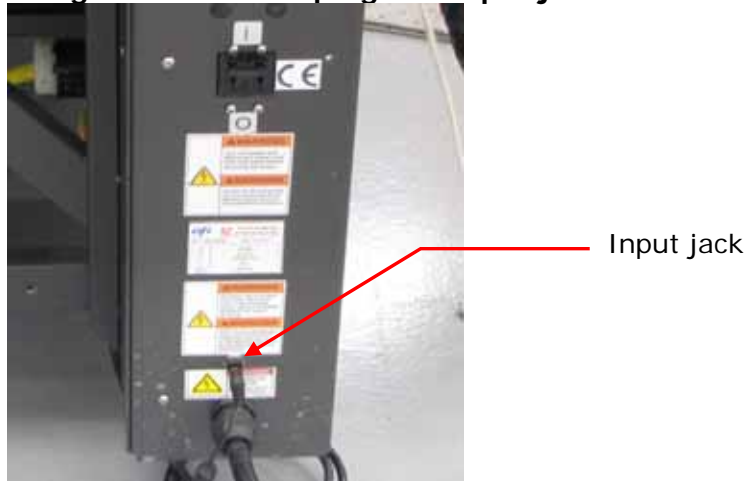
The T1000 negative pressure system prevents ink from dripping from the print nozzles. Insufficient negative pressure can result in ink dripping and excessive negative pressure can result in ink starvation during printing. The pneumatic lines run from the pressure pump, to the Valve Cluster, and finally to the overflow tank. The overflow tank collects the ink should a pressure imbalance occur.

**Caution:** The negative pressure system must be plugged in and powered on to prevent ink from dripping from the jet packs during power outages or printer shutdown.

The CMYK and W negative pressure valves are located on top of the Carriage and must be open when the printer is in use.

The auxiliary power input jack is located on the lower right rear printer leg. The power cord should be plugged into the [UPS Battery Backup](#) to maintain the negative pressure system during power outages.

**Figure 16: Negative Pressure plug and input jack**



## UPS Battery Backup

*Without main power or a UPS battery backup, the printer loses the negative pressure holding the ink in the print heads, for example, during power loss or printer shutdown.*

Negative pressure loss occurs if power is off longer than 10 minutes. To prevent negative pressure loss during a power failure, the Negative Pressure Backup AC adapter should be plugged into a UPS, uninterruptable power supply.

**Note:** EFI does not provide a UPS unit with the T1000 but strongly recommends customers install one for the Negative Pressure Backup System.

## Auxiliary Outlet for Printer Control Computer and Monitor

*The printer contains separate AC power outlets for computer and printer components.*

The T1000 contains an auxiliary AC power outlet for supplying AC power only to the printer control computer and monitor, or optionally, a UPS if the computer and monitor are also to be powered from the UPS. An outlet strip with a power cord equipped with a plug for the auxiliary AC power outlet should be used for powering these devices from the printer.

The computer and monitor are also provided with additional line filtering and transient protection when powered from the auxiliary outlet on the printer. See [Figure 17](#).

**Figure 17: T1000 220VAC Dedicated Auxiliary Power Strip**



**Caution:** Always disconnect the UPS (uninterruptible power supply) prior to servicing the T1000 Printer. DC power may be present even when main power is off or disconnected.

## Table Vacuum Pump Power Connection

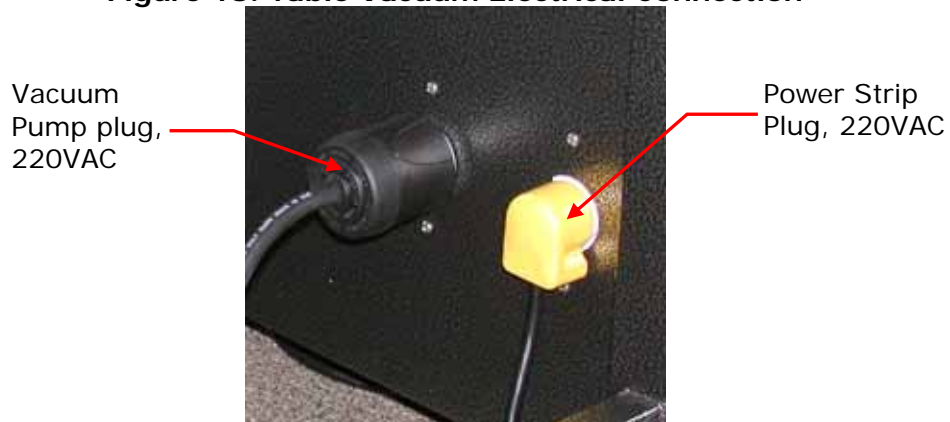
*The T1000 ships with a vacuum pump that holds media against the media table during printing.*

The vacuum pump plugs into the receptacle provided on the inside right rear of the printer base assembly.

**Warning!** Do not plug the vacuum pump motor into any other power source.

The vacuum pump is controlled using the [Vacuum Foot Pedal Control](#).

**Figure 18: Table Vacuum Electrical Connection**



## Vacuum Pump

The Vacuum Pump is located underneath the printer behind the lower rear cover.

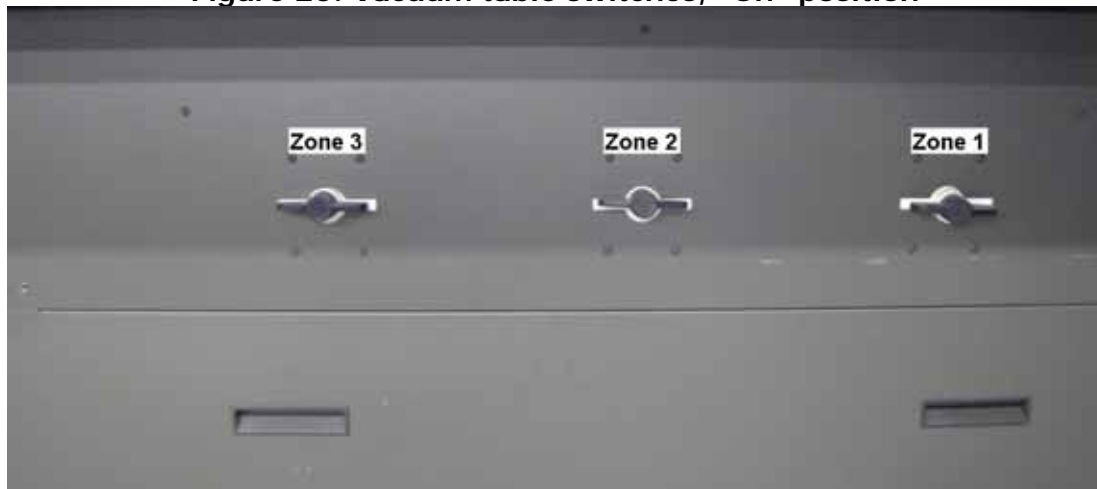
Figure 19: Vacuum Pump



## Vacuum Table Switches

There are three Vacuum Table Switches allowing the user to control the three [Vacuum Table Zones](#).

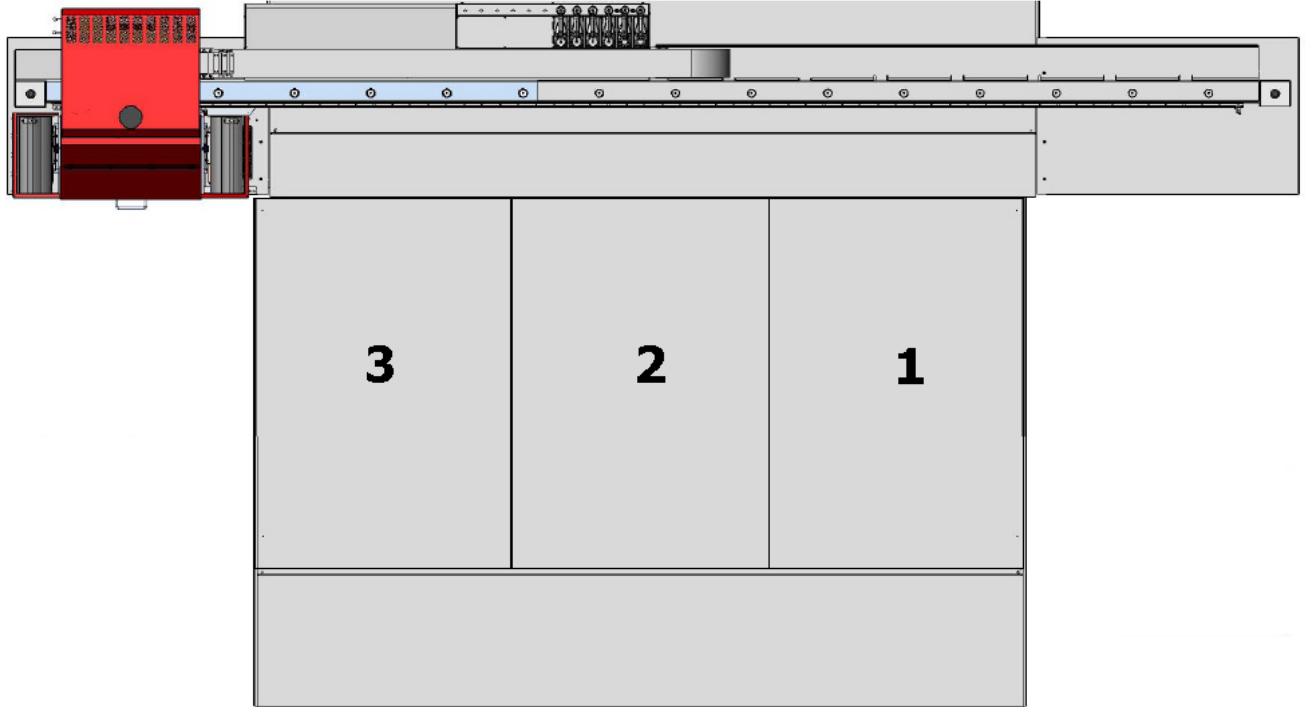
Figure 20: Vacuum table switches, "On" position



## Vacuum Table Zones

The vacuum table can be controlled by turning vacuum switches on/off. The numbers correspond to the matching and control vacuum in three segments, shown next.

Figure 21: Vacuum Table Zones – 1, 2, and 3



## Vacuum Foot Pedal Control

Press the foot pedal at the front of the printer to toggle vacuum media table on and off.

Figure 22: Vacuum Foot Pedal



The foot pedal connects at the inside base of the front left printer leg.

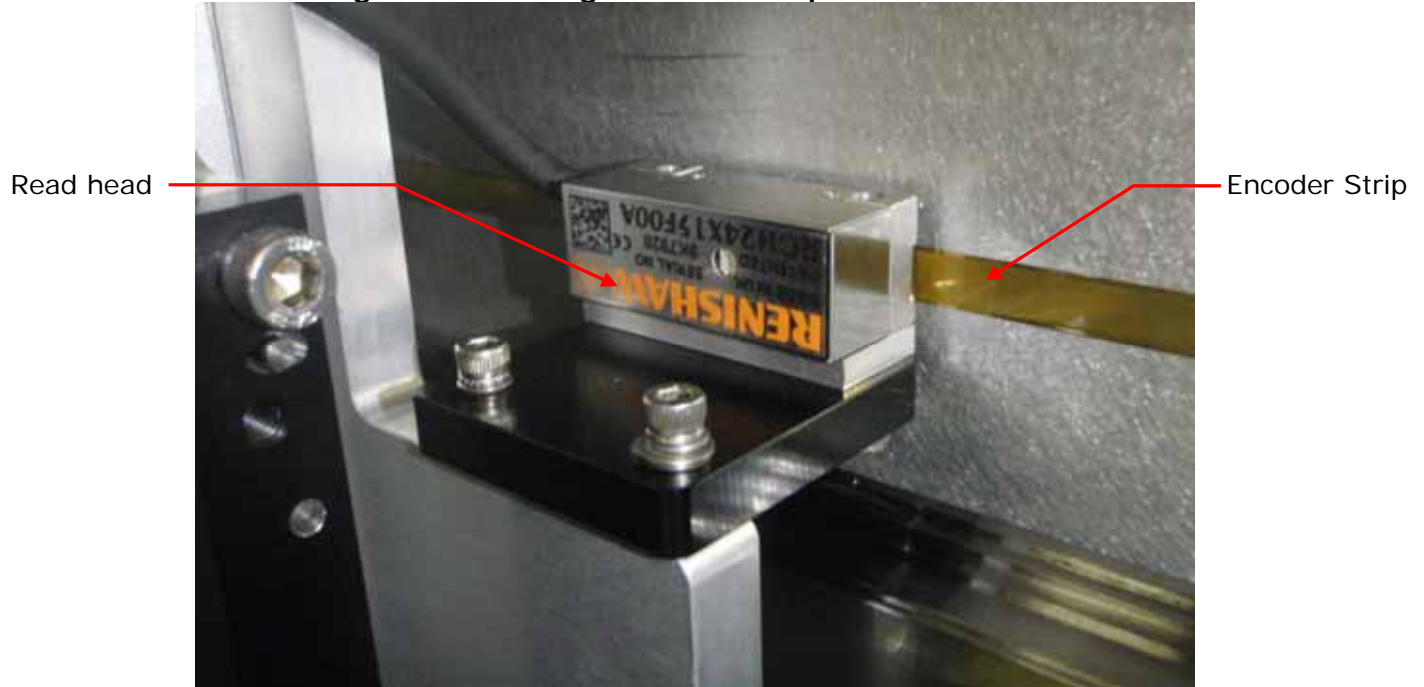


## Carriage Encoder Strip and Read Head

The carriage encoder read head provides carriage location information to the printer based on the carriage encoder strip.

The encoder strip is located on the printer beam; the read head is attached to the printer carriage.

**Figure 23: Carriage Encoder Strip and Read Head**

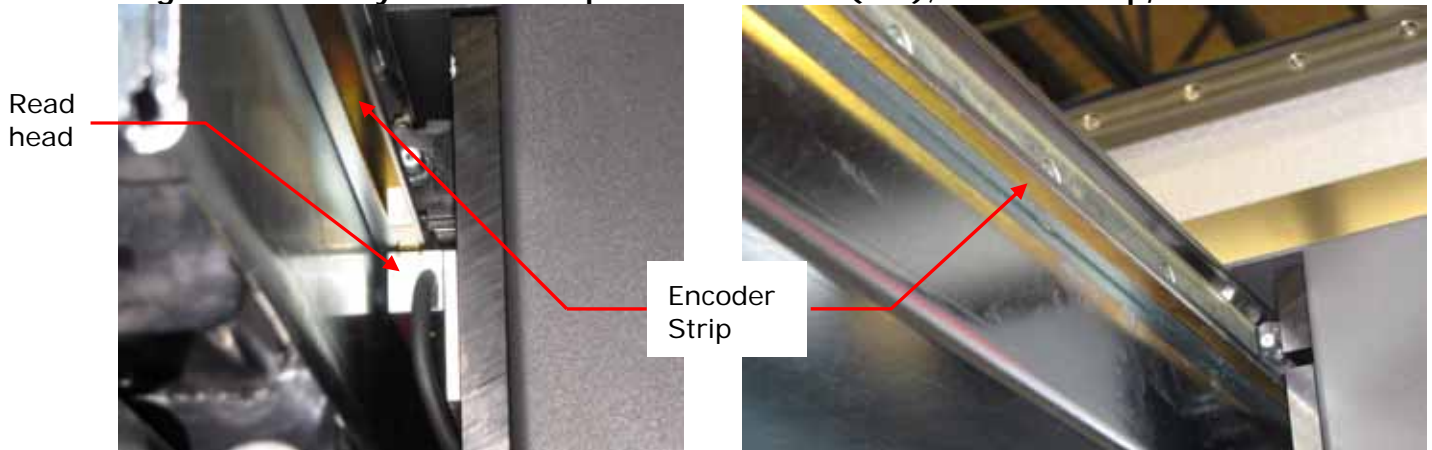


## Gantry Encoder Strip and Read Head

The gantry encoder strip and read head provide gantry location information to the printer.

The encoder strip and read head are located on the left and right sides of the Vacuum table.

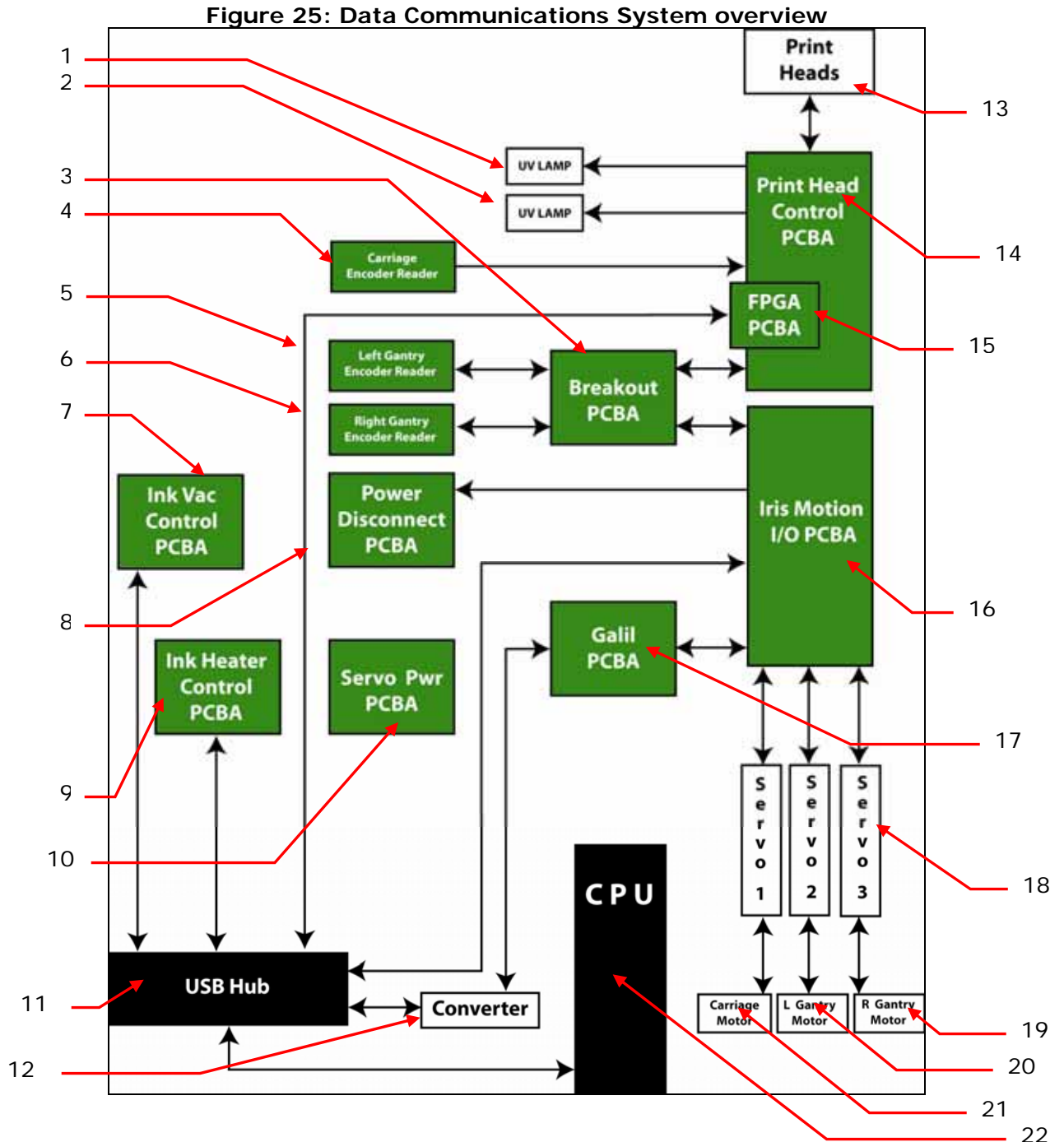
**Figure 24: Gantry Encoder Strip and Read Head (left); Encoder strip, view from below**



**Note:** The gantry encoder strips are located underneath the left and right sides of the vacuum table. Avoid touching the strip, as oils and contaminants deposited on the strip from an operator's hands can lead to gantry read errors.

## Data Communications System

The T1000 data communications system is comprised of numerous printed circuit board assemblies (PCBs), each serving a unique function. A flow diagram of the T1000 communication network is provided next.



**Table 1: [Data Communications System](#) legend**

1	UV Lamp
2	UV Lamp
3	Breakout PCBA
4	Carriage Encoder Reader
5	Left Gantry Encoder Reader
6	Right Gantry Encoder Reader
7	Ink Vac Control PCBA
8	Power Disconnect PCBA
9	Ink Heater Control PCBA
10	Servo Power PCBA
11	USB Hub
12	Converter
13	Print Heads
14	Print Head Control PCBA
15	FPGA PCBA
16	Iris Motion I/O PCBA
17	Galil PCBA
18	Servos 1, 2, and 3
19	Right Gantry Motor
20	Left Gantry Motor
21	Carriage Motor
22	Computer/CPU

# Initial Printer Setup

*This chapter covers the basic setup of the printer, including initial printer air settings, carriage and vacuum settings, and other basic configuration settings.*

## Printer and Computer Startup

*The following steps outline the basic printer and control computer startup steps.*

1. Check that the main power cord to printer is connected.
2. Check that the UPS unit, if used, is plugged into its AC power source and turned on.
3. Check that the AC Adapter is plugged into the UPS unit and the printer.
4. Plug in USB cable from Printer to printer computer.
5. Set the printer's [Main AC Breaker](#) to the ON position.
6. Set the printer's green [Auxiliary Power Switch](#) to ON.
7. Turn on power to the printer control computer and monitor by pressing the computer and monitor power buttons.
8. Enter the user name and password for the computer as set up during printer installation.
9. Follow the instructions to [Start the Printer Application Software](#) on the Print Control Computer.
10. Send Carriage and Gantry to Home position.
11. Enable **Auto-fill** and **Recirculation** on **Maintenance** tab of printer control software.
12. Allow printer to warm up to optimum operating temperature, approximately 5-10 minutes, depending on site temperature. See [Print Head Warm Up](#).
13. Follow the instructions in [Performing Print Head Maintenance](#).
14. Load media as described in [Loading Media](#).
15. Adjust Carriage Height as described in [Adjusting Carriage Height](#).
16. Print a Nozzle test. See [Printing and Analyzing a Nozzle Test](#).
17. Print an image. See [Printing an Image](#).

**Note:** These steps are required during initial setup of the printer. Not all steps are required during normal operation, assuming that the Print Control Computer is setup for auto standby.

18. The main power circuit breaker is also a main power interrupt. When the main power breaker is turned off, power is interrupted to the printer – with two exceptions.
  - If a UPS is connected and charged, the carriage vacuum pump remains powered, allowing the ink to be held in the print heads.
  - If the PC AC power is not connected via the dedicated outlet on the printer, some power is available to the T1000 printer through its USB connection. In this case, for a complete power down, the computer must be turned off and the USB cable must be disconnected.

## Start the Printer Application Software

After the printer control computer has finished its login routine, start the printer software using the following instructions.

1. Double-click the T1000 icon to launch the T1000 printer control program.
2. The control program will open to the **Print** tab menu as the default screen.

**Figure 26: Startup Status Displayed on the Print Tab Menu**

```
6/26/2009 3:18:00 PM – INFO: Starting carriage subsystem.  
6/26/2009 3:18:01 PM – INFO: Carriage subsystem started.  
6/26/2009 3:18:01 PM – INFO: Starting motion subsystem.  
6/26/2009 3:18:01 PM – INFO: Motion subsystem started.  
6/26/2009 3:18:03 PM – INFO: Starting print control subsystem.  
6/26/2009 3:18:03 PM – INFO: Print control subsystem started.  
6/26/2009 3:18:03 PM – INFO: Starting tending subsystem.  
6/26/2009 3:18:05 PM – INFO: Tending subsystem started.  
6/26/2009 3:18:05 PM – INFO: Initializing GUI.  
6/26/2009 3:18:05 PM – INFO: Printer initialization complete.
```

3. The software forces the printer to “Home” the carriage and gantry before finishing initialization.

**Note:** To save time during printer startup, always home the gantry and carriage at the end of the previous production day.

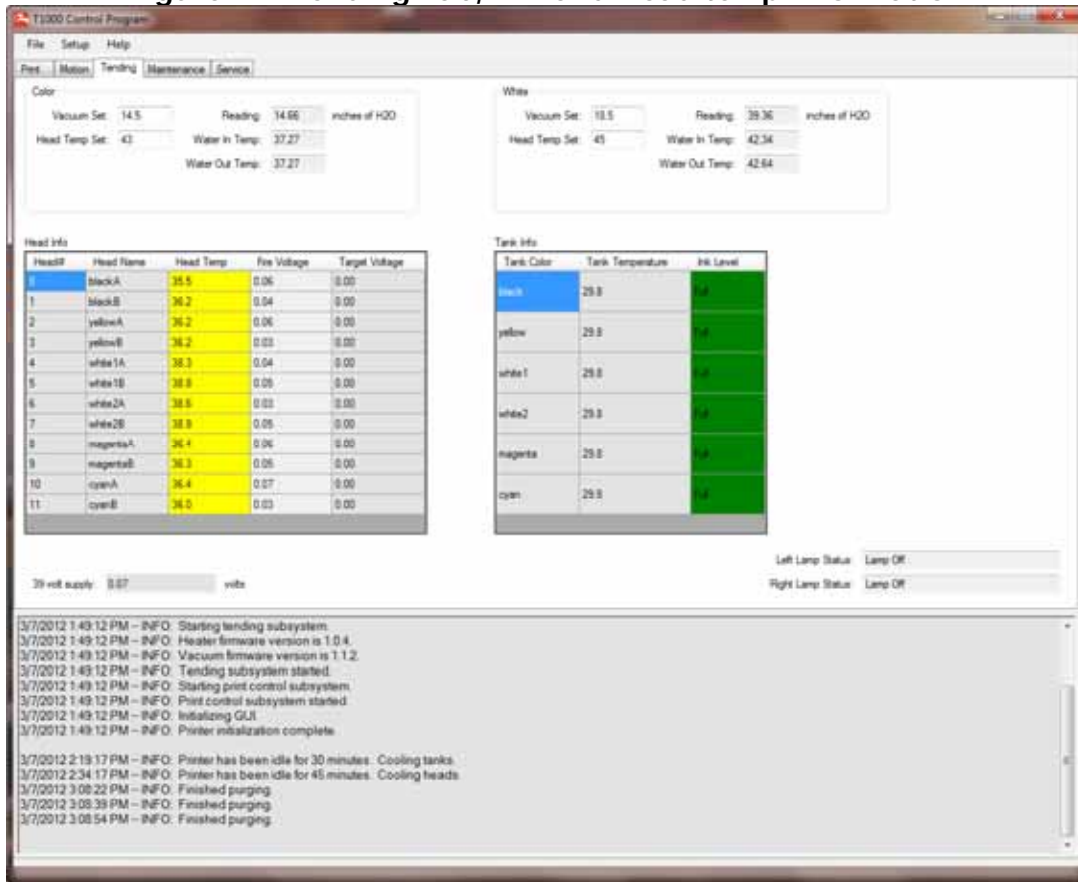
4. For a complete overview of the printer software, see page [35](#).

## Print Head Warm Up

*The print heads and ink tanks must warm up prior to printing or running print tests.*

The print heads and ink tanks require several minutes to warm up, depending upon site temperature. During the warm-up cycle the operator may observe the ink levels, monitor temperatures, and check vacuum pressure by selecting the **Tending** tab of the graphic user interface, [Figure 27](#).

Figure 27: Tending Tab, Ink and Head temp information



## Loading Media

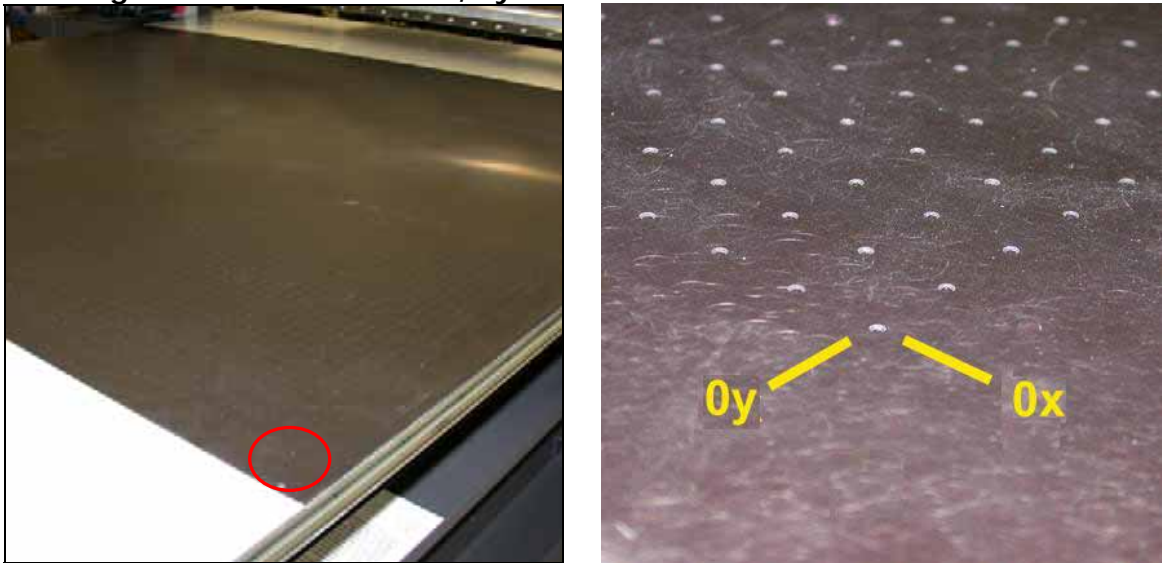
For best results, determine Image Area and Start Position before printing.

For easiest access to media table when loading media, send the carriage and gantry to Home position.

1. Stand in front of the T1000 and load the media with its top-left corner positioned in the front-right corner of the vacuum table. Proper orientation and placement of the media is very important, especially when printing on position-dependent materials.
2. Properly oriented media does not need to be positioned at the absolute (0, 0) coordinate. Define the x and y position when setting up the print run. All measurements will be based on this critical coordinate, once defined.

**Note:** Place additional material around your print media, such as sheets of similar material and thickness, to completely cover the table.

**Figure 28: Location of 0x, 0y Coordinate Position on Vacuum Table**

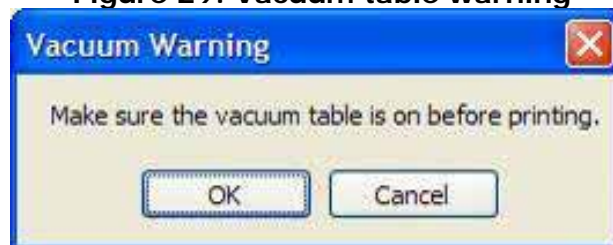


## Vacuum Table

*The Vacuum Table holds the print media firmly in position during printing.*

Press and hold the [Vacuum Foot Pedal Control](#) to turn vacuum power on and off. If an operator attempts to print without vacuum, the GUI displays a message box, [Figure 29](#).

**Figure 29: Vacuum table warning**



The vacuum table area must be completely covered to ensure proper holding force on the print media. Follow these guidelines for best printing results.

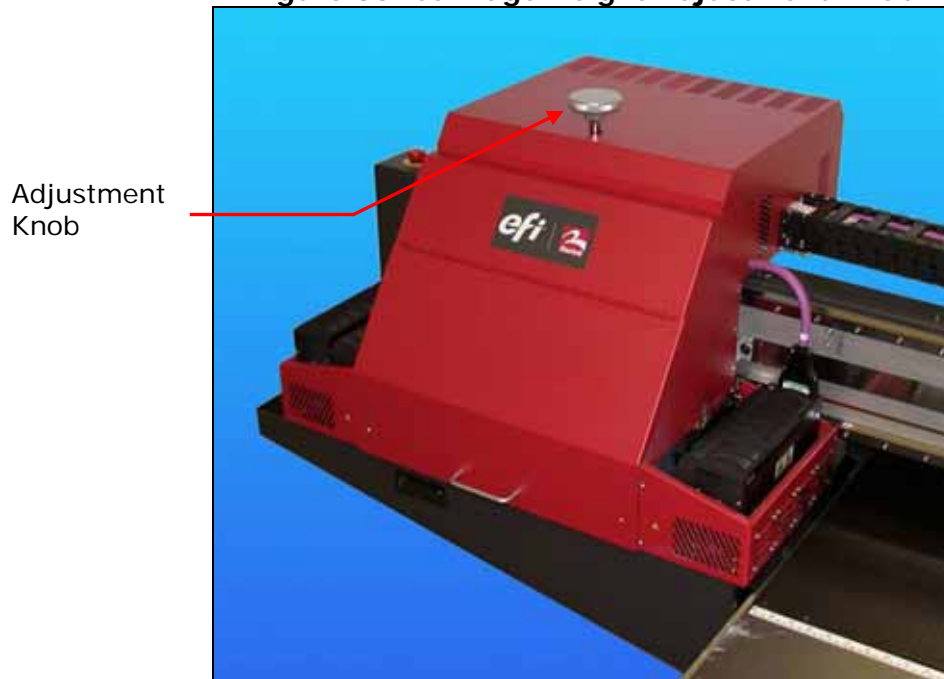
1. Position the desired substrate on the vacuum table and measure from the (0x, 0y) coordinate to determine the start location for your image.
2. Place additional material around your print media, such as sheets of similar material and thickness, to completely cover the table.
3. To turn off portions of the vacuum table, use the [Vacuum Table Switches](#).

## Adjusting Carriage Height

*Follow the procedural steps below to adjust and set the carriage height assembly.*

It is critical to adjust the carriage height based on the thickness of each type of media placed on the vacuum table. Proper carriage height adjustment ensures the finest dot quality and prevents damage to the print heads during printing due to head strikes. The T1000 includes a set of adjustment tools for checking and setting the print carriage height prior to running a print.

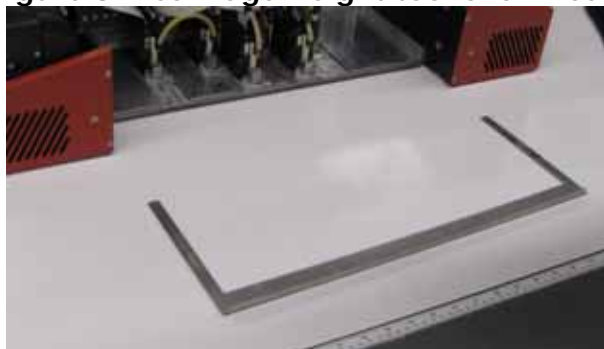
**Figure 30: Carriage Height Adjustment Knob**



1. Use the carriage height adjustment knob to raise the carriage enough to be movable over the media without touching anything.
2. Gently push the carriage, by hand, over the print media.

**Note:** For consistency, use the same position each time you are verifying the carriage head height.

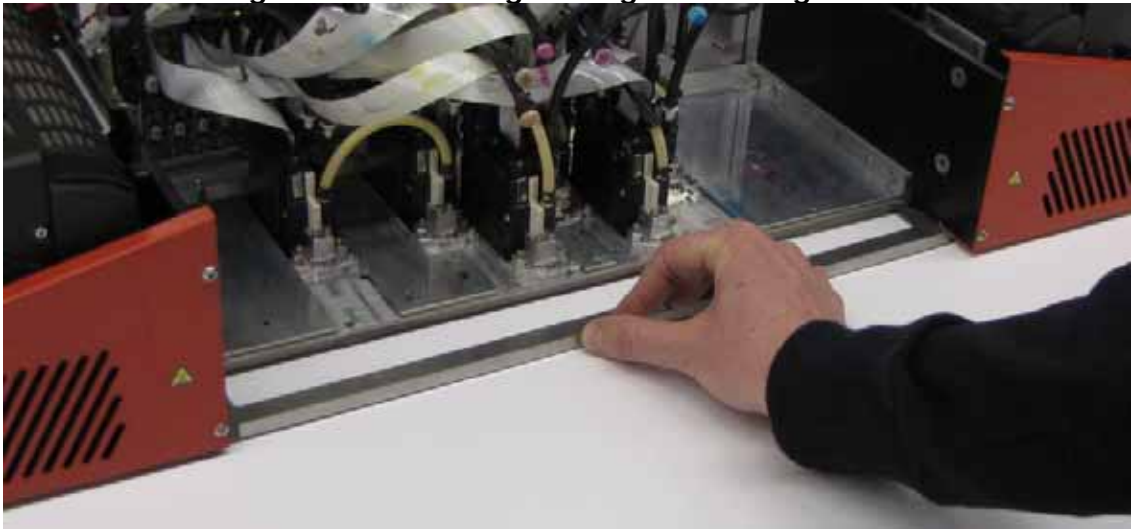
**Figure 31: Carriage Height tool over media**



3. Slide the carriage height gap tool under the carriage between the UV Lamps.



**Figure 32: Inserting carriage head height tool**



4. Visually check to ensure the edge of the carriage height gap tool is under the head assembly. Misplacement of the carriage height gap tool can result in a false adjustment and result in damage to the printer or media.
5. Slowly turn the carriage height adjustment knob to adjust the carriage height until a very slight resistance on the carriage height gap tool can be felt. With the carriage height adjusted properly, the operator should be able to easily pull the carriage height gap tool out and away from the carriage.

**Figure 33: Carriage height adjustment knob directions**



6. With the carriage height properly set, the operator can proceed to [Performing Print Head Maintenance](#).

## Performing Print Head Maintenance

*Proper print head maintenance ensures the best possible image quality and longest life for the T1000 print heads.*

Head maintenance is generally required if:

- **This is the first time bringing up the printer for the day, or,**
- **The AC power has been off for more than ten minutes.**

Otherwise, print head maintenance is only required if print quality is substandard.

Additional maintenance is required for customers who have installed the T1000 in a dry and/or dusty environment. Each of the six print heads on the T1000 Printer has 304 individual print nozzles for precisely delivering ink to the print media.

**Note:** Maintaining the print heads for optimum performance and longer up time requires daily and weekly maintenance routines. Refer to the T1000 Basic Maintenance Guide.

Wait for the printer to thoroughly warm up before proceeding with Head maintenance. Refer to [Print Head Warm Up](#).

## Bleeding Air from Print Heads

*Follow the online instructions to bleed air from the Print Heads.*

<http://www.vuteksupport.com/doc.php?doc=1755>

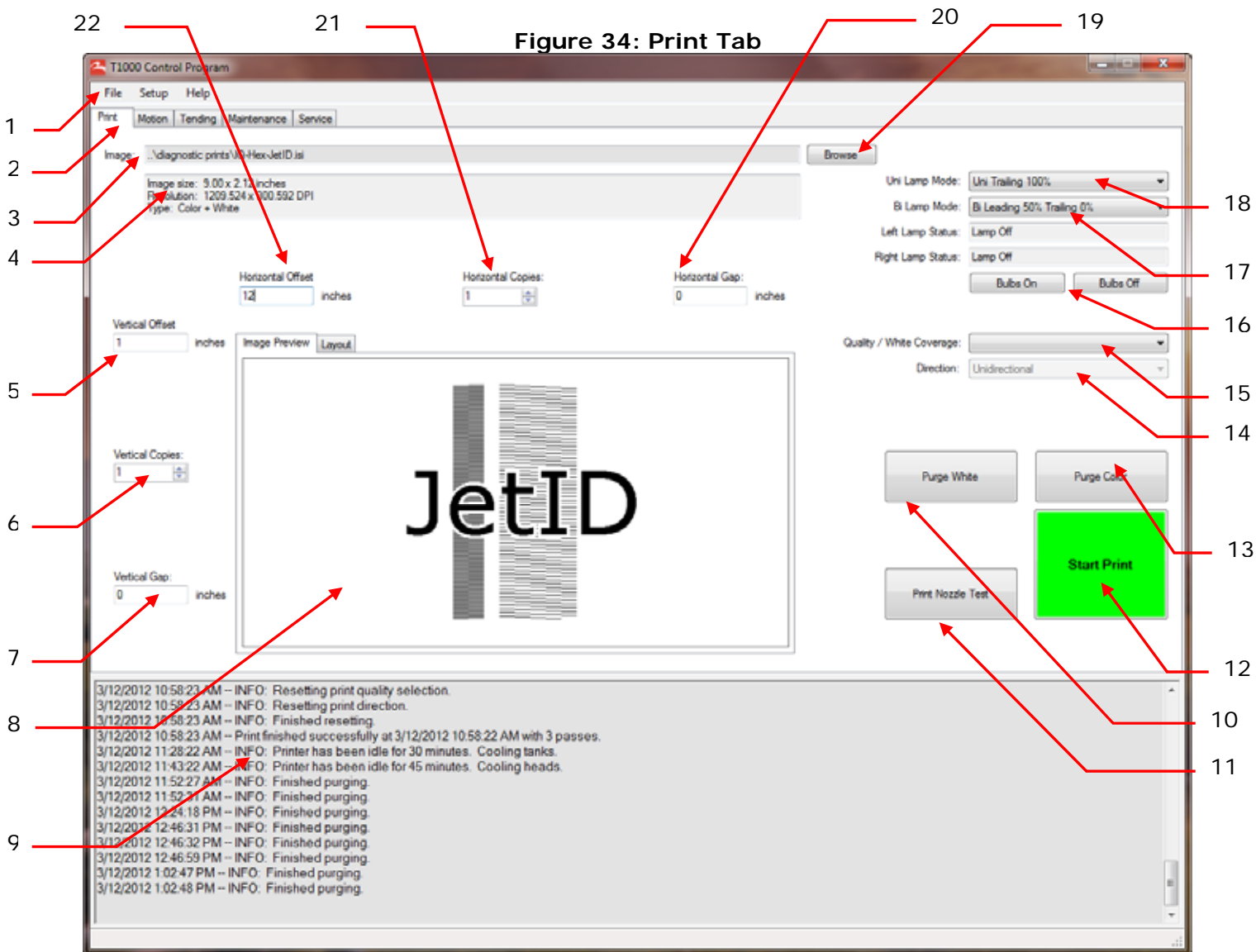
# T1000 Control Program

This chapter covers the T1000 Control Program, or GUI (Graphical User Interface.)

## GUI – Print tab

Set print options in the Print tab.

The Print tab controls printing, print options, such as layout, location, number of copies, and printer status information.



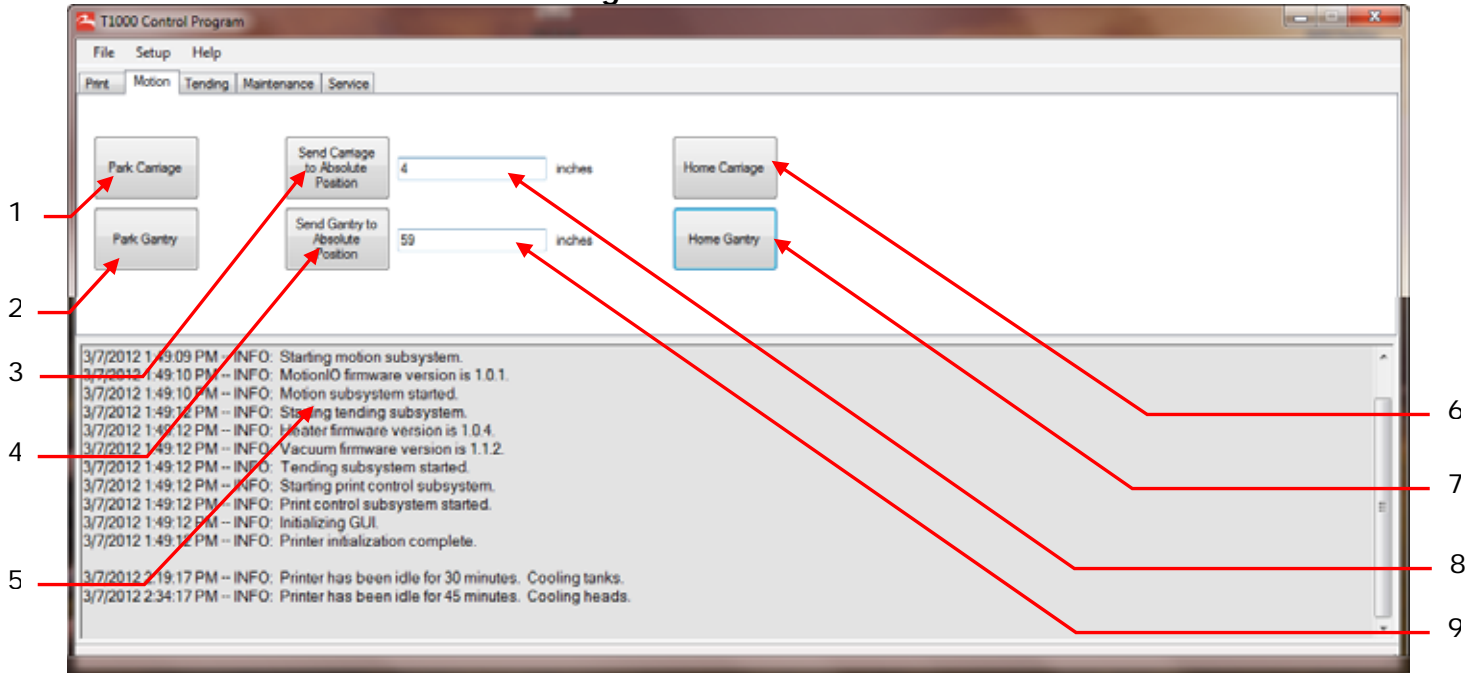
**Table 2: [GUI – Print tab](#) Legend**

- 1** Menus – File, Setup, and Help menus
- 2** Tabs – [GUI – Motion tab](#), [GUI – Tending tab](#), [GUI – Maintenance tab](#), [GUI – Service tab](#)
- 3** Image – The local folder which contains the image to print; images must be on a local drive
- 4** Image details – Image size, resolution and type (color or color w/white)
- 5** Vertical offset – Distance in inches from (x, 0)
- 6** Vertical copies – Number of copies to print in the vertical direction
- 7** Vertical gap – Vertical distance (y-axis) in inches between multiple copies
- 8** Image thumbnail – Preview of selected image
- 9** Printer status messages – Printer controlled message area, Print tab
- 10** Purge white print heads – Purge ink through white print heads
- 11** Print Nozzle test – Refer to [Printing and Analyzing a Nozzle Test](#)
- 12** Start Print – Begin the print based on the current settings
- 13** Purge color print heads – Purge ink through the CMYK print heads
- 14** Print direction – Select Unidirectional or Bidirectional
- 15** White quality settings – Choose settings for the White ink channel
- 16** Bulb control area – Select to use one or two lamps, and to turn bulbs on or off; see
- 17** Bi Lamp mode – Select leading and trailing lamp settings when both lamps are enabled
- 18** Uni Lamp mode – Make settings based on using only a single lamp
- 19** Image Browse – Displays an Open dialog box to select images for printing; The files will have an “ISI” file extension for full color job and an “ISM” file extension for colors + white
- 20** Horizontal gap – Horizontal (x-axis) distance in inches between multiple copies
- 21** Horizontal copies – Number of copies to print in the horizontal direction
- 22** Horizontal offset – Distance in inches from (0, x)

## GUI – Motion tab

Set Carriage and Gantry options and locations in this tab.

Figure 35: Motion Tab



**Note:** Image cropped for illustrative purposes.

- 1 Park Carriage – Sends Carriage to far left, or Home position
- 2 Park Gantry – Sends Gantry to far rear, or Home position
- 3 Send Carriage to absolute position – Place Carriage at a specific location on the x-axis
- 4 Set Gantry to absolute position – Place Gantry at a specific location on the y-axis
- 5 Printer status messages - Motion tab – Printer controlled message area
- 6 Home carriage – Send Carriage to Home position
- 7 Home Gantry – Send Gantry to Home position
- 8 Send Carriage to Absolute Position; location carriage moves based on (x, 0)
- 9 Send Gantry to Absolute Position; location gantry moves based on (0, y)

## GUI – Tending tab

Establish print head and ink tank settings in the Tending tab.

The screenshot shows the T1000 Control Program GUI with the Tending tab selected. The interface is divided into several sections:

- Color Channel:** Vacuum Set (14.5), Reading (14.66 inches of H2O), Head Temp Set (43), Water In Temp (37.27), Water Out Temp (37.27).
- White Channel:** Vacuum Set (18.5), Reading (39.36 inches of H2O), Head Temp Set (45), Water In Temp (42.34), Water Out Temp (42.64).
- Head Info Table:**

Head#	Head Name	Head Temp	Fire Voltage	Target Voltage
0	blackA	35.5	0.06	0.00
1	blackB	36.2	0.04	0.00
2	yellowA	36.2	0.06	0.00
3	yellowB	36.2	0.03	0.00
4	white1A	38.3	0.04	0.00
5	white1B	38.8	0.05	0.00
6	white2A	38.8	0.03	0.00
7	white2B	38.9	0.05	0.00
8	magentaA	36.4	0.06	0.00
9	magentaB	36.3	0.05	0.00
10	cyanA	36.4	0.07	0.00
11	cyanB	36.0	0.03	0.00
- Tank Info Table:**

Tank Color	Tank Temperature	Ink Level
black	29.8	Full
yellow	29.8	Full
white1	29.8	Full
white2	29.8	Full
magenta	29.8	Full
cyan	29.8	Full
- 39 volt supply:** 0.07 volts
- Lamp Status:** Left Lamp Status: Lamp Off, Right Lamp Status: Lamp Off
- Log Window:** Shows system startup and purging messages.

### Color Channels

- 1 Vacuum Set
- 2 Head Temp Set
- 3 Reading (Inches of H<sub>2</sub>O) (read only)
- 4 Water In Temp (read only)
- 5 Water Out Temp (read only)
- 6 Head Info table

### White Channels

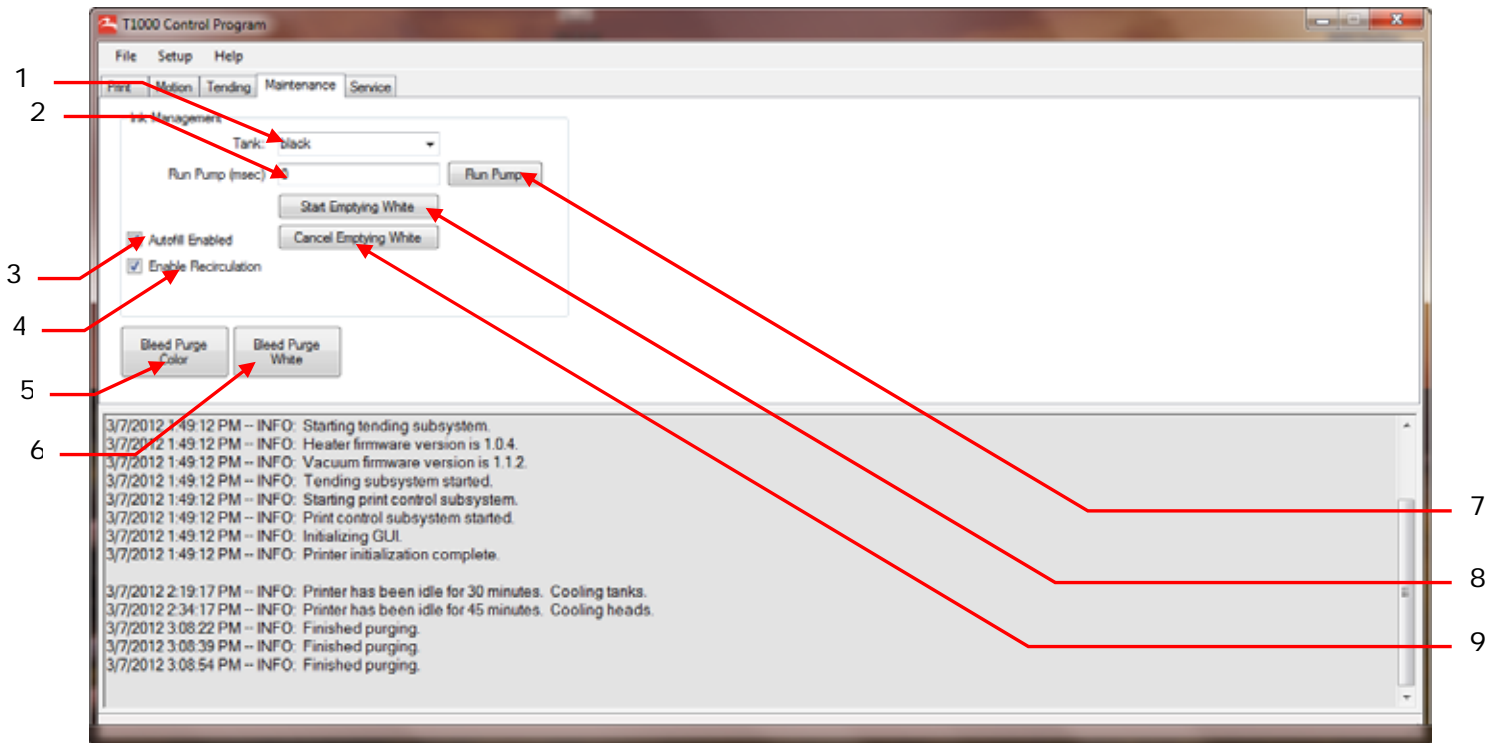
- 9 Reading (Inches of H<sub>2</sub>O) (read only)
- 10 Water In Temp (read only)
- 11 Water Out Temp (read only)
- 12 Vacuum Set
- 13 Head Temp Set
- 14 Tank Info table

### Both Channels

- 7 39 Volt supply, +/- volts from 39
- 8 Printer status messages – Tending tab
- 15 Left Lamp Status
- 16 Right Lamp Status

## GUI – Maintenance tab

Set ink management and secondary ink tank settings in the Maintenance tab.

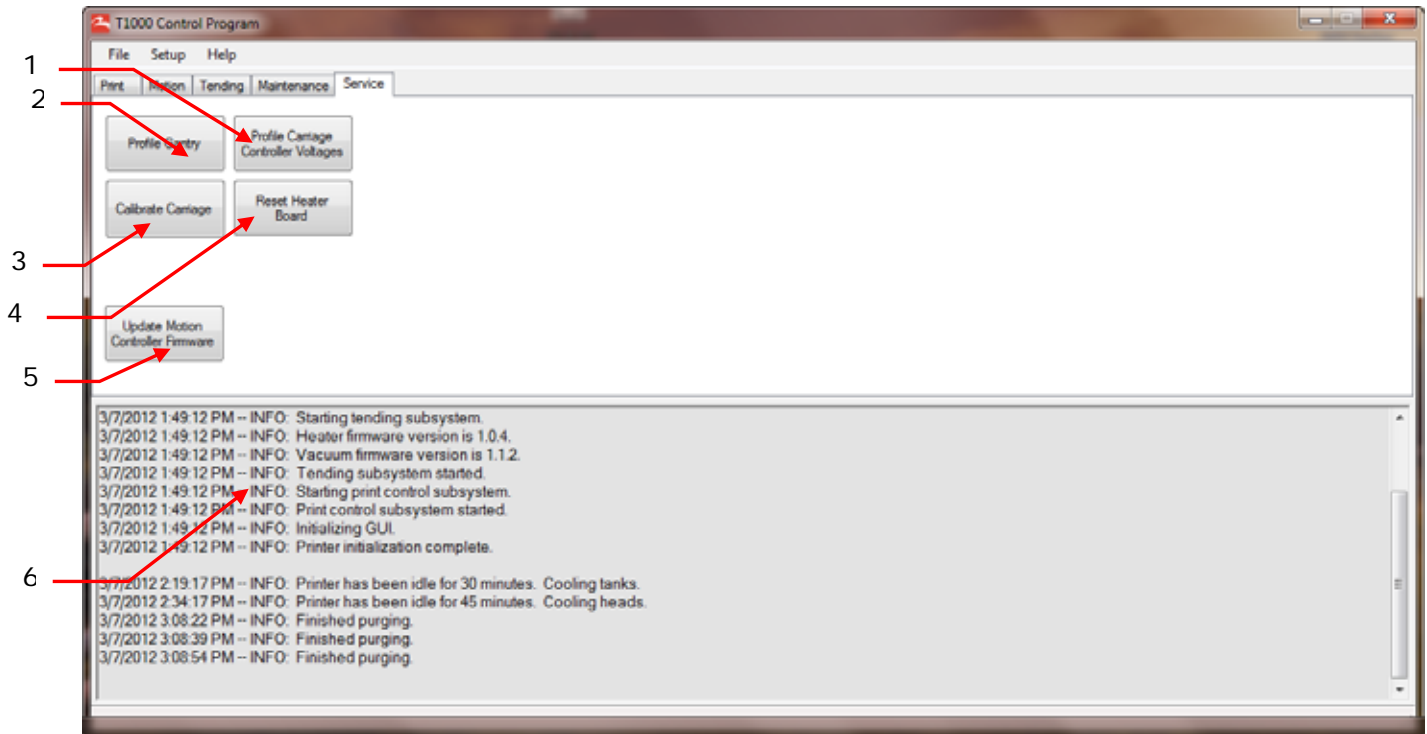


- 1 Tank select drop-down – **NOT USED**
- 2 Pump run time – **NOT USED**
- 3 Autofill Enabled check box – Select during printing, clear during selected maintenance tasks
- 4 Enable Recirculation check box – Select during printing, clear during selected white channel maintenance tasks
- 5 Bleed Purge Color button – Click to start a three second purge of the selected color channel
- 6 Bleed Purge White button – Click to start a three second purge of the selected white channel
- 7 Run Pump button – **NOT USED**
- 8 Start Emptying White – Begins emptying the white secondary ink tank
- 9 Cancel Emptying White – **NOT USED**

## GUI – Service tab

Perform Service tasks from the Service tab.

**Caution:** Service tasks must only be performed by trained and experienced users. Inexperienced users performing these tasks could disable the printer, rendering it unusable.



**Note:** Image cropped for illustrative purposes.

- 1 Profile Carriage Controller Voltages
- 2 Profile Gantry button
- 3 Calibrate Carriage
- 4 Reset Heater Board
- 5 Update Motion Controller Firmware
- 6 Printer status messages – Service tab



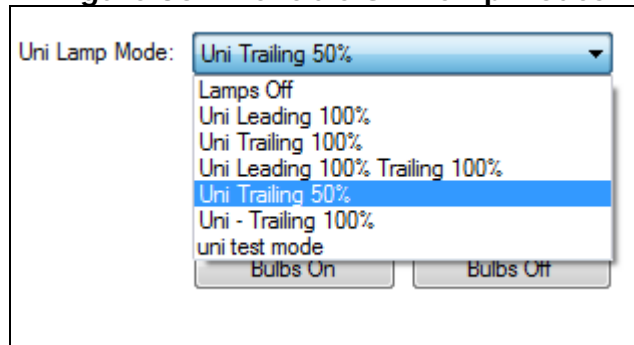
## Lamp Operation Modes

This control allows selection of leading, trailing, or both lamps.

### Uni Lamp Mode

This section outlines the available Uni Lamp modes.

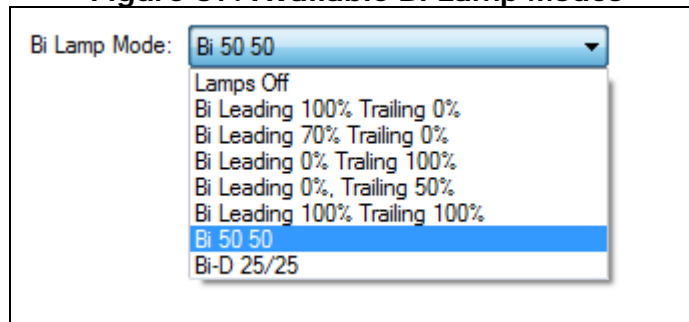
Figure 36: Available Uni Lamp Modes



### Bi Lamp Mode

This section outlines the available Bi Lamp modes.

Figure 37: Available Bi Lamp Modes



- **Bi-directional** – both lamps light during printing at the percentage indicated
- **Leading** – only the Leading (front) lamp is used during printing at the percentage indicated
- **Trailing** – only the Trailing (back) lamp is used during printing at the percentage indicated

The main considerations are amount of curing, media sensitivity to heat and image gloss characteristics. There are no specific recommended settings for lamp modes or intensity. Also, the UV Lamp Height can be adjusted up or down to decrease or increase UV light intensity, respectively.

**Caution!** A maximum lamp cure setting (100% + low physical lamp placement) may cause media to buckle upward. This is the primary cause of the carriage running into the media, damaging print heads. Print heads damaged in this manner are not covered under any warranty.

# Printer Operation

## Printing an Image

Follow the instructions in this section to print an image. Begin with the [Printing Overview](#).

**Note:** A trained operator must be present at all times during printing. Without the immediate intervention of a trained operator, small problems and failures during printing may cause significant damage to your printer.

## Printing Overview

Follow these basic steps to print an image from the T1000 printer.

1. Open an Image file and prepare the file for RIP.
2. Select the Image Profile.
3. Select the Print Resolution.
4. Set the Image Size.
5. RIP image and send to Print Queue.

**Note:** The number of horizontal and vertical copies, and lamp settings are handled in the printer GUI. Refer to the next section, [Printing an Image File](#).

## Printing an Image File

Follow these instructions to print an image. Images must be “ripped” in Fiery XF prior to printing or importing image files.

1. From the **Print** tab click the **Browse** button to launch the **Open** window.

**Note:** Print files must be in either “ISI” or “ISM” file formats for printing with the T1000 Printer.

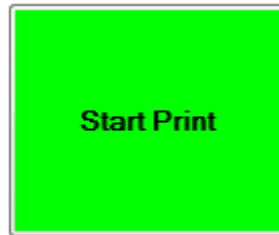
2. Select the file from the file list and click the **Open** button at the lower right of the window. Notice the status boxes of the **Print** tab are now populated with default values for the print job; see [GUI – Print tab](#). The default spacing is set to 10 inches from the left and five inches from the top. The operator may choose less spacing – one inch from the left and top – to avoid wasting media.
3. Select a **Print Mode** and a **Lamp Mode**.
4. Set the left image edge and the top image edge of the media.
5. Select the number of vertical and horizontal copies to be printed and set the vertical and horizontal gap between each copy (gap measurements can be represented in decimals.)
6. Check to ensure the print media is flat throughout the printing zone and that the entire vacuum table has been covered with material.
7. Turn on the vacuum table.
8. From the **Print** tab click the [Start Print](#) button. A vacuum pump warning dialog box will appear if vacuum pump has not been activated.

9. The UV lamps will warm up for approximately 20 seconds before printing begins. When the UV lamps are at operating temperature, the T1000 begins printing. A **Cancel** dialog box displays during printing, allowing the option to cancel the print run at any time during printing. When printing is complete, the carriage returns to the starting position and the UV lamps begin a cool down cycle.

## Start Print

*The Start Print button initiates a print run.*

**Figure 38: Start Print button**



Check to ensure all other settings are complete before pressing the **Start Print** button. After starting a print, a print dialog box displays with **Pause** and **Cancel** options available.

## Basic White Printing

*For optimum printing results, follow these guidelines when printing with White ink.*

White UV ink is very heavy and pigments tend to settle out of the ink. The T1000 uses a recirculation pump to keep the white ink in the main ink bottle stirred. However, white ink still sits in many parts of the printer including tubing, the working reservoirs, and the two white print heads.

Therefore, it is important to do the following things to keep the white ink printing smoothly.

1. Always keep sufficient white ink in the main bottle.
2. Always turn on the white negative pressure valve when the printer is running. This allows the head maintenance cycle to keep fresh white ink in the print heads.
3. **Print White ink at least once per day.** Printing a one square foot area of white keeps the print heads jetting the ink properly.
4. If white ink will not be used for a long period of time, the entire white ink system needs to be flushed and the white heads disabled. Please contact Field Service if this is desired.

## White Printing Modes

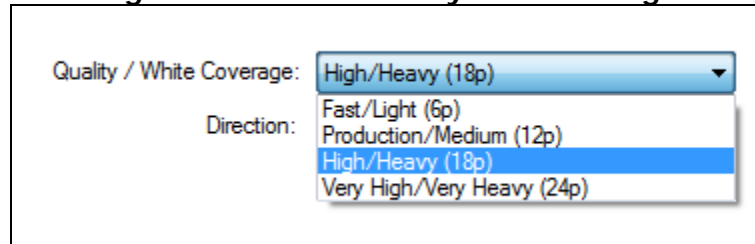
*On the T1000, white can be printed in one of three modes.*

1. White as a base, or white first and CMYK second.
2. White as an overcoat or CMYK first with white printed on top.
3. White as a spot color. In this case white is being treated as a normal color and printed simultaneously with the CMYK.

**Note:** Both the white and CMYK colors are printed as the carriage passes over the media.

1. To prepare the image for printing, the RIP must be instructed to generate the white color plane.
2. After ripping the file as required, import the ISW file into the Print Control Program.
3. From the GUI, select the Quality/White coverage, [Figure 39](#).

**Figure 39: White Quality and Coverage**



# Printer Tests

This chapter covers the basic printer tests, which assist users in determining print head quality, print quality, and aligning the printer.

## Preparing for Printer Tests

Accurate print head alignment is critical on the T1000 to ensure high quality image output.

**Note:** Proper print head alignment can only be achieved with the T1000 printer at operating temperature. Prior to performing any printer test, the printer must be fully functional.

The following items must be completed prior to performing printer tests:

1. Turn on the printer and allow it to stabilize in its normal operating environment.
2. Temporarily set the fluid target to **40°C** and allow the printer to stabilize. You will restore the fluid temperature setting at the end of the head alignment procedures.

**Note:** Make note of the existing head temperatures prior to changing for tests.

3. Use the provided Gap Tool to set the Carriage Height to 1mm.
4. Use only high-quality print media, such as glossy photo stock or equivalent, when running printer tests or attempting any head alignment procedures. Do not use rough, porous, or mat finished media, as these media types lead to image distortions and false alignment readings.
5. Print media must be 48" wide or wider.
6. To align the white print heads, a section of dark brown vinyl or similar shade material is required to provide contrast when printing with white.
7. Check to ensure the print head voltages have been properly set.
8. Return Head Temperatures to original temperature settings.

## Print Head Alignment Procedures

The following table provides an overview of the ten sequential procedures involved in aligning the T1000 print heads. A detailed description of the alignment test procedures is provided below. These alignments must be repeated for the white ink.

**Table 3: Overview of Print Head Alignment Procedure**

Step No.	Test Description	Comments	Skill Level
1	Nozzle Test	Common test	All users
2	Head Rotation alignment	Mechanically adjusted head alignments	Field Service Engineers only
3	Orthogonality	Mechanically adjusted head alignments	Field Service Engineers only

4	Head Y Placement	Mechanically adjusted head alignments	Field Service Engineers only
5	6x3 Forward / Reverse	Software adjusted head alignments	All users; adjustments by experienced users only
6	6x3 Color to Color	Software adjusted head alignments	All users; adjustments by experienced users only
7	BiDirectional Alignment 6x3	Software adjusted head alignments	All users; adjustments by experienced users only
8	12x3 Head Forward /Reverse	Software adjusted head alignments	All users; adjustments by experienced users only
9	12x3 Color to Color	Software adjusted head alignments	All users; adjustments by experienced users only
10	BiDirectional Alignment 12x3	Mechanically adjusted head alignments	All users; adjustments by experienced users only

**Caution:** Performing alignment procedures out of sequence will result in misaligned heads and poor print quality.

Precision alignment of the KL (black – left) print head is the base reference for all other print head alignments to follow. Improper alignment of KL print head results in poor alignment across all of the print heads.

**Note:** Run a print sample prior to performing the nozzle test to ensure heads are at operating temperature.

Alignments have to be run in both Color and White for proper alignment to be obtained.

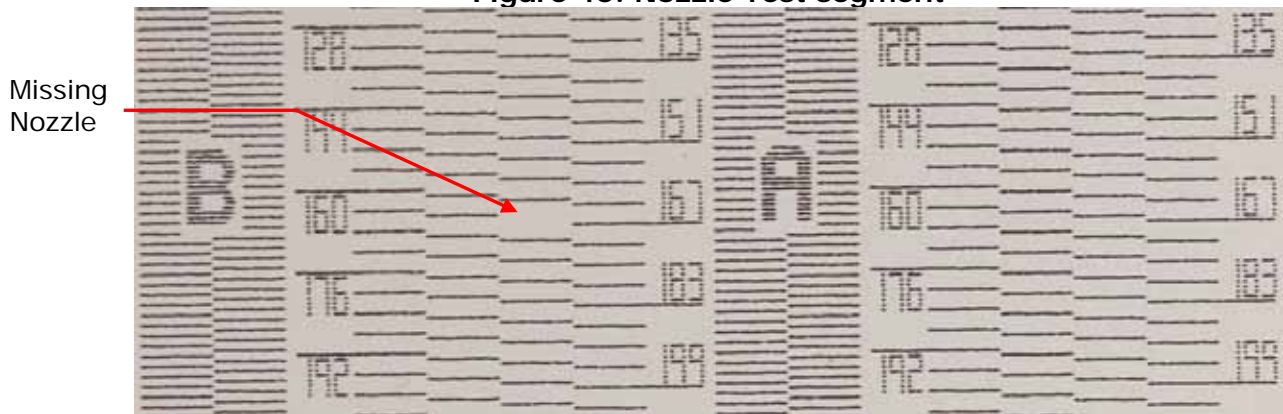
## Printing and Analyzing a Nozzle Test

*The nozzle test verifies that all print head nozzles are firing correctly.*

The test prints one segment for each print head. The test pattern creates solid and stepped areas that correspond to each print nozzle. Missing line segments or faded areas indicate that a specific jet pack's nozzles are not firing correctly. Each segment corresponds to all nozzles for each jet pack as shown by the nozzle number printed within the test.

1. From the **Print** tab, click the **Browse** button in the **Image:** path.
2. Browse to the **Diagnostic Prints** folder and open the **IQ-Hex-Jet-ID.isi** file. The **Image Preview** area displays the Nozzle Test image.
3. Set both the **Horizontal Offset** and the **Vertical Offset** values to position the test image in the desired location. If this is a new piece of media, begin at (0, 0) inches.
4. Click the **Print Nozzle Test** button. A single pass nozzle test prints.

Figure 40: Nozzle Test segment



5. View the Nozzle Test with a 30x or stronger eye loupe. If acceptable, go to step [8](#). Perform these steps if the Nozzle Test is not acceptable.
  - Perform a Purge Color and/or Purge White.
  - Print another Nozzle test.

**Note:** Never purge ink unless necessary. For example, if only Color nozzles are missing, do not purge White.

6. Analyze the second nozzle test. If acceptable, go to step [8](#). Perform these steps if the jet test is not acceptable.
  - Perform the steps as outlined in [Vacuuming the Surface of the Jet Packs](#).
  - Print another jet test.
7. Analyze the third jet test. If acceptable, proceed to step [8](#). If the results are not acceptable, there are several potential causes:
  - Carriage vacuum is too low or too high – Adjust the vacuum in small increments, printing a Nozzle Test after each adjustment.
  - There is air in the ink system – see [Bleeding Air from Print Heads](#).
  - There is one or more blocked print head nozzles.
8. If the jet test is acceptable, proceed to [Error! Reference source not found.](#)

**Note:** Do not attempt to change any Alignment values until you have printed an acceptable Nozzle Test.

## Additional Alignment Procedures

*The instructions for the remaining alignment procedures are located on the EFI Support website.*

1. Proceed to the website at <http://www.vuteksupport.com>.
2. Select the T1000 as the **Printer Model**.
3. Enter "Alignment" in the **Search** field and click **Go**.

# Ink Care Procedures

## Ink System

*The T1000 UV-curable ink comes in 0.5 liter bottles.*

This bag-in-a-box ink container system provides the maximum possible protection from exposure to light while keeping the ink adequately contained during handling.

**Note:** Always wear personal protective gear when working with UV-curable ink.

## Ink Pumps

*There is one self-priming dual diaphragm ink pump for each color and two pumps for each white channel.*

Ink is drawn from the bottle of ink, through the primary ink filter, into the ink pump, and then pumped to the secondary ink container on the carriage. When ink in the secondary ink container is low, a sensor detects its low condition and turns on the ink pump to fill the secondary ink container. Each pump turns off when the ink level reaches the full limit.

Refer to [Figure 13](#) for location of Ink Pumps.

## Storing Ink

*Store UV-curable ink bottles in an environmentally controlled area that is both dark and well ventilated.*

Extended exposure to light causes the ink to cure.

UV-curable ink has a shelf life of six months from date of manufacture. Use the oldest ink first to avoid loss due to expiration. The expiration date is on the outside of each bottle. Dispose of expired ink in a manner consistent with your local regulations.

## Replacing Ink Bottles

*Follow these instructions when replacing ink bottles.*

The T1000 is equipped with an **Ink Low** alert screen which displays in the GUI. Do not replace ink until the **Ink Low** alert screen displays.

**Note:** UV Curable Ink can be stored for a maximum of six months. Using ink beyond its shelf life will cause printing problems. Check the expiration date on your new bottle of ink to ensure the new bottle is still usable.

1. Calculate ink consumption relative to your work load and keep at least one full set of inks on hand to avoid any production delays while waiting for replenishments to arrive.
2. To check ink levels, gently lift each ink bottle to determine how much ink it contains. Do not shake the ink bottles as shaking will produce foam. During normal printing operations a bottle of ink lasts one week or more. Regardless, check ink levels at least once a day.



3. Check the expiration date on your new bottle of ink to ensure the new bottle is still usable.

The T1000 Inks can be replenished while the printer is printing. However, EFI recommends replenishing the inks while the T1000 printer is idle and gantry is in Home position.

## CMYK Inks

*Follow these instructions to replenish Cyan, Magenta, Yellow or Black ink:*

**Caution:** Wear Nitrile or a similar type of gloves and wear proper eye protection when replenishing inks.

1. Place spill pad on the floor around ink bottle area to absorb any spilled ink.
2. Prepare a new ink bottle by removing cap and seal from new ink bottle.
3. Tighten cap on the existing C, M, Y, or K bottle of ink that requires replacement.
4. Tip bottle to remove ink bottle and cap assembly from ink tray.
5. Unscrew cap and remove tube assembly. Use paper towels or shop rags to contain any dripping ink.
6. Immediately place cap and tube assembly into new bottle and tighten cap.

**Caution:** Never refill an empty ink bottle. Use only a brand new bottle of ink when replenishing the T1000. Dispose of all chemical waste in accordance with local environmental guidelines. Never discard chemical waste in a common trash receptacle.

7. Place new ink bottle in the ink bottle tray.
8. Ensure ink tubes are not pinched or obstructed, and then **loosen the ink bottle cap.**

**Note:** The ink bottle cap (and tube assembly) must not be tight on the bottle. A tight cap creates a vacuum inside the bottle, preventing ink from flowing out of bottle.

## White Ink

*Follow these instructions to replenish White ink.*

**Note:** Due to the white ink recirculation design, replacing white ink must be done while the T1000 is idle. Have sufficient paper towels or shop rags handy.

1. Place spill pad on the floor around ink bottle area to absorb any spilled ink.
2. Turn off the white recirculation system.
3. Prepare a new ink bottle by removing cap and seal from new ink bottle.
4. Tighten cap on the existing white bottle of ink that requires replacement.
5. Tip bottle to remove ink bottle and cap assembly from ink tray.
6. Unscrew cap and remove tube assembly. Use paper towels or shop rags to contain any dripping ink.
7. Immediately place cap and tube assembly onto new bottle and tighten cap.

**Caution:** Never refill an empty white ink bottle. Use only a brand new bottle of ink when replenishing the T1000. Dispose of all chemical waste in accordance with local environmental guidelines. Never discard chemical waste in a common trash receptacle.

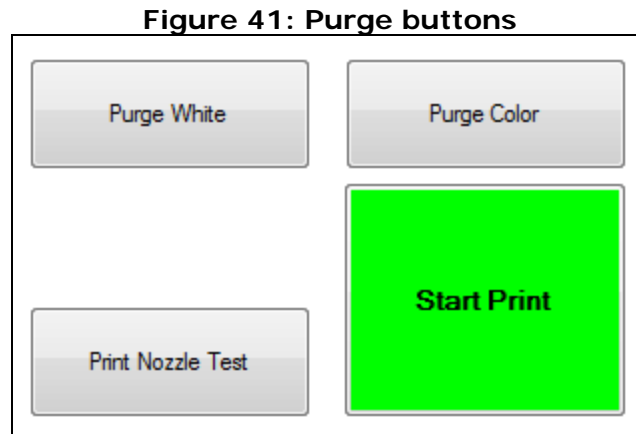
8. Place new ink bottle in the ink bottle tray.
9. Ensure ink tubes are not pinched or obstructed, and then **loosen the ink bottle cap.**

10. Clean up any spills on the printer or surrounding work area, especially the floor.
11. Turn on the white recirculation pump in the **Maintenance** tab of the GUI.

## Ink Purge Process

Follow these instructions to perform an Ink Purge.

1. Click the **Print** tab in the T1000 GUI.
2. The **Purge White** and **Purge Color** buttons display in the bottom right of the tab.



3. Click the inks to purge, either white or all colors, by clicking the respective buttons.
4. Clean the print head surfaces and jet plate as defined in [Vacuuming the Surface of the Jet Packs](#).
5. Print a Jet ID Test to verify print quality.
6. If the test is unacceptable, repeat steps [3](#) through [5](#).
7. If the test is still unacceptable, blot the print head surfaces and print head mounting plate with a lint-free cloth soaked with flush solution. However, great care must be taken during blotting to avoid pushing debris up into the print nozzles.

**Note:** EFI recommends using the vacuum cleaning method over blotting. T1000 printer operators will find vacuum cleaning increases reliability and print nozzle up-time. Blotting the heads requires a developed technique. If blotting is not done properly it can lodge debris in the print nozzles, misdirecting the ink jetting, and eventually disabling the nozzles.

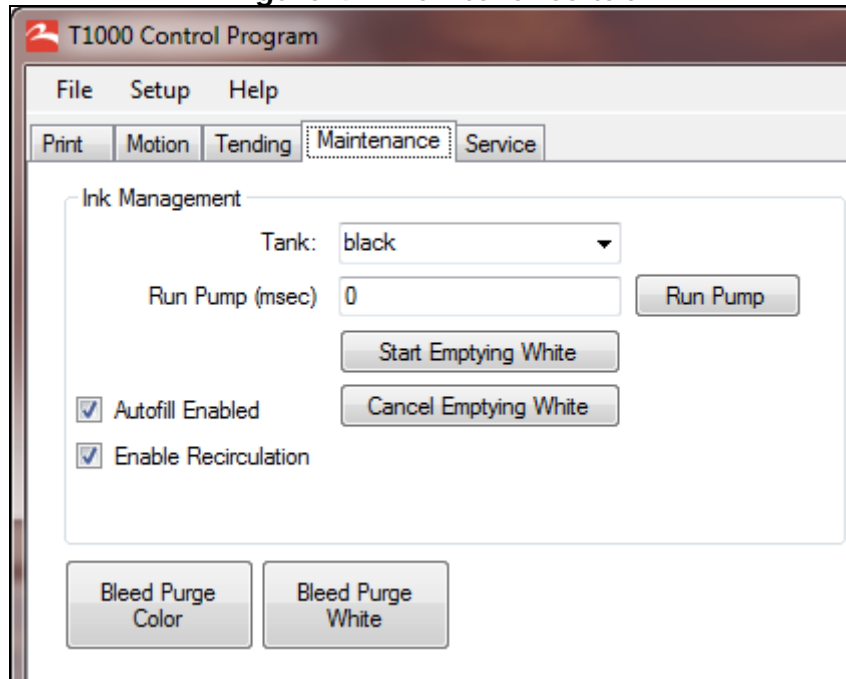
## Bleed Purge Process

Follow these instructions to perform a Bleed Purge on all jet packs.

**Note:** A Bleed Purge is shorter in duration than a Purge.

1. Click the **Maintenance** tab in the T1000 GUI.

Figure 42: Maintenance tab



2. Click the **Bleed Purge Color** button.
3. Click the **Bleed Purge White** button.
4. Vacuum the print heads according to the [Vacuuming the Surface of the Jet Packs](#) instructions.

## Emptying Waste Pan

*Follow these instructions to empty the ink waste pan.*

Ink drains from the jet packs into a waste pan located underneath the carriage. Check the waste pan every day or more often if running multiple shifts. Empty the tray if it is more than 50-75% full.

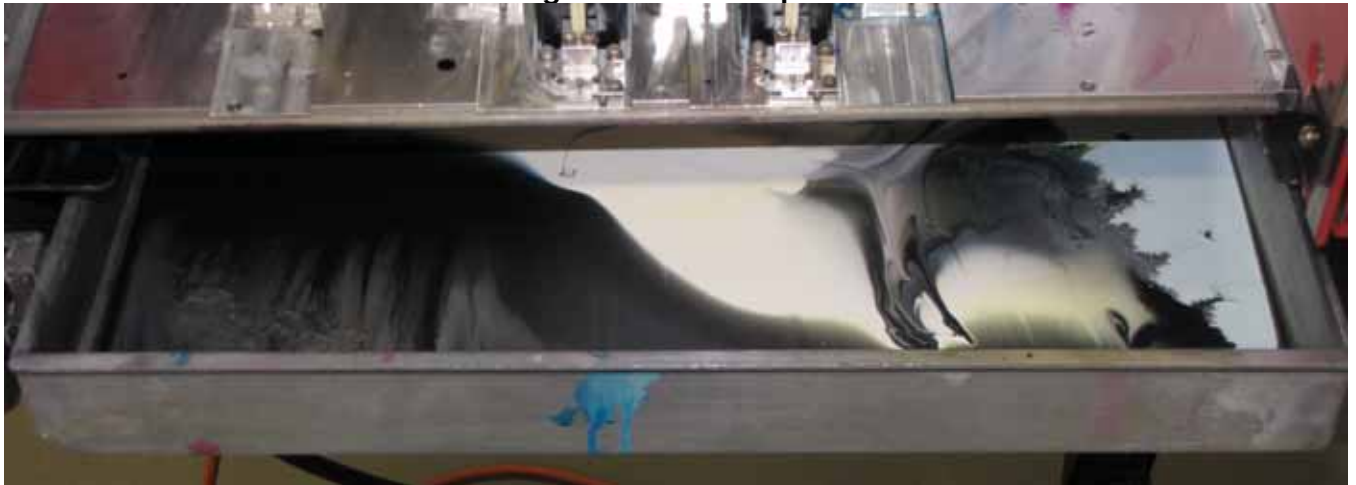
1. From the GUI, go to the **Motion** tab and click **Park Carriage** to position the carriage over the waste tray compartment.

**Figure 43: Waste pan door, front of carriage**



2. Place a waste container on the floor beneath the carriage to capture the waste ink.
3. Open the waste pan door.
4. Slowly remove the waste pan and pour contents into the waste container.

**Figure 44: Waste pan**



5. Replace the waste pan and close the waste pan door.
6. Dispose of the waste inks in accordance with local site requirements.

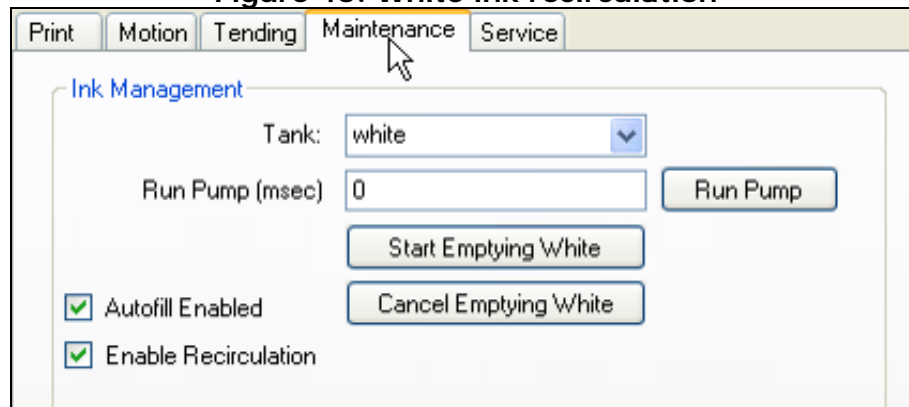
## White Ink Recirculation System

Follow the instructions to enable or disable the white ink recirculation system.

**Note:** Users must disable the White Ink Recirculation system when changing white ink bottles.

1. From the GUI, click the **Maintenance** tab.
2. In **Ink Management** pane, change the **Tank** drop-down to **White**.
3. Check or clear the **Enable Recirculation** check box to turn the recirculation system on or off, respectively, and save changes.

**Figure 45: White ink recirculation**



# Maintenance and Jet Pack Care

## Maintenance Guide

The Maintenance Guide provides you with a list of preventative maintenance procedures. See <http://www.vuteksupport.com/doc.php?doc=1800>.

## Safety Guide

Before working with any EFI-VUTEK printer, review all safety precautions and procedures in the Safety Guide, <http://www.vuteksupport.com/doc.php?doc=683>.

## Before You Begin

Before beginning any maintenance procedures, verify that you have all the materials required to complete the procedure. If you have any questions, please contact VUTEK Technical Support prior to starting any maintenance procedures.

The Product Support phone numbers are:

- USA 603-677-3111
- Europe 32-2-749-9420

Perform all maintenance, other than daily, at the beginning of the week, either Monday or Tuesday, from 8:30 am to 5 pm, Eastern Time or Central European Time.

**Note:** For safety concerns, perform the lockout/tagout procedure before starting any maintenance procedures which involve moving parts, such as the carriage.

## Using the Maintenance Log

*Keep the printer's Maintenance Log current. If a Service visit is required, the Field Service Engineer reviews maintenance and service record documents.*

## Safety Note

*All service and maintenance procedures must be performed by qualified service personnel.*

Without the immediate intervention of a trained operator, small problems and failures during printing may cause significant damage to your printer.

## Vacuuming the Surface of the Jet Packs

*Follow these instructions when vacuuming the surface of the jet packs.*

1. Place the shop vacuum near the left-front corner of the printer.

2. From the GUI, go to the **Motion** tab and click **Park Carriage** to position the printer carriage over the waste tray compartment.
3. Open the waste tray compartment Access Panel.
4. From the **Maintenance** tab of GUI, purge the CMYK ink two times in succession and wait for the ink to stop dripping. See [GUI – Maintenance tab](#).
5. In the same tab, purge the White ink two times in succession and wait for the ink to stop dripping.
6. Check to ensure the vacuum wand attachment is completely clean. Clean the vacuum wand attachment, if necessary, prior to inserting the wand into the waste tray compartment.

**Figure 46: Vacuum Wand attachment**



**Note:** Keeping the vacuum wand clean, free of dirt, dried ink, or other contaminants is very important. Any particulate on the vacuum wand could become forced into the print nozzles and result in poor print quality or unscheduled down-time.

7. Carefully insert the vacuum wand with the slot oriented towards the print heads and hold it flat against the bottom of the print head mounting plate.

**Figure 47: Vacuuming print heads**



**Note:** The waste tray can remain in place during the vacuum cleaning procedure; however, the operator must exercise caution to keep the vacuum hose from catching on the waste tray and spilling UV ink

8. Turn the vacuum cleaner on and begin removing ink from the heads by pulling the vacuum wand attachment from back to front in a continuous motion. Any side-to-side movement will likely cross-contaminate the uncured inks on the print heads.
9. When vacuum cleaning is complete, wipe any excess ink from the vacuum wand attachment.
10. Turn the wand sideways to allow any excessive un-cured ink to drip into a catch tray.
11. Wipe any excess ink from the vacuum wand attachment and snap the wand into place on the Vacuum body.

**Note:** Keep the vacuum wand clean and free of dirt, dried ink, or other contaminants. Any contamination on the vacuum wand could become forced into the print nozzles and result in poor print quality or unscheduled downtime. Never vacuum any ink from the waste tray at the bottom of the waste tray housing.

12. Run a Jet ID Diagnostic print to verify all print nozzles are firing properly.
13. Typically purging, cleaning, and printing a Jet ID is required only once or twice each morning as long as the printer runs continuously throughout the day. At their discretion, operators may check print nozzle functionality by purging, vacuum cleaning, and printing the Jet ID (Nozzle Test) file.

**Note:** Occasionally, blotting the jet pack mounting plate with a lint free cloth soaked with flush solution is an acceptable means for removing excess ink and build-up. However, great care must be taken during blotting to avoid pushing debris up into the print nozzles. EFI recommends using the vacuum cleaning method over blotting. T1000 printer operators will find vacuum cleaning results in a more thorough cleaning of the heads with a shorter recovery time.



## Recovering Print Heads

Follow these instructions to recover print heads e.g., recover nozzles.

**Note:** Contact [EFI-VUTEK](#) if initial efforts to recover jet packs are unsuccessful.

1. Print a Nozzle Check test and analyze it using a 30x or better eye loupe.
2. Look for:
  - Specific jet packs with missing nozzles
  - Specific channels missing nozzles, e.g., white, cyan, etc.
  - Jet packs missing entire blocks of nozzles
3. Perform the [Vacuuming the Surface of the Jet Packs](#) procedure.
4. Follow the instructions for [Bleeding Air from Print Heads](#) if the Nozzle Check test is poor quality.

## Setting Carriage Vacuum

Carriage vacuum is essential to printing as it maintains print head nozzle meniscus. Too much vacuum pressure causes poor printing quality due to ink starvation. Too little or no vacuum results in ink dripping from the heads. Follow these steps to set the correct carriage vacuum pressure.

**Note:** Never adjust Carriage Vacuum unless there are jet drop out or print quality issues.

1. From the Printer Control Software, click the [GUI – Tending tab](#).

Figure 48: Tending tab

Color	White
Vacuum Set: 14.5	Vacuum Set: 17.5
Reading: 14.7 inches of H2O	Reading: 17.58 inches of H2O
Head Temp Set: 43	Head Temp Set: 45
Water In Temp: 48.35	Water In Temp: 58.13
Water Out Temp: 47.55	Water Out Temp: 54.84

2. Compare the **Vacuum Set** value to the **Reading** value (in inches of H<sub>2</sub>O.) If there is greater than a 0.5 difference, there may be problems with the
3. To change the **Vacuum Set** value, click in the field, type in a new value and press the **Enter** button.

**Note:** Vacuum settings will vary depending on printer environment and elevations.

# Shutdown Procedures

## Shutdown and Storage Guidelines

For complete information about printer operational statuses, refer to the following topics

### Standby - Overnight

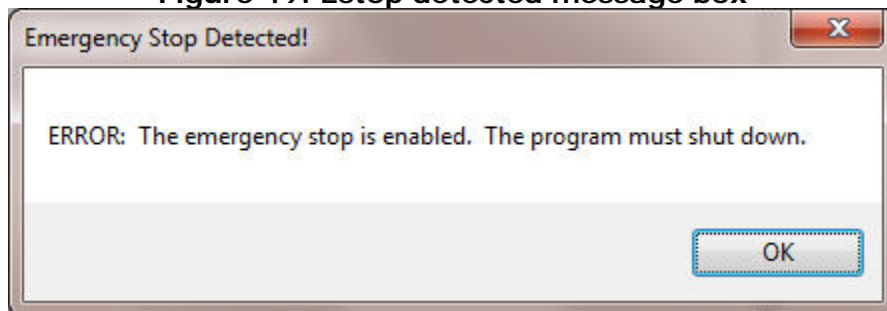
Standby Mode is defined as the condition where the [Auxiliary Power Switch](#) is set to STANDBY, but the Main Power Circuit Breaker is set to ON.

### Restarting from an Emergency Stop

Follow these instructions to restart the printer from an Emergency Stop.

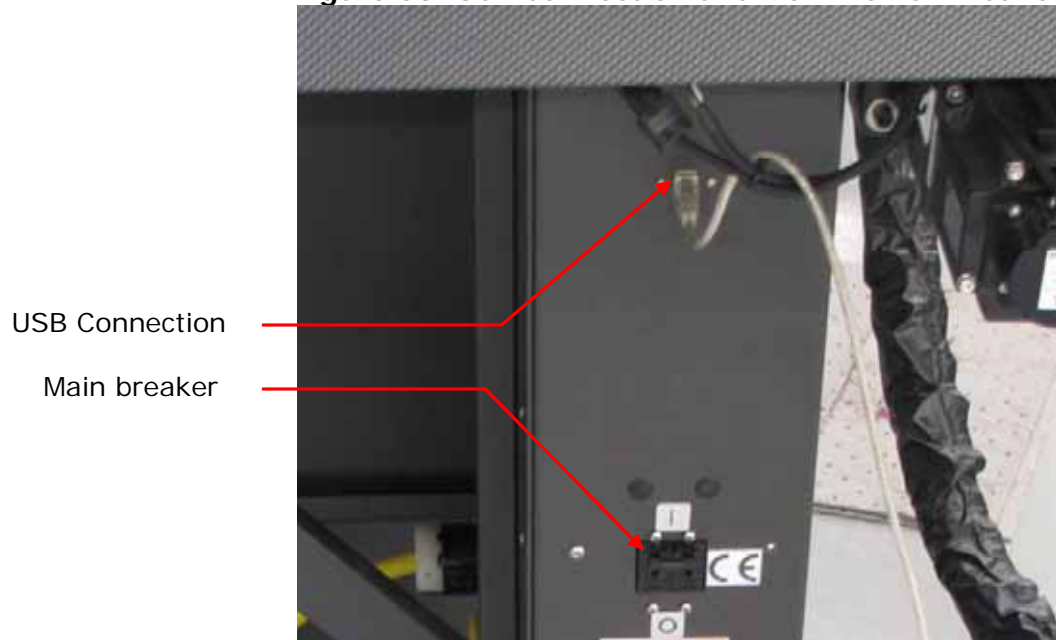
1. After the estop is pressed, the **Emergency Stop Detected** dialog opens.

**Figure 49: Estop detected message box**



2. Clear issue which required an Emergency Power Off.
3. Turn off system power switch and suction pump switch.
4. Turn off main power breaker.
5. Close CMYK negative pressure valve.
6. Close White negative pressure valve (if using white ink).
7. Manually park carriage assembly in Home position.
8. Twist emergency-stop knobs counter-clockwise to reset knobs.
9. Shutdown the printer computer through the GUI.
10. Turn off the main electric breaker.
11. Disconnect the main USB cable for 30 seconds. See [Figure 50](#).
12. Reconnect the USB cable.
13. Turn on main power breaker.
14. Turn on the Auxiliary power switch.
15. Log on to the printer computer and launch the printer GUI.
16. From the **Service** tab, click the **Home Gantry** button.
17. The T1000 printer power is now restored.
18. Print an acceptable Nozzle test.
19. Restart the print job.

**Figure 50: USB connection and Main Power Breaker**



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