

**efi**



# H652 Operations Manual

**Document Type:** Operations Manual

**Affected Product:** H652

**Date:** 12/7/2011

**Control Number:** H652-001, Rev 3



One VUTEk Place  
Meredith, NH 03253  
(603) 677-3111 X4

## Legal Notices

The H652 Operations Manual is designed as a reference for operating the H652 Printer and is not intended to replace any formal training required by efi/Rastek.

This document contains operation information for the H652 Printer. Every effort has been made to guarantee the accuracy and integrity of this manual. Should you find any errors in the content, please call technical support staff at (603) 677-3111 (X4) to bring the matter to our attention. International customers may contact efi directly at the same number.

efi/Rastek accepts no responsibility for improper use of the H652 Printer. Please read this operations manual thoroughly before you begin operating your H652 Printer.

## Copyright

This document is protected by copyright laws. © 2011 by efi/Rastek. All rights reserved.

## Confidentiality

This manual is proprietary information belonging to efi/Rastek. The information contained herein is intended to be used by efi employees, field service technicians, and H652 product owners / operators. Use of this information for any other purpose is expressly prohibited without prior written permission of efi/Rastek.

## Specifications

H652 Printer specifications are subject to change without notice. Descriptions, graphics and instructions are for illustrative and reference purposes only and in some cases may not exactly reflect the current revision of hardware or software.

## Software

The software described in this manual is furnished under license with each efi/Rastek printer. All software and data created during operation of the software may be copied in accordance with the terms for that specific software license. All software provided either with the system or as an upgrade remains the proprietary property of efi/Rastek, and may not be reverse engineered or disclosed to any third party.

## Third Party Products

The names of actual companies and products mentioned in any efi/Rastek documentation, or mentioned or shown in the software itself, may be registered trademarks, or service marks of their respective owners. Any software named in this Operations Manual is used by permission of the software owner.

## About This Manual

- To ensure consistent quality and maximum throughput, with the best results from your H652 Printer, operators are required to read and understand the complete contents of this Operations Manual.
- The textual content and visual content of this document is subject to change without prior notification.

# Table of Contents

|  |           |
|--|-----------|
| <b>Chapter 1: Introduction</b> .....                 | <b>8</b>  |
| <b>Chapter 2: Safety and Precautions</b> .....       | <b>9</b>  |
| Introduction.....                                    | 9         |
| Conventions used in this manual.....                 | 9         |
| For more information .....                           | 10        |
| UV Ink and Solvent Precautions .....                 | 10        |
| Storage of Combustible Materials.....                | 10        |
| Ventilation System.....                              | 10        |
| UV Lamps and UV Radiation Risks and Precautions..... | 11        |
| Fire or Explosion Risks and Precautions.....         | 11        |
| Risk of Eye and Skin Irritation .....                | 11        |
| High Voltage Danger and Precautions.....             | 12        |
| Printing Media Handling and Precautions .....        | 12        |
| Electrical Facilities at the Customer’s site .....   | 12        |
| <b>Chapter 3: Functional Description</b> .....       | <b>13</b> |
| The H652 Printer .....                               | 13        |
| Physical specifications .....                        | 13        |
| Print media types .....                              | 13        |
| UV lamps.....  | 14        |
| Carriage and Print Heads .....                       | 15        |
| Platen Vacuum System .....                           | 17        |
| Overview of Ink Delivery System.....                 | 19        |
| Negative Pressure / Pressure System.....             | 23        |
| Pressure / Negative Pressure Shut-off Valves.....    | 24        |
| Power Breaker Panel.....                             | 25        |
| Power Start Button .....                             | 26        |
| Emergency Stop Buttons .....                         | 26        |
| Printed Circuit Boards .....                         | 27        |
| Print Control Computer .....                         | 28        |
| Printer Software.....                                | 28        |
| Printer Firmware Driver.....                         | 28        |
| RIP Software.....                                    | 28        |
| Printing Perquisites.....                            | 28        |

---

|  |           |
|--|-----------|
| Print Head Temperatures .....                                  | 28        |
| Heated Fluid Temperature .....                                 | 29        |
| Negative Pressure Range.....                                   | 29        |
| <b>Chapter 4: H652 Printer Operations .....</b>                | <b>30</b> |
| Short and Long-term printer storage: .....                     | 35        |
| Printer Software .....   | 35        |
| Launching Fiery FX Control Application.....                    | 35        |
| Control Icon Menu .....  | 36        |
| Set Print Mode – Rastek H652.....                              | 36        |
| Printing Mode Pane .....                                       | 37        |
| Media’s Position & Margin .....                                | 37        |
| Margin (X).....  | 37        |
| Margin(Y).....   | 37        |
| Double White Ink.....  | 38        |
| UV Shutter Controls .....                                      | 38        |
| Left Lamp Shutter.....   | 38        |
| Right Lamp Shutter.....  | 38        |
| UV Power Control.....  | 38        |
| Ink Low Indicators .....                                       | 39        |
| Test Printer – Rastek H652.....                                | 39        |
| Printer Parameter Settings .....                               | 40        |
| System tab .....   | 40        |
| Page Setting .....   | 41        |
| Offset.....  | 41        |
| Head Temperatures .....  | 43        |
| Voltage and Waveform Setting.....                              | 44        |
| Checking Print Head Temperature and Pressure Valve Status..... | 44        |
| Check Print Head Temperature.....                              | 44        |
| Pressure Valve Status.....                                     | 44        |
| Printer Power Status .....                                     | 44        |
| Loading Print Media .....                                      | 46        |
| Rigid Media .....  | 46        |
| Roll-to-Roll Media.....  | 52        |
| Setting up for Roll Media.....                                 | 55        |
| Gap Height.....  | 55        |
| Media Tracking .....   | 58        |

---

|  |           |
|--|-----------|
| Testing the H652 from the Printer Control Computer ..... | 59        |
| Nozzle check .....                                       | 60        |
| Resetting the UV lamps .....                             | 60        |
| Powering-down the UV lamps.....                          | 60        |
| Emergency Stop Procedure.....                            | 61        |
| Restart Procedure following an Emergency Stop.....       | 61        |
| <b>Chapter 5: X and Y-Base Setting Procedures .....</b>  | <b>62</b> |
| Setting X-Base:.....                                     | 62        |
| Setting Y-Base .....                                     | 63        |
| <b>Chapter 6: H652 General Operator Maintenance.....</b> | <b>65</b> |
| Scheduled Maintenance of H652.....                       | 65        |
| Preparation .....  | 66        |
| Daily Ink Level Check and Replacing Ink .....            | 66        |
| Replacing CMYK Ink.....                                  | 67        |
| Replacing White Ink .....                                | 67        |
| Emptying Waste Bottle .....                              | 68        |
| Maintenance of Moving Parts.....                         | 68        |
| Purging Ink and Sweeping the Heads.....                  | 70        |
| Ink supply System Maintenance .....                      | 71        |
| Maintenance of Conveyor Belt .....                       | 71        |
| Head Bleeding Procedure.....                             | 74        |
| Adding Fluid to the Print Head Heating System .....      | 75        |
| UV Bulb Replacement .....                                | 81        |
| Removing UV Ink from the Vacuum Belt .....               | 89        |
| <b>Appendix A: H652 Specifications .....</b>             | <b>90</b> |
| <b>Appendix B: Glossary .....</b>                        | <b>91</b> |

## List of Figures

|           |   |    |
|-----------|---|----|
| Figure 1  | H652 General Features .....                                   | 13 |
| Figure 2  | H652 UV Lamps .....   | 15 |
| Figure 3  | H652 Carriage and Dual-Row Print Heads .....                  | 16 |
| Figure 4  | Platen Vacuum and Conveyor Belt .....                         | 17 |
| Figure 5  | Platen Vacuum Suction Zones .....                             | 17 |
| Figure 6  | Platen Vacuum Suction Width Valves .....                      | 18 |
| Figure 7  | Suction Pump Power and Footswitch .....                       | 18 |
| Figure 8  | H652 Ink Delivery System Flow Diagram .....                   | 19 |
| Figure 9  | Ink Supply Bottles and Tray .....                             | 20 |
| Figure 10 | Ink Management Bay .....                                      | 21 |
| Figure 11 | Ink Control System Components .....                           | 22 |
| Figure 12 | Negative Pressure bleed Adjustment and Ink Purge Button ..... | 23 |
| Figure 13 | Pressure / Negative Pressure Shut-off Valves .....            | 24 |
| Figure 14 | Breakers and Switches – Printer Off .....                     | 25 |
| Figure 15 | Power Start Button Location .....                             | 26 |
| Figure 16 | Emergency Stop Button Location (2X) .....                     | 26 |
| Figure 17 | H652 Main Printed Circuit Boards .....                        | 27 |
| Figure 18 | Printer Control Software Icon .....                           | 35 |
| Figure 19 | Control App .....   | 36 |
| Figure 20 | Set Print Mode Window .....                                   | 37 |
| Figure 21 | Shutter Controls on Rastek User Interface .....               | 38 |
| Figure 22 | Overview Test Strip Interface .....                           | 39 |
| Figure 23 | System Tab .....  | 40 |
| Figure 24 | Page Setting Tab .....  | 41 |
| Figure 25 | Offset Tab .....  | 42 |
| Figure 26 | Head Temperatures Tab .....                                   | 43 |
| Figure 27 | Voltage and Waveform Tab .....                                | 44 |
| Figure 28 | Pressure Valves for CMYK Inks and White Ink .....             | 45 |
| Figure 29 | Adjusting the Head Carriage Height .....                      | 47 |
| Figure 30 | Adjusting the Vacuum Belt Suction Width .....                 | 48 |
| Figure 31 | Media Feed Alignment Stops .....                              | 48 |
| Figure 32 | Placement of Media in Suction Zone .....                      | 49 |
| Figure 33 | Main Power On – Suction Pump On .....                         | 50 |
| Figure 34 | Head Height “Gap” Tool .....                                  | 50 |
| Figure 35 | Adjusting Carriage Height for Rigid Media .....               | 51 |
| Figure 36 | Rigid Media Printer Margin Setting .....                      | 52 |
| Figure 37 | Roll Media Bar Clamps, Hubs, and drive gear .....             | 53 |
| Figure 38 | Roll Media Take-up Spool .....                                | 54 |
| Figure 39 | Roll Media Printer Margin Settings .....                      | 55 |
| Figure 40 | Adjusting the Head Carriage Height .....                      | 56 |
| Figure 41 | Head Height “Gap” Tool .....                                  | 57 |
| Figure 42 | Adjusting Carriage Height for Roll Media .....                | 57 |
| Figure 43 | Vacuum Width Adjustment Valves .....                          | 58 |
| Figure 44 | Test Printer Control Panel .....                              | 59 |
| Figure 45 | Setting X-Base on the Page Setting Tab .....                  | 62 |
| Figure 46 | Maintenance of Moving Parts – View 1 .....                    | 68 |
| Figure 47 | Maintenance of Moving Parts – View 2 .....                    | 69 |
| Figure 48 | CMYK Nozzle Test Print Results .....                          | 70 |
| Figure 49 | Ink Purge and Head Sweep .....                                | 71 |

|           |  |    |
|-----------|--|----|
| Figure 50 | Vacuum Conveyor Belt Maintenance .....         | 72 |
| Figure 51 | Auto Cleaning System Components .....          | 73 |
| Figure 52 | Adding Fluids to the Head Heating System ..... | 75 |
| Figure 53 | Removing Carriage Beam Covers .....            | 76 |
| Figure 54 | Cleaning the Optical Encoder Strip.....        | 77 |
| Figure 55 | Removal of Air Filter and Frame .....          | 79 |
| Figure 56 | Removal of Filter Element.....                 | 80 |
| Figure 57 | Installation of New Fan Filter Element .....   | 80 |
| Figure 58 | Replacement of Air Filter and Frame .....      | 81 |
| Figure 59 | Removal of Carriage Shroud.....                | 82 |
| Figure 60 | Cooling Fan power Connectors.....              | 83 |
| Figure 61 | Removal of Lamp Module .....                   | 84 |
| Figure 62 | Lamp Module and Lamp Fixture Separation .....  | 85 |
| Figure 63 | UV Bulb Removal .....                          | 86 |
| Figure 64 | Hermetically Sealed Replacement UV Bulb.....   | 87 |
| Figure 65 | Bulb Wire Lead and Ceramic Block.....          | 88 |

## List of Tables

|          |  |    |
|----------|--|----|
| Table 1: | H652 General Features.....                   | 8  |
| Table 2: | Breaker and Switch Identifier.....           | 25 |
| Table 3: | Test Strip Interface Detailed Features ..... | 39 |
| Table 4: | Test Strip Interface Basic Features.....     | 59 |
| Table 5: | H652 General Technical Specifications .....  | 90 |

## Chapter 1: Introduction

The H652 operations manual provides end-users with an overview of operating the printer in terms of basic printer features and functions, workflow for printing an image, and scheduled operator maintenance.

This manual is organized as follows:

| Chapter No. | Chapter Title                     | Chapter Content  |
|-------------|-----------------------------------|--|
| Chapter 1   | Introduction                      | Provides an overview of the general content of the manual.   |
| Chapter 2   | Safety and Precautions            | Provides important safety information  |
| Chapter 3   | Functional Description            | Contains a comprehensive description of printer systems, components and use.                         |
| Chapter 4   | H652 Printer Operations           | Contains general information on printer operation including detailed printer operations instructions |
| Chapter 5   | X and Y Base Setting Procedures   | Provides information on setting the X and Y Base to calibrate image position.                        |
| Chapter 6   | H652 General Operator Maintenance | Contains general operator maintenance items and procedures.  |
| Appendix A  | H652 Specifications               | Contains H62 Printer Specification   |
| Appendix B  | Glossary                          | Contains a general glossary of terms used in the manual.   |

The H652 uses variable-drop-on-demand, piezoelectric technology to print colorful, wide format images at a maximum of 1200 x 600 dots-per-inch (dpi) resolution.

See **Table 1** for a description of your H652's general features. See **Chapter 2: Functional Description** for a more in depth explanation of H652 features and controls.

| Table 1: H652 General Features |  |
|--------------------------------|--|
| Description                    | Specification  |
| Printing method                | Variable drop-on-demand piezoelectric  |
| Colors                         | CMYK + White   |
| Ink type                       | UV-curable   |
| Ink supply bottle capacity     | 1 liter each   |
| Media handling capabilities    | Rigid or Roll-to-Roll  |
| Media types:                   | <b>*Rigid:</b><br>Corrugated foam, various types of Acrylic Glass®, sheet metal, sheet film, Illustration boards, Coroplast®, wood, ceramic tiles, and Al-bond |
|                                | <b>*Roll-to-Roll:</b><br>Paper, vinyl, fabrics, adhesive-backed vinyl, banners, and PVC.   |

\* Media types include – but are not limited to – materials listed in Table 1

Please refer to **Appendix A** for complete H652 Specifications.

## Chapter 2: Safety and Precautions

### Introduction

Chapter 2 provides important safety information. Please read, understand, and follow all safety information presented throughout this manual before operating your H652.

The H652 uses the following chemicals and substances:

- A wide variety of printing media types
- UV-curable ink
- Cleaning solution which contains a small amount of solvent.

### Conventions used in this manual

This manual may use a number of types of special messages to emphasize information or point out potential risk areas to personnel or equipment. A sample of each message and symbol that may appear in this manual follows.



WARNINGS point out procedures that you must follow precisely to serious or fatal injury to yourself or others. This also includes causing serious damage to the equipment.



Cautions point out procedures that you must follow precisely to avoid damage to yourself, others, equipment, loss of data, or corruption of files in software applications.



UV light present. Immediate or prolonged exposure to UV light can result in painful eye injuries, skin burns, premature skin aging, or skin cancer. Individuals who work with or in areas where UV sources are used are at risk for UV exposure if the appropriate shielding and protective equipment are not used.



Hazardous voltage present; compartments or electrical boxes contain hazardous voltages inside that could result in severe electrical shock or burns, and could be lethal.



Burn hazard, hot surface; do not touch; surface of equipment may be hot, serious burns could result.



Wear hand protection, nitrile rubber gloves when handling UV-curable inks and solvents. Wear lint free cotton gloves when touching UV lamps or the UV glass.



Perform the lockout/tagout procedure. Operator and service personnel should perform the lockout/tagout procedure before continuing with any other procedures.



Entanglement Hazard, Keep hands and other loose articles clear of moving parts or serious bodily injury could result.



Crush Hazard, keep hands and other loose articles clear of moving parts. Serious bodily injury could result.



Impact Hazard, Keep hands and other loose articles clear of moving parts or serious bodily injury could result.

### For more information

Please contact our Product Support Department in the USA at (603) 677-3111 (X4) if you have any questions about this manual, the H652 Printer, or other EFI products.

Please take the time to familiarize yourself with each section. This will help to reduce downtime and improve print quality. As a result you will be more efficient with operating and maintaining your H652 Printer.

Use the *My VIP Account* section of the EFI website to access additional information such as technical bulletins, instructions, manuals, parts information, and more. <http://rasteksupport.com/> Search functions built into the My VIP Account allow the user to search for a particular document or for all documents pertaining to an individual product.

### UV Ink and Solvent Precautions

Observe the following notes and precautions regarding the printer, ink, and related solvents:

- Un-cured UV inks and cleaning solvents are flammable.
- Un-cured UV inks and cleaning solvents can cause severe eye damage.
- Operator should not wear contact lenses when operating the printer with insufficient ventilation.
- Operator should wear safety glasses or face shield to protect against splashes and against UV light.
- Operator should wear Nitrile gloves when flushing print heads, ink tubes, or when working with ink containers.
- UV Inks and solvent odors can irritate the eyes, throat and skin.
- The yellow triangle caution symbol represents potential for personnel injury or damage to the printer.

### Storage of Combustible Materials

Inks should be clearly labeled and stored in an area designated for flammable liquids in accordance with local safety regulations. Ensure that one or more approved, fully operational fire extinguishers are available near the storage area. Selected safety personnel should be trained in using fire extinguishers and techniques for extinguishing chemical fires.

### Ventilation System

Proper ventilation - as described in the Site Preparation Specification - is required in the printer work area. Printer operators must monitor printer settings to ensure UV inks cure completely. Operators risk exposure to un-cured UV Ink and related odors if cure times are not accurately maintained.

Follow these precautions:

- The ventilation system must be on in the printer work area to ensure adequate air circulation.
- Store inks in proper cabinet designed for flammable liquid storage.
- Keep ink containers tightly closed at all times. If a container shows signs of damage or leakage

repair or replace the container immediately.

- Clean ink or solvent spillages as soon as possible.
- Only use dry powder or carbon dioxide type of fire extinguishers.

### **UV Lamps and UV Radiation Risks and Precautions**

When working near the UV lamps please observe the following precautions:

- Wear UV protection glasses when operating the printer.
- Avoid being too close to the UV lamps during printer operation.
- UV lamps must be off while completing maintenance tasks especially when working in close proximity to the UV lamps.

### **Fire or Explosion Risks and Precautions**

Open flame, heat energy, or sparks around the printer can trigger a fire or an explosion when excessive fumes are present. When working with flammable materials please observe the following precautions:

- Do not smoke near the printer work area or ink storage area.
- Do not allow open flame near the printer work area or ink storage area.
- Do not use heaters or halogen lights within five meters of the printer work area or ink storage area.
- Do not use spark producing equipment, including devices capable of static electrical discharge, within five meters of the printer work area or ink storage area.
- Proper use of fire extinguishers.

### **Risk of Eye and Skin Irritation**

When working with open containers of inks and solvents please observe the following precautions:

- When ink or solvent comes in contact with your skin, thoroughly **wash your skin at once** with cold water and designated soap(s).
- When ink or solvent comes in contact your eyes, thoroughly **wash your eyes at once** with cold water.
- Do not drink or swallow solvent, ink, or waste ink.
- Only authorized operators are allowed to handle inks, solvents, and related printing materials.
- Keep inks, solvents, waste inks, used shop rags, waste media, and other operating materials in covered fireproof containers.
- Place covered fireproof containers at least five meters away from the printer work area.
- Dispose of waste materials in accordance with local, state, province, or/and country government regulations.
- The presence of children or pets is forbidden at all times in or near the printer area.

## High Voltage Danger and Precautions

The H652 is safe to operate in normal operating configuration. However, with key protective covers opened or removed, electrical components carrying high voltage are exposed. The H652 carries high voltage that could cause serious injuries or death. Only **qualified service technicians** may service the H652 Electrical Systems.

When operating the H652 please observe the following precautions:

- Verify provisions for emergency power off **BEFORE** connecting the printer to main power supply.
- When printer power is ON, Do Not open any cover panel or touch any electrical components.
- All printer systems should be grounded in accordance with local electrical safety regulations per State, Province, Region, or Country codes. Ground voltage should be less than 3V.
- Set the printer on smooth ceramic tile or cement floor.
- Use specific anti-static floor mat to minimize risk of static build-up and discharge.

## Printing Media Handling and Precautions

The H652 is capable of using a wide variety of rigid media as well as roll-to-roll media.

Follow these precautions:

- Wear hand and foot safety protection gear when loading, unloading and handling media to avoid bodily injury.
- Use proper heavy-duty handling equipment if available.

## Electrical Facilities at the Customer's site

Please refer to the H650/H652 site preparation specification document.

## Chapter 3: Functional Description

Included in this chapter are brief descriptions of the H652 printer's many features and functions.

### The H652 Printer

EFI's Rastek H652 is an advanced hybrid digital printer designed for wide format, full color printing. The H652 can print using roll-to-roll media as well as rigid and flexible media types. The H652 uses environmentally-friendly UV-curable inks to ensure higher volume production and improved resolution over traditional silkscreen printing. See **Chapter 4**, for detailed operating instructions.

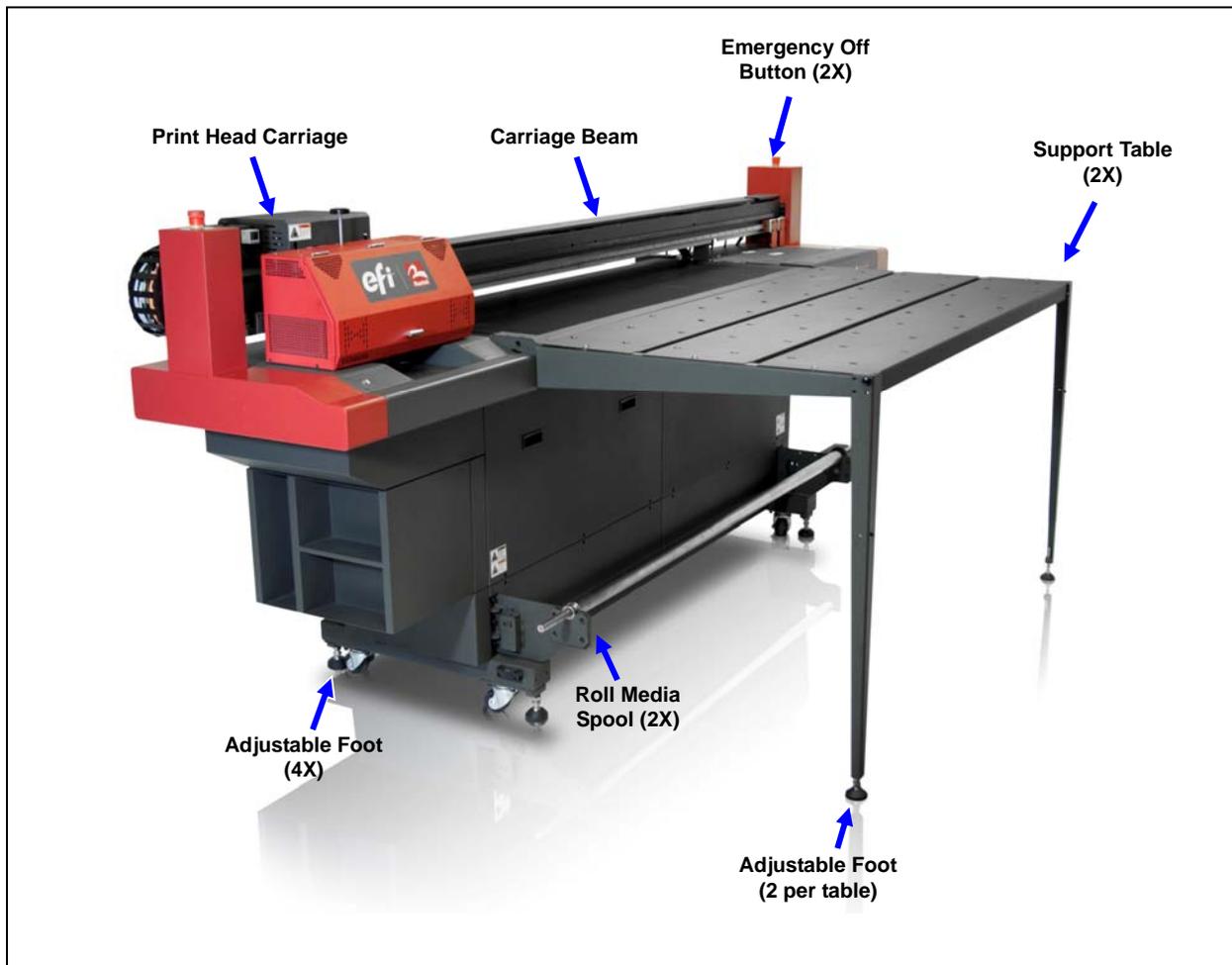


Figure 1 H652 General Features

### Physical specifications

|                 |  |
|-----------------|--|
| Printer Height  | 52 inches (132.08 cm)                          |
| Printer Width   | 121.5 inches (308.61 cm)                       |
| Printer Depth   | 40 inches (132.08 cm) without extension tables |
| Depth w/ tables | 94 inches (238.76 cm) with extension tables    |
| Printer Weight  | 1000 pounds (635.03 Kg)                        |

### Print media types

Media types include but are not limited to Foam Core, PVC, styrene, corrugated plastic, plywood, MDO, MDF, aluminum, plastic composite, cardboard, paper, acrylic and Plexiglas. Maximum media thickness is 1.8 inches (4.57 cm) and maximum media weight is 75 lbs. (34.02 kg).

### **UV lamps**

The H652 uses two dual-intensity UV lamps, which function to cure the UV inks. UV lamps can be configured via computer control to cure the inks at high intensity or low intensity. Computer controlled shutters are activated for leading and/or trailing lamp curing.

The useful life of a UV lamp is dependent on a few factors in the H652. UV lamps are similar to sodium vapor lamps in that they create light by heating a gas to very hot temperatures causing the gas to ionize and effectively “glow”. UV light is actually a very soft purple color or invisible, so the bright white light you see is actually not useful in curing the UV ink. Thus a UV lamp may still be producing bright white light and limited UV.

Some basic rules about the UV lamps:

- 1) Always start the UV lamps on HIGH Power and let warm on High for 2 minutes. UV output will not become stable until the lamps are at full temperature. Starting the lamps on low power will reduce their life.
- 2) The life of UV lamp is affected by the number of starts and the time spent on. The following rules apply
  - a. Each start (Strike) of the UV lamp in the H652 will reduce the lamp life by approximately 2 hours
  - b. Running the lamp on High power uses 1 minute of life for each minute the lamp is on High.
  - c. Running the lamp on Low poer uses 80% of 1 minute (0.8 minutes) of lamp life for each 1 minute of operation.
  - d. When the printer is idle for a period of up to 60 minutes between prints, it is recommended that the UV lamps be set to low power until they are needed again. However, **never** leave the UV lamps on if no personal will be around the printer!

Lamp life usage example:

If the UV lamps are started 5 times per day and run for 30 minutes (0.5 hours) each time, then the daily lamp life usage will be:

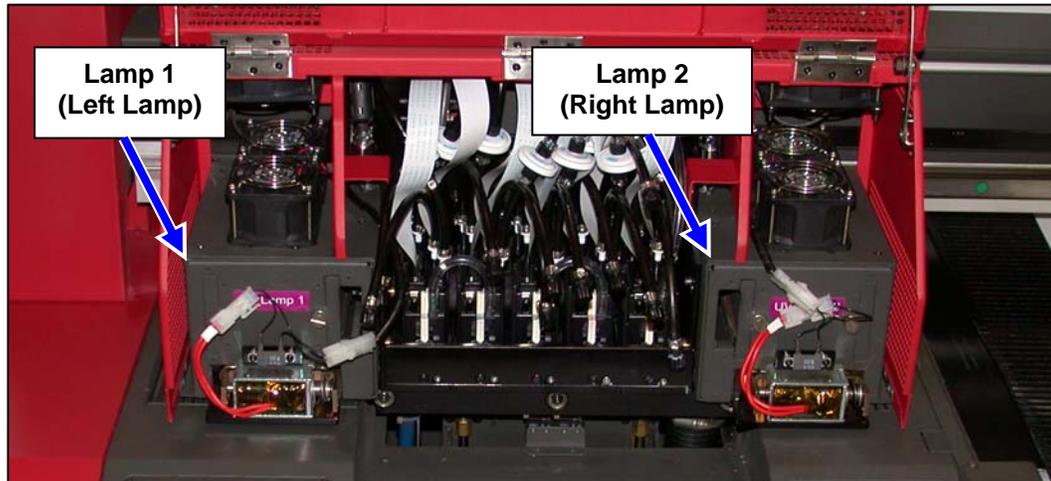
$$5 \times 2 \text{ hours} + 5 \times 0.5 \text{ hours} = 12.5 \text{ hours of lamp life}$$

In a 4 week period, using the lamps like in the example would result in using 250 hours of lamp life.

In a week this will result in the lamp using  $5 \times 12.5$  hours for a total of 62.5 hours per week.



H652 Print Head Carriage



H652 UV Lamps

Figure 2 H652 UV Lamps

### ***Carriage and Print Heads***

The H652 print head and carriage design incorporates five dual-row piezoelectric print heads, one for each process colors (CMYK) and one for printing with white. The H652 is designed for serviceability with its modular print head configuration. Each of the five print heads can be quickly and easily removed and replaced independently using standard hand tools.

During printing the print head carriage is cycled left and right via a servo-controlled motor and drive belt.

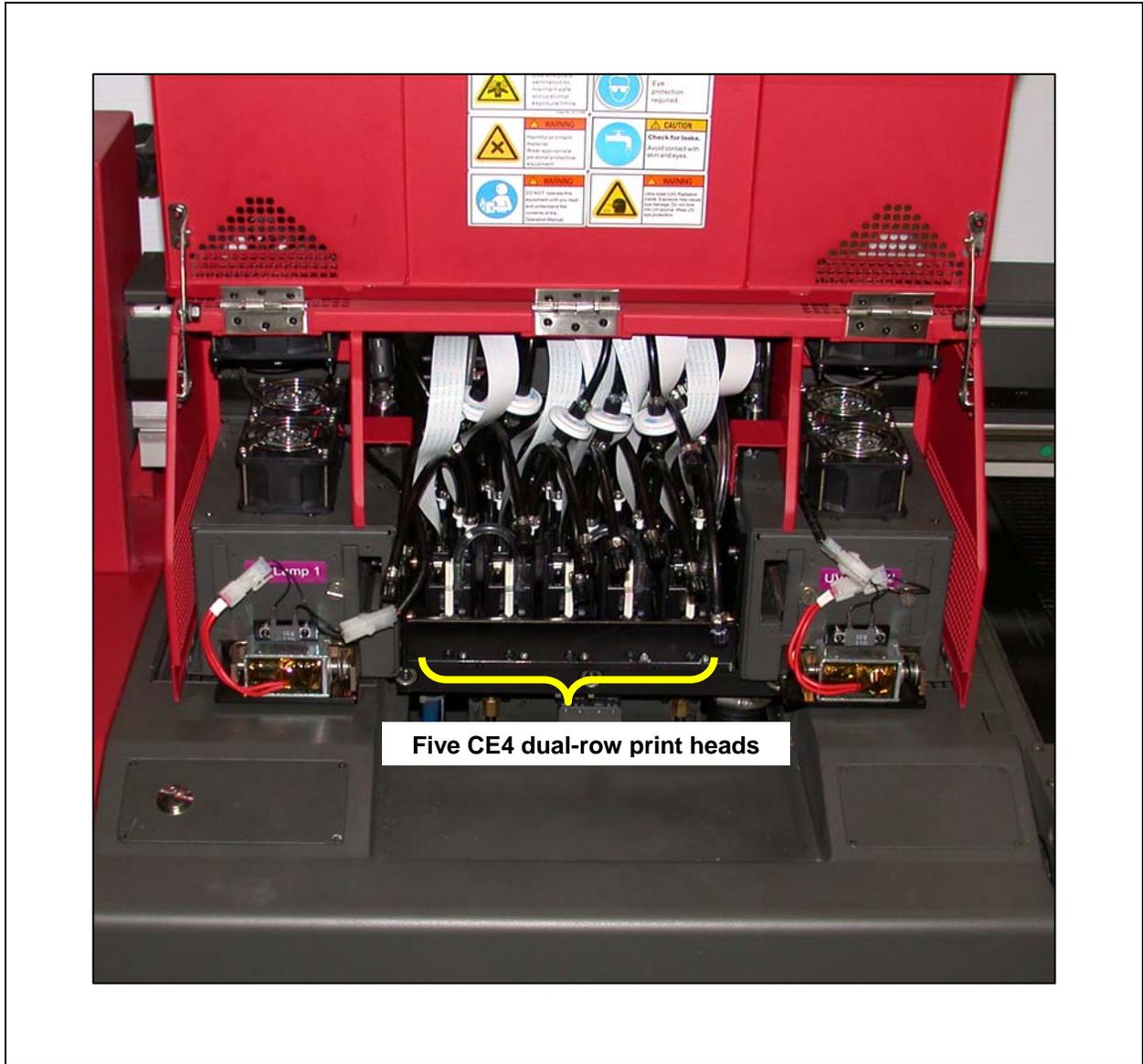


Figure 3 H652 Carriage and Dual-Row Print Heads

### Platen Vacuum System

The flatbed vacuum system provides gripping force to the print media for improved performance over traditional roll-to-roll printers. The vacuum platen system works especially well for rigid materials making the H652 a true hybrid printer. This system includes a high-power vacuum pump to hold rigid media during printing.

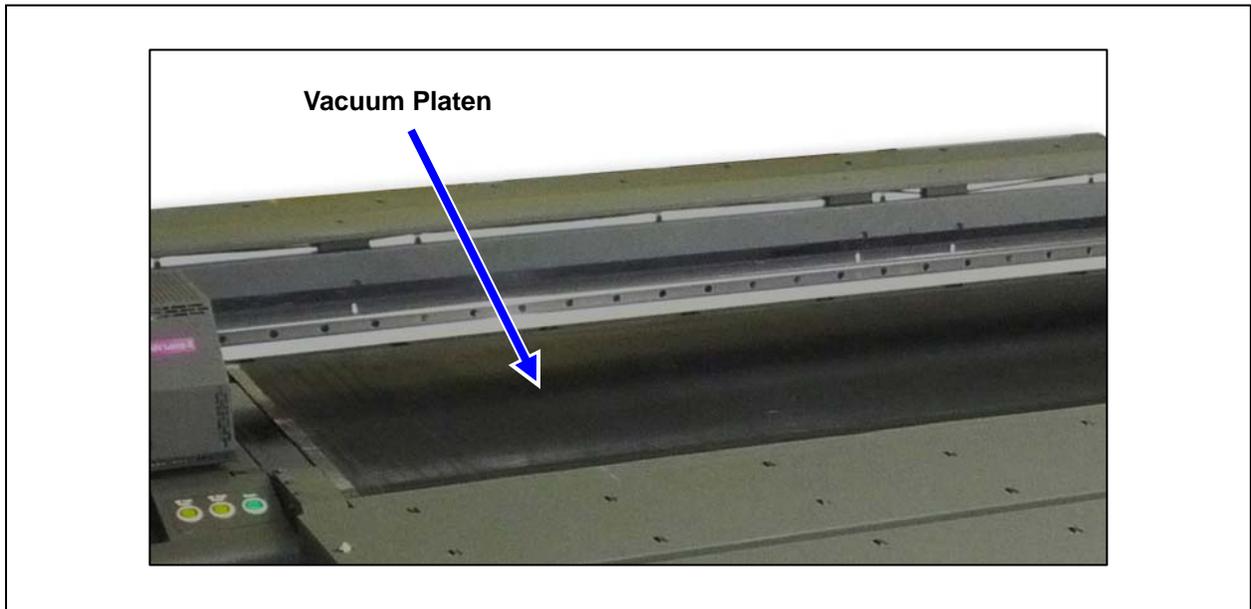


Figure 4 Platen Vacuum and Conveyor Belt

The vacuum platen grips the media with its four suction zones, selectable from 25% to 100% of the conveyor belt width. When standing at the front of printer, zone 1 is at the right. See Figure 5.

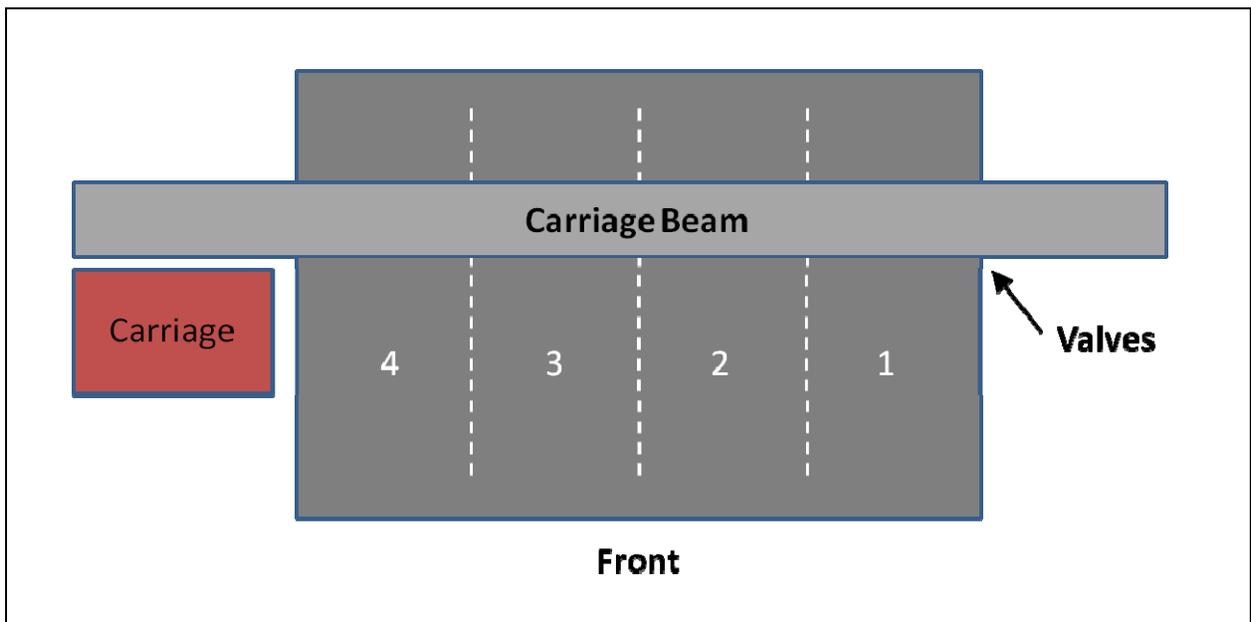


Figure 5 Platen Vacuum Suction Zones

The suction zones are selectable via a set of valves located on the lower right side of the machine below the carriage beam.

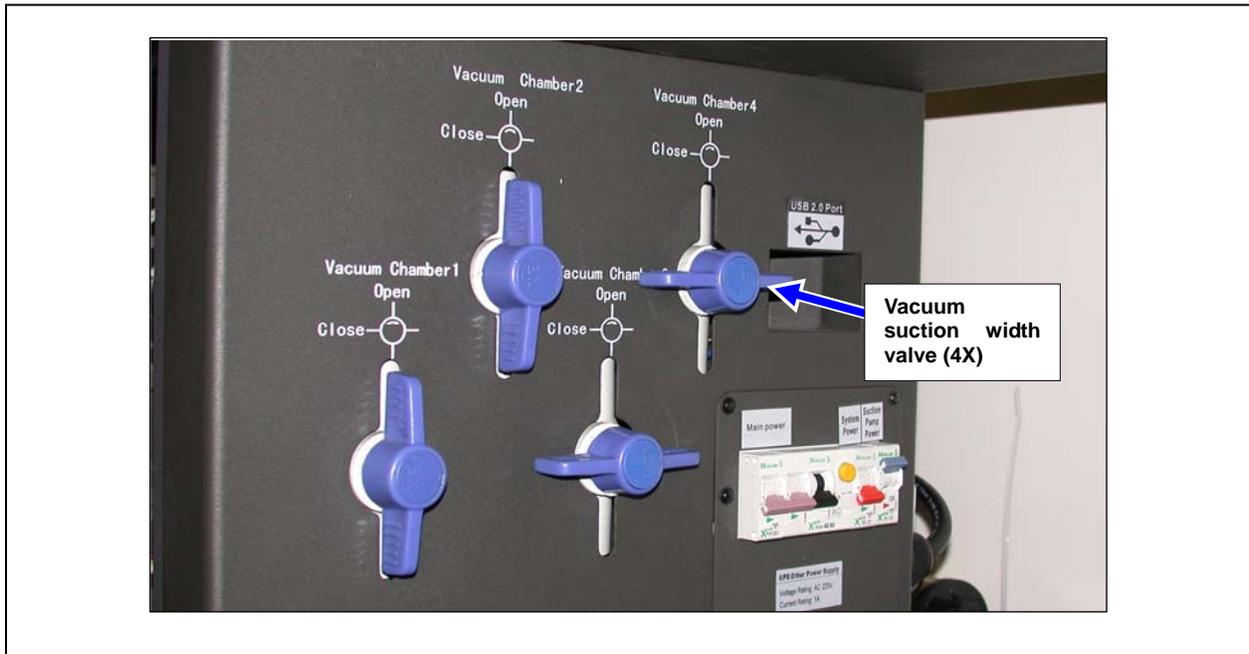


Figure 6 Platen Vacuum Suction Width Valves

The suction pump breaker must be on for the vacuum pump to operate. Turning the vacuum pump on and off during printing may be done with the provided footswitch. The footswitch has a reach of approximately eight feet from the printer to enhance placement options in the printing work area.

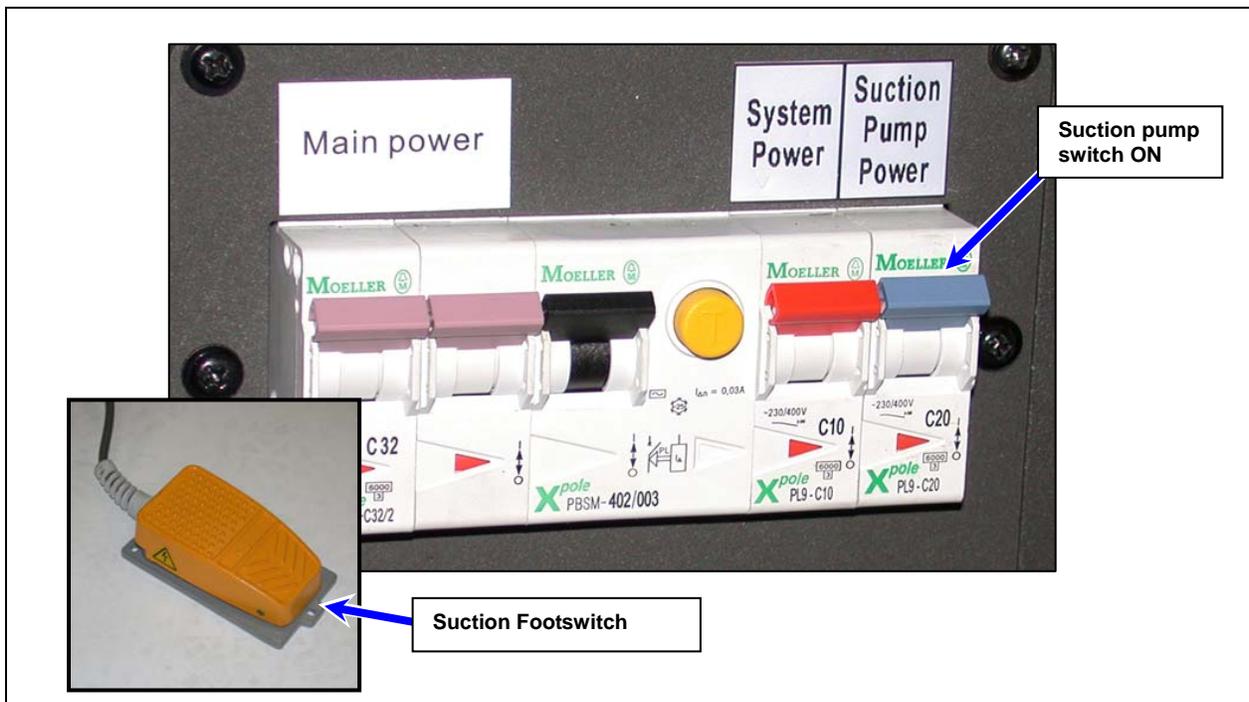


Figure 7 Suction Pump Power and Footswitch.

### Note

When printing with the H652 operators should take every precaution to prevent printing directly onto the vacuum conveyor belt. Any overprinted ink should be removed from the vacuum belt immediately to ensure the best possible printing quality and longest life for the vacuum conveyor belt.

### Overview of Ink Delivery System

Ink is pumped from a one-liter supply bottle, through a five-micron filter, and into the working reservoir. The reservoir level is monitored by a sensor inside the reservoir which ultimately triggers the ink pump to replenish and maintain working ink level which varies only two mm from ink low to ink full. From the reservoir the ink passes through an additional disk filter – called the last chance filter – to further purify the ink. Ink is finally delivered to the print heads by the force of gravity alone. Ink is not pumped through the print heads during printing. However, ink *is* pumped through the print heads during an ink purge. See **Figure 8**. When the ink low alarm sounds, a new bottle of ink must be installed. To avoid air bubbles in an ink supply line, do not allow any of the ink supply bottles to run completely dry.

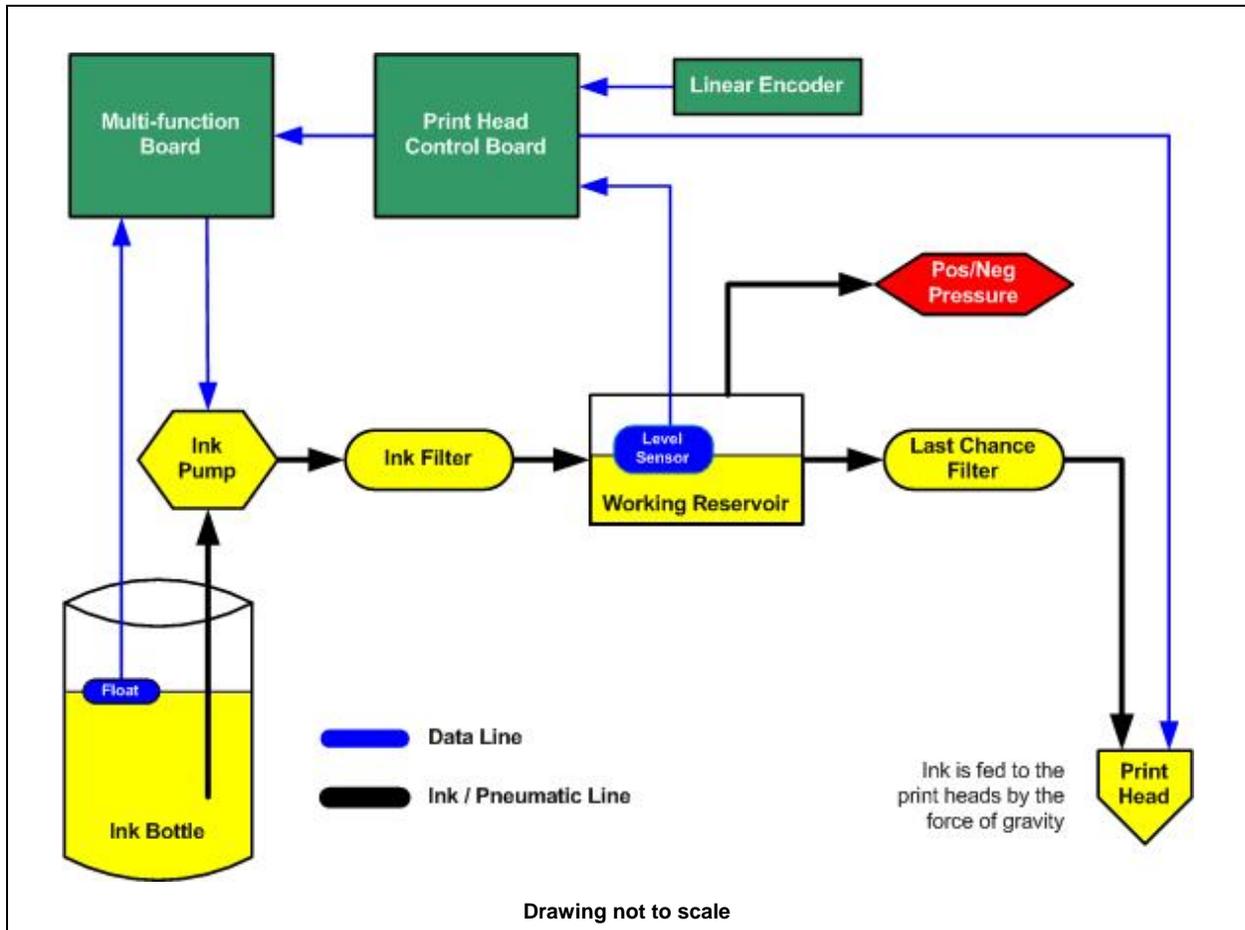


Figure 8 H652 Ink Delivery System Flow Diagram

The flow of ink to the print heads must never be interrupted during a print run. Ink levels in the supply bottles can be monitored visually as well as by the alarm system. When ink low alarm is sounded, using the visual display on the GUI determine which bottle to change. Follow the ink supply bottle changing procedure located later in the manual.



### Caution

**Never** refill an empty ink bottle. Use **only** a brand new bottle of ink when replenishing the Ink Supply System of the H652

**DO NOT** pour anything into a brand new bottle of ink. Dispose of the old bottle and its remaining contents according to local environmental guidelines. **Never** discard of ink or related chemical waste in a common trash receptacle.



Figure 9 Ink Supply Bottles and Tray

One-liter ink supply bottles are arranged in dedicated bays and connected directly to their respective ink lines and pumps. Ink bay design allows for easy access for removing and replacing the ink supply bottles.

The ink management bay is located at the top-right area of the H652 and houses the separate ink line filters and pumps. The ink management bay includes an ink alarm and houses the positive / negative pressure pump. **Figure 10** provides a brief description of the ink management bay components.

To access the Ink Management bay Loosen four thumb-screws and remove the access panel to expose the ink management bay.

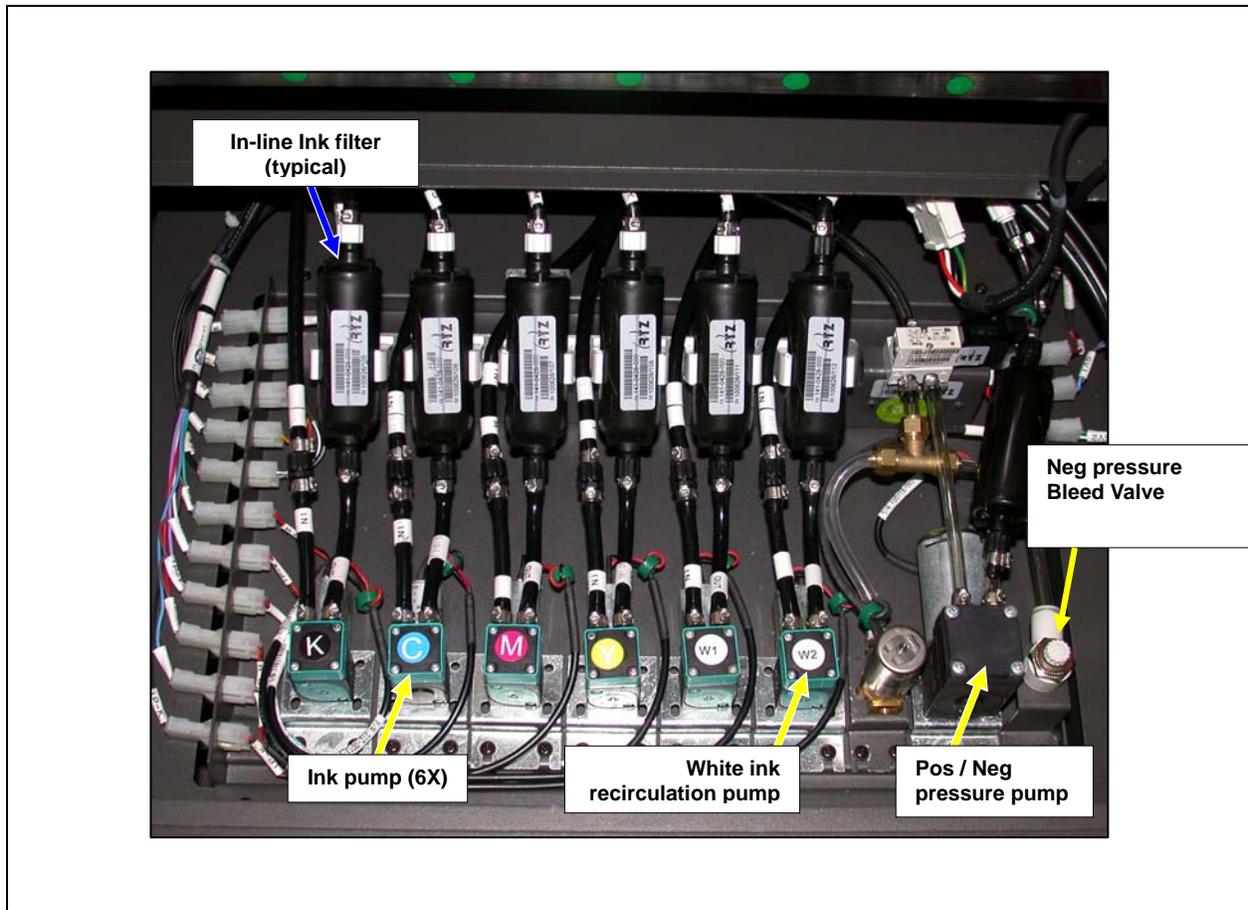


Figure 10 Ink Management Bay

#### In-line ink Filters:

The filters provide a first line of defense to prevent contaminants from flowing into the print heads.

#### Ink pump:

Each color of ink has a dedicated ink pump to flow ink from the supply bottle to the print head.

#### White recirculation pump:

This system circulates the ink in the white bottle to prevent suspended molecules in the ink from settling to the bottom. White ink is continuously circulated via the white recirculation pump to ensure the best printing quality. The white ink recirculation pump cycles on and off at regular intervals when the printer is on or when the printer is on auxiliary power.

#### Positive / negative pressure pump:

This dual function pump provides a slight backwards draw on the ink system to prevent ink from dripping from the print nozzles. In addition the pressure pump provides the positive pressure necessary during an ink purge.

Additional ink management system components, shown in **Figure 11**, are located at the top, right area of the H652. Following is a brief description of ink control system components shown in **Figure 11**.

### Multi-Function Board:

The Multi-Function Board is the master controller for the ink supply system. The Multi-Function board and print head control board work in tandem to manage the flow of ink from the supply bottles, to the print heads, and finally onto the print media. The Multifunction Board manages the following subsystems. See **Figure 11**.

- Negative pressure control
- Ink pumps - ink fill
- Ink overflow - and error conditions
- Ink bottle sensors
- Maintenance station
- Carriage limit switches
- UV power level control
- UV error conditions

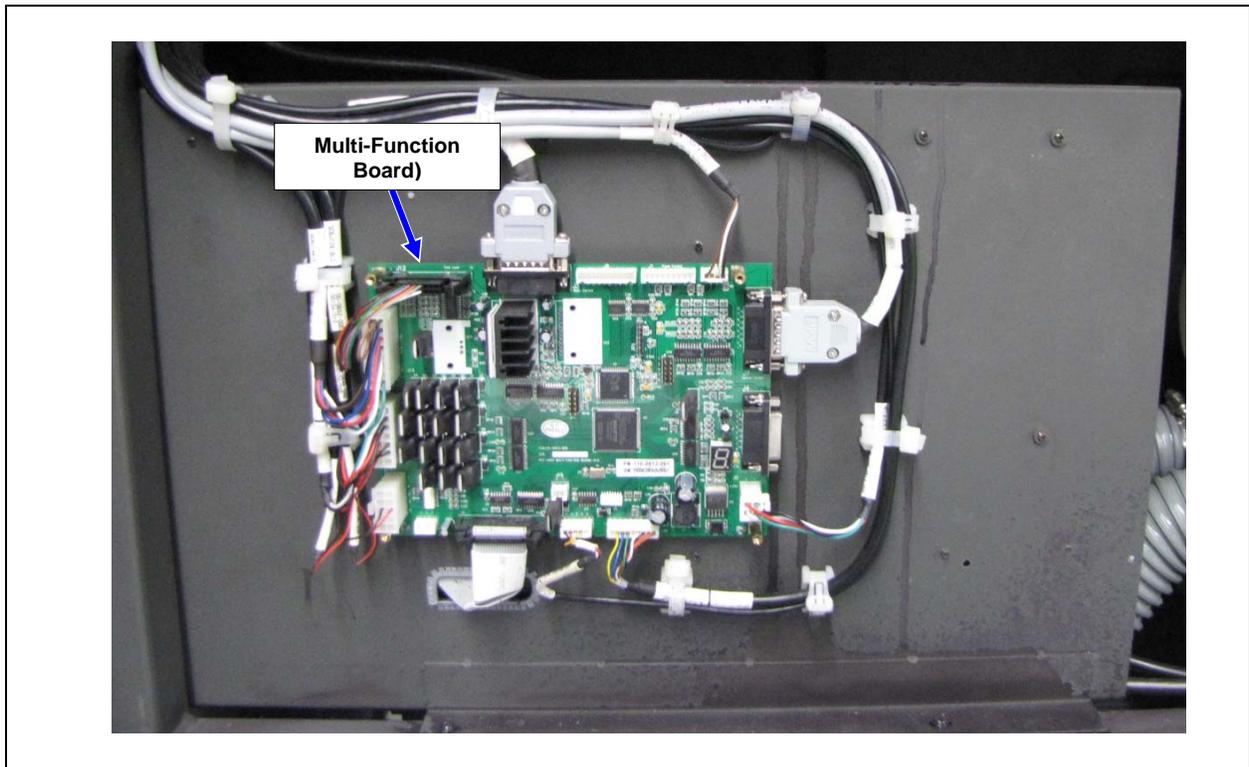


Figure 11 Ink Control System Components

### Negative Pressure / Pressure System

The H652 is equipped with a computer controlled pulsed negative pressure system that automatically adjusts the negative pressure. The negative pressure setting is located on the Parameters System Tab and should be set to -2.4 kPa. Negative pressure is set by a fields service technician and printer operators should not need to modify this setting.

#### Note

Altitude may affect the required negative pressure setting. Altitudes over 2000 ft (610 meters) may need the target setting to be lowered to -2.3 kPa to -2.1 kPa. The field service technician installing the machine should determine what works best for the machine and advice the user.

The air pump is locate in the pump bay which can be accessed from the top right of the printer. The air pump shown in **Figure 12**, provides both negative pressure (vacuum) and positive pressure.

**Figure 12** calls out the negative pressure bleed valve for reference only. The valve was adjusted during installation and should not require additional adjustments by the customer. See also **Chapter 4: How to Operate the H652** for detailed instructions on purging ink from the print heads.

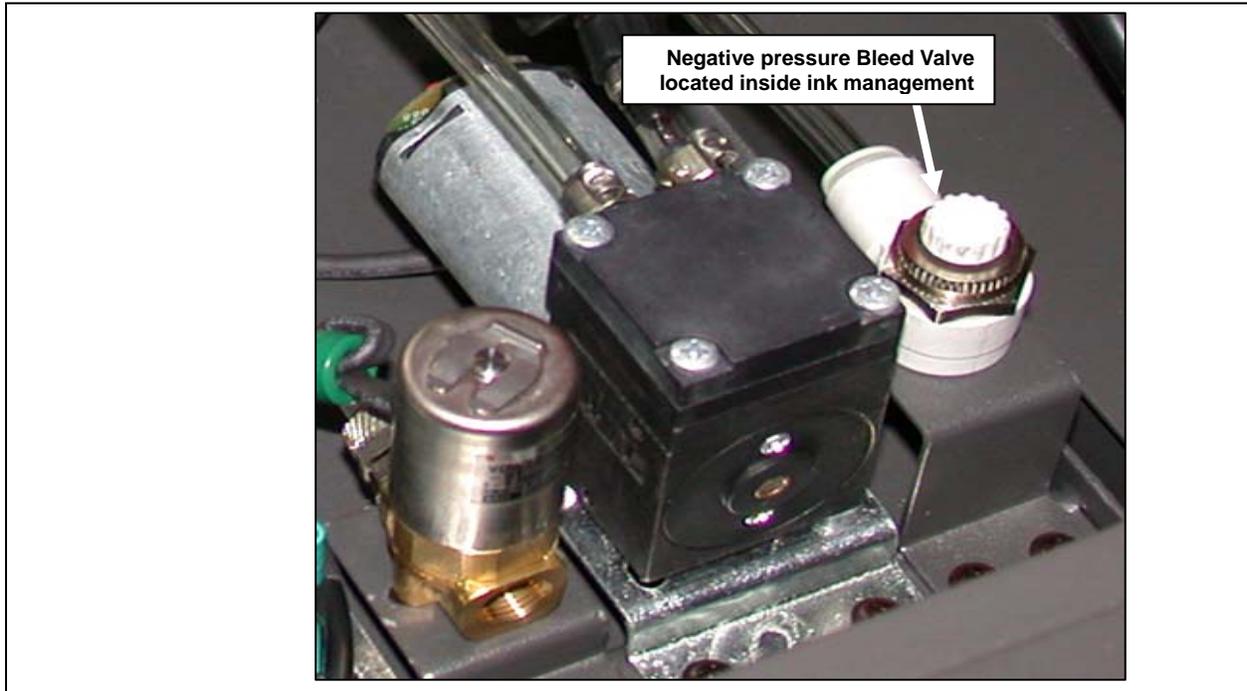


Figure 12 **Negative Pressure bleed Adjustment and Ink Purge Button**

When the **Ink Purge** button is pressed, the airflow is reversed to force ink from the print nozzles. The maximum positive pressure value is 15 kPa.

#### Note

When the printer is sitting idle, the air pump should run for about 0.5 seconds every 12 seconds. If the air pump is running more often while idle, either the negative pressure bleed valve is set incorrectly, or there may be a leak in the air/ink system. Should this happen, please contact support to determine the correct course of action.

### Pressure / Negative Pressure Shut-off Valves

The Shut-off valves are located on top of the print head carriage. When the pressure valves are open, as shown in **Figure 13**, a small negative pressure is present in the ink system to prevent ink from dripping from the nozzles.

When the **CMYK** and **W** pressure valves are closed, as show in **Figure 13**, there is no positive or negative pressure applied to the working tanks.

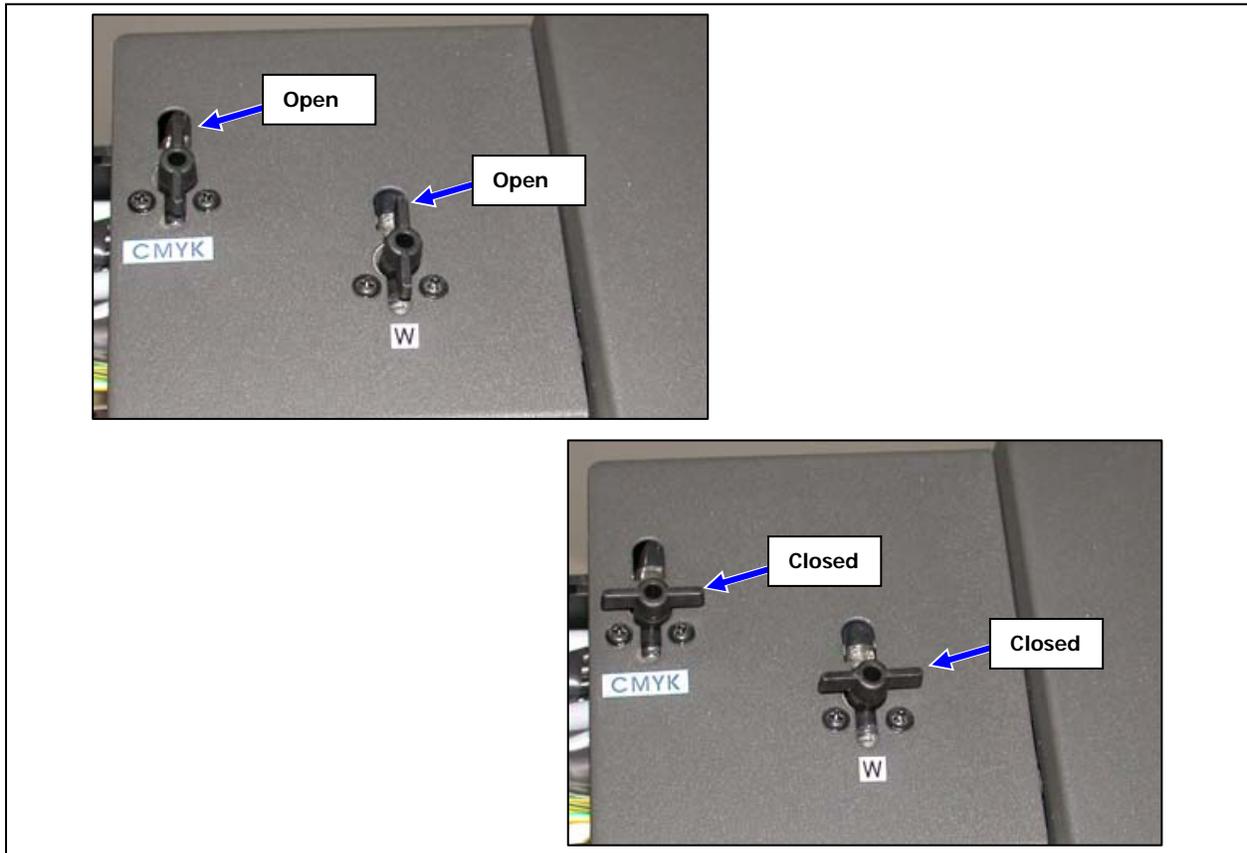


Figure 13 Pressure / Negative Pressure Shut-off Valves

The pressure valves must remain open at all times during normal printer operation. They may be turned off during maintenance procedures, service operation, or power outages.

**Power Breaker Panel**

The H652 electrical breaker panel is located at the lower right side of the printer as you are standing in front of the printer. See **Figure 14**.

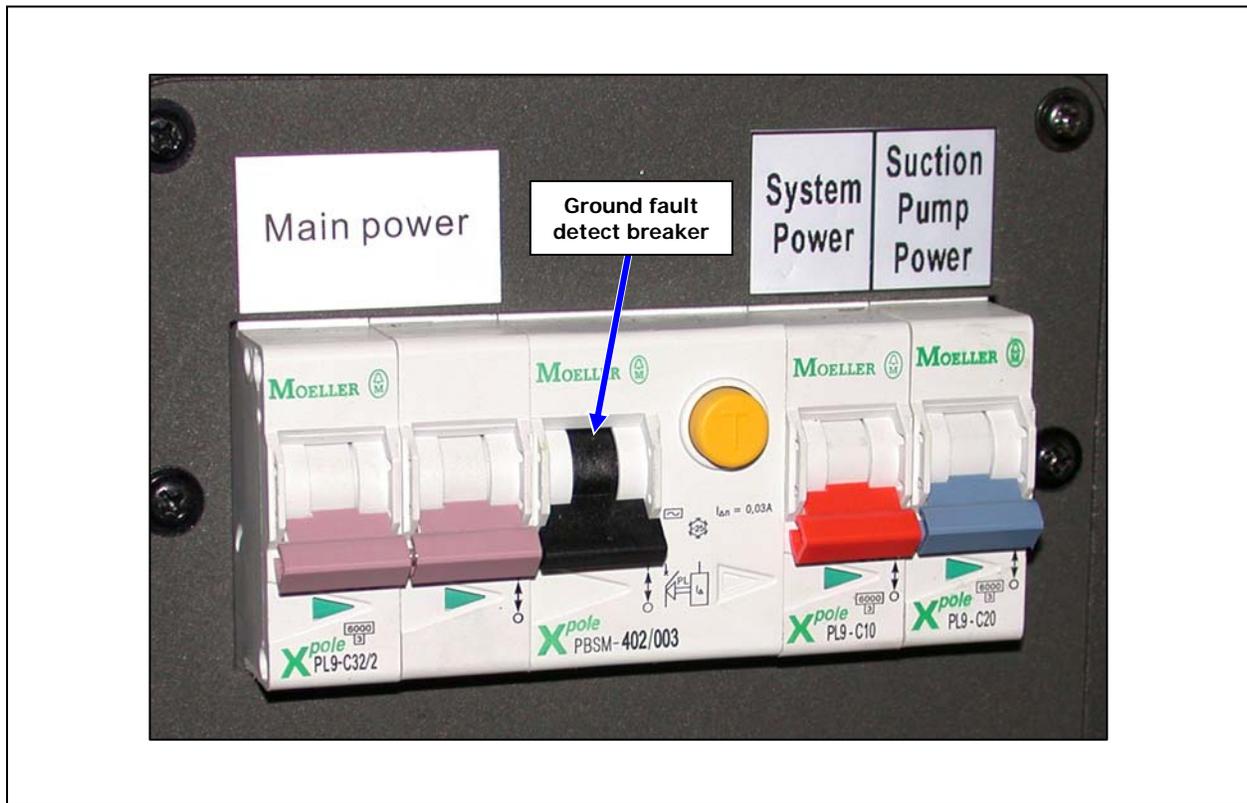


Figure 14 **Breakers and Switches – Printer Off**

The individual breakers and switches of the power breaker panel are explained in **Table 2**.

| Table 2: Breaker and Switch Identifier |                   |  |
|--|-------------------|--|
| Sequence                               | Description       | Function   |
| 2                                      | Purple: Breakers  | Two Main Power breakers are joined to make up one 25A breaker. Allows power to the Red switch and the Blue switch. Also allows power to the UV power supply.   |
| 1                                      | Black: Breaker    | Ground Fault Detect Breaker which allows house power to enter the machine. This breaker should always be thrown first. The purple breakers will not energize or stay on if the black breaker is off. |
| As needed                              | Amber: "T" Button | Ground fault test button. Pressing this button will cause the Black breaker to trip, subsequently causing the Purple breakers to trip.   |
| 3                                      | Red: Switch       | Allows power to the all electronics in the printer <i>except</i> the UV power supply which is on the two purple breakers.  |
| 4                                      | Blue: Switch      | Allows power to the vacuum pump, which in turn, provides suction to the vacuum conveyor belt.  |

### **Power Start Button**

The H652 Power Start button is located beneath the right-front corner of the printer. See **Figure 15**. This out-of-the-way location was chosen to prevent unintentionally powering on the H652.



Figure 15 **Power Start Button Location**

### **Emergency Stop Buttons**

The H652 has two emergency stop buttons, located at either end of the carriage beam. See **Figure 16**.

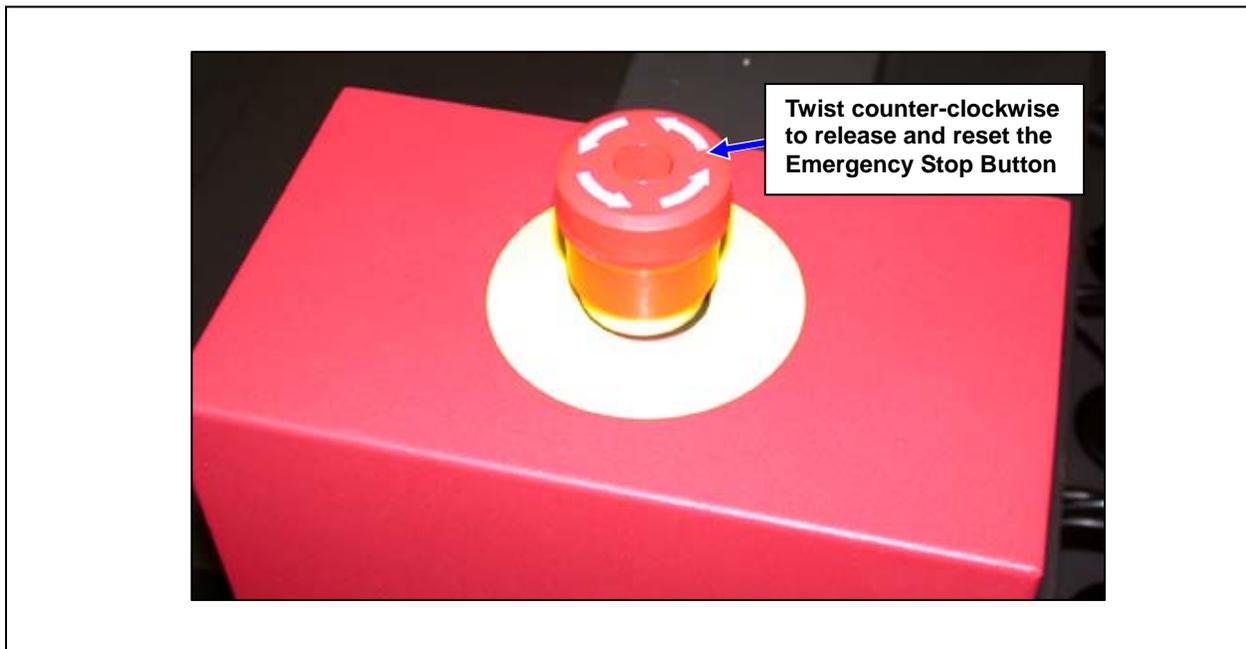


Figure 16 **Emergency Stop Button Location (2X)**

### Printed Circuit Boards

The simplified H652 design uses just three printed circuit boards; USB Board, the Print Head Control Board, and Multi-Function Board.

The **USB Board** controls the image data and handles all the serial command and control information via a USB 2.0 cable connection. The USB board controls the X and Y servos.

The **Print Head Control Board** manages data to and from the print heads, the encoder reader, and tracks ink fill / ink overflow functions. The PHCB includes a programmable DC power supply board which provides the dual-row heads with the required waveform voltage

The **Multi-Function Board** The Multi-Function Board is the master controller for the ink supply system. The Multi-Function board and print head control board work in tandem to manage the flow of ink from the supply bottles, to the print heads. See also **Figure 11** above.

Printed circuit boards are not customer serviceable PCBs are to be handled by trained field service technicians only. . Please call Rastek technical support to address any issues with your H652 electronics system.

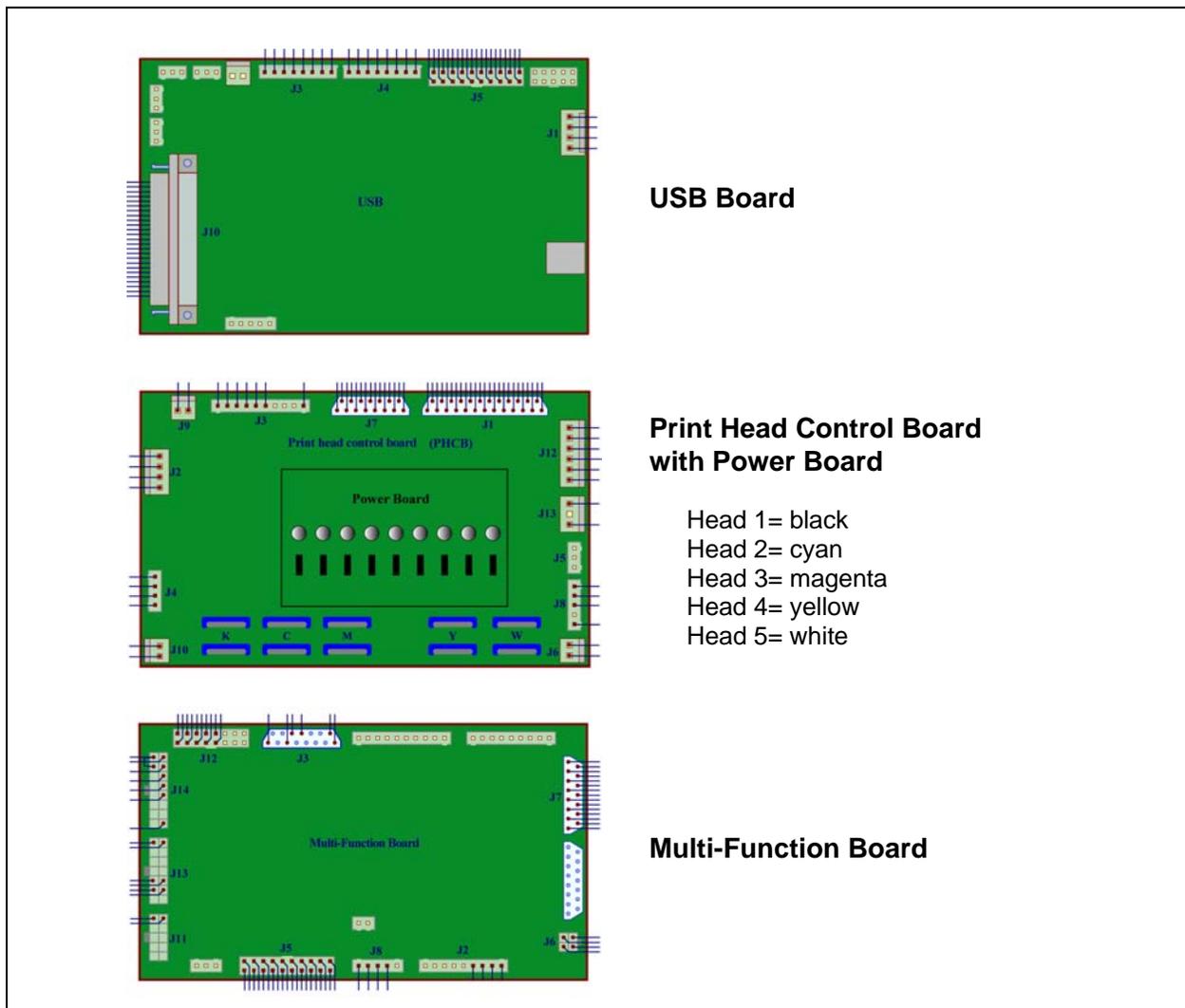


Figure 17 H652 Main Printed Circuit Boards

---

### **Print Control Computer**

The H652 is shipped with a Windows-based desktop computer which is used to run the H652.printer. The computer is equipped with Microsoft Windows operating system (OS), a flat-panel display, a full-size keyboard, a two-button wheel-mouse, and a high quality USB cable.

### **Printer Software**

The H652 control computer runs three levels of software

#### **XF/ Onyx RIP Application/Server**

This level of software provides the user to manipulate the raw image and prepare it for printing. Both RIPs use a modular software approach and thus require several of these modules to be installed.

#### **Control Application – Middleware**

This small “wrapper” program provides the interface between the RIP Server and the printer driver.

### **Printer Firmware Driver**

The H652 uses proprietary printer firmware to control the internal communications and functions of the printer. Operator access to printer controls is via the **Test/ Parameters** program.



### **Caution**

*Operators should not attempt to upgrade the H652 firmware without detailed prior instructions. Please contact field service for up-to-date information and instructions regarding firmware.*

### **RIP Software**

The H652 is configured with either Onyx RIP Software or EFI's Fiery RIP Software. Please refer to Onyx OEM Documentation or EFI's Fiery RIP OEM Documentation for additional information on these two software packages.

### **Printing Perquisites**

The service technician who installed your H652 briefly trained you on operating the H652. In **Chapter 4: How to operate the H652**, we explain setting up the H652 for running a print job. The concepts presented in **Chapter 4** are intended as a refresher rather than an introduction of all new material. Listed below are the current printing parameters for running your H652 with efi | Rastek 250C inks. Please check to ensure all printing perquisites have been met before continuing with **Chapter 4**.

### **Print Head Temperatures**

The H652 printer uses heads which require a flow of heated/cooled fluid running through them to maintain the printheads at the desired printing temperature. Since the printer will operate over a large range of room temperatures, the target fluid temperature may need to be adjusted. The automatic heating/cooling system will attempt to maintain the print heads in the optimal printing temperature range.

Idle Print Head Temperature:

36.5C to 38C

Printing Head Temperatures

38C to 40C – Optimal\

38C to 44C -- Maximum

### ***Heated Fluid Temperature***

The nominal target for the fluid temperature range is 36°C to 38°C. When the proper water temperature target is set, the printer will maintain the print heads within the ideal temperature range. Idle temperature is defined as the carriage has been sitting at the maintenance station for a period of 5 to 10 minutes. This idle time is necessary to allow the heating/cooling system to stabilize the heads back to idle temperature.

#### **Note**

It is not necessary to let the printer sit idle between jobs as long as the head printing temperatures stay within the printing range.

### ***Negative Pressure Range***

Negative pressure was set -2.4 kPa during printer installation. Negative pressure level is software controlled and under normal operating circumstances, should not need to be monitored or adjusted.

See above for details

---

## Chapter 4: H652 Printer Operations

**Chapter 4** provides detailed information for trained operators to setup and run the H652 including testing to ensure the printer is in perfect working order.

### Note

A “Quick Start” operations guide is provided in Appendix A.

The content of Chapter 4 is organized to follow a specific work flow.

There are 6 basic conditions from which the printer will need to be started:

- 1) Normal “morning startup”
- 2) “Cold start/ Warm start”
- 3) E-Stop Condition
- 4) Power outage
- 5) Short term storage (no operation up to 1 week)
- 6) Long term storage (No operation for longer than 1 week)

Each of the startup conditions is dependent on the previous condition of the printer. Below are the conditions that the printer may be left in during non use time.

- 1) Night time “sleep”
- 2) Printer powered off
- 3) Emergency stop pressed
- 4) A power outage occurred
- 5) Short term storage
- 6) Long term storage

### **Night time sleep and morning start-up:**

At completion of the day’s work, the following process should be followed”

- 1) Turn off the UV ;lamps and allow to cool
- 2) Turn off the Media Suction Blower
- 3) Optional – Turn off computer monitor, **but leave the computer running**
- 4) Leave the printer powered ON – **Do not turn off the power**

In the morning simply do the following:

- 1) Turn on the computer monitor if it was turned off
- 2) Turn on the UV lamps on HIGH Power and let warm for 2 minutes
- 3) Perform a 3 second to 5 second purge, longer purges are usually not necessary
- 4) Sweep the heads using the sweep icon on the test strip GUI

- 5) Load scrap media and perform a nozzle check.
  - a. If the nozzle check is not normal, then perform a 5second to 10 second purge
  - b. Perform a sweep on the heads
  - c. Perform a nozzle check
  - d. If the nozzle check is not normal, then the heads may need additional cleaning. See the section on cleaning the heads

**Power off and cold/warm start – short time**

It may be necessary to power off the printer for short periods of time to perform some necessary maintenance.

**Note**

**Power off the printer only when absolutely necessary.**

To power off the printer follow this procedure:

- 1) Turn off the UV lamps and allow to cool for approximately 2 minutes
- 2) Turn off the media suction blower using the switch located on the back side of the printer.
- 3) Make sure the computer printer GUI has been closed.
- 4) If the printer will be powered off for more than 60 seconds, turn off both the CMYK and W black air valves located on the top left hand side of the carriage. This will prevent the ink from dripping from the heads while power is off. Note that if power is left off for longer periods of time, bring up will take additional steps.
- 5) Turn of the system power using the switch on the back side of the printer.
- 6) Trip the dual breaker on the back side of the printer.
- 7) The printer is now turned off.
- 8) Optional: Turn off the computer and monitor or restart the computer depending on the need.

To reboot the printer and computer perform the following:

- 1) Computer and monitor
  - a. If the computer and monitor has been turned off, turn on the monitor and then the computer
  - b. If the computer has been restarted, allow the computer to fully reboot before moving to the next step.
- 2) Make sure the printer top is clear of all items and that all personal is aware that you are starting the printer.
- 3) Check the E-stops to make sure they are not engaged. If they are release the E-stop(s)
- 4) Turn on the Main printer breaker located on the back side of the printer
- 5) Turn on the system power switch located on the back side of the printer

- 6) Press the large GREEN button located under the “right side” of the printer to engage the safety relay. This will energize the printer.
- 7) If the air CMYK and W valves were previously turned off, turn the black air valves to the “ON” position. Note if the printer has been turned off for more than a few minutes, the print heads might need to have the air bled. See the section on how to bleed the print heads.
- 8) To check that the computer has communications with the printer, open the test strip in the GUI.
  - a. Move the carriage to the right by clicking the right blue arrow located near the left side of the test strip window.
  - b. Return the carriage to the home position by pressing the left blue arrow located near the left side of the test strip window.
  - c. Check that the head temperatures are rising towards the desired idle head temperatures of 36.5C to 38C.
- 9) Perform a purge on the heads
  - a. If the printer has been shut off for less than 2 minutes, perform a 3s to 5s purge
  - b. If the printer has been shut off for more than 2 minutes, it is recommended that a 10 second purge be used.
- 10) Sweep the heads
- 11) The printer is ready to perform a nozzle check print.
- 12) Remember to turn the media suction switch back on when it is needed.

### **E-Stop Condition and Reboot**

Emergency stops are provided at each end of the H652 printer. These should be used only when there is an emergency condition. E-Stops should not be used to shut off the machine under normal conditions.

To activate an E-Stop, simply press the either red knob firmly down which will shut off power to all the printer systems.

- 1) Once the E-Stop is pressed, take care of the condition causing the emergency.
- 2) Shut off the Suction and System Switches
- 3) Shut off the main breaker
- 4) Close the CMYK and W air valves
- 5) If the computer GUI was active or the printer was printing when the E-Stop was pressed, it may be necessary to shut down or reboot the computer.

To restart the printer after a E-Stop perform the following:

- 1) Take care of the condition for the emergency
- 2) If needed, reboot the computer and turn on the monitor
- 3) Make sure the “Printer Application has restarted.
- 4) Check each E-Stop and release if engaged. To release an E-Stop press down and rotate counter clockwise. Release the downward pressure and let the red knob spring up.
- 5) Once the printer is cleared and if need be repaired, turn on the printer main breaker

- 6) Turn on the system switch
- 7) After making sure everyone is clear of the printer mechanics, press the green button located on the front right underside to activate the printer.
- 8) Open the CMYK and W air valves located on the carriage
- 9) On the computer, open the printer GUI to the “Test Strip” window.
  - a. Move the carriage to the right; away from the maintenance station
  - b. Move the carriage back to the left, returning it to the “Home” position
  - c. Check that the head temperature are either at temperature, or are climbing towards the correct “idle head temperature”
- 10) Purge the heads for 5 to 10 seconds
- 11) If the printer was not off for more than 5 minutes, skip this step
  - a. Bleed the CMYK heads
  - b. Bleed the W head
  - c. Purge the heads for 3s to 5s
- 12) Sweep the heads
- 13) Load test media
  - a. Turn on Media Suction Switch
  - b. Load and gap the media properly
  - c. Perform a Nozzle check

**Power Outages:**

If power outages occur frequently where the printer is installed, it is advisable to install a UPS system. The UPS system must be installed on the main power for the printer and therefore must be cable of providing 205VAC to 235VAC, 20Amps, 50/60Hz for a period of time.

Power outages may occur at any time:

- 1) During printing
- 2) During printer idle with an operator around
- 3) During a time when the printer is unattended

If the power goes out during printing perform the following:

- 1) Turn the CMYK and W air valves to the off position
- 2) Replace the carriage back over the maintenance station, making sure that the carriage is positioned properly at the carriage home position
- 3) Turn off the Suction switch, the system switch and the printer main breaker.

If the power goes out while the printer is idle and there is an operator around perform the following:

- 1) Turn off both the CMYK and W air valves
- 2) Turn off the Suction Switch, the system switch, and the printer main breaker

If the power goes out when the printer is idle, but no one is around, the printer may drip some ink into the maintenance tray. Should the power come back on during the night, the printer will reboot but remain in the idle position. When an operator returns, if the power is still out, follow the procedure for power out with an operator present.

To return the printer to full operation after a power outage, perform the following:

- 1) If the power outage occurred while an operator was present and the power outage only was for a short time then:
  - a. Reboot the computer
  - b. Turn on the printer main circuit breaker
  - c. Turn on the system power switch
  - d. Purge the heads for 3s to 5 seconds
  - e. Sweep the heads
  - f. Properly load the media and properly gap the carriage
  - g. Perform a nozzle check and inspect
- 2) If the power outage occurred while an operator was present but the outage was for more than 30 minutes, the perform the following:
  - a. Reboot the computer
  - b. Turn on the printer main circuit breaker
  - c. Turn on the system power switch
  - d. Purge the heads for 5 to 10 seconds
  - e. If the ink has drained out of the heads during the power outage, it will be necessary to bleed the heads of air. Follow the head bleeding procedure for each color.
  - f. After completing the bleed procedure, purge the heads for 3 to 5 seconds
  - g. Sweep the heads
  - h. Properly load the media, and properly gap the carriage
  - i. Perform a nozzle check.
- 3) If the power outage occurred while no operator was present and the air valves were not closed, ink will have drained from the heads. Follow the procedure below:
  - a. Reboot the computer
  - b. Turn on the printer main circuit breaker
  - c. Turn on the system power switch
  - d. Purge the heads for 5 to 10 seconds
  - e. Purge the heads again for 5 to 10 seconds and check that ink is dripping out of all the heads
  - f. Since the ink will have drained out of the heads during the power outage, it will be necessary to bleed the heads of air. Follow the head bleeding procedure for each color.
  - g. After completing the bleed procedure, purge the heads for 3 to 5 seconds
  - h. Sweep the heads
  - i. Properly load the media, and properly gap the carriage
  - j. Perform a nozzle check.

## Short and Long-term printer storage:

For both short term and long term printer storage, please contact service support for the proper procedures.

## Printer Software

The H652 comes with PC using a Windows Operating System. This computer runs 3 levels of software which controls the H652 printer. Instructions in this chapter will focus on the Fiery XF RIP

- 1) At the top level is the RIP. The H652 supports both the efi Fiery XF RIP or the Onyx Postershop or Productionhouse RIP.
- 2) A middle ware control application provides a connection between the RIP software and the H652 printer driver
- 3) The H652 printer driver which converts the data into printer understandable form, and controls the printer.

## Launching Fiery FX Control Application

The control application should automatically start when Windows starts, but if it does not, launch the Control program by double clicking on the short cut which should be located on the desktop. To access the Fiery FX printer control software, right-click the printer icon located in the quick launch tray at the lower right of your monitor. When the printer control software is idle a vanilla colored icon shows. See **Figure 18**.

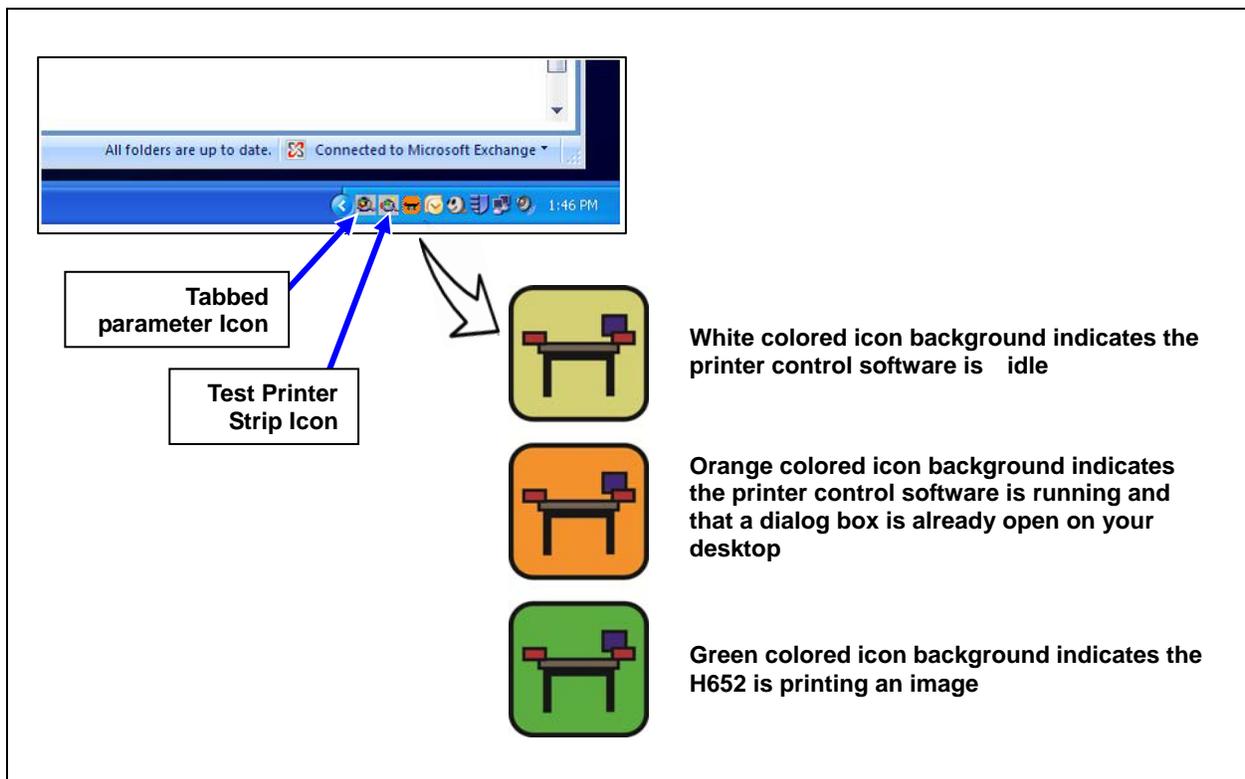


Figure 18 Printer Control Software Icon

Fiery works in conjunction with H652 Graphic User Interface (GUI)/ printer driver to operate the H652. Before you begin making any adjustments to the array of printer settings, let's take a closer look at the features and functions of the GUI.

By right-clicking the Control Application icon, the operator can access the following control items:

- Set Parameter – Rastek H652

- Test Printer – Rastek H652

- UV Lamp Control

  - UV lamp Off

  - UV Lamp Low Power

    - Off

      - Turns both UV lamps off

    - UV lamp power Low

      - Turns both UV lamps to Low power

    - UV Lamp High Power

      - Turns both UV lamps to High power

      - Autostart this control (If checked, this will autostart the control application when Windows starts.

    - Exit

### Control Icon Menu

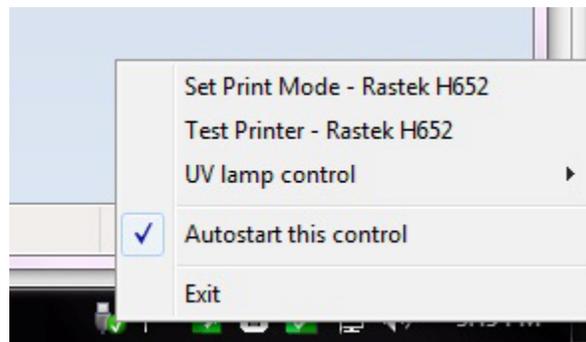


Figure 19 Control App

To activate the control program, right-click on the printer icon located in the bottom right tray. Once this program is run for the first time, the Autostart this control should be checked; providing automatic start when the computer is started.

### Set Print Mode – Rastek H652

The blue Printer parameters window provides the operator with basic control of the printer.

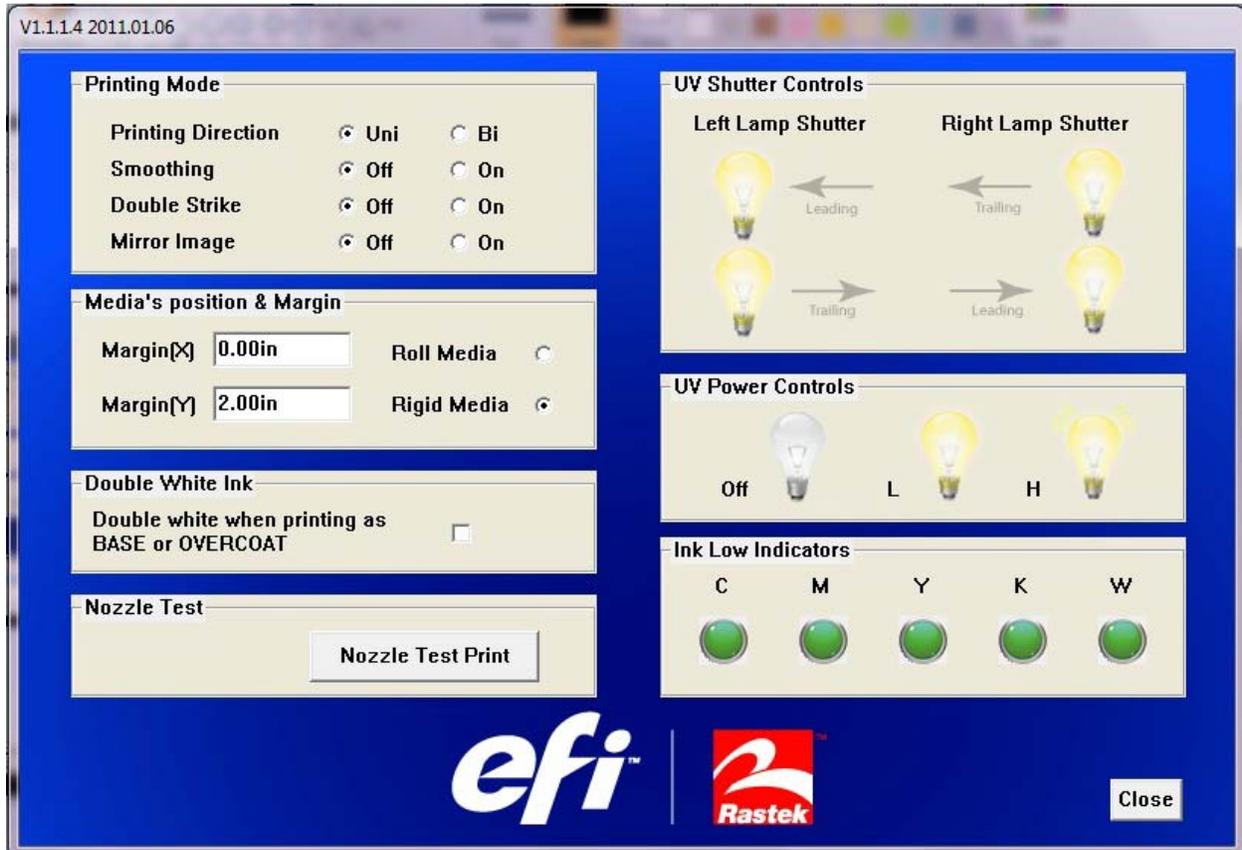


Figure 20 Set Print Mode Window

### Printing Mode Pane

When using XF, only the Printing Direction and Mirror Image buttons will control the way the image is printed. Smoothing and Double strike are controlled from the XF window.

### Media's Position & Margin

#### Margin (X)

Margin(X) controls the right side image margin. Note that right side is from the perspective of the image on the computer monitor, thus it will actually move the image to the left when standing in front of the printer.

It is recommended that this control be used when moving the image "right" as moving the image from this control will effectively move the starting position of the carriage. This will provide the most efficient printing of the image. Moving the image in XF will cause the carriage to fly over the white space, thus slowing the throughput of the printer.

#### Margin(Y)

Margin(Y) control the amount of white space at the top of an image. This is provided primarily for rigid media. When rigid media is loaded against the rest media index stops, the media will require moving forward before printing. Late in the manual one will see how to set the base Y movement

which will print full-bleed to the top of the image. Margin(Y) should be used to add additional white space to the top edge of an image.

### Double White Ink

In the very rare case that insufficient white ink can be printed, this feature allows the user to quad strike white on the image. This is accomplished by effectively printing CMYK in uni-directional mode while printing white in bi-directional mode.

### UV Shutter Controls

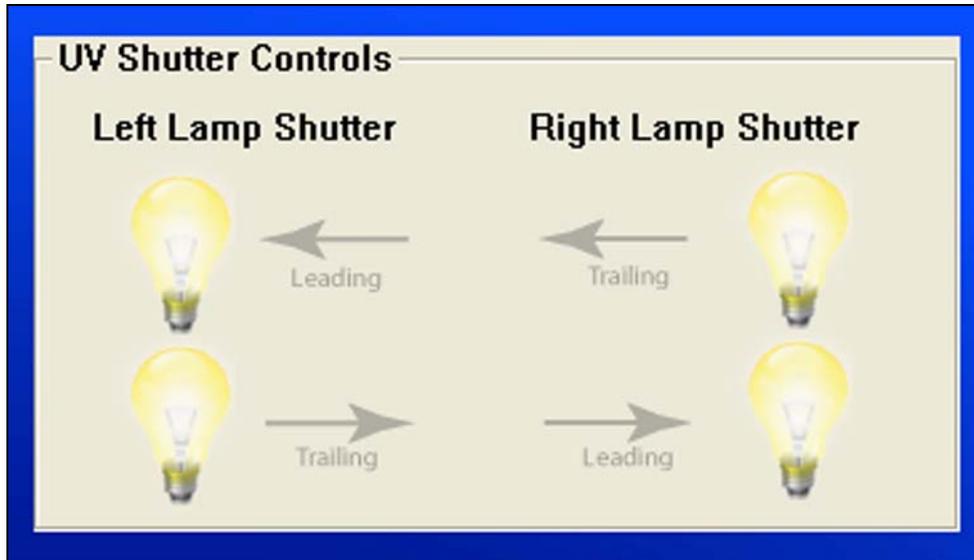


Figure 21 **Shutter Controls on Rastek User Interface**

The H652 lamps include shutters which open and close to allow UV light to cure the ink. UV Shutter are selectable in terms of leading or trailing during printing. The shutters remain closed during idle printer time. Leading and trailing are further explained below.

#### **Left Lamp Shutter**

- Leading – Opens the Left shutter such that the UV light is emitted prior to the new ink; in front of the carriage.
- Trailing – Opens the left shutter such that the UV light is emitted after the new ink; behind the carriage.

#### **Right Lamp Shutter**

- Trailing – Opens the left shutter such that the UV light is emitted after the new ink; behind the carriage.
- Leading – Opens the Left shutter such that the UV light is emitted prior to the new ink; in front of the carriage.

### UV Power Control

The UV lamps are controlled together

OFF : turns both UV lamps OFF

L: turns both UV lamps to Low Power (Approximately 80% power)

H: turns both UV lamps to High Power (100%) power

## Ink Low Indicators

Visual ink low indicators are provided to assist in determining which ink bottle is Low Ink. When a bottle reaches near empty, a beeping sound will be sounded and the green dot shown in the screen cap above will turn gray. At this time the ink bottle should be replaced. See how to replace the ink later in the manual.

Note 1: It extremely important to NOT let the ink bottle become completely empty. Should this happen, air will be sucked into the ink lines. This air will eventually make it to the heads at which time the head will require bleeding.

Note 2: The printer will signal Ink Out by continuously beeping and will shut the ink pump off. Once the ink pump is shut off, ink will no longer be pumped into the secondary tanks causing the heads to eventually run out of ink.

## Test Printer – Rastek H652

The test strip provides access to maintenance functions, printer setup parameters and basic printer controls.

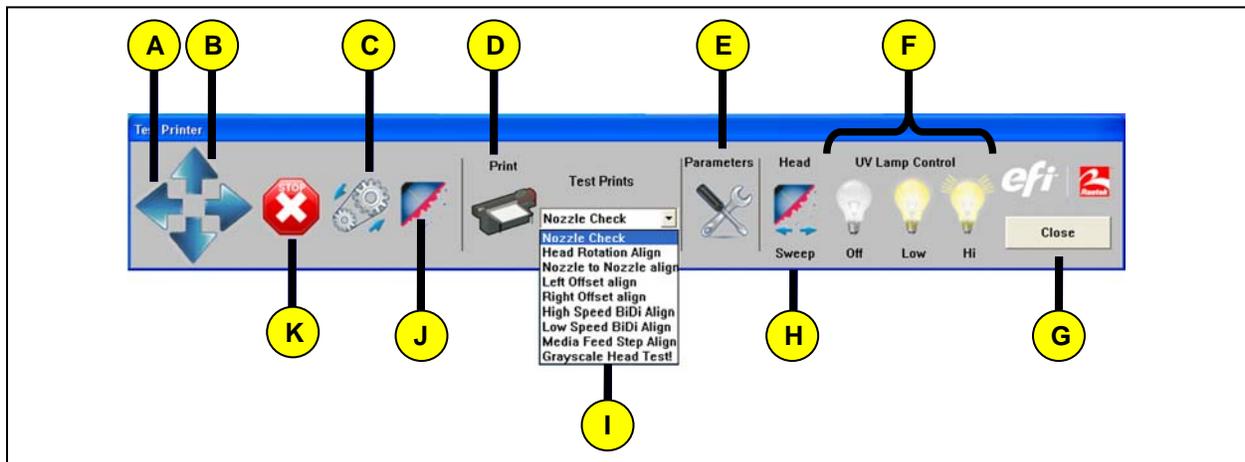


Figure 22 Overview Test Strip Interface

Table 3: Test Strip Interface Detailed Features

| Table 3: Test Strip Interface Detailed Features |  |
|---|--|
| A   | Carriage left and right motion: carriage move to the right incrementally, but will move slowly back to the home position when moving left.   |
| B   | Belt forward and reverse motion: moves the belt incrementally  |
| C   | Belt continuous feed: used for testing and setting belt alignment.   |
| D   | Print button: prints the selected test print <ol style="list-style-type: none"> <li>1) Nozzle Check<br/>Used to check nozzle performance</li> <li>2) Head Rotation Align<br/>Used to set the mechanical head rotation to 0 degrees rotation</li> <li>3) Nozzle to Nozzle Alignment<br/>Used to set CMY nozzle 1 to the K nozzle 1</li> <li>4) Left Offset Align</li> </ol> |

|   |  |
|---|--|
|   | <p>Used to set the Uni-Left to right Offset alignment from color to color</p> <p><b>5) Right Offset Align</b><br/>Used to set the Uni-Right to Left Offset alignment from color to color</p> <p><b>6) High Speed BiDi Align</b><br/>Used to set the master Bidirectional alignment for 4-level printing(high speed carriage)</p> <p><b>7) Low Speed BiDi Align</b><br/>Used to set the master Bidirectional alignment for 8-level printing (low speed carriage)</p> <p><b>8) Media Feed Step Align</b><br/>Used to calibrate the master feed step.</p> <p><b>9) Grayscale Head Test</b><br/>This is not an alignment print. It is used to check that the print heads are fully function when printing each of the 8 levels of dot volumes. Ususally not used by customer</p> |
| E | Parameters button: access to printer base settings   |
| F | UV lamp control: Turns UV Lamps Off, On Low and On High  |
| G | Close button: closes the test strip interface  |
| H | Head Sweep button: performs a print head sweep routine   |
| I | Pull-down menu: selection of printer tasks   |
| J | Vacuum On/Off button: turns the head cleaning vacuum on and off  |
| K | Motion stop button: stops printer motion, but does not shutdown the printer.   |

### Printer Parameter Settings

The “Set parameters” window is opened from the “Test Printer” control strip. A new tabbed window will open with the System tab displayed.

### System tab

**Figure 23 System Tab**

The System tab contains the following:

**Negative Press**  
This is where the target negative pressure is set. Nominally this is set to -2.4 kPa. Negative pressure is always negative and the value will not be set until the “set” button is pressed. The “current” negative pressure is read when the window is initially opened, and then only when the read button is pressed.

**Micro Drop**  
These setting adjust the timing and the number of jets the print heads will make while sitting idle over the maintenance station. Intervals determines the number of seconds between jets and Drop Times determines the numbe of jets to be done.

### Ink System Control

Turn off in Fill warning should be used carefully. When the printer indicates that a working tank is not full, the associated ink pump is disabled. Checking this box will disable the safety feature and turn back on the ink pump. Once the parameters panel is closed, the warning will re-engage automatically.

White Ink Bottle Recirculation should normally be checked. This enables a separate pump to recalculate the white ink in the ink bottle. The ink pump runs for a few seconds and then pauses for a few seconds.

### Auto Clean

The printer can automatically sweep (no purge) the heads during printing. The Count By is the number of passes required before the printer will sweep the heads.

### Status of Ink Supply

This display indicates the status of the ink level in the supply bottles. When an ink bottle is LOW, the printer will sound a series of beeps to warn of low ink. The associated Green dot will turn Gray to indicate which bottle needs to be changed.

### Note

Ink Bottles should never be allowed to completely run dry as this will result in air in the ink lines.

The UV Lamp alarm, if checked, will notify the operator that the printer is attempting to print, but the UV lamps are off. This applies to all types of prints.

### Page Setting

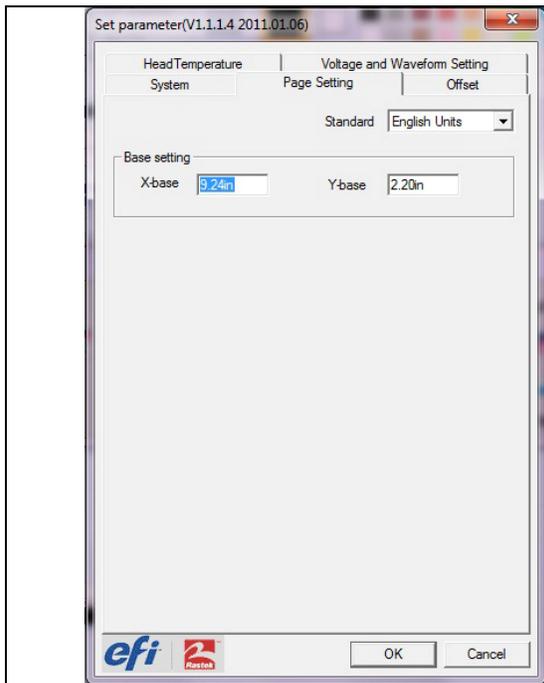


Figure 24 Page Setting Tab

The Page setting tab contains:

#### Standard:

The standards window allows the user to choose English or Metric (SIU) units. This will display all distance settings in the chosen units.

#### Base Setting:

X-Base allows the user to set the media edge base zero point. This nominally should be set to match the zero-point of the ruler on the back shelf of the printer. Once set, this setting will not usually be changed.

Y-Base allows the user to set full bleed on the leading edge of rigid media. Rigid media once loaded against the Y-axis alignment stops will be feed forward by the specified distance prior to printing when rigid media is selected. Again this setting is usually only set once and then used.

### Offset

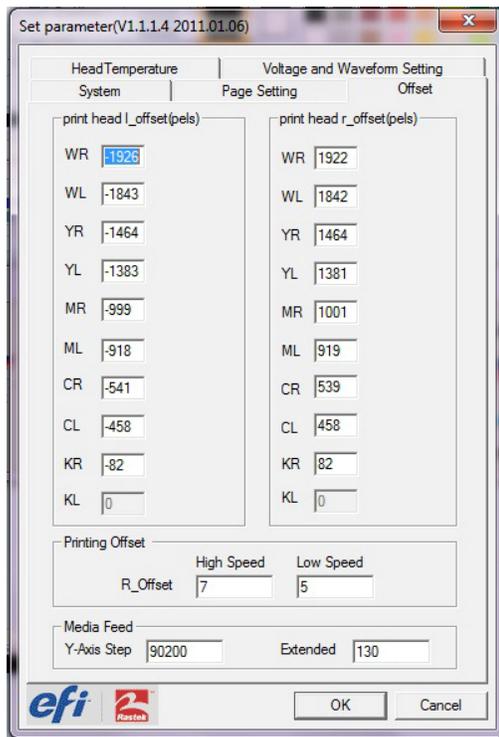


Figure 25 Offset Tab

The offset tab provides for all the X-offset and feed settings.

### Print head l\_offset and r\_offset

Due to the physical spacing of the heads in the carriage, each head requires an electronic offset to align the print heads in each uni-print direction. Note that the left offsets are negative and the right are positive. When the heads are properly mounted and mechanically aligned, the left and right offsets should not differ by more than 3 absolute points.

### Printing Offset

The R\_Offset high Speed sets the master bi-directional offset for 4 level printing. The R\_Offset Low speed sets the master bi-directional offset for 8 level printing.

### Media Feed

The Y-Axis Step is a number that the control system uses to create the correct step size for each pass. This number will be used to pass counts 8 and greater.

The Extended number is used to passes less than 8 pass to extend the feed to accommodate the longer feeds. The Extended should be set to give the best seam in 1 pass printing,

## Head Temperatures

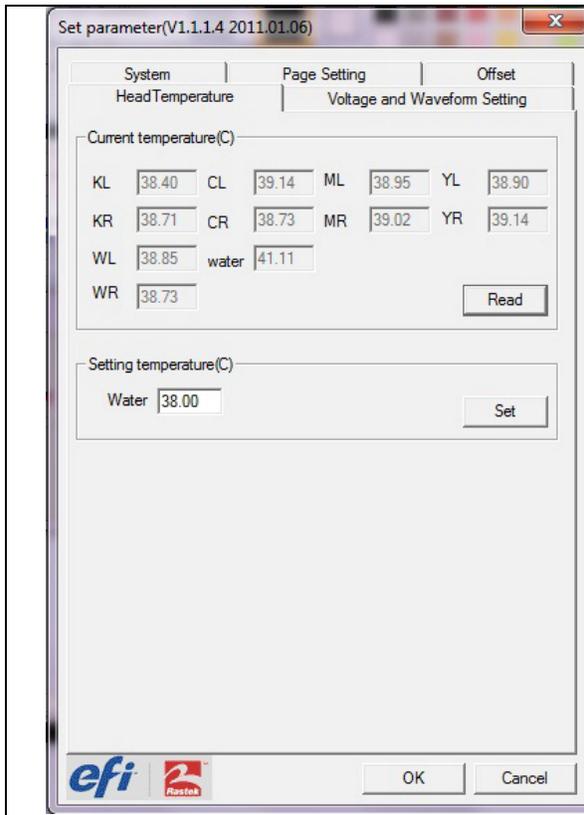


Figure 26 Head Temperatures Tab

The Head temperature reports each head temperature along with the water (fluid) heater temperature used to heat and cool the heads. It also allow the user to set the target Fluid temperature.

### Current Temperature:

When the Head Temperature tab is first opened the current head temperatures are read from each head. To update these temperatures, press the “Read” button and wait for the system to update the windows. The fluid temperature is also reported.

### Setting temperature:

The target fluid temperature is set in this window. The proper target temperature is nominally between 38C and 40C. This target temperature should be set so that the heads remain at the proper idle head temperature which is between 36C and 38C.

The number typed is not effective until the “Set” button is pressed.

## Voltage and Waveform Setting

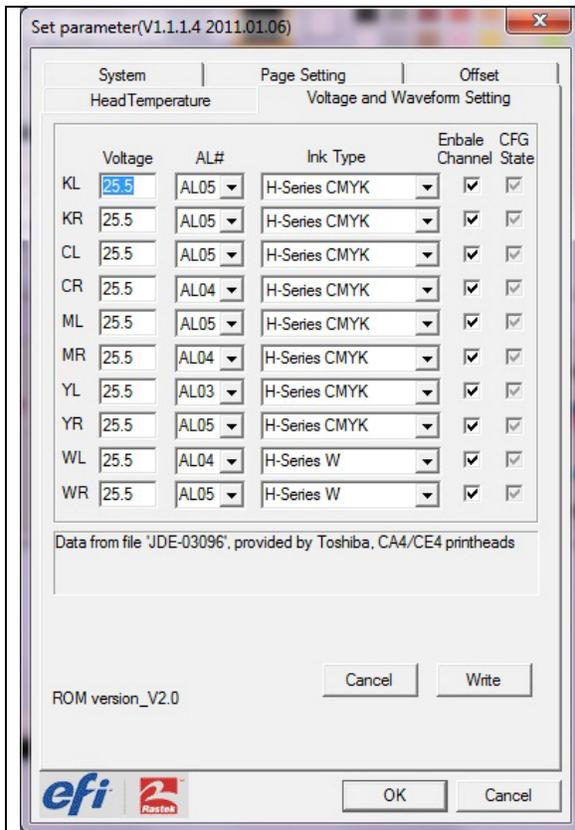


Figure 27 Voltage and Waveform Tab

The Voltage and Waveform Setting tab sets the necessary print head Voltages, AL# and Ink type.

### Voltage:

The voltage should nominally be set to the multi-drop value (middle value) provided with each head. This is a good starting point to set the voltage on each print head. Voltage should never exceed 28VDC.

### AL#

This number is provided with each head and should not be altered.

### Ink Type:

The ink type for the H652 is H-Series CMYK for the colors and H-Series W for the white head.

To write the information into the print head control PCB, the “Write” button must be pressed.

## Checking Print Head Temperature and Pressure Valve Status

### Check Print Head Temperature

Print head idle temperature range is from 36°C to 37°C. Check to ensure the print heads have reached idle temperature. With the print heads at idle temperature you may proceed with printing. During printing the head temperature range is 38°C to 39°C.

### Pressure Valve Status

The CMYK and W pressure valves must be opened at all times. Pressure valves must be closed ONLY when packing the Printer for moving.

### Printer Power Status

Power must remain ON at all times.

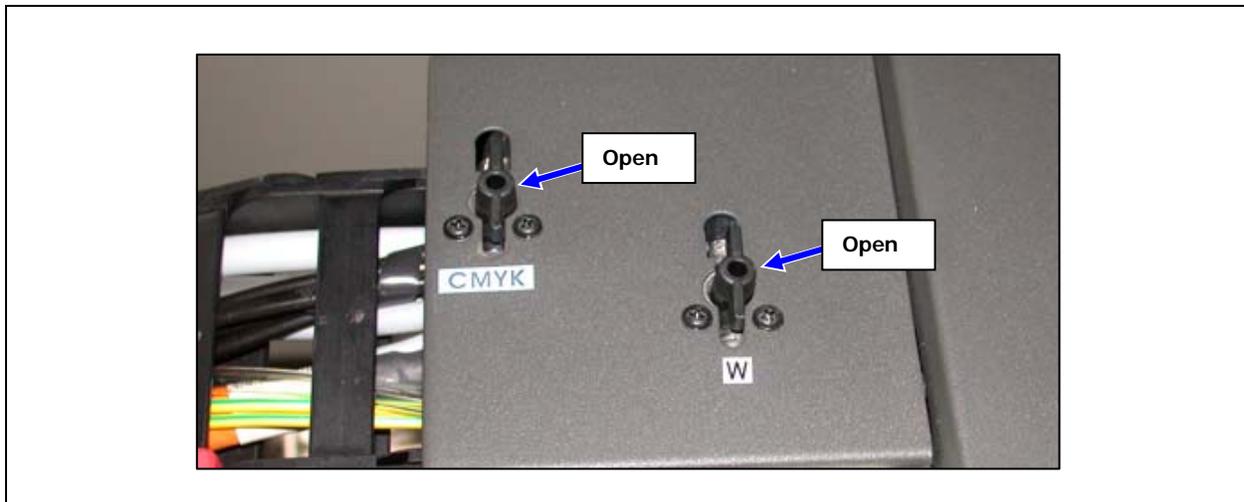
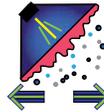


Figure 28 Pressure Valves for CMYK Inks and White Ink

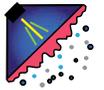
### Purge and Sweep Features

To ensure the best print quality it is recommended to purge and clean the print heads prior to each print run. See also maintenance procedures in **Chapter 6**. Check to ensure the head temperatures are at least 36°C before running the clean cycle. To purge and clean the print heads:

- 1 Press ink purge button and hold for approximately five seconds. Operators may wish to visually inspect the bottom of the print heads to ensure ink is purged from the print heads.



- 2 To clean ink from the print heads, click the sweep icon  from the test parameters Graphic User Interface (GUI). The vacuum cleaner will switch on and the heads will make one pass in each direction, over the vacuum port, to thoroughly remove any ink from the print nozzles.

- 3 To activate the vacuum cleaner independently of the sweep routine click the vacuum icon  from the test parameters GUI. Use this feature to clear any obstructions from the vacuum cleaning port.



### Caution

**NEVER** manually wipe or clean the print heads. Manually cleaning the print heads can lodge lint or other particles in the print nozzles and result in permanent damage to the print heads.

## Loading Print Media

With the printer powered up proceed with loading the print media. There are two types of print media for the H652; **Rigid** media and **Roll-to-Roll** media. Each media type has a specific procedure for loading and unloading. Please follow these safety recommendations when handling any type of print media.

- Print media must be loaded prior to testing and verifying the print heads.
- Wear clean gloves when handling rigid media as contamination of any kind will adversely affect print quality.
- Rigid media requires a thorough cleaning prior to printing. Use isopropyl alcohol (IPA) and a clean wipe to clean the media surface. Using 90% or a higher grade alcohol is recommended.
- Wear safety shoes when handling heavy roll-to-roll media.
- Load print media following the appropriate procedure for either Rigid or Roll-to-roll media.



### Warning

When loading roll media follow all safety precautions to avoid bodily injury or damage to the machine.

To focus the strength of the vacuum belt, four vacuum chambers can be opened – between 25% and 100% - to accommodate the width of the print media. The vacuum belt keeps the print media flat



### Caution

Carriage height must be set high enough to clear the print media. If carriage height is insufficient, the print heads and print media both can be damaged or destroyed.

## Rigid Media

A variety of rigid media such as Foam-Core, PVC, styrene, corrugated plastic, and plywood can be used in the H652. Maximum media size is **65** inches wide by **120** inches long. Maximum rigid media thickness is **1.8** inches. Maximum rigid media weight is **75** lbs.

The printer has two media support tables that can be attached to the front and rear of the printer. These extensions will assist in handling rigid media and facilitate printing on media up to four feet in length. For printing on media longer than four feet, additional support must be added to the front and back. Failure to use additional support tables for oversized media will cause serious media handling issues. Media support tables must be adjusted to be parallel with the conveyor belt to create one even plane for the media.

When loading heavy rigid media, it is necessary to cover the unused areas of the vacuum belt in front of the media as air is being bled through the open space. To increase the vacuum force on the media, place a sheet of paper in front of the print media. If the media is very heavy, it may be necessary to attach scrap paper to the leading and trailing edges of the media to cover the open vacuum belt. This technique will help pull the media into and through the print zone.

To load Rigid Media onto the H652:

- 1 Raise the head carriage height by turning the head height adjustment knob **clockwise**.



Figure 29 **Adjusting the Head Carriage Height**

- 2 Prior to loading the print media, set the vacuum belt suction width to match the dimensions of the media. See **Setting the Vacuum Belt Suction Width** above.

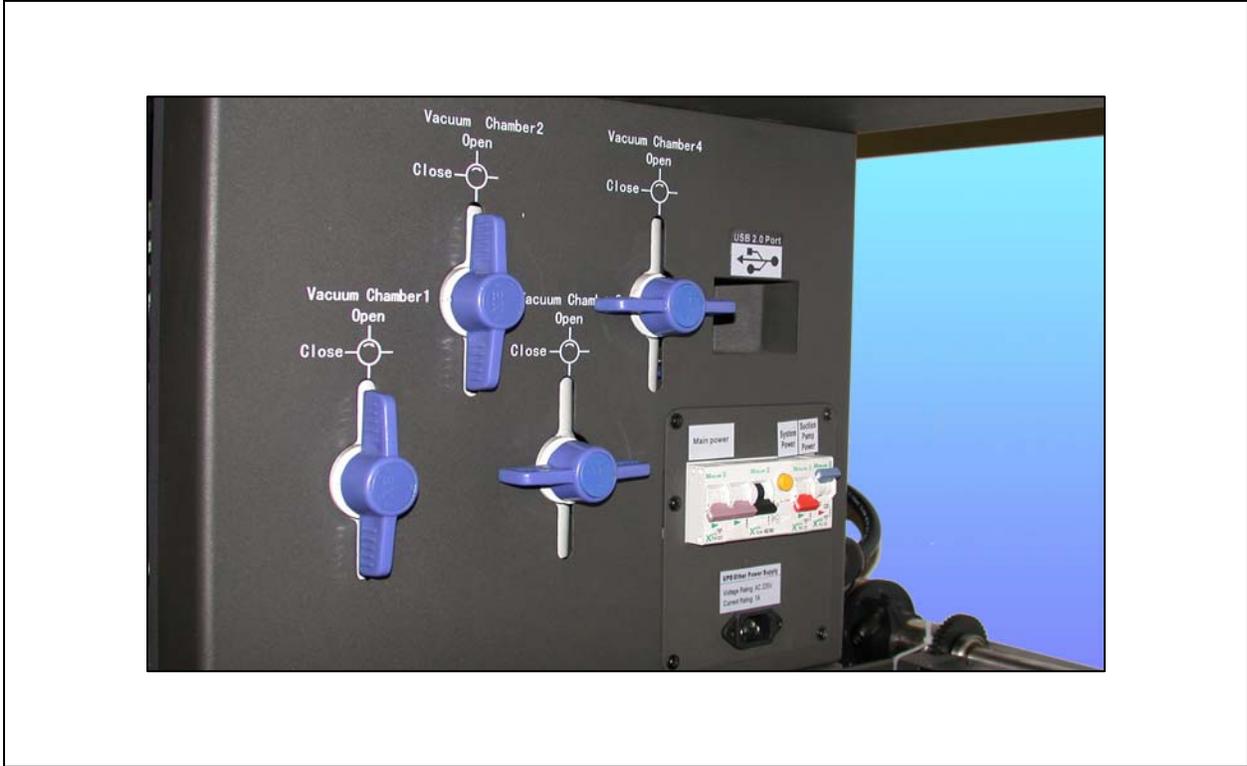


Figure 30 Adjusting the Vacuum Belt Suction Width

- 3 Position the media stops to accommodate the width of the print media.

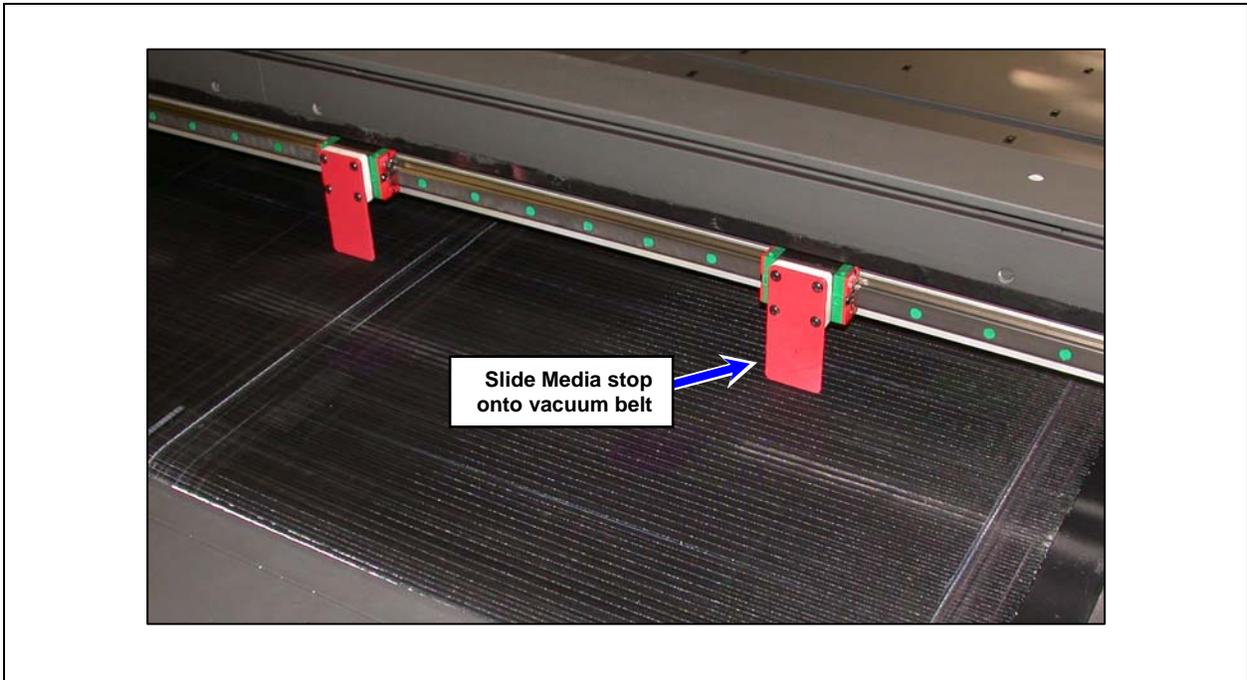


Figure 31 Media Feed Alignment Stops

- 4 Place the rigid media on the vacuum conveyor belt and gently push until the media comes into contact with both media stops. Check to ensure proper print media alignment. See **Figure 32**.

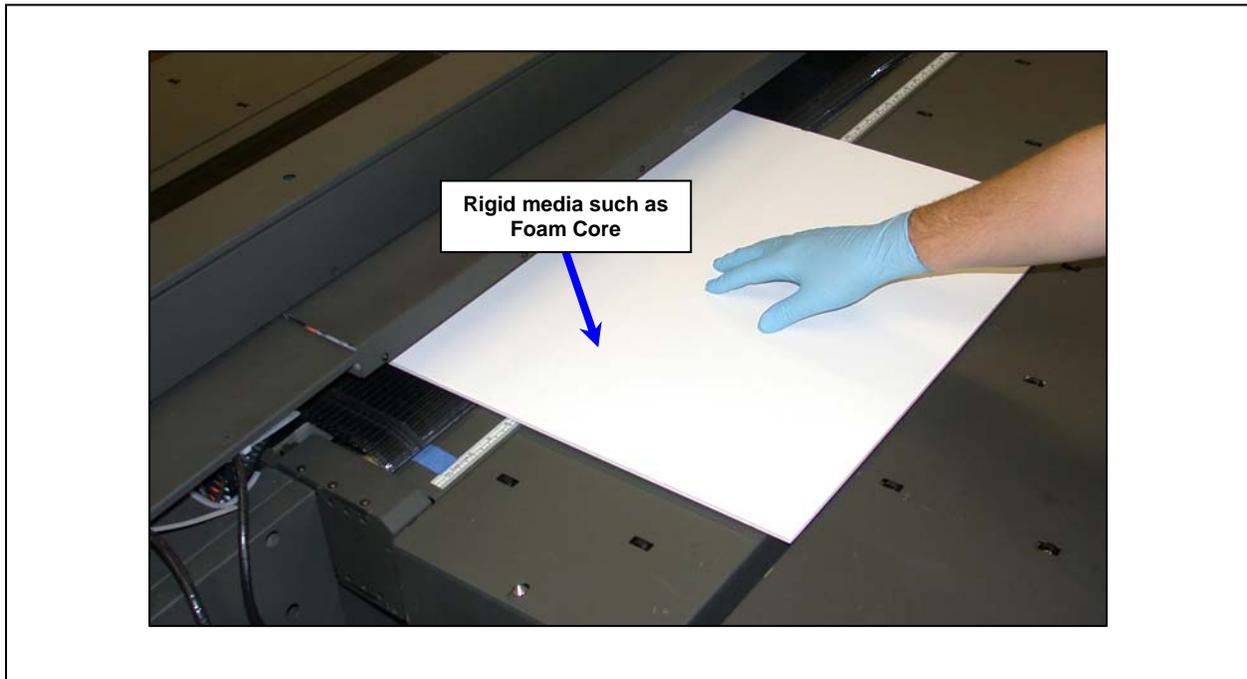


Figure 32 **Placement of Media in Suction Zone**

- 5 Turn on the suction pump switch located on the Lower-Right side of the printer. The suction pump can be controlled by footswitch after the Suction pump switch is turned on. See **Figure 33**.
- 6 Move the carriage completely onto the belt using by clicking the right arrow from the GUI.

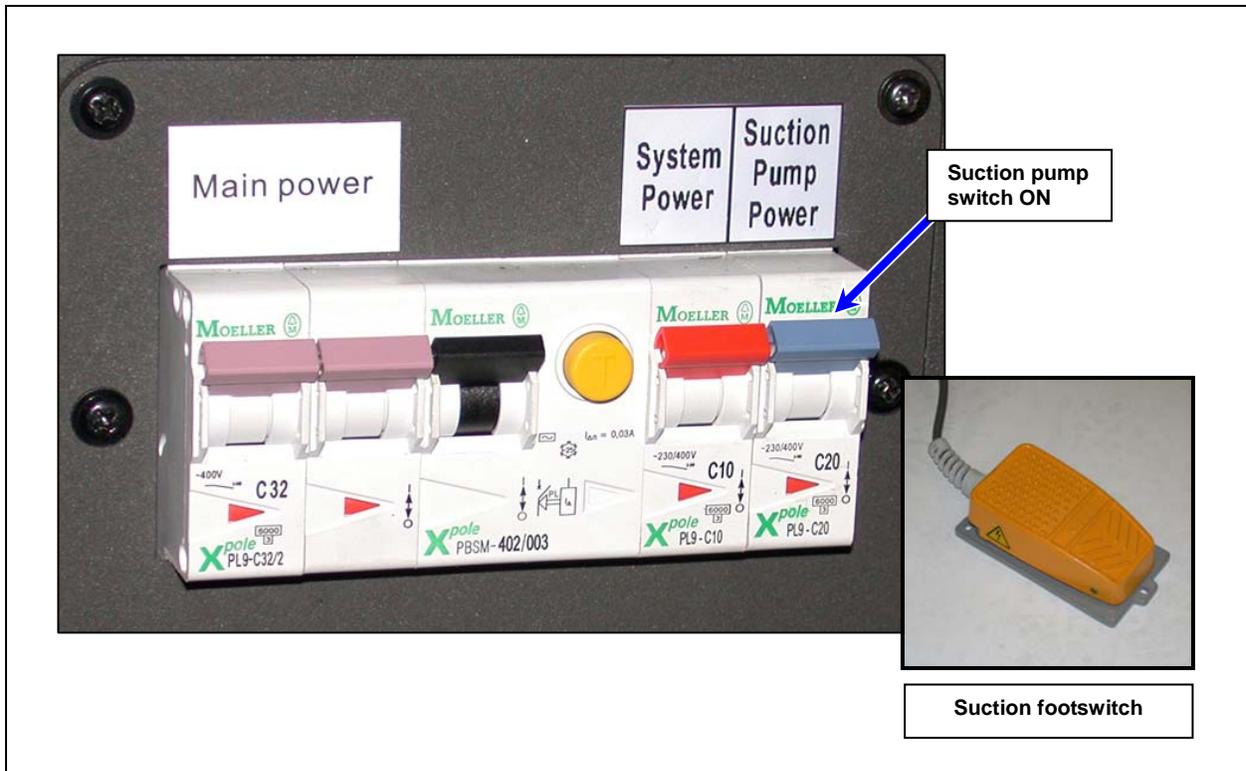


Figure 33 Main Power On – Suction Pump On

- 7 The Gap Tool has two thicknesses, one at each end, for adjusting the head carriage height or “Gap”.

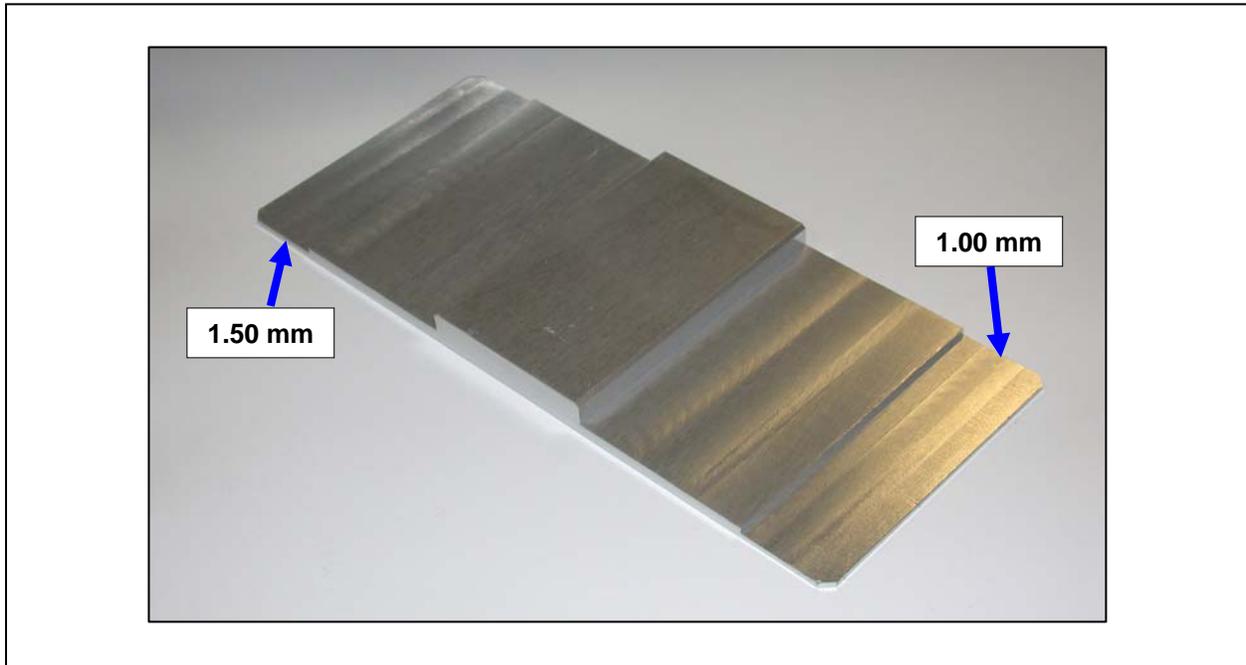


Figure 34 Head Height “Gap” Tool

- 8 Adjust the head carriage height by turning the height adjustment knob until the gap tool fits snug between the media and the head carriage.

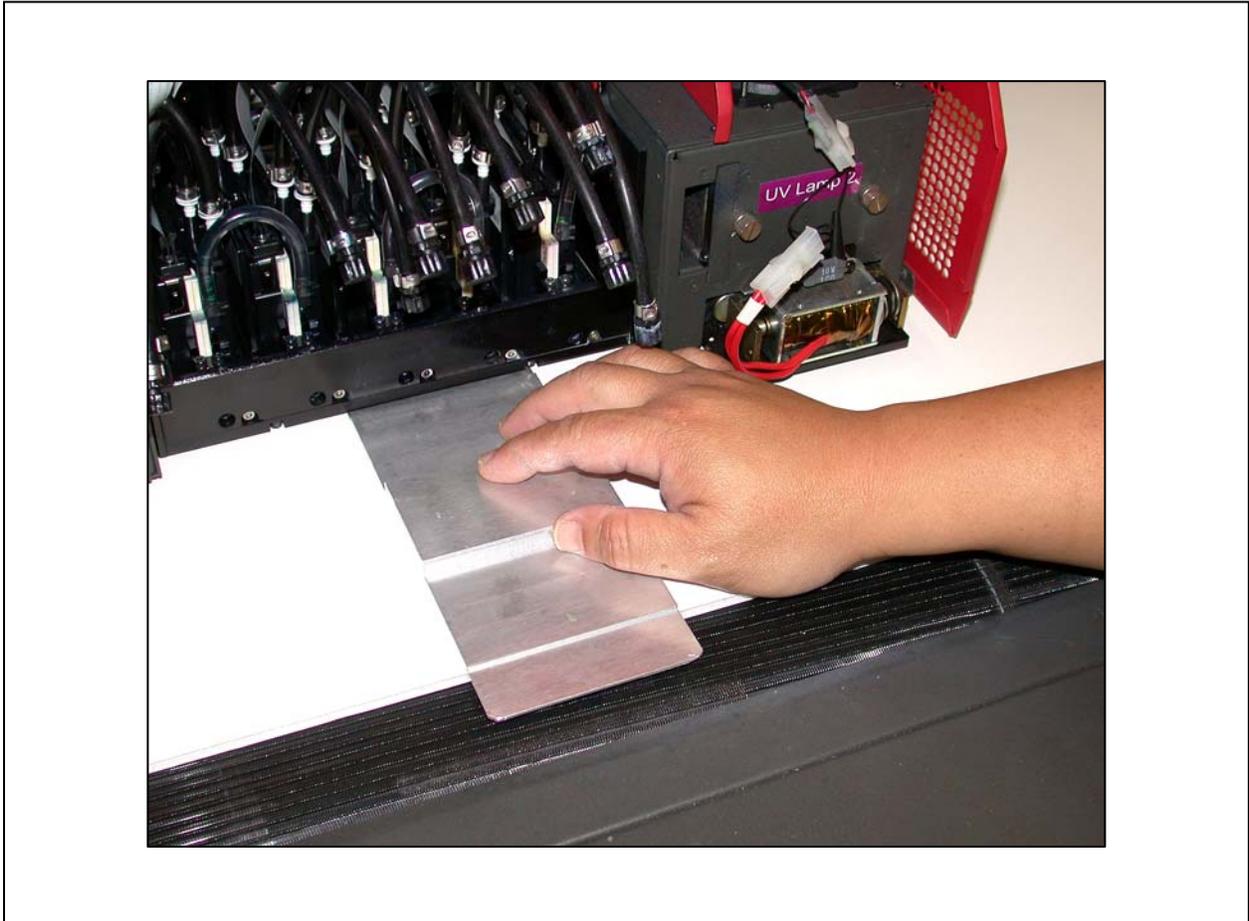


Figure 35 Adjusting Carriage Height for Rigid Media

**Note**

If media is not square, or aligned against the alignment stops, the edge of the print will skew away from the edge of the media as it moves through the printer. This undesired condition is called Media Skew.

- 9 Left printer margin 0 calibration is done using the ruler on the rear media support table. Place the media on the conveyor belt paying attention to the measured distance from the left belt edge. This measurement is the base point for setting the left margin and media alignment.
- 10 To align the left print margin use the GUI to open the print parameters window, Page Setting Tab, and set the X margin as needed. For full bleed on the left print edge, set the value to the tape measurement value. Close the window when the setting is complete.

**Note**

For manually measuring the distance from the left belt edge to the edge of your print media Rastek recommends the use of any professional grade measuring tape.



### Caution

efi/Rastek does not recommend intentionally printing on the vacuum conveyor belt as this will lead to ink accumulation and clogged vacuum holes in the platen. A clogged vacuum platen will not function properly and may need to be replaced.

- 11 Set printer to **Rigid Media** from the **Page Settings** tab. Selecting **Rigid Media** moves the media into proper position prior to printing. See **Figure 36**.
- 12 When Rigid Media is selected, the **Header Y Base** setting becomes available to the operator. Each printer may vary by one or two millimeters and the typical setting for full bleed along the front edge is 170 mm. Adjusting this setting to less than 64.2 in (163 mm) will cause printing directly onto the vacuum belt. Settings greater than 64.2 in (163 mm) will leave an area of unprinted media along the front edge of the media.

### Note

The full bleed point must be calibrated. Any desired white space at the top of the media is set in the "Page Header" input.

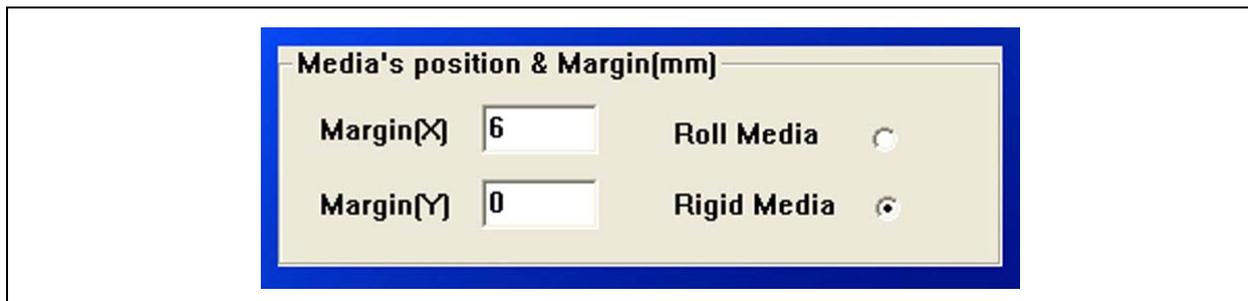


Figure 36 Rigid Media Printer Margin Setting

### Roll-to-Roll Media

Roll-to-roll media can be wound onto the take-up spool in either direction, allowing you to take up the printed media to the inside or outside of the take up spool. The H652 is a center loading machine which requires the media to be centered on both spools. The media spools use conical hubs and clamps at both ends to position and secure the media, and to prevent lateral motion during printing. See **Figure 37**.



### Caution

efi/Rastek recommends removing the media support tables from the H652 when printing in roll to roll mode. Although removing the media support tables is not mandatory as the roll media can be fed through the H652 with the support tables in place. Working with roll media while the support tables are in place can be quite cumbersome and time consuming.

To load or reload roll media on the H652:

- 1 Remove the media supply spool located on the front of the printer and remove the clamp and hub from gearless end of the bar.
- 2 Load fresh roll of media onto the bar and position the media in the center.

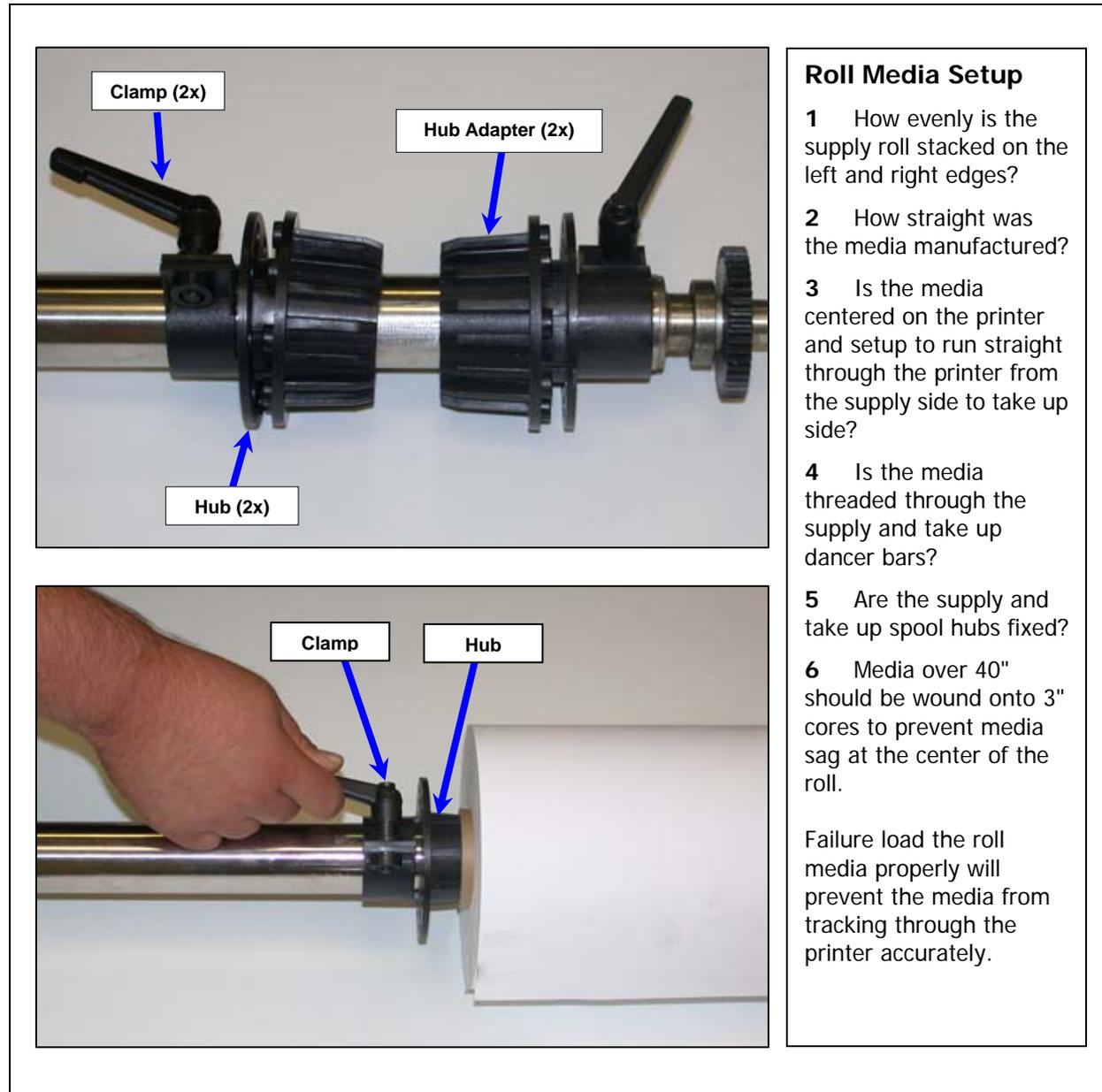
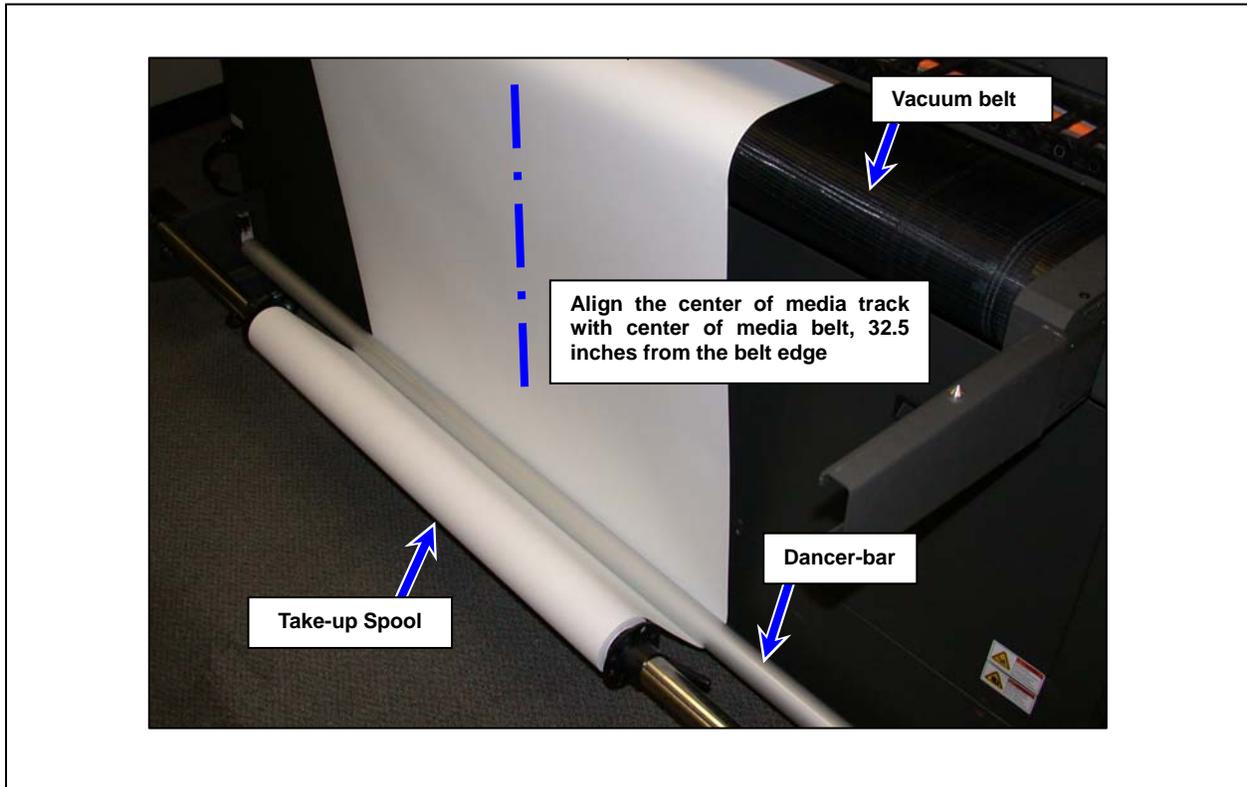


Figure 37 Roll Media Bar Clamps, Hubs, and drive gear.

- 3 Tighten the media clamps by (a) pulling up on the spring loaded handle (b) repositioning the handle with a counter-clockwise motion (c) pushing the handle down again and (d) turning the handle clockwise to tighten the clamp. Repeat steps (a) through (d) to secure both clamps and hubs.
- 4 Re-install the media and feed bar onto the front of the printer.

- 5 Turn on the supply media drive motor. Set the rocker switch and the push button to forward. The media feed and take-up system will automatically pull the media taut.
- 6 Prior to threading the media through the printer, set the belt vacuum to the proper suction width for the media you are loading. You may turn on the vacuum pump now.
- 7 Thread the media beneath the rear dancer-bar and up onto the vacuum belt. See **Figure 38**.



**Figure 38 Roll Media Take-up Spool**

- 8 If you have not done so, turn on the suction pump to hold the media in place. See **Figure 30** (above). Neglecting to turn on the suction pump will adversely affect the print quality.



**Caution**

Do not force the media forward as this may damage the supply media motor. To move the media forward, leave the suction pump off until the media has been completely loaded.

- 9 Stand at the front of the printer and pull the media slowly forward. Allow the supply motor to feed the print media. Apply equal tension on both sides of the media as it is pulled through.

**Note**

When printing a limited number of images, using individual sheets of media is an acceptable workflow. However, when printing a long run of images, Roll-to-Roll mode is the recommended workflow.

- 10 Thread the print media through the take up dancer, over the vacuum conveyor belt, and affix the media onto the take-up spool. Make sure that the media is aligned and square to the media on the supply roll. Any misalignment will cause the media to drift during printing.
- 11 Turn on the take up spool motor. The take up motor only operates with the dancer system in one direction. Set the rocker switch to the single bar position. To unroll the media from the take up bar, set the rocker switch to the double bar position. This setting will unroll the media while disabling the dancer function.
- 12 With the media loaded, determine the left edge of the media.
- 13 Using a tape measure to determine the left margin and enter the value on the RUI
- 14 Set printer to Roll mode from the software interface. Selecting this mode will gray-out the Media to Y base and disable the printer from moving the media forward prior to printing.

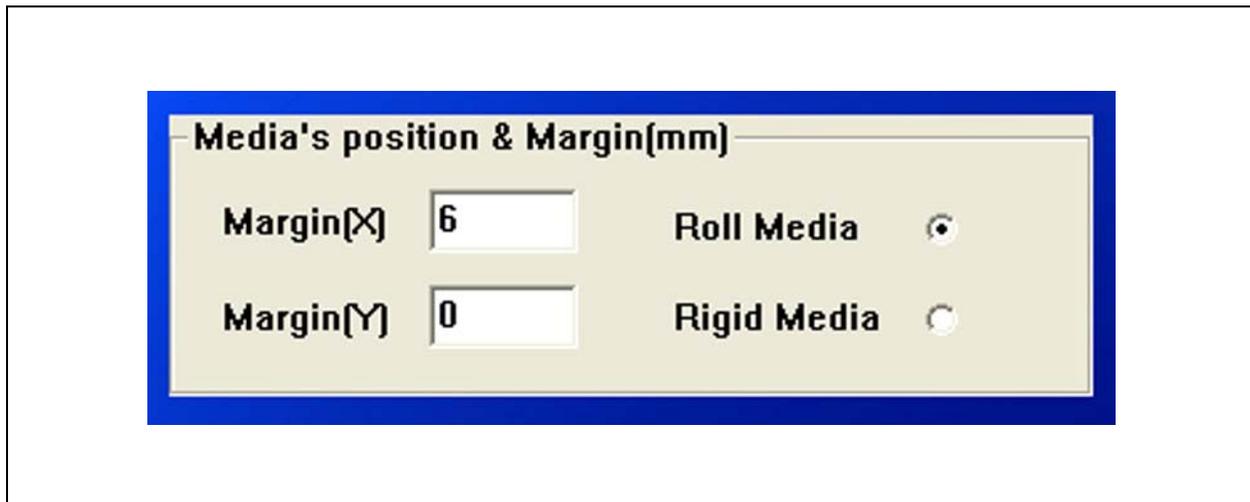


Figure 39 Roll Media Printer Margin Settings

### Setting up for Roll Media

Prior to loading the print media it is important to properly adjust the head gap to clear the print media when in motion. Failure to properly set the gap height may result in damage to the head assembly as well as the print media. To adjust the head gap, follow the procedure below. Remember, minimum media thickness is 0.005" (0.127 mm) and the maximum media thickness 1.8" (45.7 mm).

### Gap Height

Set the desired carriage height or "Gap" as follows:

- 1 Locate a clean scrap of print media similar to what you're about to run.
- 2 Place the scrap of print media on the left (parking side) of the vacuum belt.
- 3 With the carriage located at the parking station, turn the height adjustment knob clockwise to raise the head carriage. Check to ensure there is enough space to clear the print media. See **Figure 40**.

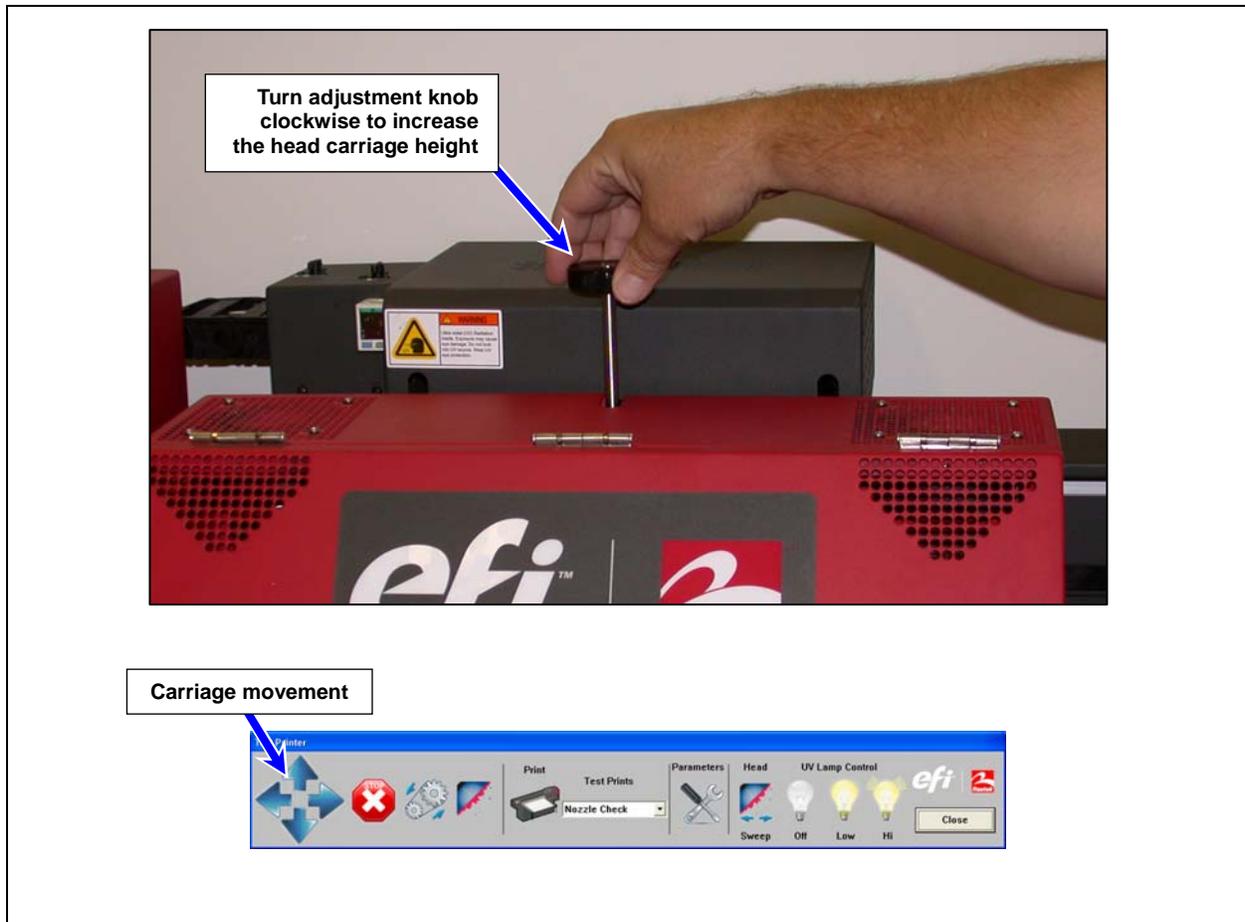


Figure 40 **Adjusting the Head Carriage Height.**

- 4 Use the blue motion arrows of the GUI to position the carriage over the print media.
- 5 Slide a scrap of media beneath the carriage which should clear the media by at least an inch. Make adjustments as needed to get proper clearance.

### Note

Printing with a carriage height greater than 1.5 millimeters results in a image quality reduction that may be noticeable to the unaided eye.

- 6 Select either 1.0 mm or 1.5 mm edge from the gap tool. Slide the tool between the media and the front of the carriage.
  - **1 mm gap** provides the best print quality, but requires extremely flat. print media. The 1 mm gap should be used only with high quality media that is less sensitive to warping.
  - **1.5 mm gap** provides the maximum usable clearance for the carriage over the print media, but produces a slightly lower quality image. This image quality reduction is usually unnoticeable to the unaided eye. The H652 is capable of printing on a variety of media types using a range of quality levels. The head carriage height must be adjusted for each media type to achieve optimal printing results for that particular media type.

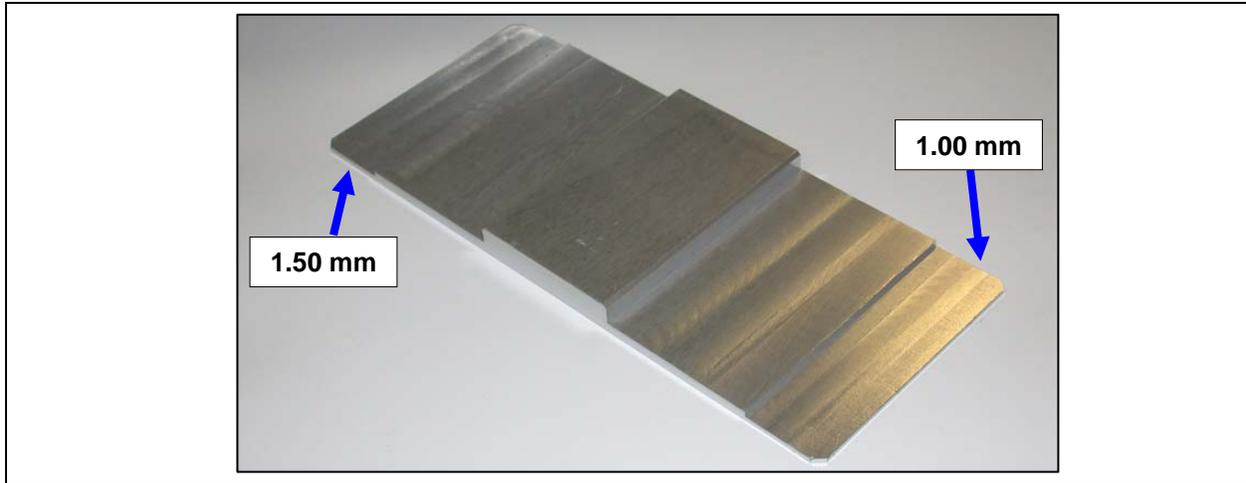


Figure 41 Head Height "Gap" Tool

- 7 Adjust the head carriage height by turning the height adjustment knob until the gap tool fits snug between the media and the head carriage.

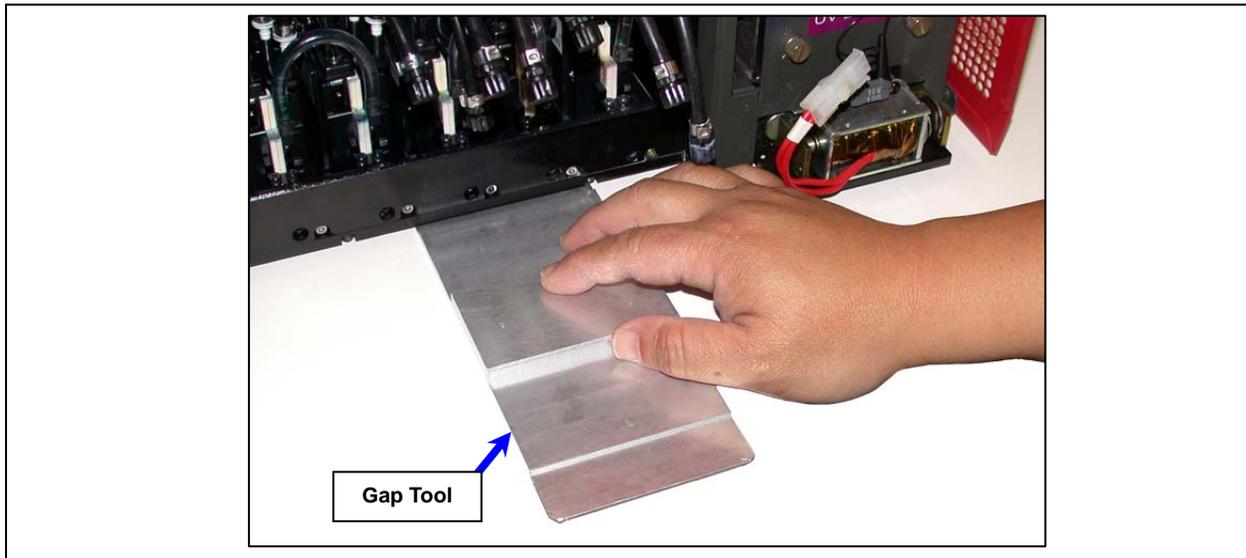


Figure 42 Adjusting Carriage Height for Roll Media

- 8 Remove the gap tool, the scrap piece of print media, and set them aside for future use.



### Caution

The print head carriage height must be high enough to clear the print media. If the gap is not sufficient the print heads and media can become seriously damaged.

### Conveyor Belt Suction Width

The H652 has four (4) vacuum chambers positioned directly beneath the vacuum platen. After placing print media on the conveyor belt, select the appropriate number of vacuum chambers to secure the media to the conveyor belt. All chambers are equal in size and individually controlled by a set of valves located at the lower right of the printer.

Vacuum chambers are activated by opening the adjustment valves. Chamber 1 activation is located nearest the control panel side of the printer. Chambers 2, 3 and 4 can be opened successively to expand the conveyor belt suction width to accommodate the print media size and shape.

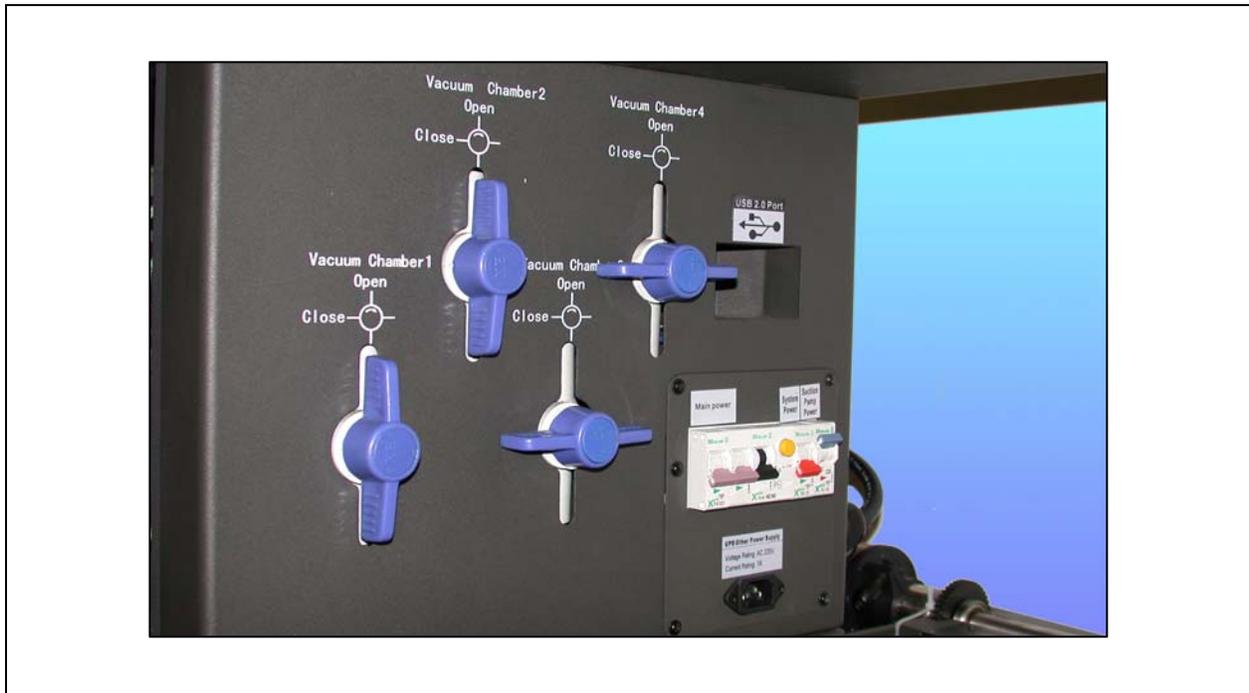


Figure 43 Vacuum Width Adjustment Valves

Set the vacuum width based on the material size to be printed upon. For example: media widths that fall on or close to the 16, 32, 48, or 65 inch division will require opening 1, 2, 3, or all four vacuum chambers. However, if the print media is just over the exact chamber width, Rastek does not recommend opening an adjacent vacuum chamber. Opening an adjacent vacuum chamber will slightly reduce the grip of all open vacuum chambers and may not hold the media as firmly as required. The media width must cover at least 50% of an adjacent vacuum chamber before it makes sense to open and use an additional vacuum chamber.

### Media Tracking

The edge of your Roll-to-roll media may wander during a long continuous printing run. The product specification is on quarter inch of variance over 15 feet. Roll media wandering is based upon, but not limited to, the factors listed below.

- How evenly the media is rolled onto the spool.
- How straight the media is cut by its original manufacturer
- How well the media is loaded to track straight from the supply spool to the take-up spool.
- Whether the media is loaded using the supply and take up dancers

- Whether the supply and take up tubes are secure in the locking hubs. Failure to do so will result in the printer not being able to tension the media.

Media over 40 inches wide should be rewound onto 3inch core tube. To prevent media sag at the center of the core tube.

### Testing the H652 from the Printer Control Computer

Testing the Printer from the Printer Control Computer is done via the PC interface. The **Off/On Line** button should be set to **On Line** before running test prints. From the RIP software, open the **Printer Option** tab and click the **Test Print** button. The **Test Printer** window appears. Exercise movement of the belt and print head carriage by using the arrow keys in the **Test Printer** window.

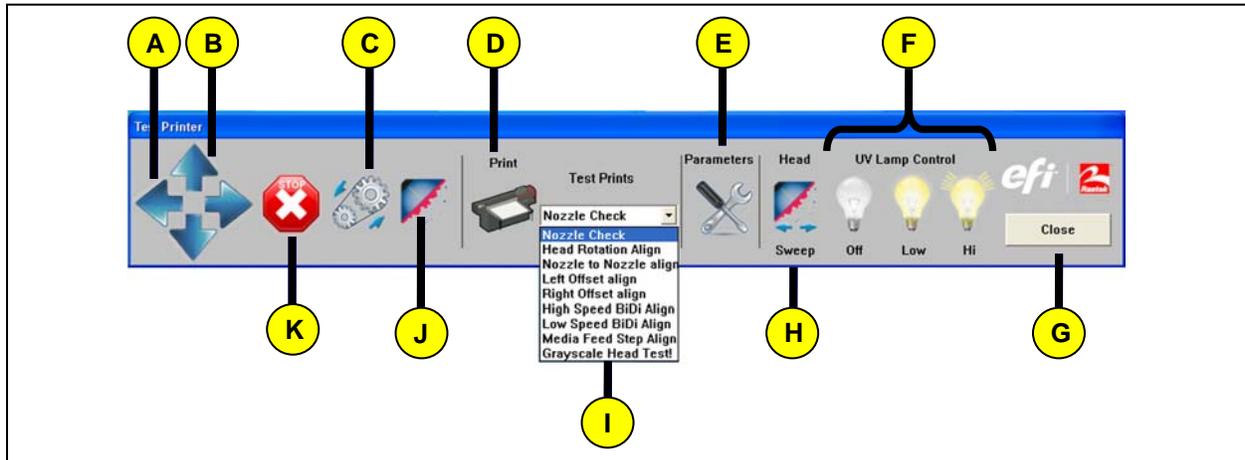


Figure 44 Test Printer Control Panel

| Table 4: Test Strip Interface Basic Features |  |
|--|--|
| A  | Carriage left and right motion: moves the carriage incrementally                               |
| B  | Belt forward and reverse motion: moves the belt incrementally                                  |
| C  | Belt continuous feed: used for testing and setting belt alignment.                             |
| D  | Print button: releases the selected test print from the print queue and activates the printer. |
| E  | Parameters button: access to base settings   |
| F  | UV lamp control: Allows users to specify bulb intensity and bulb sequence                      |
| G  | Close button: closes the test strip interface  |
| H  | Head Sweep button: performs a print head sweep routine   |
| I  | Pull-down menu: selection of printer tasks   |
| J  | Vacuum On/Off button: turns the head cleaning vacuum on and off                                |
| K  | Motion stop button: Instantly stops printer motion but does not shutdown the printer.          |



### Caution

**NEVER** manually wipe or clean the print heads. Manually cleaning the print heads can lodge lint or other particles in the print nozzles and result in permanent damage to the print heads.

### **Nozzle check**

For instructions on printing and evaluating a nozzle test check print, see **Chapter 6: Operator Maintenance Procedures**.

White media is the best choice for running check prints with CMYK. When checking white printing quality use light brown media or clear media for greater visibility of the white test print.

- 1 Check the CMK test pattern under normal office light
- 2 Check yellow test pattern under a blue light.

### **Additional Information**

For additional information on printing procedures and techniques, including printing with white, please refer to the OEM documentation provided with your Fiery XF or Onyx RIP software.

### **Resetting the UV lamps**

When a print run is complete, you may continue printing but remember to reset UV lamp power level based on the next print job you will be running. If you wish to shut down your H652 you may do so following one of the shut down procedures listed below. The UV lamps consume approximately 2 hours of their lifespan each time they are turned on or ignited, therefore it is recommended that if a print will be started within a 2 hour period the lamps should be turned on low and left on. The printer will automatically turn off the UV lamps after a 2 hour idle period. Operators can control the H652 lamp power from the efi/Rastek User Interface (RUI) such as the Test Strip or from within XF the printer control application.

### **Powering-down the UV lamps**

- 1 Turn off the UV lamps from the graphic user interface.
- 2 Allow the UV lamps to cool for 3 to 5 minutes.

### **Note**

The UV lamps will not ignite unless they are cool. UV lamp cooling fans will automatically shut off when the UV lamps have cooled sufficiently. To extend UV bulb life, efi/Rastek recommends setting the UV lamps to low power mode anytime the printer will be idle for more than 15 minutes. To ensure your safety UV lamps will turn off automatically following two hours of printer idle time.

## **H652 Shutdown Procedures**

If printing is complete for the day or for an extended period, follow the normal shut down procedure. Emergency stop buttons are to be used only in an actual emergency. Do not use e-stops to shut down your H652.

### **Normal Shutdown Procedure**

- 1 Turn UV lamps off and allow lamps to cool for a minimum of three minutes.
- 2 Turn off the belt vacuum.
- 3 Turn off the system power switch and suction pump switch.
- 4 Turn off main power breaker

At this point the H652 is completely turned off.

If you want to turn off the Print control computer as well, make sure the PC does not have the test strip open, the Parameters window open, or the RUI open before shutting down the printer control computer.

### **Emergency Stop Procedure**

- 1 Firmly press one of the emergency stop buttons located at far-left or far-right of carriage beam.
- 2 Clear the issue which required an emergency stop.
- 3 Turn off the system power and suction pump switches.
- 4 Turn off all power switches and breakers.
- 5 Close CMYK valve and the W pressure.
- 6 Manually home the head and carriage assembly to be centered over the cleaning station. Do not push the carriage too far to the left when manually homing the carriage.

After the emergency issue is resolved, printer operators may restart the H652 following the sequence below.

### **Restart Procedure following an Emergency Stop**

- 1 Clear issue which required an Emergency Power Off
- 2 Turn off system power switch and suction pump switch
- 3 Turn main power breaker off
- 4 Manually park the head carriage assembly in home position
- 5 Twist emergency-stop knobs CCW to reset the knobs
- 6 Turn on main power breaker
- 7 Turn on the system power switch and suction pump switch
- 8 Press the large green Power Start button at the lower right front corner of the printer
- 9 Open the CMYK and W pressure valve.
- 10 Open the test print bar and use the computer to move the carriage right and then left to park the carriage. This re-homes the carriage properly.
- 11 Sweep the print heads using the cleaning icons from the GUI. The H652 is now fully powered on.

#### **Note**

If the H652 has cooled off since its last use, allow the printer to reach operating temperature before starting or resuming a print run. Check to ensure all printer settings and conditions are met prior to starting or resuming a print run.

## Chapter 5: X and Y-Base Setting Procedures

### Setting X-Base:

The goal of setting the X-base is to calibrate the image position through software to the desired 0 point of the ruler located on the rear support table lip.

A tape measure or ruler will be used in this process.

Use either English Units or SIU Metric units. It is suggested not to convert back and forth until the process is complete.

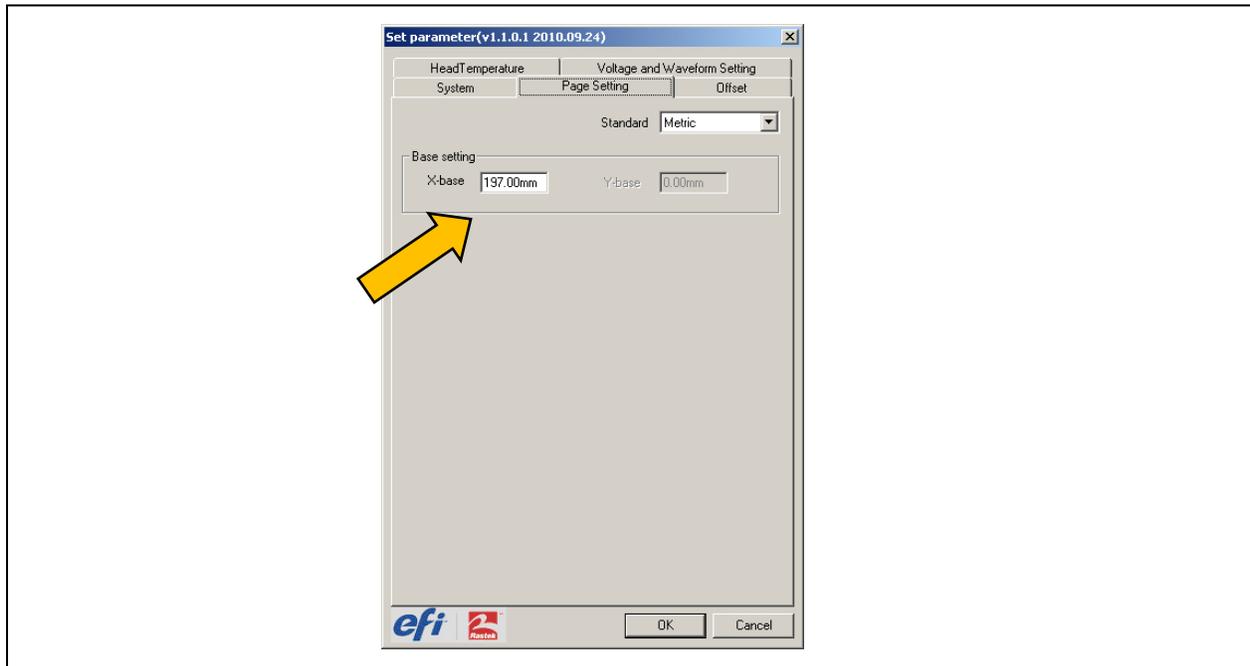


Figure 45 **Setting X-Base on the Page Setting Tab**

To set the Zero Point for the X-Base margin:

- 1 Locate some rigid media with a smooth surface, i.e. foamcore. Suggested dimensions of 24"x24" with square cut edges.
- 2 Properly load the test media on the printer
- 3 Align the edge of the media to the zero point of the measuring tape on the back table.
- 4 Load the front edge against the two sliding media stops
- 5 Set Blue RUI to Rigid Media
- 6 In the gray Set parameters: Page Setting tab set the X-Base to 7.76" or 200mm
- 7 In the Blue RUI parameters window, set the Margin(X) to 5" or 130 mm
- 8 Create an image with clearly defined edges that are smaller than the media.
  - If using 24"x24" then make the image 16" wide. This will prevent the image from printing on the belt if the initial margins are set to large.
  - Suggested print setting are 600x600, 4-Level, Smoothing=On, Double Strike=Off, BIDI printing.
- 9 Print the image. The print can be stopped as soon as a clearly defined edge can be seen on the print.

- 10 Once the printer stops, use the ruler to measure how far away the image is from the edge of the media.
  - a. Record this measurement. (example: measured = 5.5")
  - b. Do the following math: recorded measurement – Margin(X) (example: 5.5" – 5" = 0.5")
  - c. Add the results to the X-Base. (example: 7.76" + 0.5" = 8.26")
  - d. Write this result into the X-base window.
- 11 Check the results by loading the media again at the zero point and rerunning the image.
  - a. Print the image again on a clean section of the media.
  - b. If the settings are correct, the image should print 5" from the edge of the media this time.
  - c. If the settings are not correct, run the procedure again and make sure everything is done correctly.
- 12 Once the settings produce the correct x-position no adjustment further adjustments are required.

### Setting Y-Base

The goal in this case is to calibrate the Y-Base so that when rigid media is first pulled onto the platen prior to printing, the media will be fed so that the image will be printed full bleed to the leading edge of the media.

Setting set the Y-Base is similar to setting the X-Base and a tape measure or ruler is required.

Use either English Units or SIU Metric units. Do not to convert back and forth until the process is complete.

To set the Zero Point for the Y-Base margin the following steps are recommended.

- 1 Locate some rigid media with a smooth surface, i.e. foamcore. Suggested dimensions of 24"x24" with square cut edges.
- 2 Properly load the test media on the printer
- 3 setting the edge of the media to the zero point of the measuring tape on the back table.
- 4 Loading the front edge against the two sliding media stops
- 5 Set Blue RUI to Rigid Media
- 6 In the gray Set parameters: Page Setting tab set the Y-Base to 3" or 76mm
- 7 In the Blue RUI parameters window, set the Margin(Y) to 0" or 0 mm
- 8 Create an image with clearly defined edges which are smaller than the media.
  - a. If using 24"x24" then make the image 22" wide. This will prevent the image from printing on the belt if the initial margins are set to large.
  - b. Remember to set Margin(X) to appropriate value to match media position
  - c. Suggested print setting are 600x600, 4-Level, Smoothing=On, Double Strike=Off, BIDI printing.
- 9 Print the image. The print can be stopped as soon as a clearly defined leading edge can be seen on the print.

- 10 Once the printer stops, use the ruler to measure how far away the image is from the leading edge of the media.
  - a. Record this measurement. (example: measured = 0.5")
  - b. Subtract the recorded amount from the Y-base (example: 3" – 0.5" = 2.5")
  - c. Write this result into the Y-base window.
- 11 Check the results by loading the media again at the sliding Media Stops.
  - d. This time set the Margin(Y) in the Blue RUI to 1" (25mm)
  - e. Print the image like before on a new area of the media.
  - f. If the setting are correct, the image should print 1" off the leading edge.
  - g. If this is not correct, run the procedure again and make sure everything is done correctly.
- 12 Once the settings result in the correct Y-position this adjustment should not need future calibration.
- 13 Remember to set the Margin(Y) to 0 so that future prints will print full bleed to the leading edge.

This concludes the instructions for setting X-base and Y-base on the Rastek H652.

## Chapter 6: H652 General Operator Maintenance

Please follow all maintenance instructions to ensure the highest quality prints and maximum up time.

### Scheduled Maintenance of H652

The table below provides a brief description of periodic maintenance procedures to be performed by the printer owners and operators

| Maintenance Schedule            |       |       |        |         |           |               |          |             |  |
|---------------------------------|-------|-------|--------|---------|-----------|---------------|----------|-------------|--|
| Task                            | Often | Daily | Weekly | Monthly | Quarterly | Semi-annually | Annually | As Required | Operations to complete   |
| Check head temp                 | X     |       |        |         |           |               |          |             | Check head temp from the GUI   |
| Run head clean                  | X     |       |        |         |           |               |          |             | Activate head cleaning from GUI  |
| Nozzle check                    | X     |       |        |         |           |               |          |             | Run nozzle check print   |
| Check ink levels                |       | X     |        |         |           |               |          |             | Lift bottles to gauge how full   |
| Printer body                    |       | X     |        |         |           |               |          |             | Clean printer body   |
| Limit Switches                  |       | X     |        |         |           |               |          |             | Check to ensure working properly   |
| Ink supply lines and connectors |       | X     |        |         |           |               |          |             | Check for loose connections or leaks   |
| Carriage rail                   |       |       | X      |         |           |               |          |             | Clean rail and apply a light oil   |
| Clean ink bottles               |       |       | X      |         |           |               |          |             | Clean outside of ink bottles   |
| Encoder strip                   |       |       | X      |         |           |               |          |             | Clean encoder strip with IPA   |
| Cleaning station                |       |       | X      |         |           |               |          |             | Thoroughly scrub the cleaning station and surrounding area to completely remove all ink. |
| Remove ink waste                |       |       |        | X       |           |               |          |             | Drain waste ink suitable chemical waste container  |
| In-line Ink Filters             |       |       |        |         |           | X             |          |             | Remove and Replace   |
| Y-axis drive motor              |       |       |        |         |           |               | X        |             | Add gear box oil – Do Not overfill!  |
| UV bulb replacement             |       |       |        |         |           |               |          | X           | Replace both bulbs at once   |
| UV lamp filters                 |       |       |        |         |           |               |          | X           | Check and replace if dirty   |
| UV Lamp window                  |       |       |        |         |           |               |          | X           | Check and clean window if dirty  |
| Flush print heads               |       |       |        |         |           |               |          | X           | Run flush solution through heads   |

| Maintenance Schedule     |       |       |        |         |           |               |          |             |   |
|--------------------------|-------|-------|--------|---------|-----------|---------------|----------|-------------|---|
| Task                     | Often | Daily | Weekly | Monthly | Quarterly | Semi-annually | Annually | As Required | Operations to complete                          |
| Head alignment           |       |       |        |         |           |               |          | X           | Follow head alignment procedures                |
| Carriage belt            |       |       |        |         |           |               |          | X           | Check tension, tighten if needed                |
| Add heating fluid        |       |       |        |         |           |               |          | X           | Check level, add if needed                      |
| Inspections              |       |       |        |         |           |               |          | X           | Loose parts, connectors, hose clamps,           |
| Feed / take-up spool     |       |       |        |         |           |               |          | X           | Lubricate gears and bearings.                   |
| Dancer bars              |       |       |        |         |           |               |          | X           | Lubricate guides.<br>Inspect interlock switches |
| Attaching Hardware       |       |       |        |         |           |               |          | X           | Tighten any loose hardware                      |
| Vacuum Belt              |       |       |        |         |           |               |          | X           | Check, adjust for alignment and proper tension  |
| Drain ink overflow tanks |       |       |        |         |           |               |          | X           | Remove ink, dispose of ink properly             |

## Preparation

Clear the printer work area of any accumulation to ensure unencumbered progress while printing or performing maintenance tasks. Good housekeeping reduces cycle time and helps prevent safety hazards. In many cases the H652 must be turned off while performing maintenance procedures. However, diagnostic procedures often require the H652 to be powered on. Prior to operating the H652 please read, understand, and follow all safety instructions to ensure safety for yourself and others in the work area.

- 1 Check to ensure the ventilation system is on and functioning properly in the printer work area.
- 2 Inspect the printer and work area for any spills. Clean up any spills you may find.
- 3 Check to ensure the vacuum conveyor belt is clean and clear of any objects. The print head carriage must have its full range of unencumbered movement.
- 4 Ensure all emergency stop buttons are active by twisting them counter-clockwise.

## Daily Ink Level Check and Replacing Ink

The H652 is equipped with an ink low alarm which is accompanied by a GUI screen alert. Operators should not replace ink until the ink low alarm sounds and GUI alert appears.

Ink can be stored for a maximum of six months. However, 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. 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.

To check ink levels gently lift each ink bottle to determine how much ink it contains. Do not shake the bottles as shaking will produce foam. During normal printing operations a bottle of ink can last one to two weeks. Regardless, ink levels should be checked at least once a day.

The H652 Inks can be replenished while the printer is printing. However, it is recommended that the operator replenish the inks while the H652 printer is idle. To replenish white ink, the H652 must be idle. Please see also **Replenishing White Ink** below.

## Replacing CMYK Ink

To replace Cyan, Magenta, Yellow or Black ink:

- 1 Wear Nitrile or a similar type of gloves and wear proper eye protection when replenishing ink.
- 2 Place something on the floor around and under the printer to protect the floor and absorb spilled ink.
- 3 Remove the cap from the empty C, M, Y or K bottle of ink. Do not allow ink to drip from the ink-tube attached to the bottle cap. Use paper towels or shop rags to contain any dripping ink.



### Caution

**Never** refill an empty ink bottle. Use **only** a brand new bottle of ink when replacing H652 ink. At your discretion you may pour the minute amount of residual ink from the old bottle into the new ink. You may only pour forward a maximum of four times. On the fifth refill you must not pour anything at all into the new ink. Dispose of the old bottle and residual ink according to local environmental guidelines. Never discard of ink or related chemical waste in a common trash receptacle.

- 4 Replace the empty ink bottle with a brand new ink bottle.
- 5 Replace the cap on the ink bottle and ensure ink tubes are not pinched or obstructed before tightening.

## Replacing White Ink

Due to the recirculation device inside the white ink bottle, replacing the white ink must be done while the H652 is idle. Have plenty of paper towels or shop rags handy. To replenish the white ink:

- 1 Always wear Nitrile or similar type of gloves and eye proper protection when replenishing ink.
- 2 Place something on the floor around and under the printer to protect the floor and absorb spilled ink.
- 3 Prior to replacing the bottle of white turn off the white recycle. The recycle pump control is located on the Set Parameters > System tab. Uncheck white recycle.
- 4 Check the expiration date on your new bottle of ink to ensure the new bottle is still usable.
- 5 Unscrew the white ink bottle cap and lift it away from the empty bottle. The white cap has four ink tubes attached to it so keep plenty paper towels or shop rags handy and be careful to avoid dripping ink.
- 6 Place the new white ink bottle into the ink bay, insert ink tubes into bottle, and tighten the cap.
- 7 Clean up any spills on the printer or surrounding work area, especially the floor.
- 8 Turn on the white recirculation pump.

### Emptying Waste Bottle

Ink drains from the head cleaning station into a waste bottle located near the ink bay. Check the waste bottle once every two week or more often if running multiple shifts. When the waste bottle is 75% full, disconnect the drain tubes, clamp the drain tubes, and properly dispose of the waste bottle contents.

### Maintenance of Moving Parts

Perform the following maintenance tasks according to the recommended scheduled:

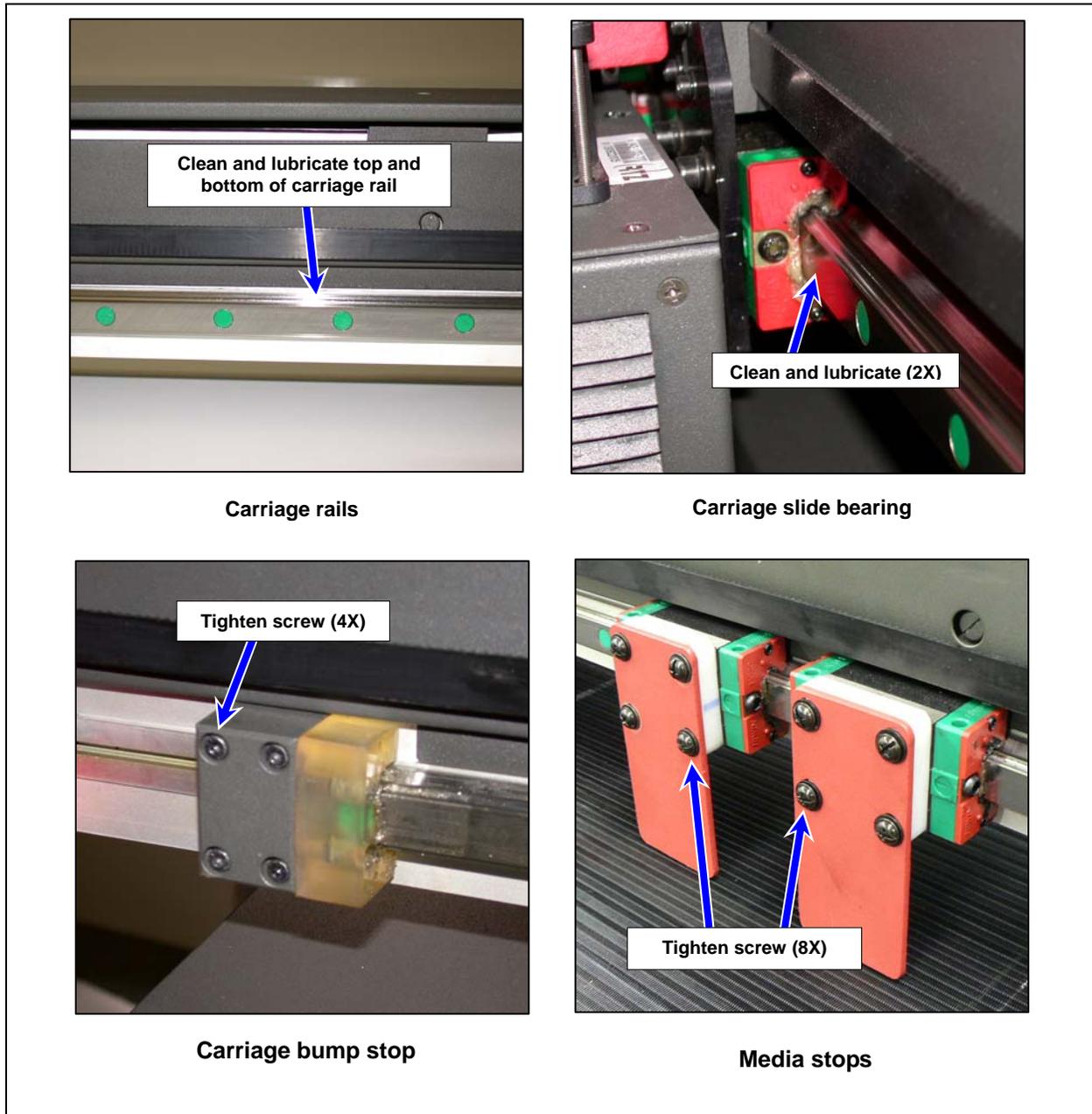


Figure 46 Maintenance of Moving Parts – View 1

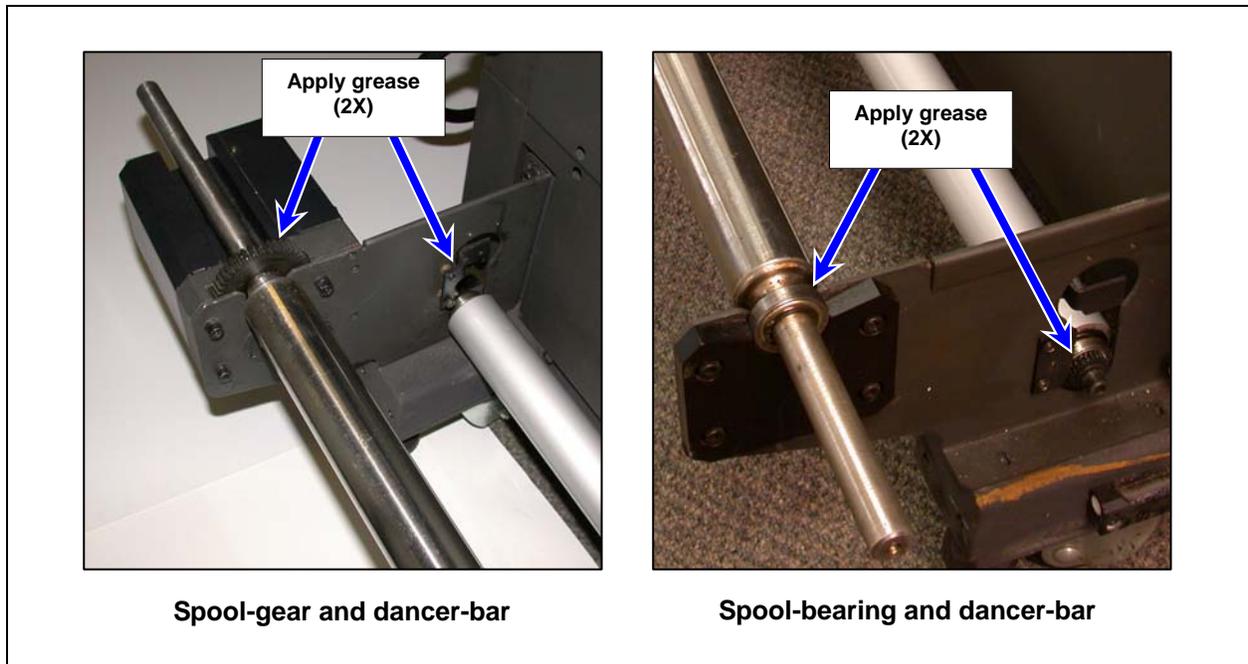
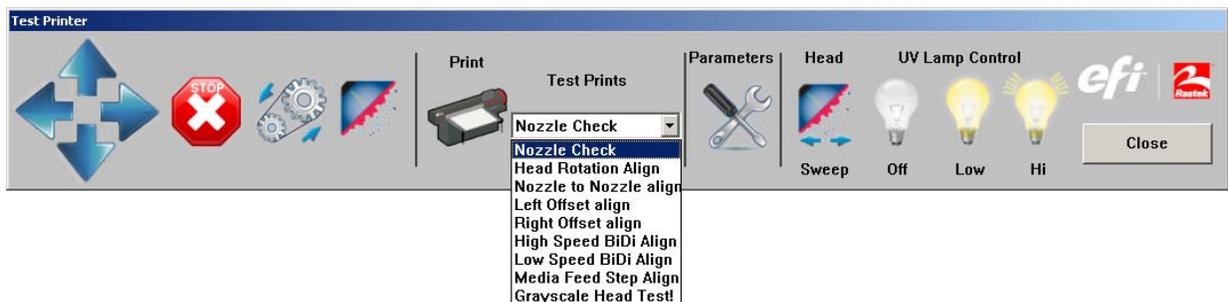


Figure 47 Maintenance of Moving Parts – View 2

### Print Head Nozzle Check

Prior to starting each new print job, efi/Rastek recommends checking the status of each print head. To check the print heads:

- 1 With the carriage at home position, place a section of white rectangular media on the vacuum belt. Media size should generously exceed the overall footprint of the print head carriage.
- 2 Click on Nozzle Check from the pull-down menu to run a nozzle Check print.



Carefully evaluate the nozzle test print for indications whether the nozzles are all firing consistently.

If the rectangles in the test print appear wavy the head temperature may be unstable. Check to ensure all printer settings are correct prior to continuing with your print run. See **Figure 48**.

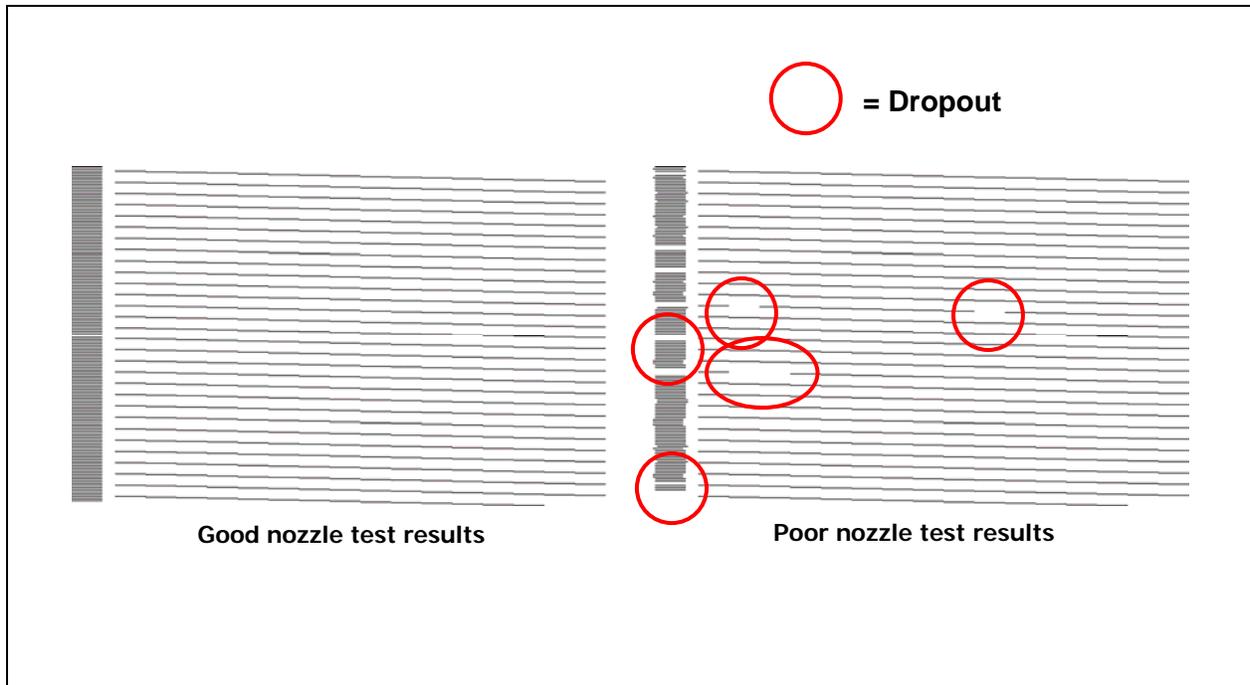


Figure 48 **CMYK Nozzle Test Print Results**

### ***Purging Ink and Sweeping the Heads***

If jetting check indicates nozzles are clogged, perform a manual purge followed by a sweep from the GUI. A print run can be paused to purge ink and sweep the print heads and all current settings will be retained. To purge and sweep the print heads:

- 3 From the Printing in progress window click the pause button to interrupt the print job.
- 4 Once the carriage is in its home position press and hold the ink purge button for five seconds.
- 5 Click the sweep button to activate the auto clean system.
- 6 After sweeping is complete, press the Resume button on the GUI to resume your print run.

Press the Advance button from the GUI to access printer parameters while printing. To abort any print job, click the Stop Sign button from the GUI. See **Figure 49**.

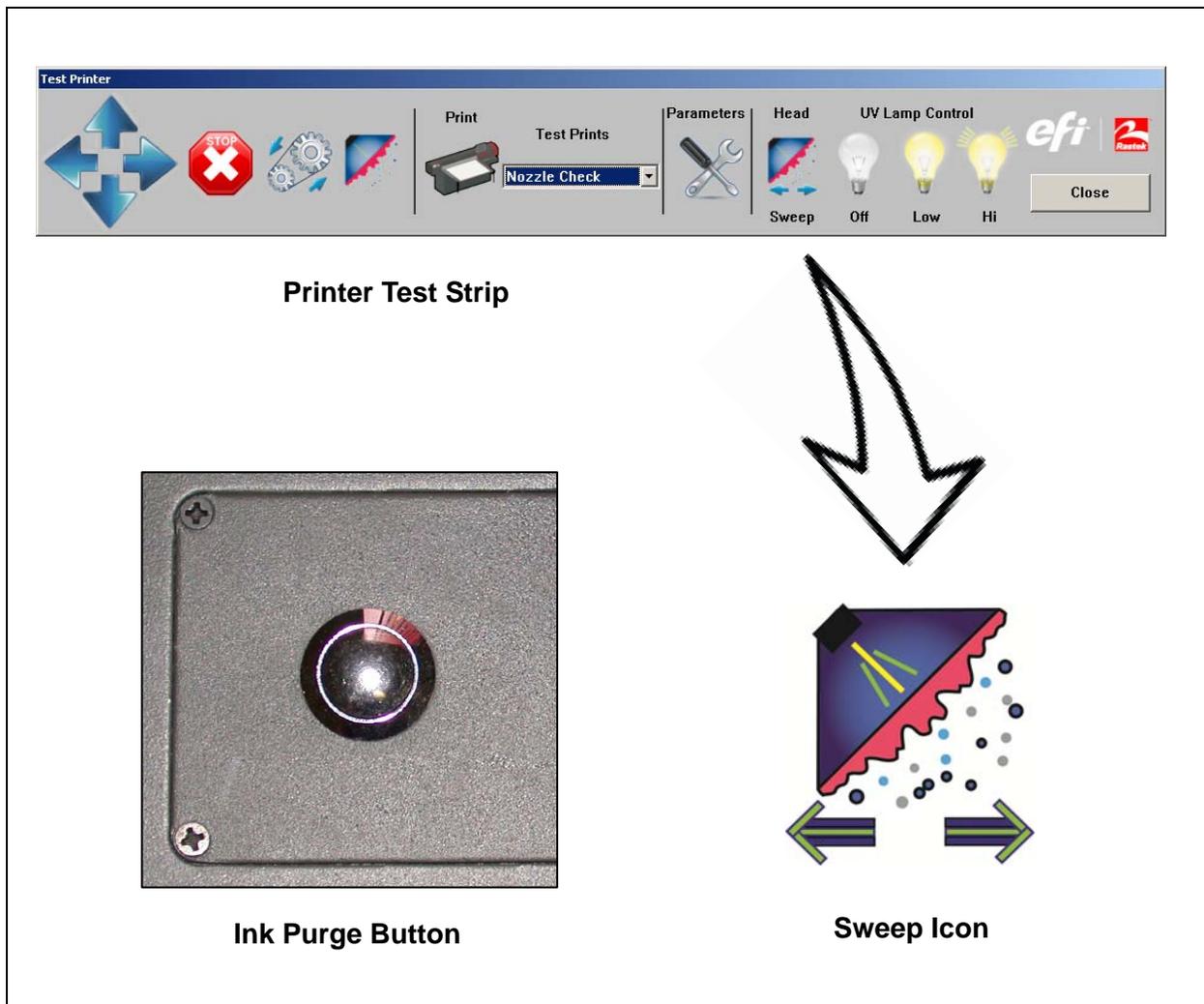


Figure 49 Ink Purge and Head Sweep

### Ink supply System Maintenance

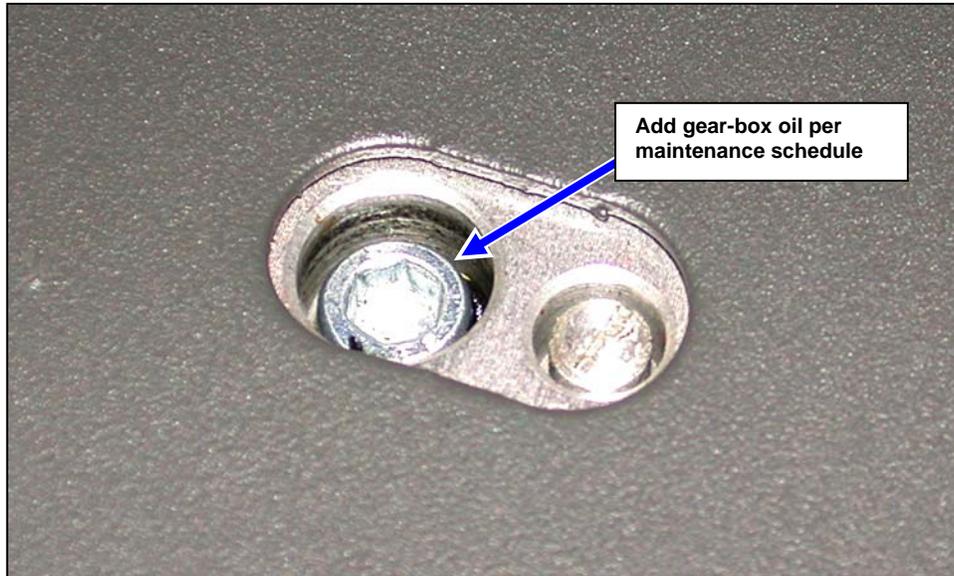
Service technicians should check to ensure the following maintenance procedures have been performed by the customer on a regular basis. Bringing your H652 into compliance is a necessary diagnostic measure for resolving service issues.

### Maintenance of Conveyor Belt

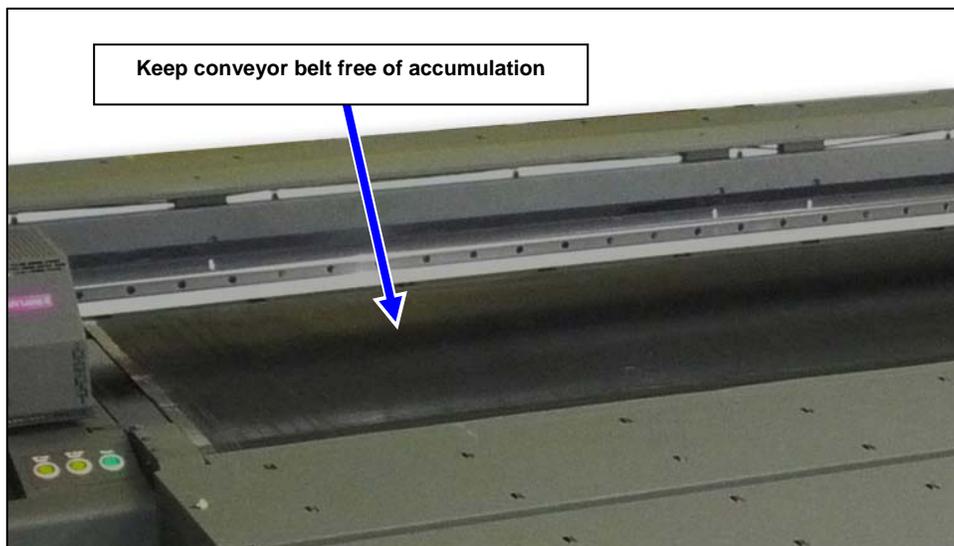
efi/Rastek does not recommend printing directly onto the Conveyor belt for any reason. Occasionally the Vacuum belt will receive small patches of over-sprayed ink. efi/Rastek strongly recommends that over-sprayed ink should be removed from the vacuum belt as quickly as possible. Ink can usually be removed from the vacuum belt using Isopropyl alcohol (IPA) and a clean-wipe. On occasion a small bristle brush may be necessary for removing stubborn spots. efi/Rastek does not recommend the use of a wire brush, sandpaper, or any abrasive device.

Check the belt drive motor for abnormal operation. Check to ensure the exhaust passage is clear to maximize belt drive motor strength.

For a more thorough conveyor belt maintenance please contact the efi/Rastek service department to schedule a visit from one of our field service technicians. The conveyor belt and its drive system components are not customer serviceable.



**Oil cap for conveyor belt gear box**



**Conveyor belt maintenance**

**Figure 50 Vacuum Conveyor Belt Maintenance**

## Maintenance of Head Cleaning Station

To limit ink accumulation at the cleaning station, replace the vacuum system filters every three months or more frequently if needed. Clean filters will optimize vacuum strength. The cleaning station must be kept clean to minimize the possibility of contaminating the print heads. Manually clean the cleaning station once a week or more frequently if needed. Use flush solution and a lint free wipe to thoroughly clean all surfaces and remove buildup. Check the waste bottle frequently to avoid an overflow. Consider the waste bottle contents as hazardous materials. Dispose of the waste bottle contents properly.

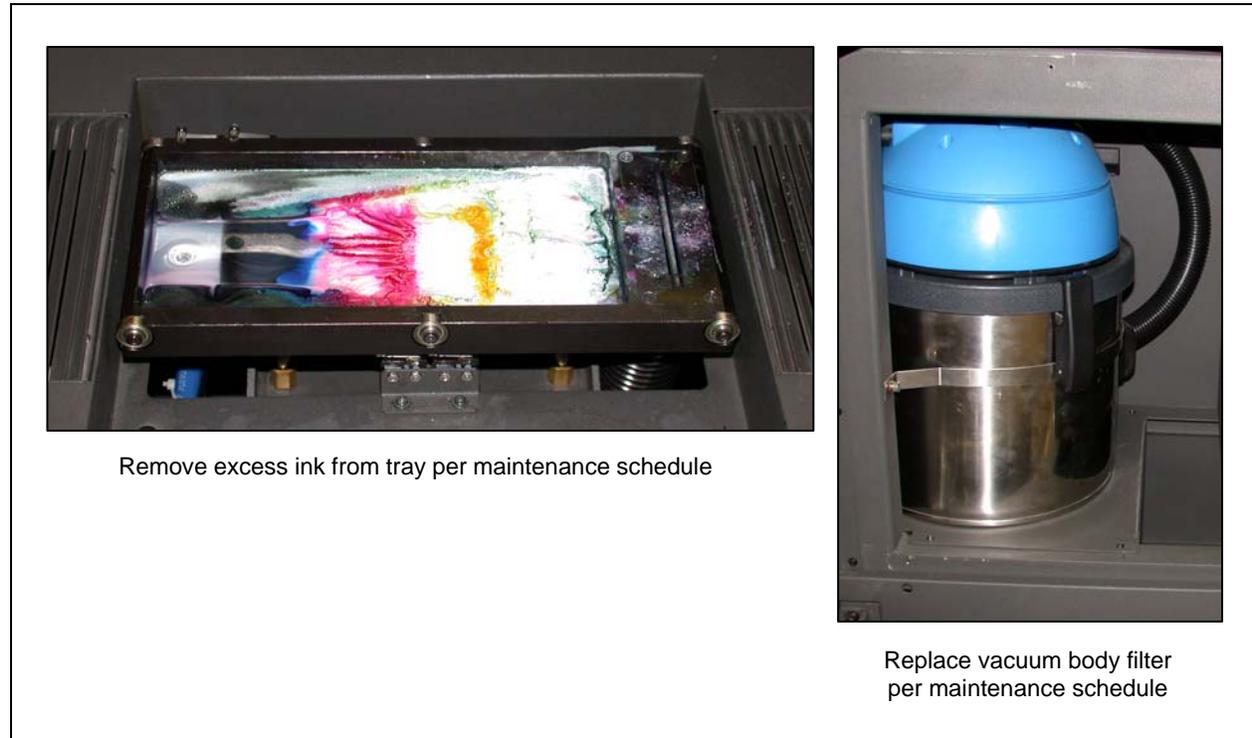


Figure 51 Auto Cleaning System Components

## Bleeding the Print Heads

Occasionally the operator will need to bleed air from the print heads. Bleeding air should not be required on a regular basis. However, operators must be capable of diagnosing and resolving ink flow issues. Air may become trapped in the print heads during jetting and cause the ink to drop out. Usually the print will look fine for a few passes but eventually show signs of drop out. Air bubbles can be trapped in one head or several heads simultaneously. Here are some possible scenarios where bleeding may be required.

- **The printer was just installed.**  
The process of installing and bringing up an H652 can allow air to be trapped in the inks, the printer tubing, ink reservoirs, and print heads. Allow a few days for the air bubble to settle out.
- **The printer was not properly turned on.**  
Follow power up procedures.
- The printer is shut off with a large number of nozzles out. Non-working nozzles can indicate the nozzles are open to the air allowing air to be drawn into the internal chambers of the head. The

solution is to run a sweep of the heads prior to shutting down the printer.

- **The printer is in a hot environment, the inks are not cooling quickly enough.**  
The temperature in the printer work area must not exceed 80°F (26.6°C). If the printer is hot when it is powered off, and work area is at 80°F (26.6°C) or higher, the UV inks cannot cool quickly enough. In this scenario fans must be set up around the H652 to cool the printer.
  - **One or more of the bleed tubes caps is leaking air.**  
Check to ensure the cap and threads are clean.
  - **A vacuum leak.**  
Check all lure fitting. Typically a vacuum leak affects all of the heads. If the problem is localize to a particular head or color, carefully check all the connections for the problematic print head.
- For additional details regarding the need to consistently bleed the heads, please contact field service.

### **Head Bleeding Procedure.**

- 1 Turn off the UV Lamps and allow them to cool.
- 2 Wear safety glasses and gloves at all times.
- 3 Close the white negative pressure valve located on the top of the print head carriage.
- 4 Determine which print head needs to be bleed and identify the appropriate bleed line.

#### **Note**

Bleed only one print head at a time to ensure proper ink line pressure.

- 5 Have ample paper towels or shop rags available prior to bleeding ink.
- 6 Find a catch container that is not susceptible to un-cured UV inks.
- 7 Place the container beneath the bleed line Lure fitting to catch expelled ink.
- 8 Open and remove the locking lure cap. The Lure cap may be difficult to remove. Do not damage the Lure cap or pull on ink bleed tube too aggressively.
- 9 Set the Lure cap aside to be reused.
- 10 Press and hold the Purge button for five seconds.

#### **Note**

Bubbling should subside after 2 to 3 seconds of continuous ink flow.

- 11 Continue to bleed the ink until bubbling subsides.
- 12 Quickly replace the Lure cap on the bleed line. If the Lure cap is not replaced quickly enough the ink will withdrawal into the bleed tube pulling air into the tube.
- 13 Check to ensure the Lure cap is tightly secured.
- 14 If bleeding more than one print head, continue with the next head and repeat steps 5 through 11.

#### **Note**

If you wish to bleed White ink separately you must open the W negative pressure valve and close the CMYK negative pressure valve. Negative pressure valves are located on the top of the print head carriage

- 15 Once bleeding is complete open the negative pressure valves.

- 16 Carefully clean up any spilled ink. Follow all local environmental laws when disposing of waste ink and soiled rags.
- 17 Check to ensure the carriage has not moved and is located directly over the cleaning station.
- 18 Press and hold the Purge button for five seconds.
- 19 Initiate a head maintenance from the Graph User Interface.
- 20 Prior to printing, check all head temperatures to ensure they are between 36°C and 37°C.

### Adding Fluid to the Print Head Heating System

The print heads of the H652 includes a heating system to maintain the print head temperatures within a specific operating temperature range. The heating system incorporates a series of poly lines to circulate a heated fluid mixture from head to head, until a mean temperature is achieved for all of the heads. The heating system sounds an alarm when monitored fluid levels become too low. Operators must add fluids to the heating system to maintain normal operating conditions. To add Fluids to the print head heating system,

- 1 Place a shop rag or some paper towels beneath the breather fitting
- 2 Open the Lure fitting in the heating system supply line. See **Figure 52**.
- 3 Attach the syringe to the Lure fitting and gently push the fluids into the heating system until fluids drip from the breather line.

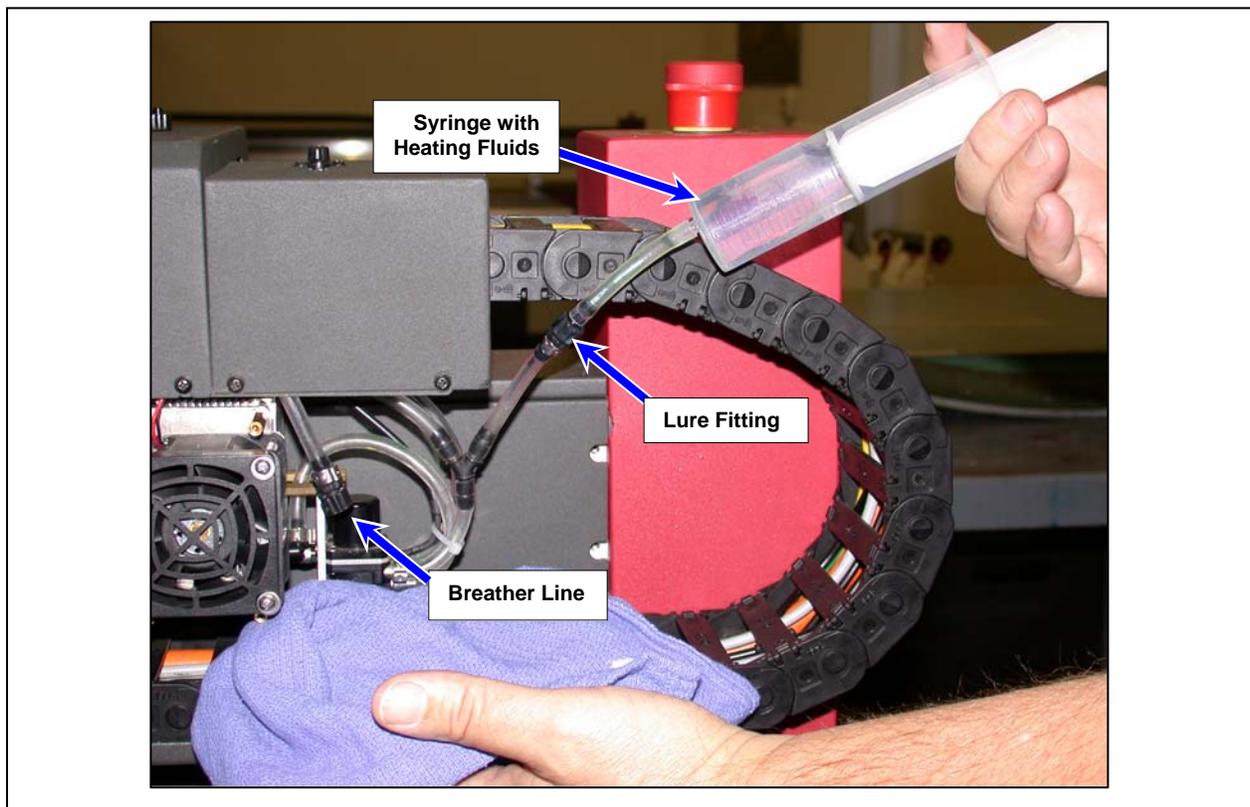


Figure 52 Adding Fluids to the Head Heating System

- 4 Cap the Lure fitting and twist the cap to ensure the cap is tight.
- 5 Clean up any fluids which may have spilled.

### Optical Encoder Strip Cleaning

To clean the optical encoder strip:

- 1 Remove both carriage beam top covers by loosening three captured screws on each cover.



#### Caution

When removing the carriage beam top covers avoid damaging the three interlock switches located on top of the carriage beam.

To fully expose the optical encoder strip you may, at your discretion, remove both front beam covers by loosening three captured screws on each cover.

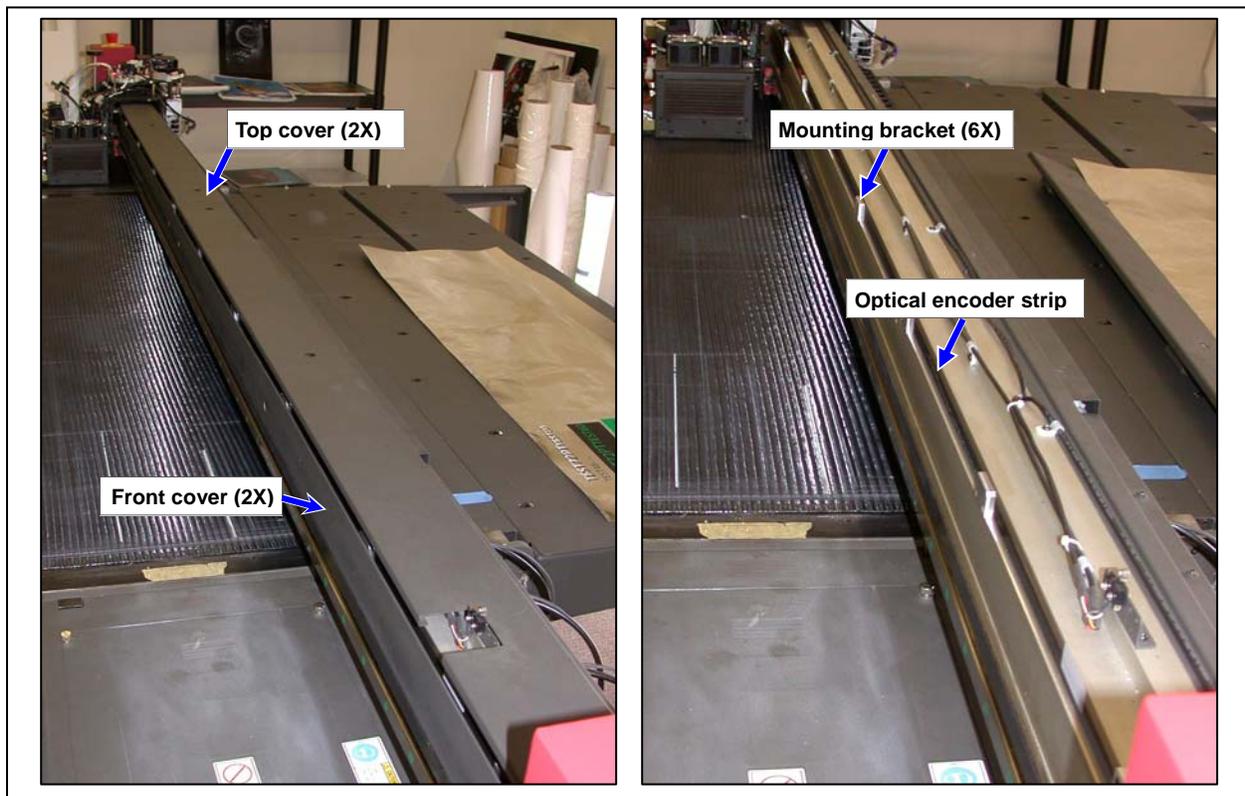


Figure 53 Removing Carriage Beam Covers

- 2 Apply some 90% or higher grade IPA to a clean lint-free cloth. Cloth should just be damp.
- 3 Gently clean one side of the encoder strip with the lint-free cloth and alcohol. See **Figure 54**.



#### Caution

Avoid folding or creasing the optical encoder strip during cleaning. Avoid pulling the encoder strip out of its mounting brackets.

- 4 Gently clean the opposite side of the encoder strip.
- 5 Visually inspect the optical encoder strip to ensure the strip is clean, undamaged, and has not become dislodged from any of its mounting brackets.



Figure 54 **Cleaning the Optical Encoder Strip**

- 6 Replace both top beam covers and secure by tightening three captured screws on each of the covers
- 7 Reinstall two front beam covers - if not installed - by tightening three captured screws on each of the covers

### **Cleaning the Carriage Rails**

Efi/Rastek recommends cleaning the carriage rails every 80 hours of printing. Ink and other airborne particulate may accumulate on the carriage rails during printer operation. Although the carriage bearings automatically clean the rails as the carriage moves, it is necessary to manually clean the rails once a week. In dusty environments, cleaning the rails daily is recommended. .

- 1 Locate some refined oil such as 3-in-1 oil, or WD-40.
- 2 Shut down the printer following the normal shut down procedure.
- 3 Apply some oil to a clean lint-free wipe.
- 4 Wipe both the top and bottom rail. Add oil to the Lint-free wipe as needed. Use additional Lint-free wipes and oil as needed.
- 5 When the exposed carriage rails have been cleaned, move the carriage from the parking station and continue cleaning the rails.
- 6 Return the carriage to the parking position and check to ensure no residual contamination was left behind from moving the carriage assembly.
- 7 Dispose of the soiled lint-free wipes properly.

## Maintenance of UV Lamp Assembly

The UV lamp assemblies are vital to curing UV ink. Each UV lamp has two air filters that must be replaced monthly to maximize UV lamp intensity. In addition the glass window located below the UV bulb needs to be inspected and cleaned on a regular basis. Cleaning will ensure no dried ink or debris are present which could diminish lamp intensity and curing ability.

Ensure the UV lamps are turned off and have completely cooled prior to performing any maintenance tasks. Clean the UV lamp window as needed using solvent and a lint free wipe.



### Caution

The UV bulb must never be touched with bare hands. Touching a UV bulb - even once - will leave an oil residue causing the bulbs to burst. Bursting UV bulbs may damage the print media and the printer. In addition, bursting bulbs may result in personal injury. Wear cotton gloves when handling UV bulbs.

Check to ensure the lamp shutter assemblies (one per lamp) are opening and closing properly. Occasionally operators will need to clean the lamp glass with window cleaner and a single edge razor blade. Please, use extreme caution when handling any kind of blade or hand tools.

## Inspecting and Cleaning UV Air Filters

The H652 UV Lamps are equipped with two air filters which prevent airborne particulate from accumulating on the UV bulbs. Air filters require inspection on a weekly basis and cleaning as necessary based on the observable level of dust accumulation.



### Caution

Overheating the UV lamps will shorten bulb life and may cause the lamps to turn off unexpectedly.

On the front of each lamp assembly are two thumbscrews, one for each UV lamp filter. Both filters on each of the two lamps must be inspected and cleaned regularly.

To inspect and clean the air filters:

- 1 Turn off main power breaker
- 2 Hold the solenoid wiring up to avoid damaging the connector or wires.
- 3 Loosen filter frame thumb screw as shown below.
- 4 Gently pull the filter and frame out of the receptacle.

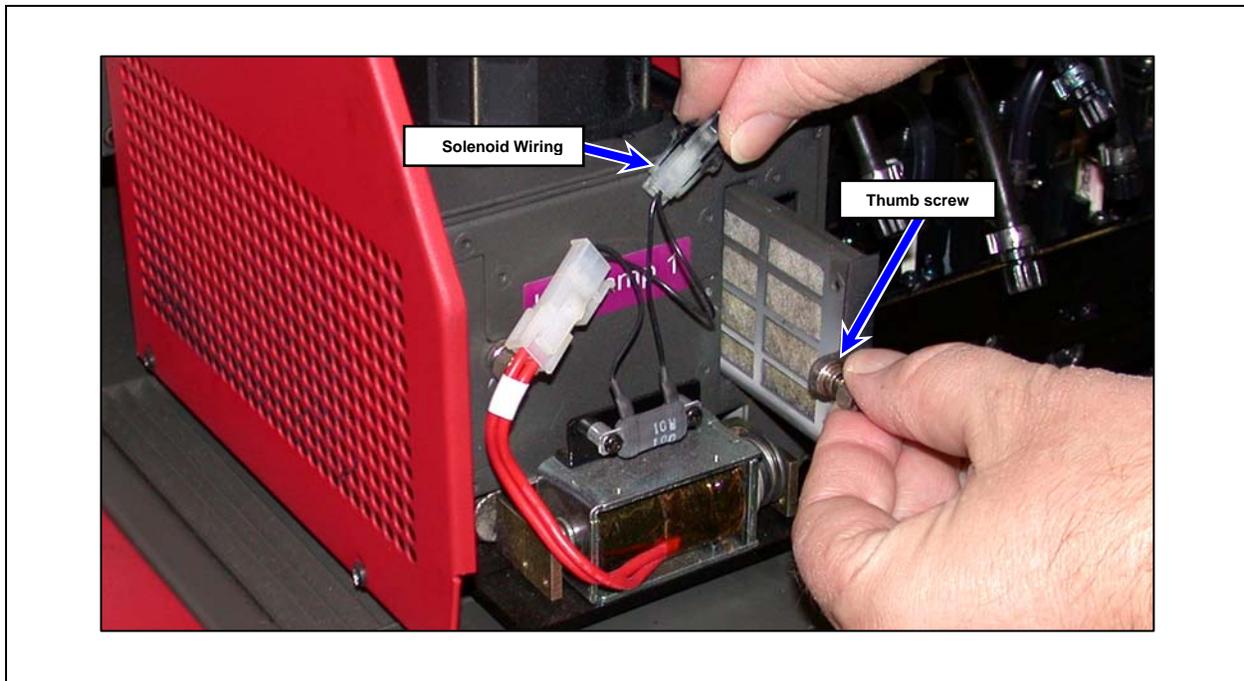


Figure 55 **Removal of Air Filter and Frame**

- 5 Inspect the air filter material for dust level and discard any filter that cannot be properly cleaned.
- 6 Clean the dirty filter using mild soap and warm water.



### Caution

Use only mild soap such as dish detergent when cleaning the UV lamp air filters. Cleaning the air filters with solvents will cause distortion, deterioration of the air filter material, and is not recommended.

- 7 Allow the filter material to dry.
- 8 Return the frame and filter in the receptacle and tighten the thumbscrews securely.
- 9 Repeat steps 1 through 4 until all four UV air filters are inspected or cleaned.

## Replacing the UV Air Filters

The UV air filter elements must be replaced on a regular basis to prolong bulb life and to prevent the UV bulbs from overheating. To replace the air filter elements in the UV lamps:

- 1 Turn off main power breaker
- 2 Hold the solenoid wiring up to avoid damaging the connector or wires. See **Figure 55**.
- 3 Loosen filter frame thumb screw as shown. See **Figure 55**
- 4 Gently pull the filter and frame out of the receptacle.
- 5 Remove two screws from each filter element clamp. Set screws and clamps aside to be reused
- 6 . Remove and discard the soiled filter element.

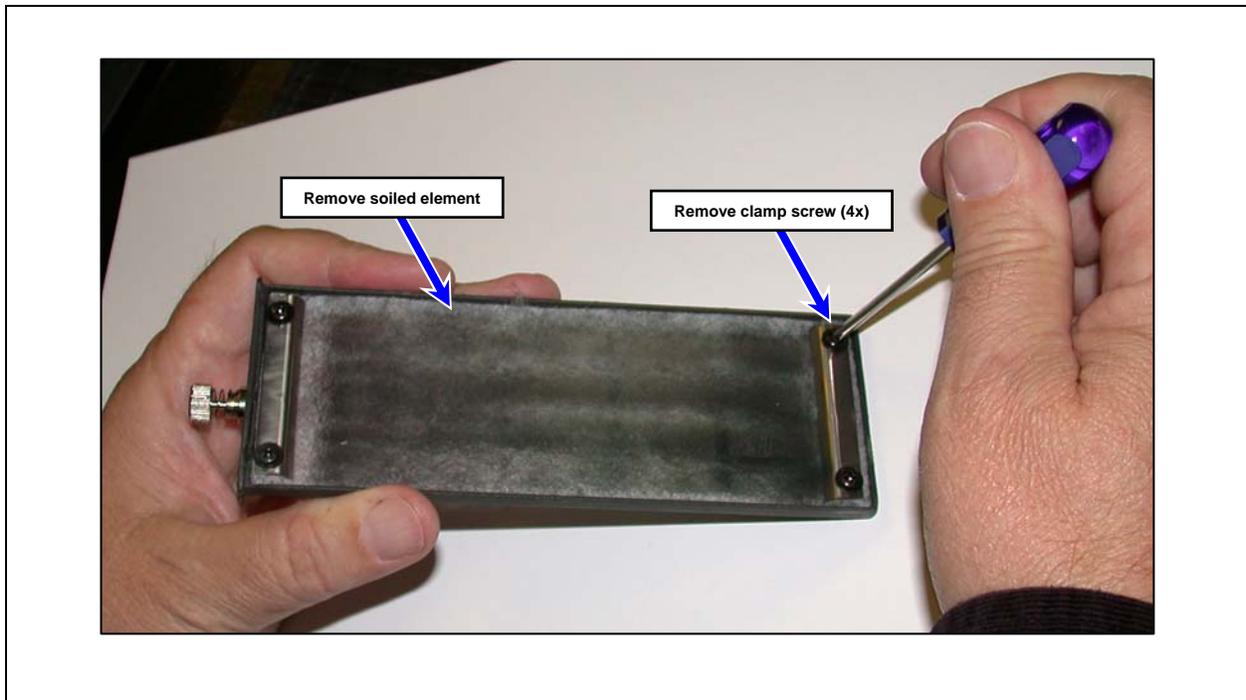


Figure 56 **Removal of Filter Element**

- 7 Cut a new section of filter material to **2 and 3/16** by **6** inches. Each UV lamp has two air filters so cut a total of four new filter elements.
- 8 Place the new filter element into the frame as shown below. The filter element should fill the frame and have no visible gaps around the edge.

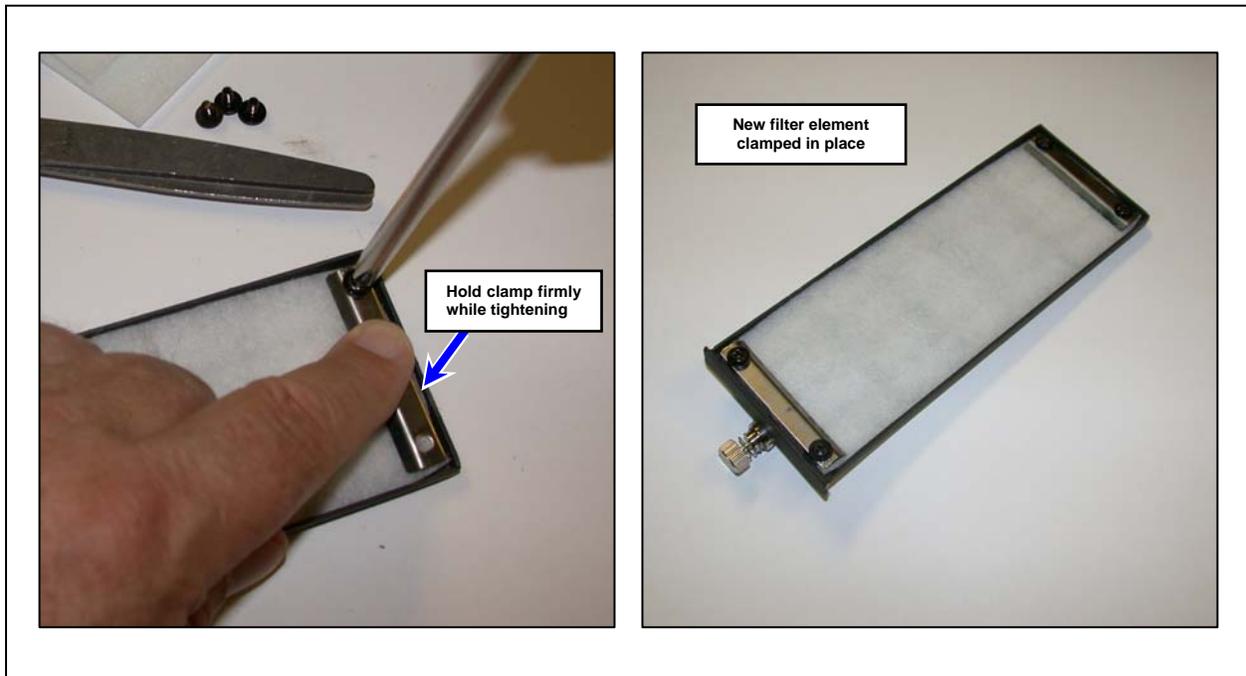


Figure 57 **Installation of New Fan Filter Element**

- 9 Hold the solenoid wiring up to avoid damaging the connector or wires.
- 10 Replace filter and frame into its receptacle on the UV lamp module
- 11 Tighten the thumb screw.

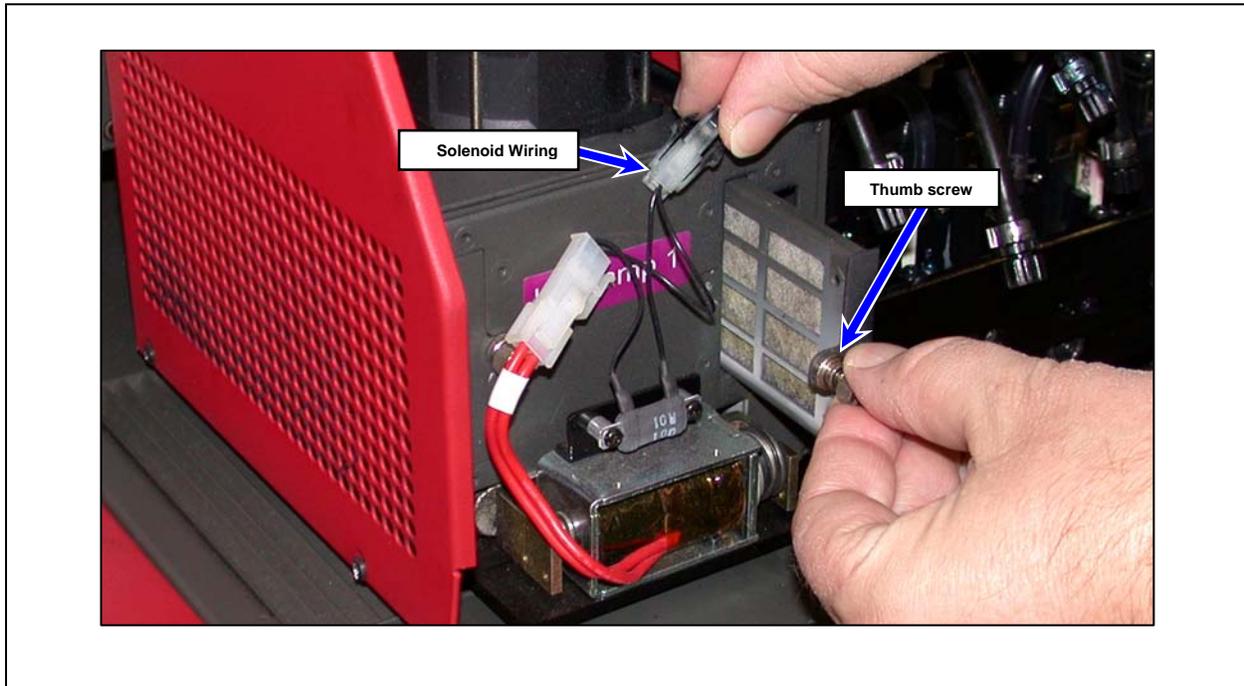


Figure 58 Replacement of Air Filter and Frame

- 12 Replace the second air filter on the UV Lamp Module. Rastek recommends replacing all four air filters at the same time.
- 13 When filter replacement is complete check for any loose screws or pinched wires before powering up the H652 or running any prints.
- 14 Clear all materials away from the H652 belt and carriage path.

### UV Bulb Replacement

UV bulbs have a projected lifespan of 500 hours and will require replacement at regular intervals. The actual bulb lifespan varies dependent upon number of times ignited, level of intensity and other factors. UV bulbs can become ineffective at curing inks while still producing visible light and heat. Rastek recommends replacing your UV bulbs in pairs to ensure uniform UV intensity during printing.

#### Tools Required

- Standard Field Service Tool Kit
- Latex, Nitrile, or an equivalent type of gloves
- Isopropyl Alcohol
- Lint Free Wipes

## Procedure

To install new UV bulbs on your H652:

- 1 Shutdown the printer following the normal shutdown procedure.
- 2 Turn off main power breaker
- 3 Clear a work surface and lay several lint-free wipes on the work surface.
- 4 Check to ensure the UV bulbs have completely cooled.
- 5 Begin removal of carriage shroud by loosening four screws, two at each side of the shroud.
- 6 Continue removal of the shroud by removing two screws from two locations inside the carriage shroud as shown below.

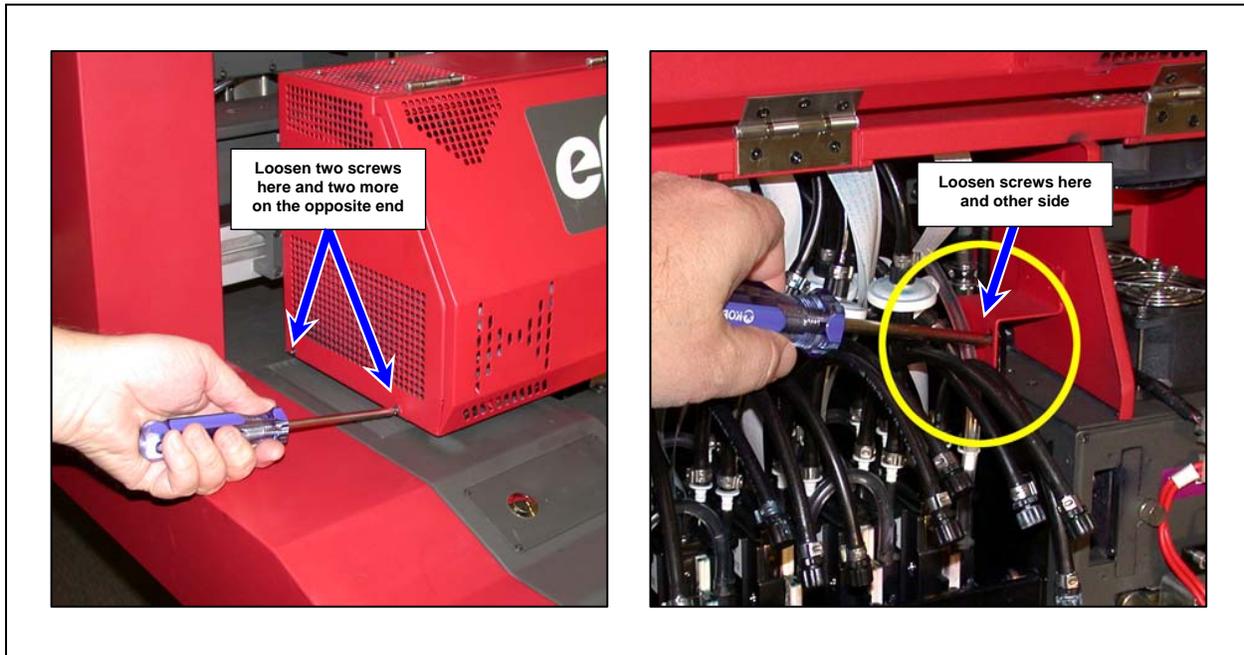


Figure 59 Removal of Carriage Shroud

- 7 Disconnect the cooling fan power connector in two places

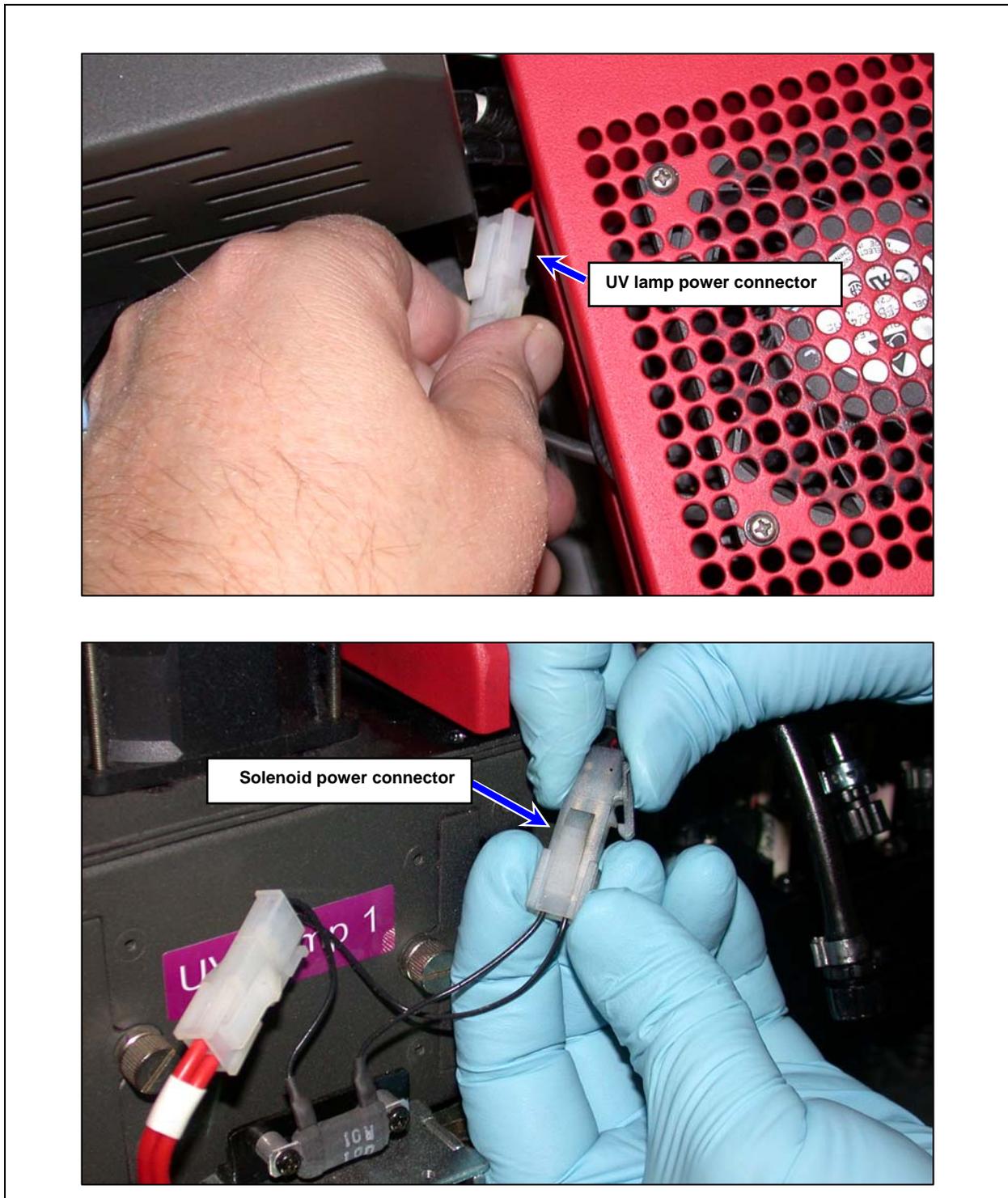
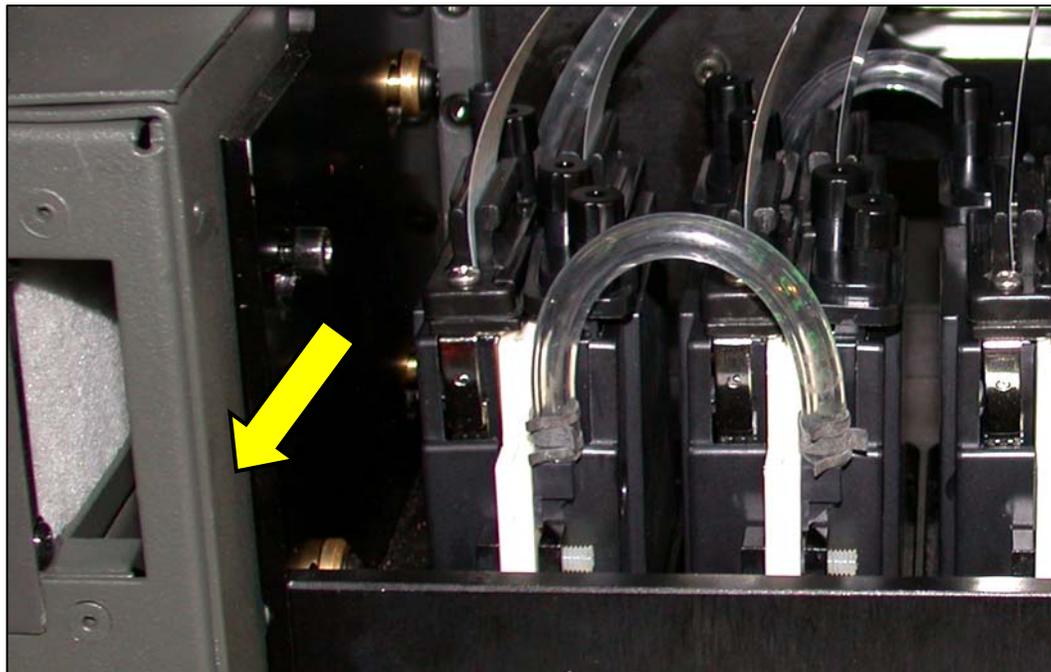
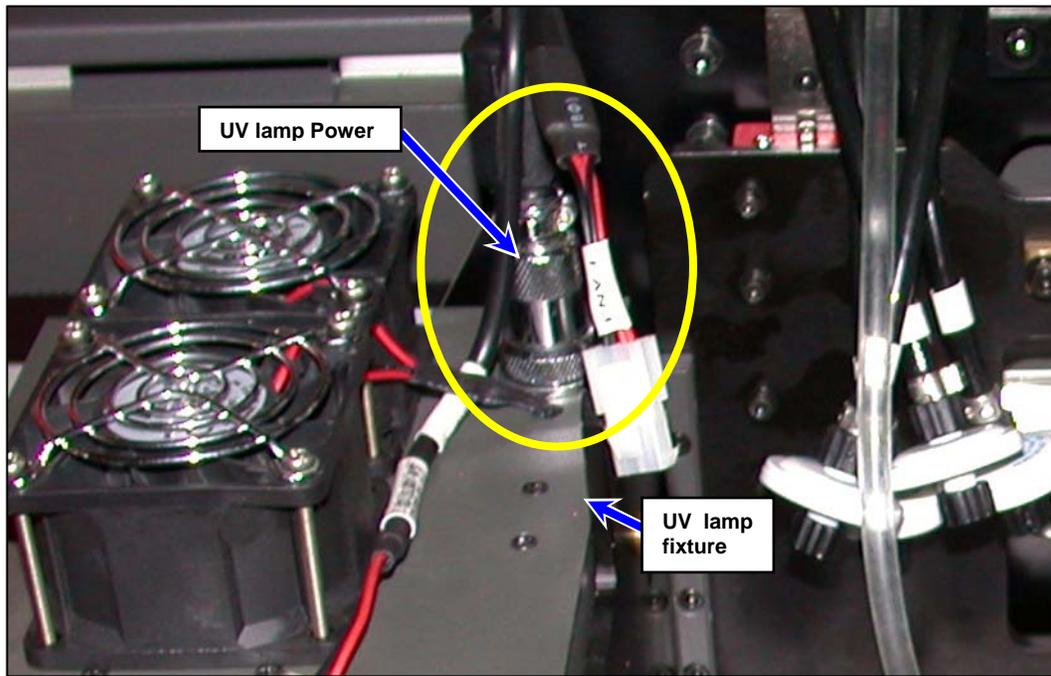


Figure 60 **Cooling Fan power Connectors**

- 8 Disconnect the solenoid power connector.
- 9 Disconnect the lamp power connector by turning the collar counter-clockwise then gently rock the connector from side to side to free it from its receptacle.



**Figure 61 Removal of Lamp Module**

- 10 Pull lamp module forward and slightly to the left to release it from its mounting plate.
- 11 Place lamp module on a clean work surface.

- 12 Remove four screws holding the inner lamp fixture to the lamp module. Set four screws aside to be reused later in this procedure.
- 13 Gently pull the lamp fixture up and away from the lamp module.

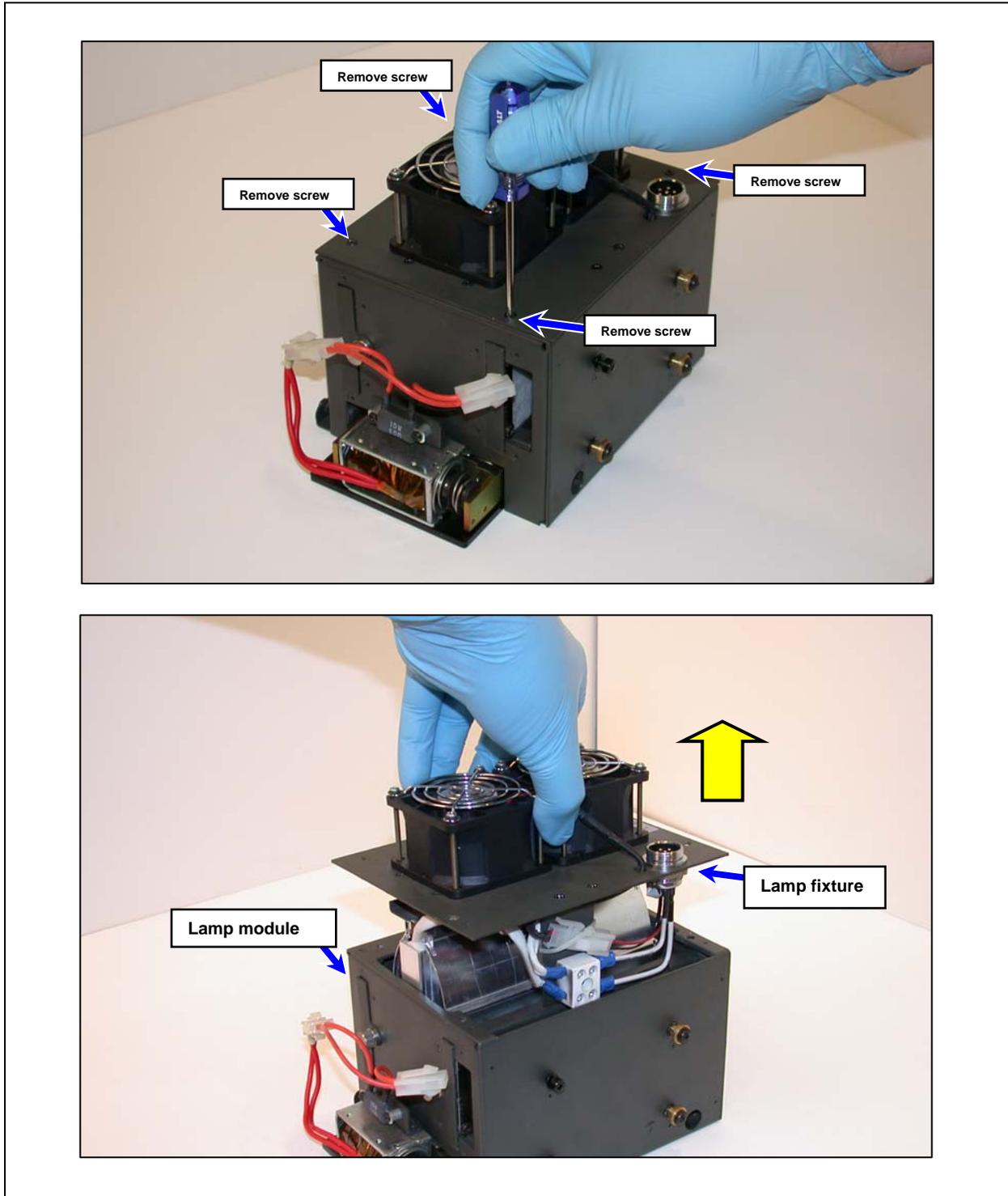


Figure 62 Lamp Module and Lamp Fixture Separation

- 14 Lay the lamp fixture on a clean work surface and position as shown below.
- 15 Loosen two screws in the ceramic block to disconnect the UV bulb leads.
- 16 Turn the lamp fixture over to expose the spent UV bulb.

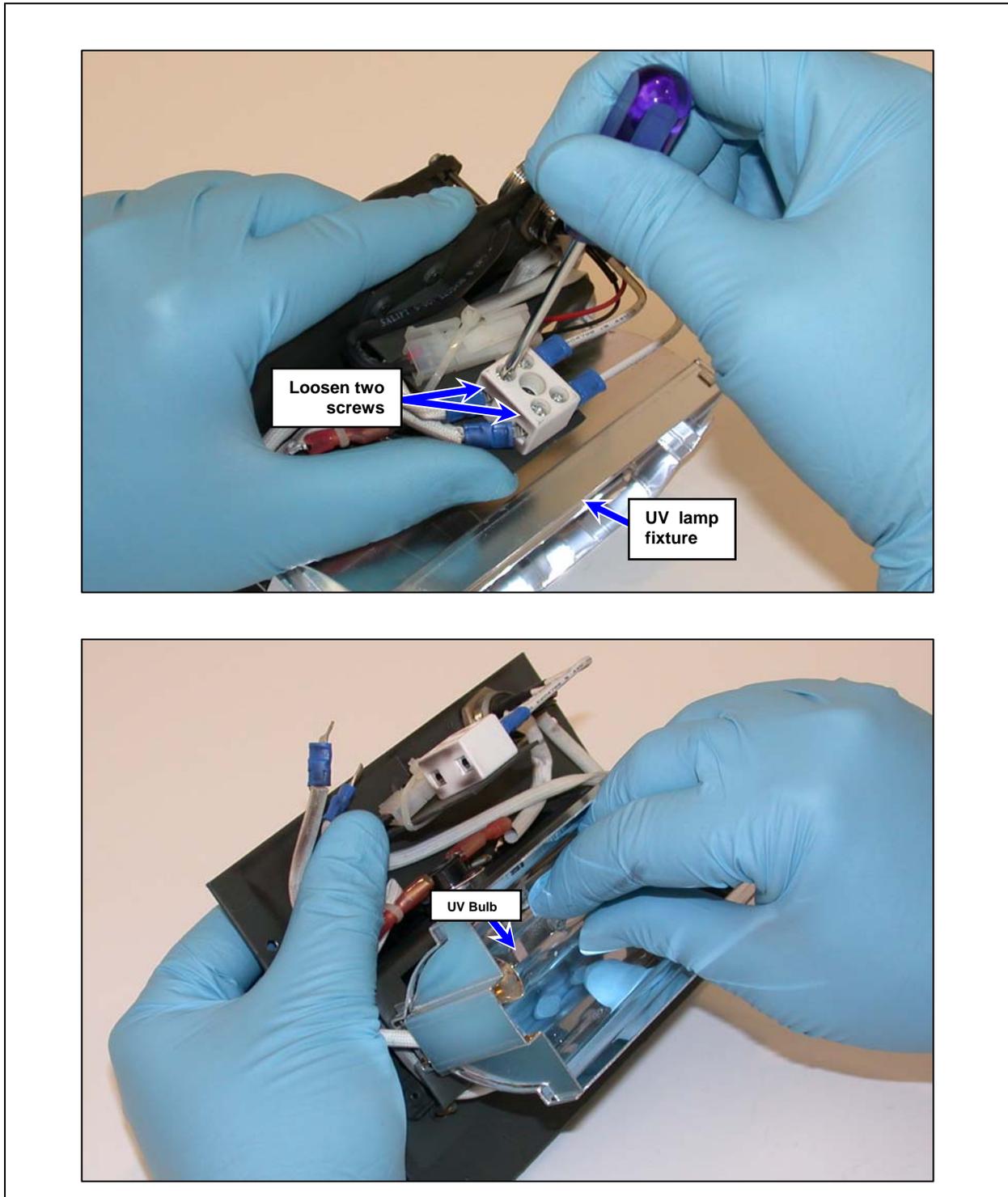


Figure 63 UV Bulb Removal

- 17 Hold the lamp fixture firmly, pinch the spent UV bulb, and pull the bulb straight up out of the retaining clips.
- 18 Guide the bulb leads to aid in freeing the spent UV bulb from the fixture.

### Caution

Spent UV bulb contains mercury and considered hazardous waste. Spent UV bulbs should be disposed of properly and should never be thrown in the trash.

- 19 With gloved hands you may open the replacement UV bulb.



### Warning

**NEVER** touch a UV bulbs with your bare hands. Touching a UV bulb - even once - will leave an oily residue which will eventually cause the UV bulb to burst. A bursting UV bulb will cause damage to the print media and may cause damage to your printer. Additionally, a bursting UV bulb will create a biohazard and could result in personal injury to you. Rastek recommends the use of cotton gloves when handling bare UV bulbs.

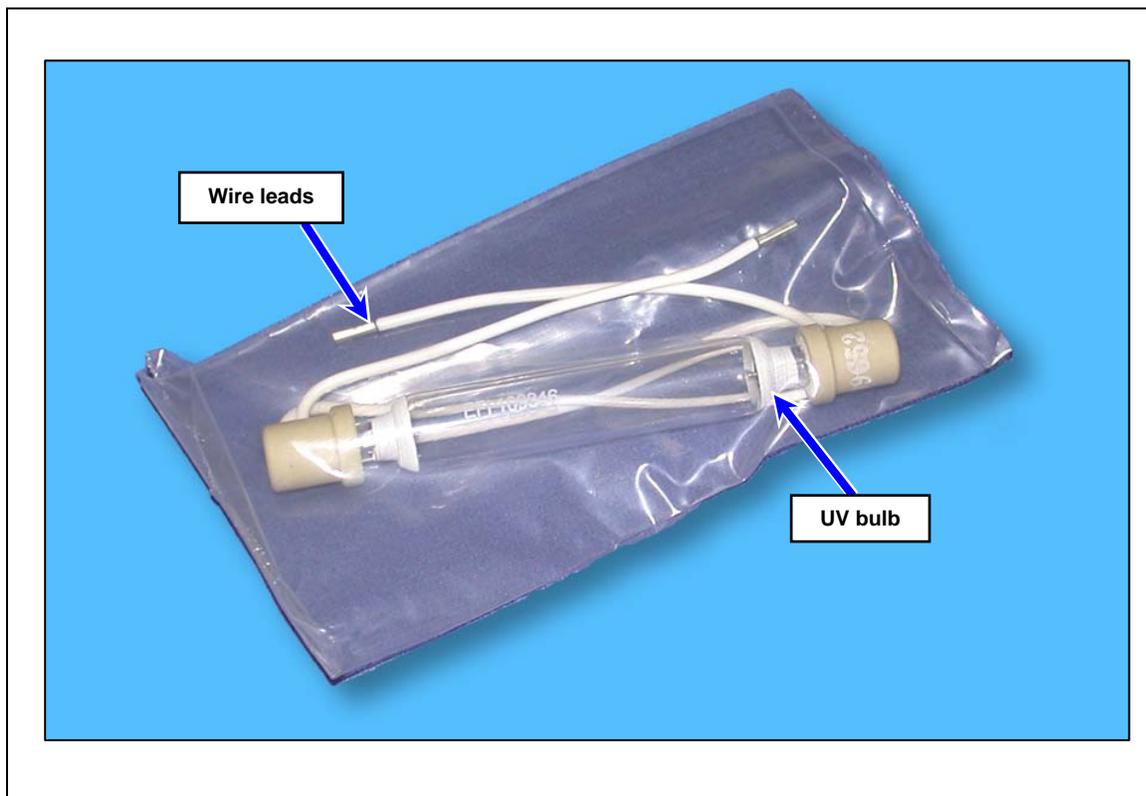


Figure 64 Hermetically Sealed Replacement UV Bulb

- 20 Prior to connecting the new bulb the wire leads must be shortened to and some insulation removed from the wire ends. To modify the UV bulb wire leads:
  - a. Measure the wire length of the old UV bulb
  - b. Cut the wire length to match the original UV bulb.
  - c. Strip approximately 1/4 of an inch of insulation from each wire end.
- 21 Feed the wire leads through the lamp fixture and neatly route the leads to the ceramic block.



### Caution

Cutting into the wire strands will adversely affect the electrical connection and inhibit bulb performance

- 22 Gently insert the new bulb into the bulb retaining clips.
- 23 Insert each wire end into its contact location and tighten the retaining screws.
- 24 Check to ensure the retaining screw makes a positive contact with the wire lead end.

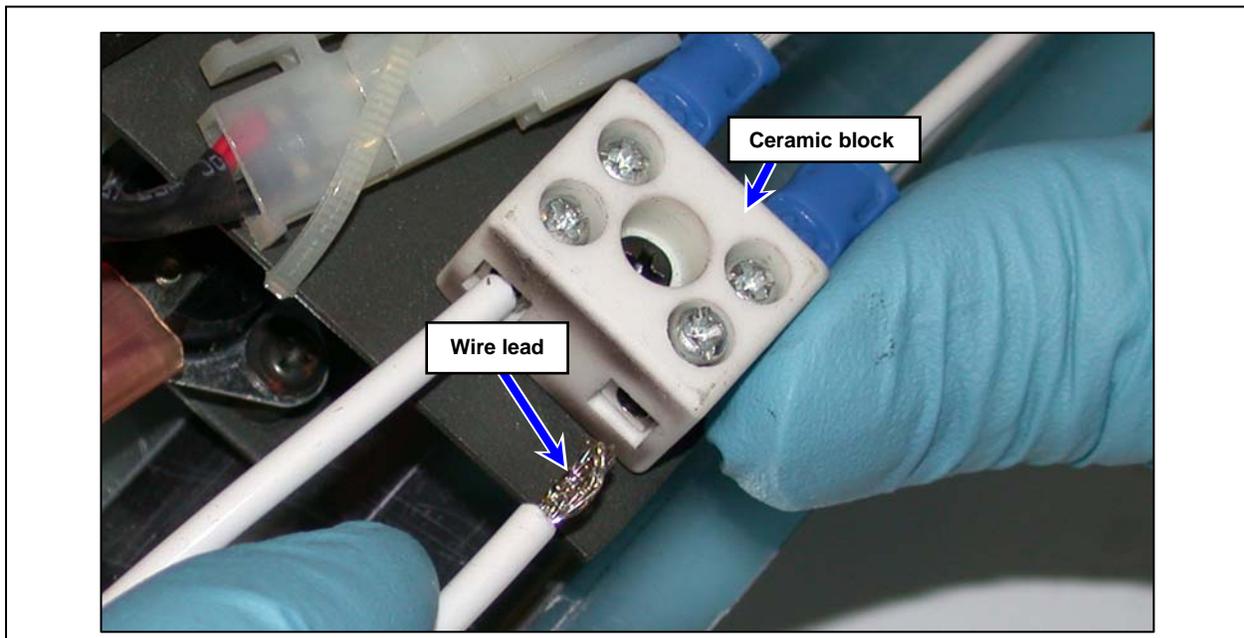


Figure 65 Bulb Wire Lead and Ceramic Block



### Warning

The UV lamps modules use high voltage to ignite the lamps. any exposed bare wires inside the lamp fixture may cause electrical arcing. Arcing will result in damage to the printer and may cause personal injury such as burns or electrical shock.

- 25 Place the UV lamp fixture into the lamp module and secure using four screws you sat aside earlier.
- 26 Attach the lamp module to the carriage assembly.
- 27 Connect the lamp power connector and tighten the connector collar.
- 28 Connect the Solenoid Connector.
- 29 Replace the second UV bulb by repeating **steps 7 through 28** on the second lamp module.
- 30 Continue with step 31 after both UV bulbs are installed and both lamp modules are secured to the print head carriage assembly.
- 31 Attach the lamp shroud using the screws you set aside earlier.
- 32 Connect the fan power connectors in two places
- 33 Check to ensure all electrical connectors secure and there are no loose wires anywhere.
- 34 Power up the H652 following the normal power up procedure.
- 35 Turn on the UV lamps ensure both lamps are functioning properly.
- 36 Verify the lamps by running them on high power for at least 10 minutes
- 37 If no issues after ten minutes you may proceed with a test print. Remember to properly set the carriage height before printing.

### **Removing UV Ink from the Vacuum Belt**

Occasionally the Vacuum belt will receive small patches of over-sprayed ink. efi/Rastek strongly recommends removing over-sprayed ink from the vacuum belt as quickly as possible. Ink can usually be removed from the vacuum belt with the aid of Isopropyl alcohol (IPA) and a clean lint-free cloth. On occasion a small bristle brush may be necessary for removing stubborn spots. Efi/Rastek does not recommend using a wire brush, sandpaper, or any abrasive device directly on the belt material.

## Appendix A: H652 Specifications

| Table 5: H652 General Technical Specifications |  |
|--|--|
| Description                                    | Specification  |
| Model Number                                   | H652   |
| Print head type                                | Grayscale drop-on-demand piezoelectric, dual-row   |
| Number of print heads                          | Five   |
| Print head color configuration                 | 1: Cyan, 1: Magenta, 1: Yellow, 1 Black, and 1: White  |
| Print resolution (dpi)                         | 300 x 300, 600 x 450, 600 x 600, 900 x 900, 1200 x 600   |
| Print Settings                                 | Bi-directional or Uni-directional  |
| Print Productivity / Output rates              | Ultra Quality Mode, 16 Pass, 600 dpi, 80 ft <sup>2</sup> /hr (7.43 m <sup>2</sup> /hr)                 |
|  | High Quality Mode, 8 Pass, 600 dpi, 130 ft <sup>2</sup> /hr (12.1 m <sup>2</sup> /hr)                  |
|  | Quality Mode, 4 Pass, 600 dpi, 255 ft <sup>2</sup> /hr (23.69 m <sup>2</sup> /hr)                      |
|  | Express Mode, 2 Pass, 300 dpi, 455 ft <sup>2</sup> /hr (42.27 m <sup>2</sup> /hr).                     |
| Maximum media limits                           | Media width: 65 inch (165 cm)  |
|  | Printing width: 65 inch (165 cm)   |
|  | Printing thickness: 1.8 inch (4.6 cm)  |
|  | Media weight: 75 lbs. (34.02K g)   |
|  | Roll diameter: 9 inch (23 cm)  |
| Minimum PC system req.                         | 2 GB RAM, 40GB HD, Windows XP Professional   |
| Power requirements                             | 205 - 235VAC, single phase, 50 - 60Hz, 30 Amps maximum   |
| Operating conditions                           | Environmental Temperature: 65 <sup>o</sup> - 80 <sup>o</sup> F (18 <sup>o</sup> - 26.6 <sup>o</sup> C) |
|  | Relative humidity: 30% - 80% (non-condensing)  |
| Weight   | 1000 lbs (635 Kg)  |
| UV lamp power rating                           | 700W each  |
| Overall dimensions                             | Height: 52 inch (132 cm)   |
|  | Width: 121.5 inch (308 cm)   |
|  | Depth: 94 inch, without support tables (238.7 cm)  |
|  | Depth: 40 inch, without support tables (101 cm)  |

## Appendix B: Glossary

### - A -

#### **Adobe Acrobat**

Documentation software created by Adobe Systems Inc. for converting any document into an Adobe Portable Document Format (PDF) file.

#### **aliasing**

A defect which occurs when a graphic file does not have enough resolution to reproduce image detail and causes visible jagged lines along the edges.

#### **attachment**

When referring to e-mail, an electronic file placed within an e-mail for the purpose of sending through the Internet.

### - B -

#### **banding**

The horizontal, parallel lines in an ink jet print caused by misaligned or defective print head. Also the vertical lines which may be the result of a mechanical issue.

#### **bi-directional printing**

A printing mode that allows the print heads to fire each time the heads pass over the substrate, regardless of direction of travel. See also unidirectional.

#### **bitmap images**

Computerized image made up of a collection of dots or pixels; these images appear blocky when you zoom in; also known as raster images.

#### **bleed**

Ink which prints beyond the trim edge of the page, created for the purpose of allowing ink to extend to the edge of the page after trimming. Without bleed, cutting the product becomes extremely difficult and may sacrifice the quality of the product.

### - C -

#### **cmyk**

Cyan, magenta, yellow, and black. The subtractive primaries, or process colors, used in color printing.

#### **color bar**

Strips of color used as a tool to check color accuracy and density.

#### **color mapping**

The terminology that permits the “best match” in appearance to the “source image”.

**color separations**

The process of preparing artwork, photographs, transparencies, or computer-generated art for printing by separating color into the four primary printing colors: cyan, magenta, yellow and black.

**contrast**

The comparing of light and dark on an image, such as low = gray (light).

**crop**

To cut off parts of a picture or image.

**crop marks**

Printed lines showing where to trim a printed sheet.

**- D -**

**densitometer**

A quality control device used to measure the density of printing ink.

**density**

The degree of color saturation in an image or photograph.

**dithering**

Creating dots to “fool the eye” into seeing shades of gray.

**dot size**

Relative size of halftone dots as compared to dots of the screen ruling being used. No unit of measurement expresses dot size. Dots are too large, too small or correct only in comparison to what the viewer finds attractive.

**dots-per-inch (dpi)**

Unit of measure for print and electronic images. Used to set resolution of input devices such as scanners, display devices such as monitors, and output devices such as laser printers, image-setters. also called dot pitch. See also Pixel.

**Drop-On-Demand (DOD)**

An ink jet system in which pressure pulses are generated directly in the print head by piezo-crystals or heated resistors to eject drops of ink only when they are needed to print a dot. See also impulse.

**drop mass or drop volume**

The size of a jetted drop of ink, usually measured in nanograms. Adequate jet-to-jet drop mass uniformity is required in many applications in order to eliminate banding. When 1 is the specific gravity, 1picoliter (pL) = 1.

**drop velocity**

The speed at which a drop of jetted fluid travels from the print nozzle to the receiving medium.

**- E -**

**encapsulated postscript (eps)**

An Adobe Systems Inc. graphic file format for high-resolution images; it translates graphic and text into code that tells a printer to print in the highest resolution possible and also has low-resolution view files for quick screen viewing.

**encoder**

A device or transducer that converts linear or rotary motion information into uniformly spaced incremental signals.

**- F -**

**first in first out (fifo)**

A form of low-level memory (for example , a shift register). Used in the data path for temporary storage of bitmap data on its way to a print head.

**fire pulse**

A high-voltage electrical signal of precise shape, amplitude, and width, causing a jet to eject a drop. Also called a drive pulse.

**firmware**

Embedded software, for example , software that is not loaded from a storage device at startup, but resides on the board or in the chip.

**fire pulse amplitude (fpa)**

The peak voltage of a fire pulse.

**file transfer protocol (ftp)**

The language used to facilitate the transfer of files from a server on the Internet to another location, such as a desktop computer or another server.

**- G -**

**graphic interchange format (gif)**

An image format type generated specifically for computer use. Its resolution is usually low (72 dpi, equals that of computer screen), making it undesirable for printing purposes.

**gradient**

Color in shades from one starting point to another, gradually blending in between a grade change in a hue. A transition of color, creating a blended change between screen percentages of a single color or between two different colors.

**grain**

The direction in which the paper fibers lie.

**- H -**

**head drive electronics module (hdem)**

The component of the Apollo PSK that creates the high-voltage drive pulses. Programmable for pulse amplitude and width, as well as rise and fall time.

**hypertext markup language (html)**

A series of formatting commands that describes the components of graphics and text material in a consistent manner when displayed on the World Wide Web.

**- I -**

**image**

Usually a photograph that is translated into a bitmapped image by scanning.

**image area**

Designated area of the substrate, specified by the operator, that receives the printed image.

**impulse**

The electronic impelling force that ejects a drop of ink from the print head.

**initialization file**

A file, usually with the extension.ini, that sets startup variables for an application program.

**ink jet printing**

Printing method that involves spraying droplets of ink from computer-controlled nozzles.

**- L -**

**large format printing**

Refers to large-sized prints, typically A1-sized or larger, produced in full color utilizing digital ink jet printers.

**- M -**

**MSDS (Material Safety Data Sheets)**

A document which describes the potential safety hazards of a chemical. Instructs how to handle it safely and how to respond to exposures or spills.

**meniscus**

The curved surface at the top of a water column, or at any interface between a liquid or solid. Nozzles have a meniscus, whose shape and position are set by a slight negative pressure in the jets at rest, balanced against the surface tension of the liquid.

**- P -**

**portable document format (pdf)**

An electronic document format from Adobe Systems Inc., that allows the distribution of digital files across a wide range of platforms. PDFs can be display a document, formatted as originally designed, with no additional software or fonts required on the viewing computer. PDFs can be viewed via Adobe's free Acrobat Reader. To get the free Adobe Acrobat Reader please visit the Adobe Systems Inc. web site at <http://www.adobe.com/products/acrobat/readstep2.html>

**pigment**

Particles that absorb and reflect light and appear colored to our eyes; the substance that gives ink its color.

**pixel**

Short for Picture Element. A single dot on a monitor or in a digital image. See also Dots-per-inch.

**portable network graphic (png)**

A standard graphic image file format not used on Rastek Printers.

**print head**

Ink delivery mechanism of a digital printer directly responsible for applying ink to a printing substrate.

**protocol**

The set of conventions defining communication between electronic components; for example, a host computer and its interface. The way information is placed on a network. The steps needed to communicate or activate an operation or exchange of information in or between computers.

**purge**

Performed for a variety of print head maintenance reasons. A regulated pressure applied for a fixed amount of time at the air interface to the ink reservoir attached to the print head jetting assembly. Used to force ink, along with air bubbles and debris (if present), out the jets through the nozzles.

**- R -**

**raster**

A line of pixels. Also, the process of rendering an image or page, pixel by pixel, in a sweeping horizontal motion, one line after another.

**rasterization**

The process of converting mathematical and digital information (vector commands) into a series of

dots by an output device.

**raster image processor (rip)**

A combination of computer software and hardware that controls the printing process by calculating the bit maps of images and instructs the printing device to create the images. Most RIPs operate on PostScript.

**resolution**

The dots per inch (dpi) of a design. Measured by how many dots or pixels are in one inch of a design. The measurement of the fineness or detail. The higher the resolution, the finer the detail in an image.

**- S -**

**satellites**

Small droplets of jetting fluid generated behind the main drop as it detaches from the nozzle.

**substrate**

Any material with a surface suitable for printing purposes.

**- T -**

**tagged image file format (tiff)**

A standard graphic image file format often used for storing high-resolution images that can easily handle up to 24 bits of photographic image color.

**transmission control protocol/ internet protocol (tcp/ip)**

This is an open communications protocol implemented on diverse systems and the Internet and is the preferred protocol for practical operability.

**- U -**

**unidirectional**

A printing mode that only allows the print heads to fire in one selectable of direction of travel. See also bi-directional.

**- V -**

**varnishing**

A transparent coat of varnish which is applied to the printed material to produce a glossy finish.

**viscosity**

The flow rate or thickness of a liquid resulting from the friction of its molecules.

**End of Document**

---

DECLARATION OF CONFORMITY



**This certifies that following designated product**

Product: DIGITAL PRINTING SYSTEM  
 Model No.: H652  
 Manufacturer: **SHENZHEN RUNTIANZHI IMAGE TECHNOLOGY CO., LTD**  
 Guanlan Hi-tech Industry Park, Huanguan South Road, Bao'an District,  
 Shenzhen, China  
 Trade Mark: efi|Rastek

**Complies with the following directives and harmonized European standards**

|               |   |  |
|---------------|---|--|
| • 2006/42/EC  | • Machinery directive                         | EN ISO 12100-1: 2003+A1: 2009<br>EN ISO 12100-2: 2003+A1: 2009<br>EN ISO 14121-1: 2007 |
| • 2006/95/EC  | • The Low Voltage Directive                   | EN 60204-1: 2006+A1: 2009  |
| • 2004/108/EC | • The Electromagnetic Compatibility Directive |  |

**Test Report issued by**

Anbotek Compliance Laboratory Limited  
 Report No. 200907719M-3

**This declaration is the responsibility of the manufacturer/importer**

**SHENZHEN RUNTIANZHI IMAGE TECHNOLOGY CO., LTD**

Place issues Guanlan Hi-tech Industry Park, Huanguan South Road,  
 Bao'an District, Shenzhen, China

Authorized Signatory Name: LiuWenhui

Title: Engineering Manager

Signature: LiuWenhui

Date: Sept. 06, 2010



Company Stamp