

Kirk-Rudy, Inc.

Instruction and Parts Manual NetJet InkJet System



Manufactured by Kirk-Rudy, Inc.

Before using this machine, all operators must study this manual to understand and follow the Safety Warnings and Instructions. Keep these instructions with the machine for future reference. If you have any questions, contact your local Kirk-Rudy, Inc. Distributor.

10000-NetJet

Manual

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1 Important Safety Instructions

Intended Use Statement: The NetJet Print System is stationary, software driven, printing station capable of printing at resolutions up to 600 DPI on products capable of drying a water based ink. It is designed to print vertically downward onto product conveyed beneath it. A Sensor, upstream of the Imager triggers printing, while an Encoder, mounted in direct contact with the product transport belt, ensures high print quality by providing real time belt speed to the Print Imager. Printing is controlled by Graphical User Interface (GUI) software. Usage for other purposes may lead to an unsafe condition.

SAVE THESE INSTRUCTIONS. Read all instructions before using this product.



WARNING

- * NEVER OPERATE THE MACHINE WITHOUT ALL GUARDS OR SAFETY DEVICES IN PLACE.
- * ALWAYS TURN POWER OFF WHEN MAKING ADJUSTMENTS.
- * ALWAYS DISCONNECT THE POWER SUPPLY BEFORE ANY MAINTENANCE OR SERVICE WORK.
- * NEVER START THE MACHINE WITHOUT FIRST CHECKING ALL PERSONNEL ARE CLEAR OF MOVING PARTS.
- * KEEP FINGERS CLEAR OF ALL MOVING PARTS.
- * NEVER REMOVE THE PRODUCT FROM THE MACHINE WHILE MACHINE IS RUNNING.
- * SHOULD MISFED PRODUCT JAM THE MACHINE AND STOP IT FROM RUNNING, ALWAYS PRESS THE STOP BUTTON BEFORE CLEARING PRODUCT. IF THE STOP BUTTON IS NOT PRESSED AND THE JAM IS CLEARED, THE MACHINE WILL BEGIN RUNNING.
- * IT IS NOT RECOMMENDED THAT LOOSE CLOTHING, JEWELRY AND LONG HAIR BE WORN WHILE OPERATING THIS MACHINERY.
- * ALWAYS USE AN EXPERIENCED ELECTRICIAN WHEN TROUBLE-SHOOTING ELECTRICAL PROBLEMS.
- * CHANGES OR MODIFICATIONS TO THIS UNIT NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.
- *THE AUTOMATIC PRINTIMAGER PROVIDES A SAFETY INTERLOCK CIRCUIT TO PREVENT PERSONAL AND SYSTEM INJURY. THIS INTERLOCK DISABLES THE CAPPING STATION DRIVE MOTORS. IT CAN BE WIRED TO CONVEYOR COVERS AND USED TO INTERRUPT POWER TO A TRANSPORT DRIVE MOTOR. *THESE INTERLOCKS SHOULD NOT BE DEFEATED IN ANY MANNER WHEN THE SYSTEM IS OPERATING.*
- *ELECTROSTATIC DISCHARGE (ESD) CAN CAUSE SEVERE DAMAGE TO COMPUTER COMPONENTS AND PRINTED CIRCUIT BOARDS. "GROUND" YOURSELF PRIOR TO WORKING ON ANY CIRCUIT BOARDS BY TOUCHING YOUR SKIN TO A GROUNDED PIECE OF EQUIPMENT JUST PRIOR TO HANDLING BOARD, FOLLOWING STANDARD BASIC ELECTROSTATIC DISSIPATION PRINCIPLES.
- * DO NOT DISCONNECT POWER TO THE PRINT IMAGER DURING OPERATION. SHUT DOWN CONTROL BOX BEFORE DISCONNECTING CABLING TO THE PRINT IMAGER. FAILURE TO DO SO WILL RESULT IN PRINT IMAGER ELECTRICAL DAMAGE.

2 Introduction



WARNING

Read and follow all Safety Instructions, Page 4 before proceeding.

2.1 Physical Specifications

Physical dimensions of the system components are shown in Table 1-1.

Table 1-1. Physical Dimensions of NetJet System Components

Component	Length	Width	Height	Units
Print Controller Module (PCM)	12	10	5	Inch
Print Imager Assembly	5	8	4	Inch
Print Imager Mount	20	6	5	Inch

2.2 Electrical Power Requirements

The NetJet Ink Jet Addressing system operates with a single AC power connection.

NJ100 Print Control Module will operate between 100-120V Single Phase at 50-60HZ.

NJ101 Print Control Module will operate between 200-240V Single Phase at 50-60HZ.

2.3 System Description and Components

The Kirk-Rudy NetJet Ink Jet Addressing System is a complete high-speed industrial inkjet printer and (GUI) graphical user interface software intended for use in product addressing, product marking, and bundle printing applications.



Figure 2-1. NetJet Ink Jet System Components
(Optional) PC can be factory or customer supplied.

2.4 Compatible Ink Print Head Cartridges

Uses either HP 51645A (cartridge) or C6119A (bulk supply) print head.

HP51645A Cartridge



HP C6119A Bulk Ink Supply



Figure 2-2. Print Head Types

3 System Components

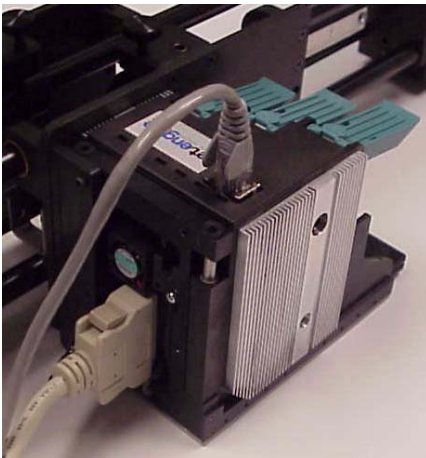


WARNING

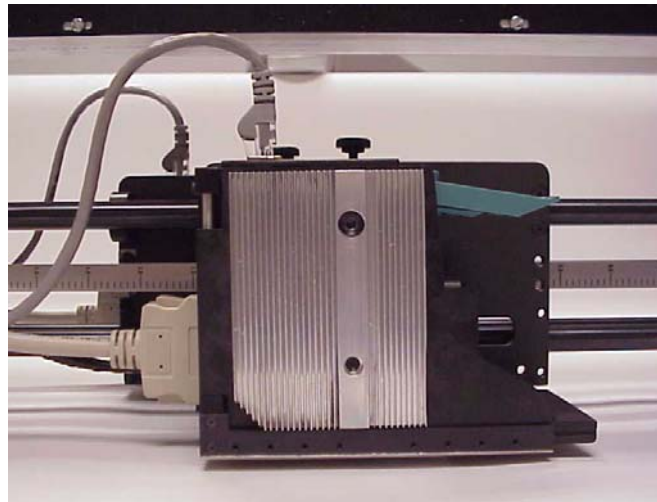
Read and follow all Safety Instructions, Page 4 before proceeding.

3.1 Print Imager Mount Assembly

A print Imager mount assembly is illustrated in Figure 3-1.



<Front>



<Side>

Figure 3-1. Print Imager Mount Assembly.

The Print Imager Assembly is composed of carriers or stalls that house the individual ink heads, and electronics to operate the Imagers. A colored lever above each stall is raised and lowered to remove and insert the print heads.

Located on the top of the print imager are two-color LED's that can take on different meanings but is normally used as a Pen status and low ink indicator. Located on the front side are three connectors that provide signal and power to the print Imager. These connectors are Print Imager Control (Centronics 36 Pin), and Print Imager Data (Ethernet), Print Imager Power (5 Pin Molex) and the mating plugs that connect to the Print Controller Module (PCM).

On the underside of the Print Imager is a product skid plate that keeps the product properly and uniformly spaced from the ink jet nozzles. The skid positions can be easily changed to prevent possible smearing of previous ink jet print.

The Print Imager Assembly is factory tested and sealed and should not be opened by other than experienced personnel. There are no user-serviceable parts within the assembly.

3.2 Print Imager Mount

A Print Imager Mount is illustrated in Figure 3-22.

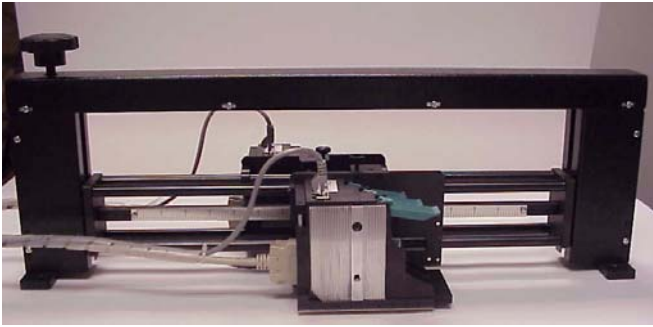


Figure 3-22. Print Imager Mount.

The Print Imager Mount is mounted to the product transport and holds the Print Imagers.

3.3 Print Controller Module (PCM)

The print Imager controller (PCM) is shown in Figure 3-33.



Figure 3-33. Print Controller Module (PCM)

The PCM is housed in a rugged metal enclosure and provides exterior connections for AC power, Print Imager cabling, sensor devices, base control, and PC communication. The PCM operates on 110/220V and is powered with a single switch. An integrated fan pulls air through a filtered inlet and maintains proper operating temperature for the interior electronics.

3.4 System Cable Connections

3.4.1 Cable Types

Table 3-1 shows the maximum lengths that should be used within the NetJet System.

Table 3-1. NetJet Cable Types			
Name	Qty	Description	Length
Print Imager Comm	1/Imager	HP Centronix 36 Male to 36 Male	≤ 10 ft
Print Imager Power	1 /Imager	DB25 Male plug to Male plug, 12 twisted pair	≤ 10 ft
Print Imager Data	1 /Imager	RJ45 Ethernet Cat 5e at PCM from Imager	≤ 10 ft
PC Data	1	RJ45 Ethernet Cat 5e at PCM from PC	≤ 10 ft
Encoder	1	AMP-9 Plug Connector at PCM	≤ 25 ft
Sensor	1	AMP-4 Plug Connector at PCM	≤ 25 ft
Base Control	1	AMP-8 Plug Connector at PCM	≤ 10 ft

3.5 Print Heads

Figure 3-4 depicts the two possible print heads types

HP45 or HP51645A Cartridge

HP C6119A Bulk Ink Supply



Figure 3-4. Print Head Types

3.6 Input / Output (I/O) Controls

The NetJet System supports I/O control. Onboard I/O is provided via an AMP-8 connector. Table 3-12 shows the Onboard I/O configuration. Reference the Schematic in Section 9 for pin out identifications.

Table 3-2. NetJet Onboard I/O Configuration		
Number	Type	Description
1	Output	Divert, 24Vdc
2	Output	Speed-up/Stacker, 24Vdc
3	Output	Feeder Stop, 24Vdc
Input/Output configuration of I/Os is established by NetJet software.		

3.7 Theory of Operation

The NetJet Print Imager is a stationary, software driven, printing station capable of printing at resolutions up to 600 DPI. It is designed to print vertically downward onto product conveyed beneath it. A sensor, upstream of the Print Imager, triggers printing, while an encoder, mounted in direct contact with the product transport belt, ensures high print quality by providing real time belt speed to the Print Imager.

Printing is controlled by a Graphical User Interface (GUI) software. The NetJet software provides a simple user interface to operate and maintain the system. Print layouts are created via the GUI. The software produces a visual “WYSIWYG” appearance allowing operators to view the appearance of their jobs before and during printing. Fixed and dynamic data are transferred to the Print Imager through an Ethernet connection via an Ethernet switch. Command and status data are transferred through (2) RS-232 interfaces provided on the 36-pin connector. Depending on operator experience and privileges, certain features can be enabled or disabled to protect the system from unauthorized and inexperienced users.

The NetJet Print Imager utilizes Hewlett-Packard™ Pens and ink Reservoir Systems, and allows easy, tool free, pen removal and replacement. The Print Imager has an optional available software controlled pen capping function.

4 Installation



WARNING

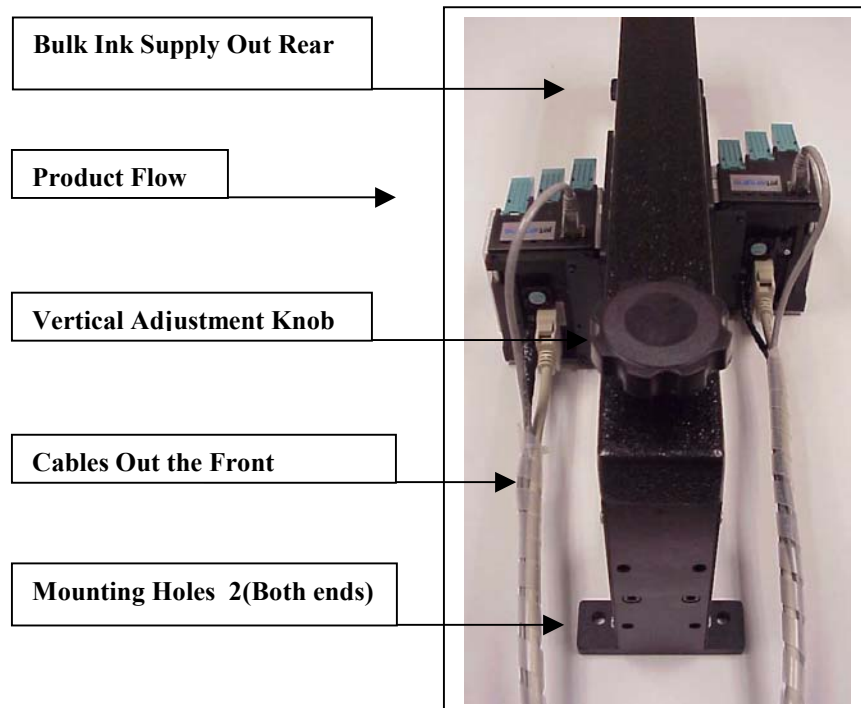
Read and follow all Safety Instructions, Page 4 before proceeding.

4.1 Hardware Installation

4.1.1 Installing Print Imager Mount (Optional)

The Print Imager Mount is typically factory installed. Installation should only be necessary when purchasing additional mounts for your current Kirk-Rudy transport base or a new installation on an existing transport base.

Please reference the hole mounting dimensions located in Section 8 Mechanical parts and diagrams.



4.1.2 Installing Print Imagers

Print Imagers are typically factory installed. Installation should only be necessary when replacing Print Imagers.

To remove a Print Imager, follow these steps:

- 1) Turn off power to the Print Control Module (PCM).

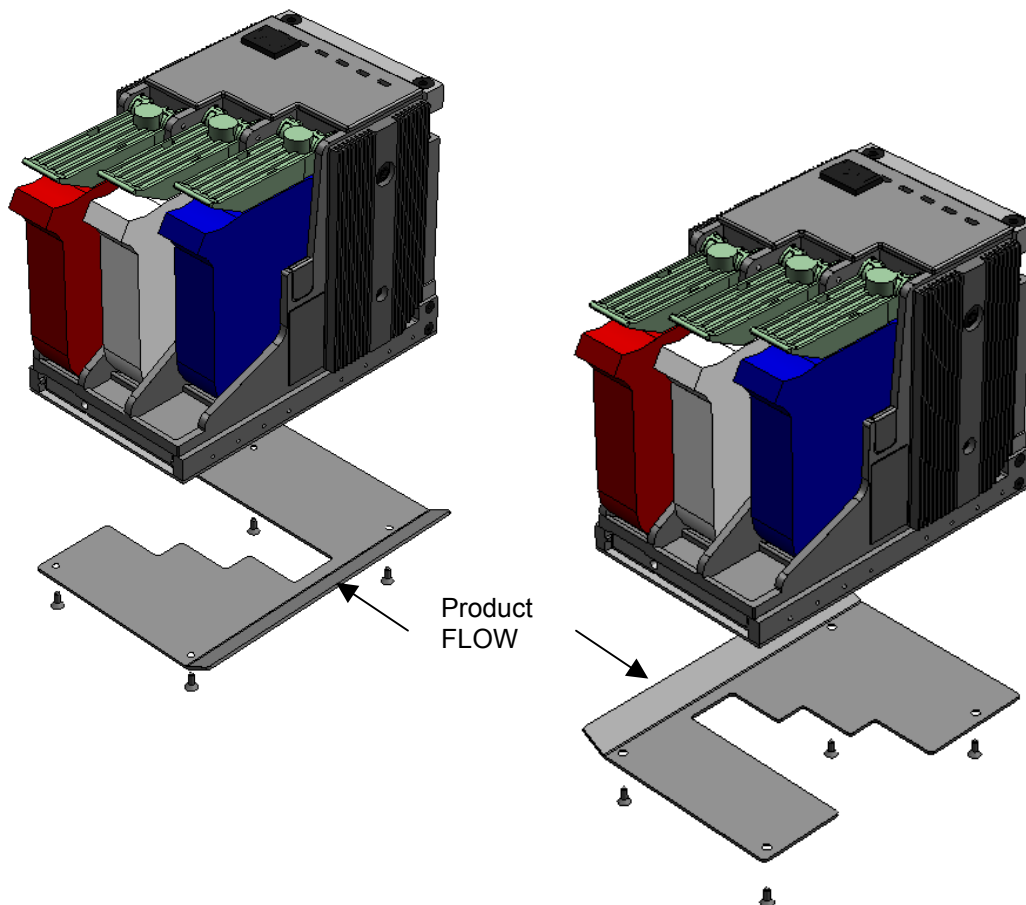
- 2) Remove the following cables from Print Imager, Print Imager Control (Centronics 36 Pin), and Print Imager Data (Ethernet), Print Imager Power (5 Pin Molex) cables from the Print Imager.
- 3) Remove the retaining screws that fasten the Print Imager to the Print Imager Mount.

To install a Print Imager, follow these steps:

- 1) Turn off power to the Print Control Module.
- 2) Install the retaining screws that fasten the Print Imager to the Print Imager Mount.
- 3) Attach the Print Imager Control (36 Pin), Print Imager Data (Ethernet) and Print Imager power cables to the Print Imager.

The Print Imager is to be rigidly mounted with the infeed area of the base registration guide directed toward the incoming product. The base is to be horizontal and parallel to the transporting device and the product is to maintain constant contact with the product registration guide to ensure pen-to-product height compliance. The mounting of the Imager at any angle other than 0° horizontal or deviation from any of the above requirements will result in reduction of print quality.

The NetJet GUI software supports bi-directional printing. Attach the appropriate ski depending on print direction.



4.1.3 Installing Bulk Ink Shelves (Optional)

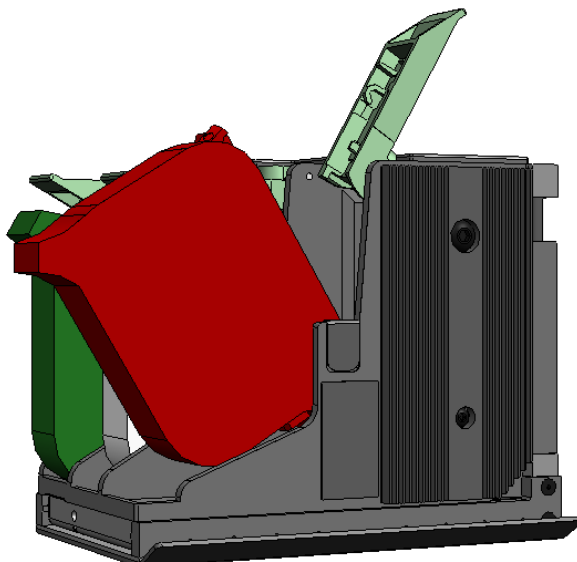
Bulk ink supply shelves are typically factory installed on the mail base. For field installation, attach the bulk ink shelves so that the tray shelf bottom is positioned 4" below the surface of the product transport.



4.1.4 Installing Print Imager Pens

Ink Jet print pens can be installed in a Print Imager at any time, including during system operation. To install a print Imager, lift the plastic lever into its full upright position, insert the print head into the plastic print stall and push until completely seated, then lower the plastic lever until it snaps into place.

Warning: *If the plastic lever does not snap into place with minimal exertion, do not force it. Make sure the print head is fully seated, then the plastic lever will snap into place properly.*



Refer to HP C6119A Maintenance Manual (Separate Manual) for proper handling techniques for pens and reservoirs.

Important: Ensure Print Imager printing is disabled and stopped printing before pen removal.

Open top latch lever (1).

Make sure tape has been removed from Pen.

Carefully lift pen by holding sides of Pen. Gently seat pen into cutout on Print Head cartridge (2).

Gently rock pen as shown to seat electrical connectors (3).

Close latch.

The Pen should be fully seated in Print Imager prior to latching. Do not force the latch or try to complete seating of Pen with latch. Forcing the latch will cause damage to the cartridge.

When using a Bulk Supply System, keep Pen above Reservoir at all times. Do not exceed 10 inches above reservoir, as air entrapment within pen is likely. Do not allow Pen to be below the Bulk Supply, as ink will flow freely from Pens.

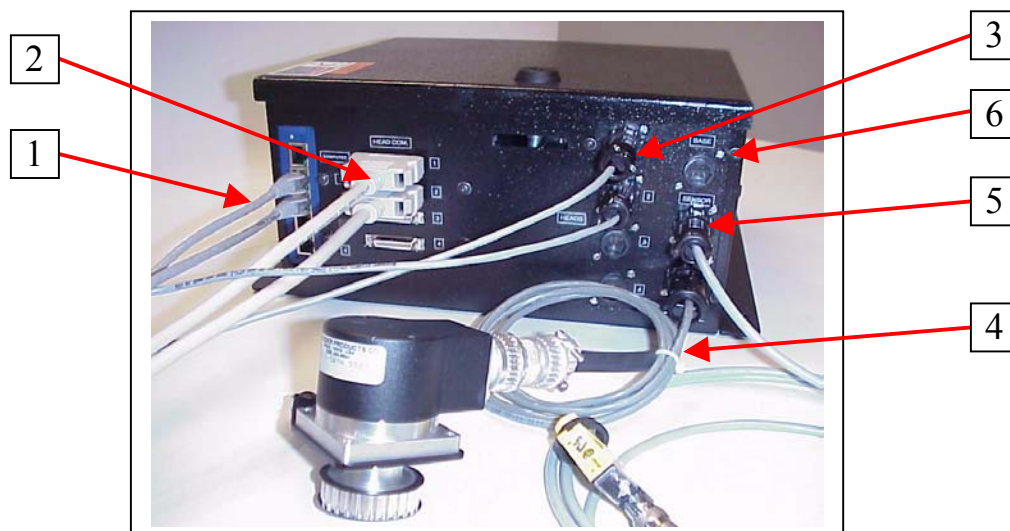
4.1.5 Installing Printer Control Module (PCM)

The Printer Control Module is designed to be installed in virtually any location and at any orientation, provided the cables that attach to the Module are of sufficient length not to exceed the maximums stated in this document. Typically the Module is installed beneath (within) a product transport or mounted to a back or side of such a transport. A minimum clearance of 3 inches is required around the filter inlet and fan exhaust.

Before mounting the Module, make sure the Encoder, Sensor, and Print Imager Control cables can all be easily attached to the Module without excessive tension. The Print Imager mounting method must allow free access to the signal, data and power cable connectors for ease of removal and maintenance. All cables should be routed so that there is no contact with any moving components. It is also important to route all cabling away from motors, high voltage cables and any electrical static discharge units.

Important: Proper grounding throughout the electrical system is important.

Also, make sure there is an available 110/220V(US/Europe) connection to power the Printer Control Module.



Cable Connections

Table 4-1 lists the cable connections that are made when installing a NetJet system.

Table 4-1 NetJet Cable Connections				
Item	From	To	Description	Length
1	Print Imager	PCM	Data Cable, Ethernet RJ45 CAT 5e	≤ 15 ft
2	Print Imager	PCM	Control Cable, HP Centronics 36 M to 36 M	≤ 10 ft
3	Print Imager	PCM	Power Cable, 5 Pin Molex	≤ 15 ft
4	Encoder	PCM	Encoder Cable, AMP-9 Plug Connector at PCM	≤ 50 ft
5	Sensor	PCM	Sensor Cable, AMP-4 Plug Connector at PCM	≤ 50 ft
6	Transport Base	PCM	Base Cable, AMP-8 Plug Connector at PCM	≤ 10 ft

4.1.6 Encoder Connections

The firing of the Print Imager Pens is controlled by input from an encoder. Generally, a rotary Encoder of 2000 pulses/rev and pulley ratio is used to define the transport speed of the product at 300 pulses/inch of belt travel. The encoder must be configured in a manner that provides actual product speed.

All Kirk-Rudy transport bases are designed to mount the encoder/pulley assembly. Please contact Kirk-Rudy for correct pulley ratio's for other transport bases

4.1.7 Sensor Connections

The Sensor must be mounted upstream of any Print Imager it is supporting. Virtually any sensor offset distance is supported, but placement accuracy is decreased as the distance from the sensor to the imager increases.

4.2 Configuring a PC

1. Power up new computer; assign computer name (end user company name) activate XP online. Don't register with Microsoft--end user can make that decision.
2. Create a user named Operator.
3. Change resolution to 1024x768, change background to none.
4. Save "My Computer" and IE shortcut to desktop.
5. Delete any unnecessary registry entries from
\\HKEY_LOCAL_MACHINE\\SOFTWARE\\Microsoft\\Windows\\CurrentVersion\\Run
6. Turn off screen saver.
7. Change power setting to never shut monitor off.
8. Remove all wallpaper and set for a blank blue screen..
9. Install NetJet software from CD.
10. Contact your dealer or Kirk-Rudy, Inc. for further instructions.

4.3 Software Installation

Installation is accomplished via the NetJet installation CD.

1. Insert CD in PC CD Drive.
2. Click on Setup from CD drive.
3. Run the Setup.exe application and follow the prompts for the installation.
4. If you have an older version installed: Rename the NetJet GUI folder. This is to prevent use of old configuration files. Uninstall the NetJet GUI using the control panel add/remove programs. The GUI will create new default configuration files that are compatible with the new GUI. There may be documentation on the CD (if installed from disk) that can be copied to the hard drive. Review the Read Me or release notes on the disk (or downloaded from the FTP site). This will give an understanding of the new features and things to be aware of.
5. Assuming a basic knowledge of Windows. This is what you need to do.

Click **Start**.

Click on **Control Panel**.

Double click **Network Connections**.

Right click on **Local Area Connection**.

Click on **Properties**.

Scroll down to **Internet Protocol (TCP/IP)**.

Click on **Properties**. A dialog box will pop up.

Set the IP Address to “192.168.0.1”

Set the Subnet Mask to “255.255.255.0”

Click **OK**.

Click **OK**.

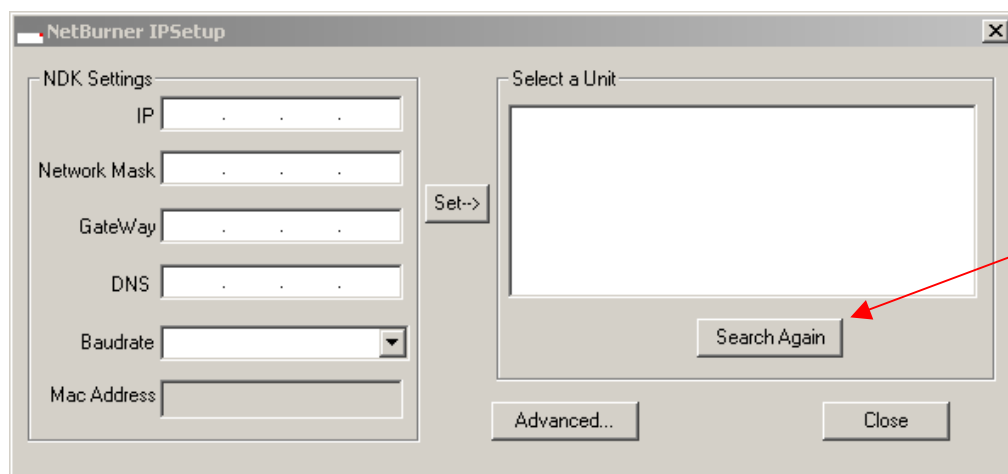
6. Set the Imager's IP

To set the imager IP address you have to run the ADDR Set Utility that was installed in the Imager Utilities Folder .

From the folder click on the icon



If you're setting up a multi-imager array, only one imager can be plugged in at a time. Otherwise, we'd have a hard time figuring out which imager we're talking to. When the program starts, the following screen will appear:



First, click the **Search Again** as shown by the arrow. A line of text will appear in the “Select a Unit” box. Select it.

Now, type 255.255.255.0 in the “Network Mask” box.

Type 192.168.0.X in the “IP” box. X represents the number of the first imager. Multiple imagers can receive sequential numbers to replace the X. It is recommended to start Imager1 X=3, Imager 2 X=4 is 4, Imager3 X=5 and Imager4 X=6.

NOTE: Imagers are shipped from Kirk-Rudy with the IP Address set to 192.168.0.2. It is recommended to reprogram the IP address of each Imager as it is installed so that new Imagers added to a configuration can easily be identified by their “out of the box” address.

The computer sets all the other fields, so leave them alone.

Click the **Set→** button. This finalizes the settings for that imager.

Now, power the imager down, wait 5 seconds, and power it up again. The imager will remember the address you typed in.

7. Upgrade the Firmware

The software should have loaded AutoUpdate, a program that detects the IP addresses of components connected to your computer.

The AutoUpdate program can be found in the **C:\jet. engine.gui** folder in the **Imager Utilities** folder that is created when you install the software.

Click the AutoUpdate icon to start the program.

Click **Find**.

Depending on configuration it may show multiple imagers.

The imager's IP address will appear as shown by letter **A**.

Click **OK**.

Browse to the file that says V4 Imager BXXXXXXXXX.s19

The X's designate a revision number for the Firmware Update.

For example **B2101005.s19**

click **Open**.

This puts the Firmware update

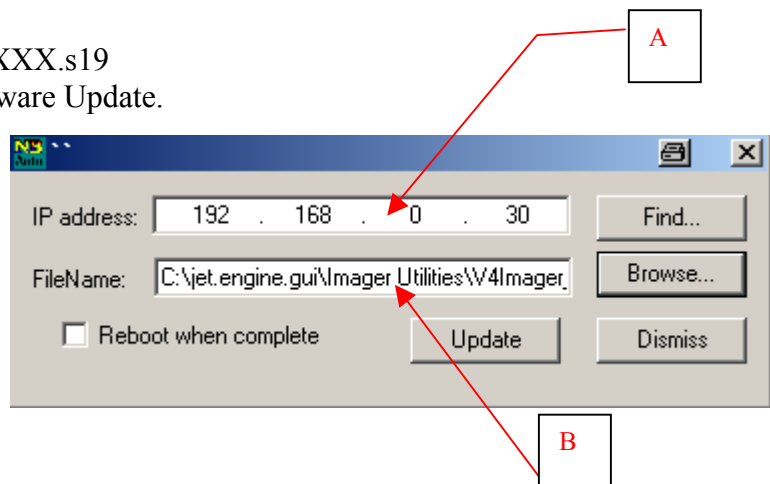
file into the **FileName** space indicated by letter **B**

Check the box to **reboot when complete**.

Click **Update**

When completed close the window.

Now, power the imager down, wait 5 seconds, and power it up again.



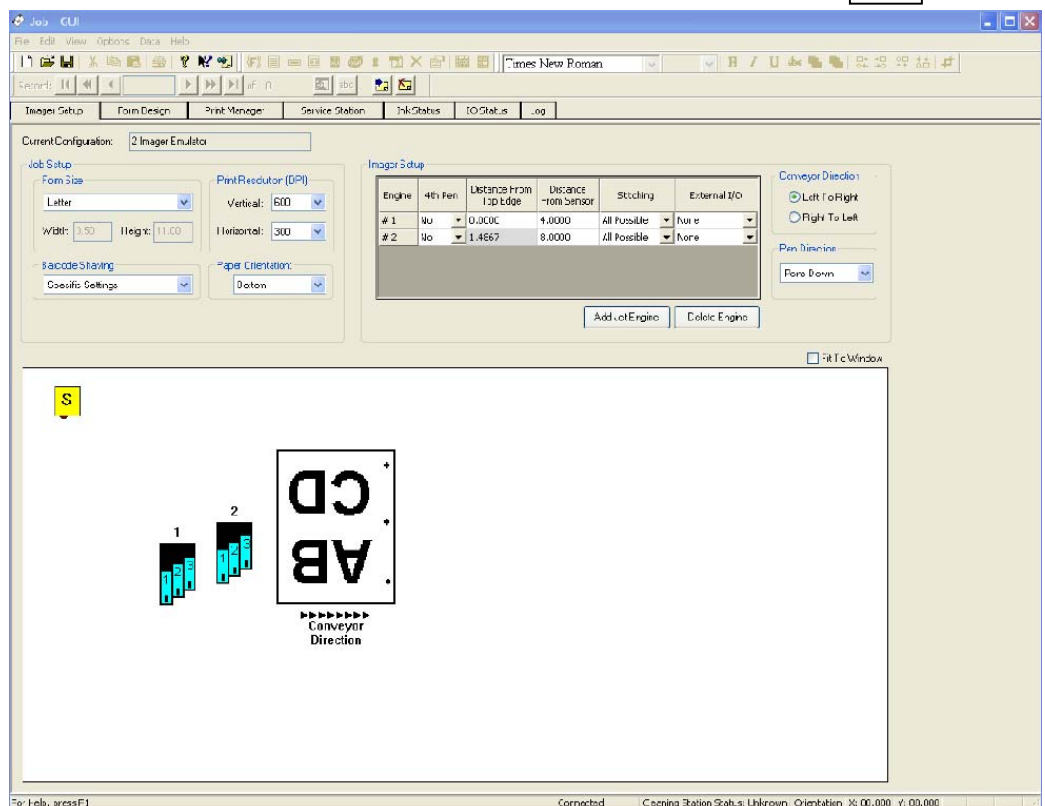
8. Start the NetJet GUI

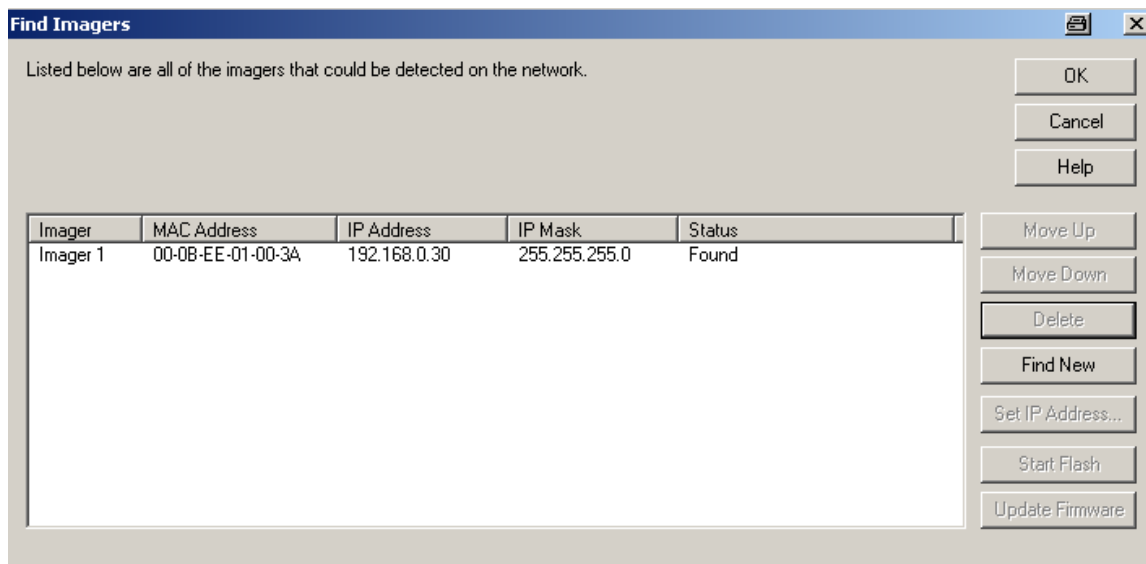
Navigate to the **C:\NetJet GUI** folder click on the icon.

This will start the NetJet .exe

And give you this screen or something similar.

This page needs to be configured for paper size and distances in order to print on the document (not on the belt) later.





The GUI will present the Find Imagers dialog and show the imager(s) currently on the network. This dialog allows the configuring of the IP Address, Network Mask, and Gateway for an imager. The Find Imagers screen displays the MAC address, the IP Address, the IP Mask, of the imager(s) connected to the network.

NOTE When the GUI is run for the first time, a special printer driver (V4 Jet Engine DPI Printer) is installed. This printer **MUST** be installed for the GUI software to work properly.

NOTE: Imagers are shipped from Kirk-Rudy with the IP Address set to 192.168.0.2. It is recommended to reprogram the IP address of each Imager as it is installed so that new Imagers added to a configuration can easily be identified by their “out of the box” address.

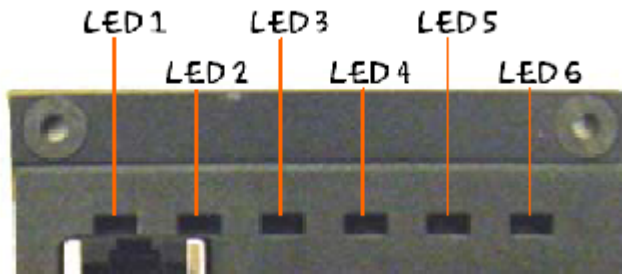
4.4 Test the Encoder

With power applied to the imager and the GUI running, jog the belt a little while keeping an eye on LED 5. It should be green. If you don’t see a green light, it means one of two things:

1. The encoder’s electrically hooked up wrong.
2. The encoder’s not connected to the timing pulley’s, connected to the infeed drive roller.

LED5 has three states:

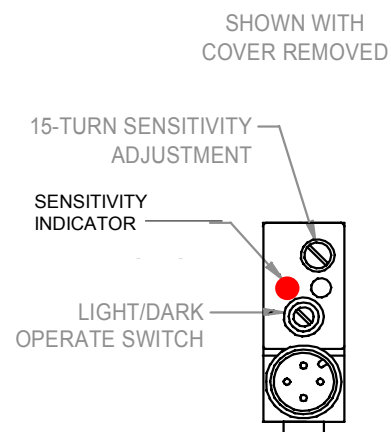
OFF	Encoder and Sensor are off
GREEN Blinking	The Sensor is off and Encoder is on
RED	The Sensor is on and overrides the State of the Encoder.



(Note: If the LED5 is **Green/Blinking** go to Sec 4.5 —**Test the Sensor** and configure it properly.)

4.5 Test the Sensor

The Sensor sensitivity level should be set first, using the indicator on the sensor. The Sensor test also uses **LED5** just like the encoder. When the sensor is blocked by the product (paper, box etc.) **LED5** will turn Red and override the state of the encoder. The key here is that **LED5** must turn Red when the product is detected. The Sensor needs to be properly set up for correct detection. The sensor shown is the Banner unit NetJet supplies. It has a dark-on/ light-on switch and a sensitivity setting. When detecting boxes, for example, the sensitivity can be high because the light is reflecting off the open air for a background. When a reflecting target is NOT used the sensor set to Light-On (when the product is present the light is detected). The other case Dark-On is used when detecting, for example, paper on a transport that has a metal plate under the drive belts. A reflective target is attached to the plate between the belts and the sensitivity is set very low to just be able to see the target. When the paper is between the target and the sensor LESS light is returned and causes the sensor to detect a “dark” state so the Dark-On setting would send the correct signal to the printer and **LED5** would turn Red.



4.6 Stitching Between Pens and Imagers

Note: Please reference Appendix C Stitching Procedure before continuing to Section 4.7.

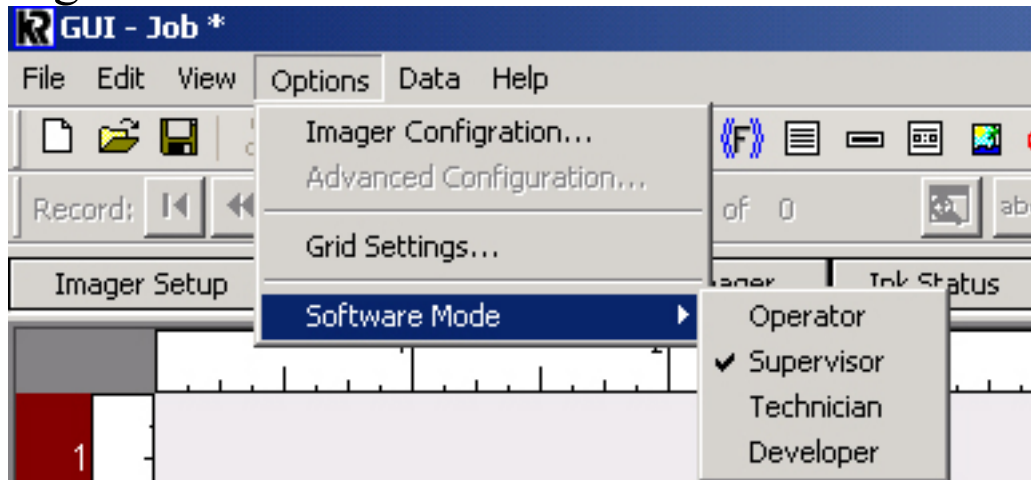
4.7 Quick Start Guide Printing a Database

Note: Make sure you have completed all previous steps before following these instructions.

This guide is intended to get you started printing quickly with your NetJet Printer. Assuming the Imager has been setup properly and stitched in properly you should be printing in a few minutes with this guide.

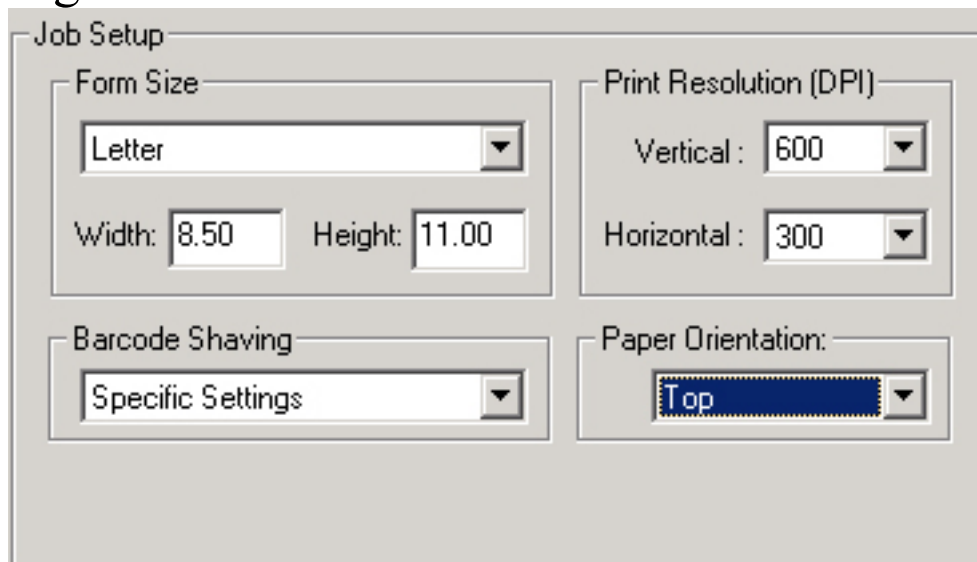
You must first Start the NetJet Software by clicking on the Jet.Engine.Gui Icon. The software will open in Operator mode. You must select Supervisor mode minimum to create a layout and import database. Operator mode is for just loading a job and printing it. (See Fig1). If a password has been set the software will ask you for the password.

Fig 1



Make sure you set your Form Size, and Paper Orientation should be Top. Print Resolution (DPI) should be set here. (Fig 2)

Fig 2

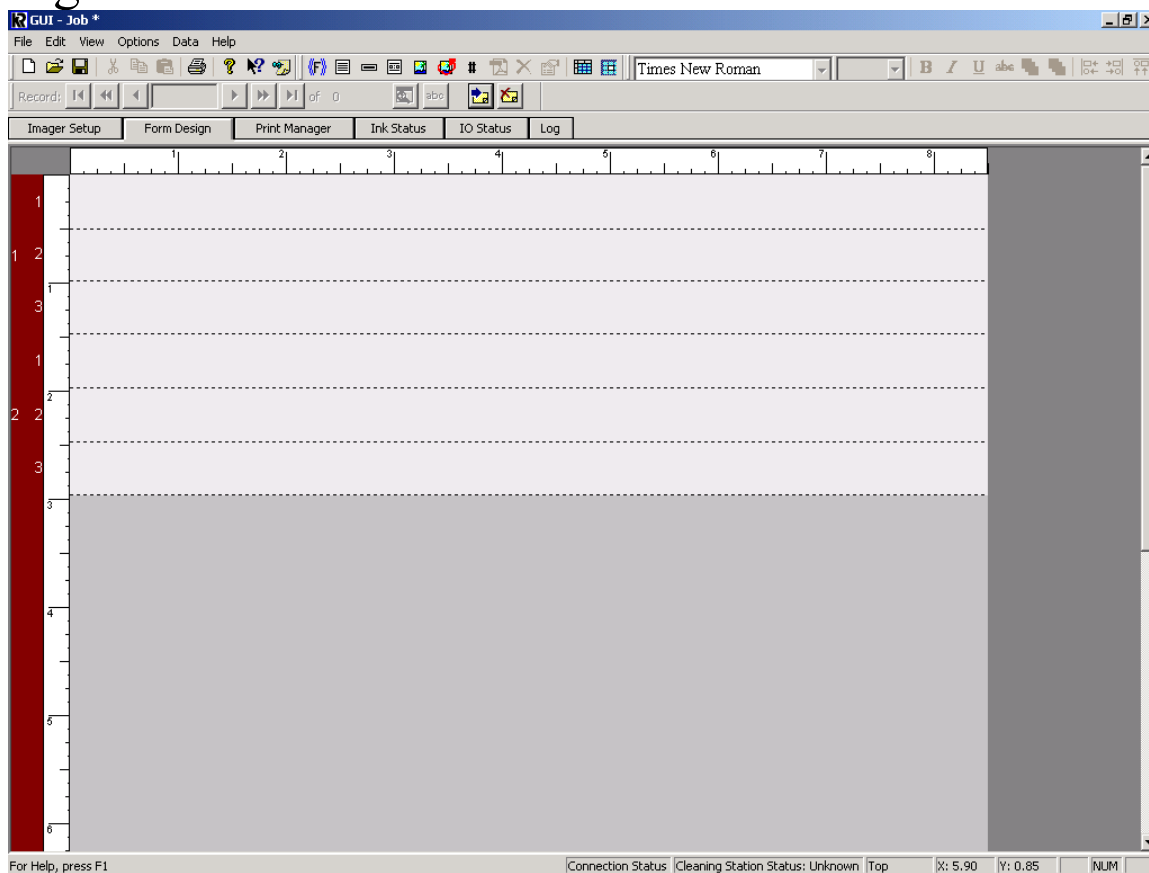


Click on the Form Design Tab



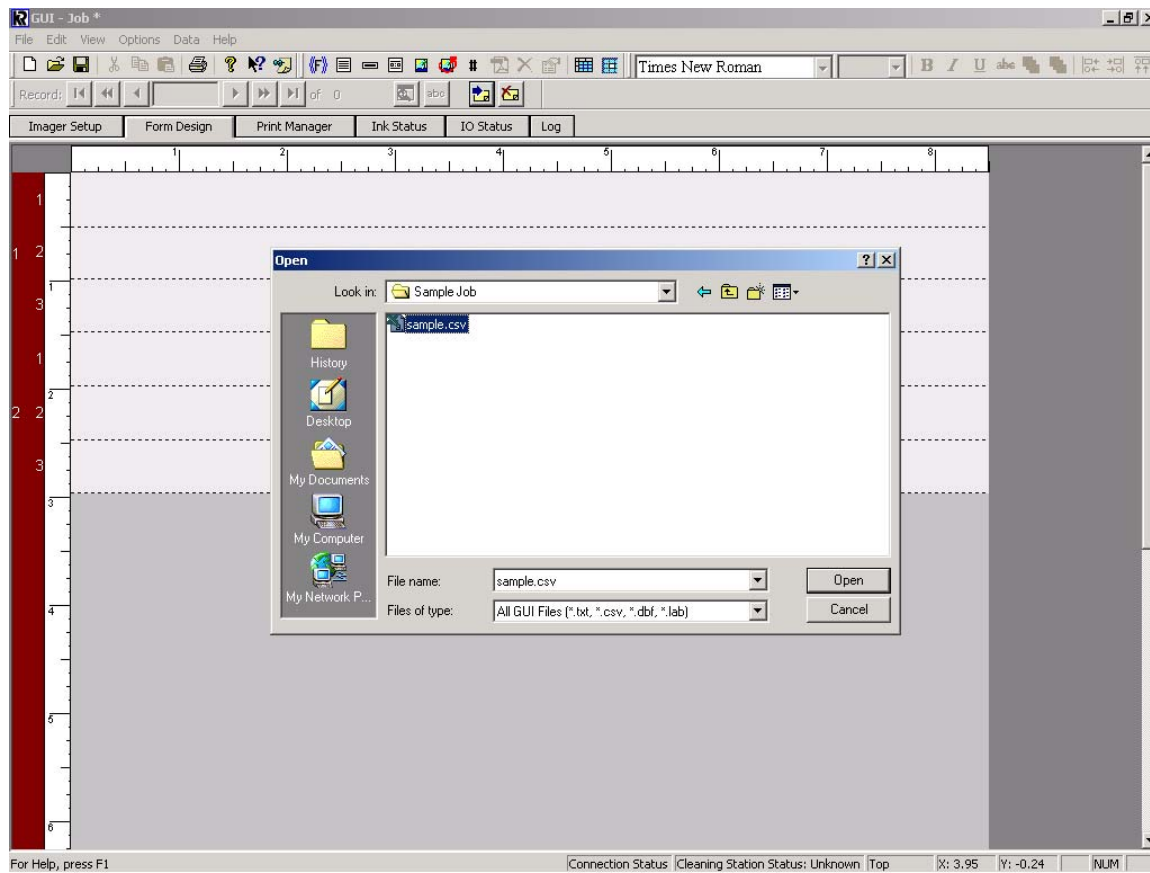
and you should see the layout as in Fig 3.

Fig 3




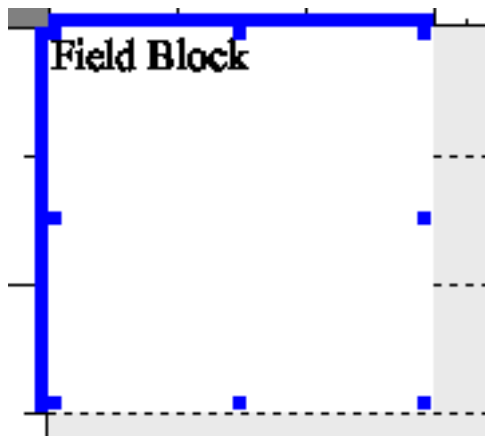
You will need to click on the Load Database icon .

Fig 4



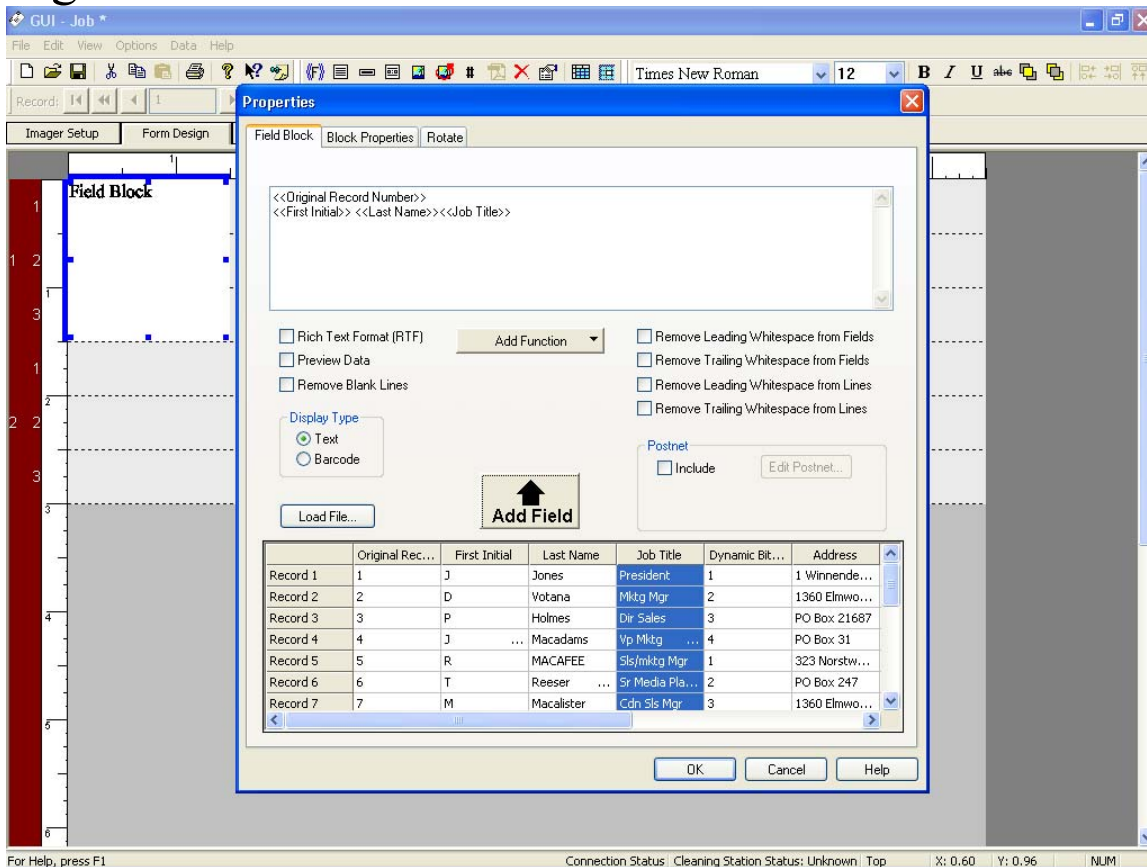
Browse to the location of your database files, click on it and then click open. (Fig 4)

Now that your database is loaded we can begin to create a layout. Click on the Field Block Icon  to get a field block will display on the screen.



Double click on the field block and it will open the properties for the field block. (Fig 5)

Fig 5



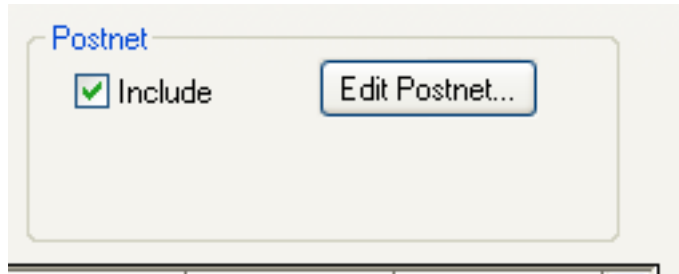
Click in the preview window at the top of the field you want to be printed and then the Add Field



Button that field will show up in the preview window at the top. Then click in the preview window type the enter key to move down to the next line or add a comma, etc and click on your next field you want to print. Then click the Add Field button again. Repeat this for each field you want to print.

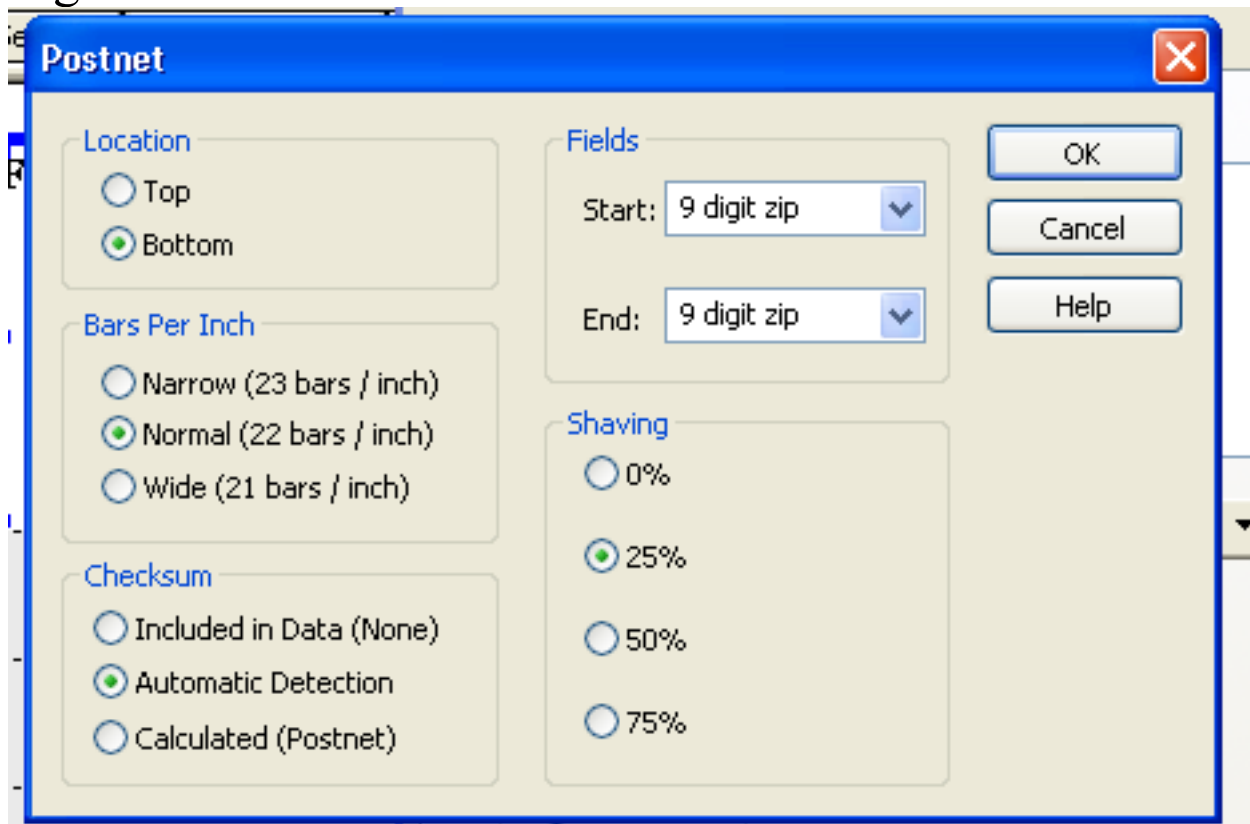
Place a check mark in ☐ Remove Blank Lines Remove Blank Lines box. It is also recommended that you place a check mark in each of the Remove White Spaces boxes located on the right side.

If you want to include a postnet barcode with this job place a check mark in the Include box then click on Edit Postnet... button.




Another window will pop up. (Fig 6)

Fig 6



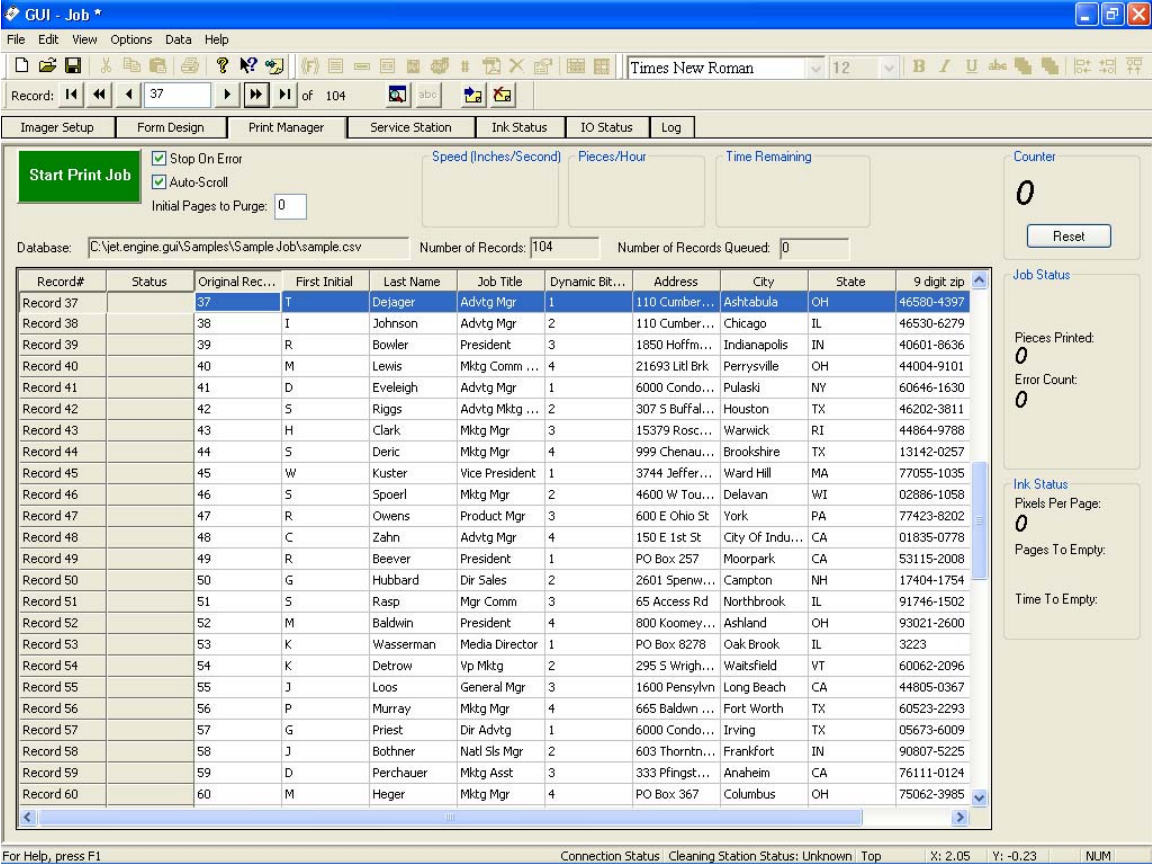
Click where you want to barcode to be placed, Bars Per Inch, Checksum, (Automatic Detection is recommended) Fields must be selected and in order. You must set a Start and End, even if the data is all in one field. Select the percentage of shaving (thinning of the bars) desired, then click ok.

Click OK then OK in the Field Properties Window to return to the Form Design section. If you wish

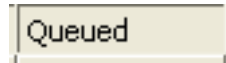
to see a preview of the lay out click on the ABC button .

Click on the Print Manager tab. (Fig 7)

Fig 7



To begin printing Right Click (press and release the right mouse button) anywhere in the Print Manager window and then select add all.



Queued will appear in the Status column. Click on the Green Start Print Job button and begin printing your first NetJet job.



5 Maintenance

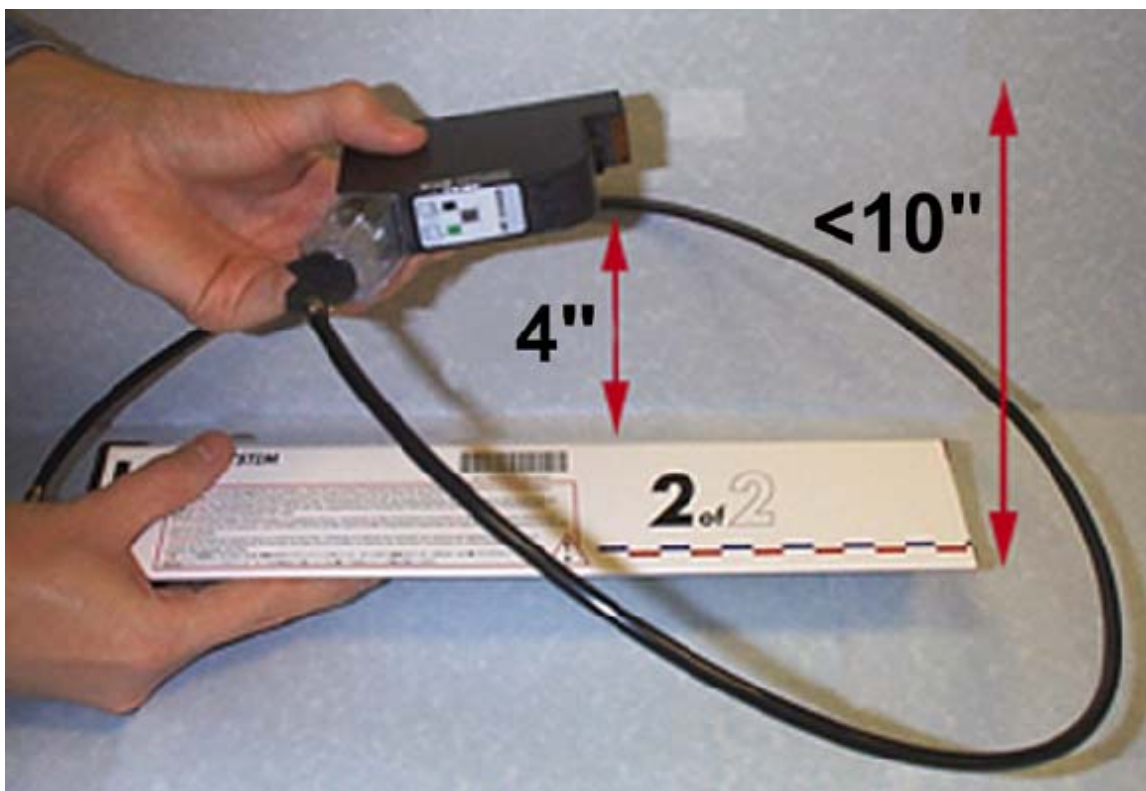


WARNING

Read and follow all Safety Instructions, Page 4 before proceeding.

5.1 Bulk Ink Supplies

The use of an Ink Reservoir System requires that the reservoir be located below the pen at a distance of $4" \pm \frac{1}{2}"$ from the face of pen to the bottom of the reservoir. The height of the reservoir establishes the back pressure of the system: too high applies excess ink; too low does not provide enough ink. The reservoir(s) should also be located to allow free positioning/movement of the 36" long hose, to eliminate kinking or damage.

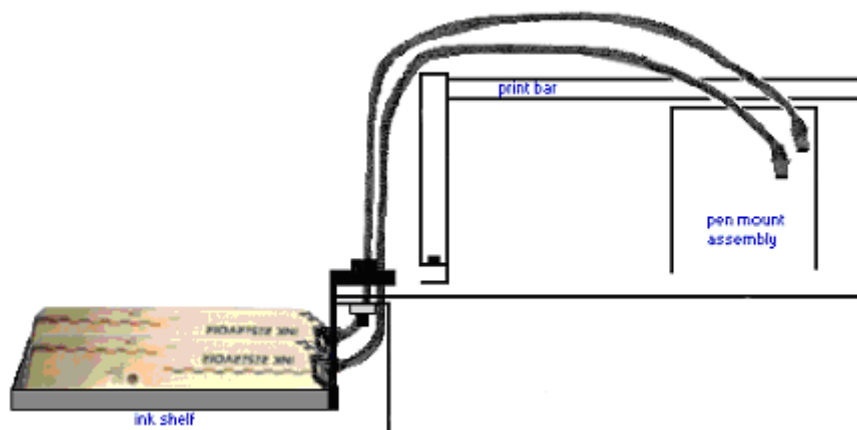


Caution: Bulk Supply Pens should not be put into the desktop printer. The Bulk Supply Pen will not fit into the desktop printer with the tube connected, and attempting to disconnect the tube from the Bulk Supply Pen can damage the Pen or the connecting adapter, and the connection may leak after reconnecting the tube to the Bulk Supply Pen.

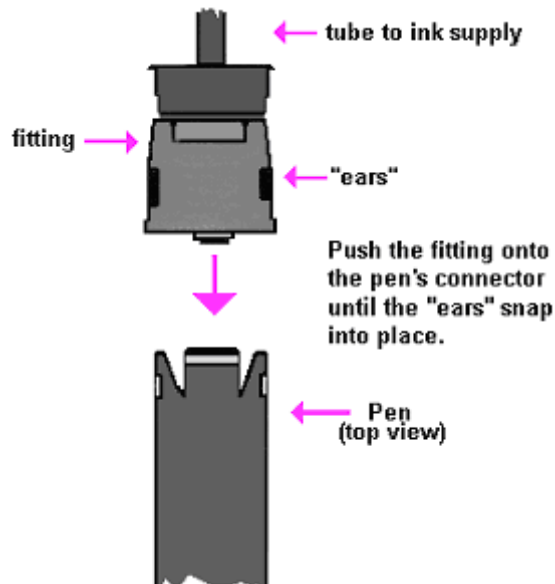
Important: Ink Jets of the Bulk Supply Pen must be kept between 3.5" and 4.5" higher than the bottom of the Bulk Supply when the bladder and Bulk Supply Pen are connected. Raising the bladder higher than 3.5" below the orifices can cause the Pen to "weep out" ink. Lowering the bladder lower than 4.5" below the orifices can allow air to enter the orifices. The Bulk Supply Mounting Tray is engineered to maintain the correct elevation of the bladder relative to the height of the Bulk Supply Pen throughout the full range of Print Imager height adjustment. When the Bulk Supply is installed correctly, the Pen Mount can be raised or lowered fully and the Bulk Supply Pen will remain within the correct height range relative to the ink bladder.

5.1.1 Connecting the Bulk Supply

1. Lay the bladder in the Ink Shelf. Each Ink Shelf holds two bladders.



2. Route the Ink Supply Tube to the Pen.



3. Insert the end of the fitting onto the Pen fitting until the fitting clicks into place.

5.2 Pen Installation

1. Remove the new print cartridge (Pen) from the shipping box.
2. Remove the tape covering the ink jets and electrical contacts.
3. Tilt the top of the Pen in the direction of the tab.
4. Insert the base of the Pen into the Pen Cavity just past the Pen Restraint Spring.
5. Tilt the top of the Pen upright, pushing the Pen down just far enough for the top of the Pen to enter the Pen Cavity.
6. With the Pen upright, press the Pen down until it reaches the bottom of the Pen Cavity.
7. Close the flap down over top of pen.

5.3 Pen Maintenance

The Hewlett-Packard Pens apply water based inks, which, when left unattended, can dry on and in the pen nozzles. In addition, the ink may build up around the nozzles causing the ink to be deflected from its intended path. Proper cleaning and maintenance of the pens and Print Imager assembly will help to ensure high quality printing and longevity of the assembly. The frequency of cleaning depends on print quality required. The ambient conditions also play a role in the frequency of cleaning. Some types of paper create more dust and particles may contaminate the nozzles. The recommended frequency of cleaning will vary pending the particular location and application.

5.3.1 Cleaning the Pen Nozzles

The Print Imager has an optional software controlled capping station, which may be used to clean the pens when necessary (see ref “b”). If the pens are left in the “print” mode for prolonged periods, it may be necessary to manually clean the pens using the following method:

- Use a lint free cloth wipe. HP recommends the use of their Tex Wipes (part number 1952219)
- Fold wipes once and place on a flat surface.
- Dampen wipe with de-ionized water approx. 4" long (approx. five drops).
- Remove pen from cartridge. (see section)
- Place pen nozzles on damp area and hold for 1 - 2 seconds to allow ink to wick.
- Wipe pen across damp area, one 3" stroke in the direction indicated.
- Wiping the pen on a dry area may result in scratched/damaged nozzles.
- Repeat process as necessary.



If pen loses its prime, and wicking on damp Tech Wipe does not pull ink from all the jets, then place Tech Wipe below pen and lower pen below reservoir to allow ink to flow freely on to Tech Wipe. Once ink flows freely, return pen to recommended height above reservoir.

5.3.2 Cleaning the Print Imager

If the Print Imager requires cleaning:

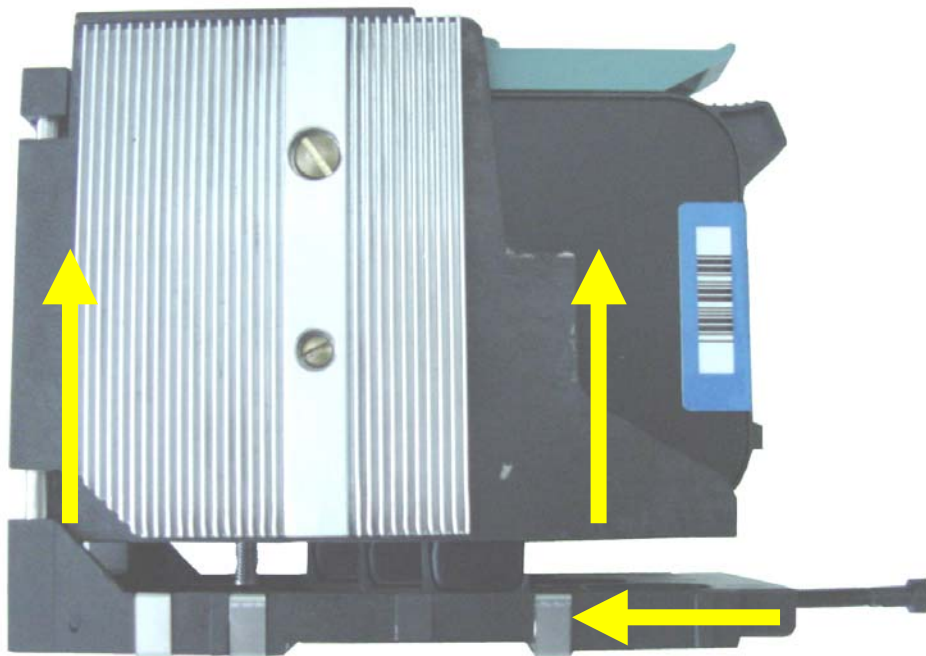
- Do not use any chemical cleaners (this includes types of electrical contact spray). The Print Imager contains a variety of plastics, some of which are sensitive to a wide array of chemicals.
- Do not immerse the Print Imager in any liquid.
- Do not return to service unless completely dry.
- It is recommended to dampen a lint free cloth (Tech Wipe) with de-ionized water and gently clean the exterior.

5.3.3 Capping the Print Imager

The Print Imager has an optional software controlled capping station which may be used to park the pens when necessary (see ref “b”).

The manually operated capping station is integrated with the Print Imager. Lift and hold the Print Imager body and slide the capping tray into the Print Imager base until it stops. The springs in the Print Imager assembly will pull the pens against the caps.

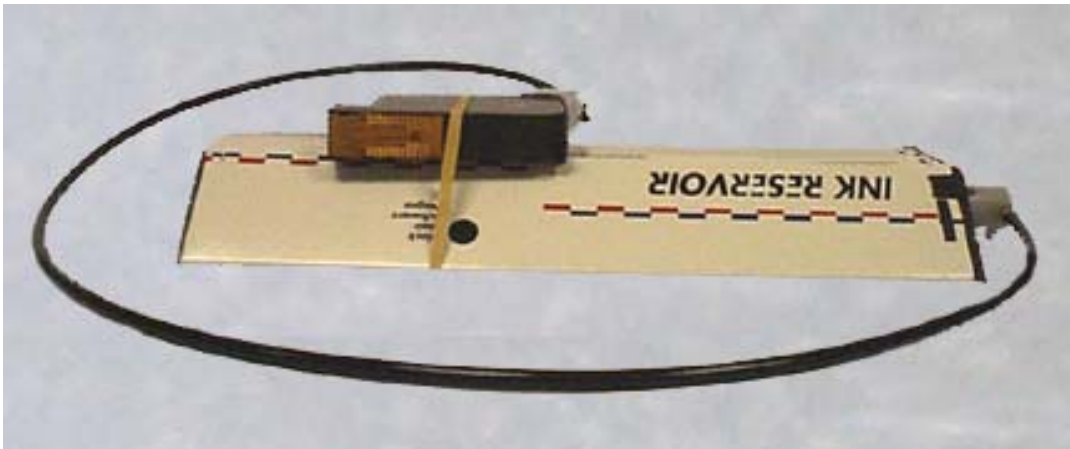
To return to the “print” position, lift the Print Imager body and slide the capping tray out until it clears the pens. The springs in the Print Imager assembly will help pull the Print Imager body back into its original position flush with the Print Imager base.



5.3.4 Storing Pens

If a pen has the protective tape removed from nozzles and capping station is in use, or otherwise unavailable, store pen in an airtight container.

When storing a pen/reservoir system that has been in use, maintain the pen above reservoir at all times. One method is to place pen on its side on top of the reservoir and wrap an elastic band around them.



Jets in a Pen may not fire properly if they are clogged with paper fiber, dust, or if the ink has dried in the jets.

1. Keep Pens in the shipping box with the plastic strip on the ink jets until you are ready to install the Pen. This prevents the ink from drying and dusts from accumulating in the jets.
2. Do not drop or otherwise deliver a shock force to the Pen. Shock forces could introduce air into the jets.
3. If a Pen will not be used for several hours, over a holiday weekend for example, cover the orifices.

5.3.5 Print Head Drying Prevention

Prevention is the best way to prevent having problems with jets in a Pen. Follow these steps below to maintain the jets.

5.3.5.1 Production Purging

Production purging at the appropriate rate is a good way to keep Pens working properly. The clear and purge functions are similar to functions performed by inkjet printers during the printing process.

- The Clear interval cleans Pens during production.
- The Purge that is applied after non-printing time periods is controlled by the purge

parameters in the same window

5.3.5.2 Manual Maintenance

Manual maintenance may occasionally be needed. Dried ink and paper fibers or dust can be removed by gently wiping the printing surface of the Pen.

Either remove the Pen from the Pen Mount or tilt the bottom of the Pen Mount towards the mail base controls.

Lightly moisten a Tex Wipe (or similar, lint-free, soft cloth).

Wipe the printing surface of the Pen gently with a single, light stroke perpendicular to the direction that the mail piece moves across the printing surface.

5.4 PCM Maintenance

The intake air filter should be checked, cleaned or changed monthly.



6 Light Codes PCM and Print Imager



WARNING

Read and follow all Safety Instructions, Page 4 before proceeding.

6.1 Print Control Module LED's

The print control module has lights on the Ethernet 5-Port Switch, which indicate communications and connection speed.

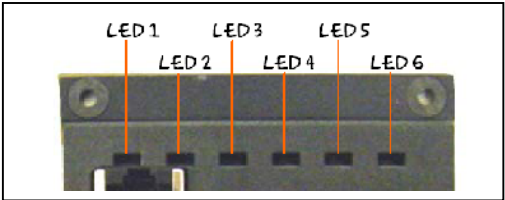
The power switch has a red LED located next to the switch indicating power is “on”.



Power On Light

Ethernet Connection Lights

6.2 Print Imager Module LED's



LED 1 shows 100Base-T status while
LED 2 shows 10Base-T status as follows:

Half Duplex	Green on
Half Duplex activity	Green flash
Full Duplex	Red On
Full Duplex Activity	Red Flash

LED 3 is shows whether the imager is configured.

Imager Unconfigured	Red On
Imager Operational	Green On

LED 4 shows Imager status

Ready to Print	Green Flash
printing	Green Solid
Find Imager	Red/Green Flash
Error	Red Flash

LED 5 shows Sensor and Encoder status.
The Sensor has priority over the Encoder.

Sensor and Encoder Inactive	LED off
Product under Sensor	Red On
Encoder pulses detected	Green On

LED 6 shows Capping Motor status

Motor Voltage Detected	Green On
Motor Voltage Missing	Red On

7 Print Performance

7.1 Print Imager Environmental Requirements

The operating specifications below are designed to ensure that the installed print Imagers will operate as desired over a wide range of environments. Figure 7-1 depicts the range of acceptable print Imager environments. Within the outer envelope, some performance degradation may occur and optimal print quality may not be achieved. Print quality is application (printer) specific, by definition.

Table 7-1. Operating environment specifications

Parameter	Lower Limit	Upper Limit	Units	Notes
Ambient temperature	10	40	°C	
Ambient humidity	10	80	%RH	

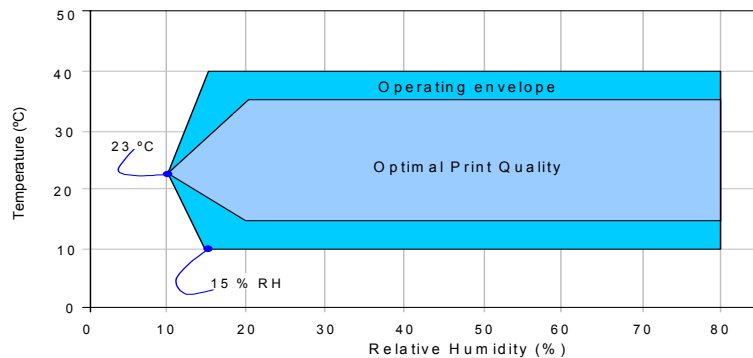


Figure 7-1. Operating temperature and humidity ranges (operating envelope)

7.2 Print Performance

The quality of the print depends on a few primary concerns:

- The cleanliness of the pen nozzles.
- The registration of the product.
- The establishment of the product's true speed via the encoder.
- The environment in which the printing occurs.
- The product being printed.

7.2.1 Cleanliness

The cleanliness of the nozzles is extremely important to maintaining print quality. Clogging will result in missing pixels causing unprinted "lines" through the print. Build-up may cause ink deflection, which can cause a print offset of a pixel or more. Ensuring pens are cleaned regularly and capped when not in use will help provide quality printing.

7.2.2 Printing Distance

All methods of ink jet printing require the pen-to-product distance to be controlled. The Imager base has a product registration guide, which ensures proper required distance provided the product is transported flat against it. The nozzles spray in a cone shape so if the product is further from the pens than the designed distance the ink droplets will spread causing an image that is not as sharp. Maintaining a flat registered product will provide a clear and controlled print quality.

7.2.3 Product Speed

The Print Imager requires an input to determine the speed at which to fire the nozzles, which it obtains from an encoder. The input from the encoder must be 300 pulses per inch of product travel. It is crucial that the encoder deliver the actual product speed. If the product travels slower than the encoder's input, the text will appear compressed, if faster, stretched out. If variation is noted, a review of the encoder function as well as the transport method is required. Maintaining a constant product speed against the registration guide and reporting it via the encoder will provide consistent printing aspect.

7.3 Performance Specifications

The Print Imager performance parameters define the output of the print Imager when subjected to a given set of inputs (e.g., energy, pulse width, and frequency). Some performance parameters also depend on the mounting and alignment accuracy of the print Imager holder. The performance specifications listed below serve as a guideline in determining print operational capability.

Table 7-2. Performance parameters

Parameter	200DPI	300DPI	600DPI	Units	Notes
Maximum Product velocity	350	250	100	fpm	1
Production rate	20000	14000	8000	pieces/hr	2
Print Imager to paper spacing	1.0	1.12	1.50	mm	3

Notes:

1. Maximum product velocity is dependent on production rate.
2. Based on #10 envelope, landscape orientation, 1" spacing between product
3. The print Imager to paper spacing is application specific and dependent on media , print mode, and the paper path. A close print Imager to paper spacing provides not only better print quality, but also increases the possibility of the paper hitting the print Imager and causing damage. These values should be considered as a guideline.

8 Mechanical Parts and Diagrams

9 Electrical Parts and Diagrams

9.1 Connector Pinouts

Table 9-1. Print Controller Module Connector Pinouts

Connector	Type	Pin	Signal
<i>ENOCDER</i>	<i>AMP-9 F</i>	1	GND
		3	TACHA1
		4	+5V
		5	TACHB1
<i>SENSOR</i>	<i>AMP-4 F</i>	1	+12V
		2	GND
		3	SIGNAL
		4	SHEILD GRND
<i>POWER IMAGER X 4</i>	<i>AMP-8 F</i>	3	GND
		4	COM
		5	+27V
<i>BASE CONTROL</i>	<i>AMP-8 F</i>	1	+27V
		2	DIVERT
		6	CONVEYOR SPEEDUP
		8	FEEDER STOP

10 Appendix

10.1 Appendix A Troubleshooting

Does Imager print at all?

Y **N**

- Check for 30V system power.
- Verify connections to Imager. (Sec 4.0)
- Verify software is in "PRINT" mode.
- Rotate Encoder and check Imager LED output. (Sec 4.0)
- Check that Sensor is in "light on" mode. Place product under Sensor and check to see that LED is lit. (Sec 4.0) Check Sensor gain adjustment.

Are all pens printing?

Y **N**

- Check that tape is off pen.
- Check that pen has ink.
- Check that pen is seated properly. (Sec 4)
- Check for air bubbles in line if a reservoir is being used. (Sec 5) See section 15.1 for instructions on Pen priming.

Is print faded?

N **Y**

- Check to see if pen is running out of ink.
- Check for clogged pen nozzles.
- Check for proper pen-to-product distance.
- Check reservoir height. (Too low will cause faded print)

Is print fuzzy?

N **Y**

- Check for proper pen-to-product distance.
- Check paper type.
- Check for clogged pen nozzles
- Check for proper operating temperature (Sec 7)

Is there excess ink?

N **Y**

- Check reservoir height. (Too high will cause drooling and puddling)

Is the print aspect correct?

Y **N**

- Check to see if the Encoder is slipping on the belt.
- Make sure product is not jarring the Encoder as it passes by.

Does the print have "lines" of missing ink?

N **Y**

- Check for clogged pen nozzles

Does the print capping station move?

Y **N**

- Check interlocks.
- Check 30V power to motor.
- Check for something blocking the Imager or tray.
- Check cable connections

Does the print start early or late?

N **Y**

- | • Check margin adjustment in GUI

Does the print extend beyond the product?

N Y

- | • Check print width adjustment in GUI

Is there an overlap or gap between Pens?

N Y

- | • Realign the Imager to paper travel direction.

Is there a mismatch between Pens?

N Y

- Check margin adjustment in GUI

10.2 Appendix B Ink Reservoir System

The purpose of Appendix B is to define the NetJet ink system and provide details of composition, installation and maintenance.

Ink System Composition

The Ink System packaging identifies the pen as item 1 and the reservoir as item 2. The packaging contains important instructions on installing the tube in the pen as well as cautions and advisories.

Installation

Remove the pen from its packaging and slide the reservoir out of the left side of system packaging. Do not remove diamond shaped packaging around reservoir, see caution label on bottom of reservoir. *Do not* squeeze reservoir during installation. The system may be connected by following the instructions on the pen packaging. The valve should be inserted into the clip on pen until a clicking sound is heard or the valve has been felt to snap in place. The valve and clip are not keyed so no special orientation is required.

Once the connection is made between the reservoir and the pen, it cannot be disassembled without damaging the system.

Maintain the tape on the pen until just prior to actual installation into the Imager. Ensure pen is above reservoir at all times prior to installation in Imager.

When tape is removed do not allow pen to exceed 10" above reservoir or air will leach into the system. Air inside the pen cannot only cause print defects, it can also cause the pen to stop printing prior to the reservoir being emptied.

Maintenance

The position of the pen should never exceed 10" above the reservoir regardless of any packaging notes. Exceeding 10" will likely cause ingestion of air as mentioned above. If this occurs, refer to section 5.3.1 for priming methods. The required working distance between the base of reservoir and printing face of pen is 4.0" \pm 0.5".

Maintaining a clean pen at the required printing distance and keeping a proper pen-to-reservoir relationship will provide the most efficient use of ink. Refer to Section 5.0 for proper maintenance of pen and ink system.

10.3 Appendix C Stitching Procedures

Purpose

Stitching is the process of positioning all the pens so that they can print a contiguous image like a single very large single pen. Each pen covers ½ inch of space vertically to give 300 DPI in one pen or 600 DPI (600 DPI). This allows printing large bitmaps and barcodes that overlap pen boundaries. This is especially important for wide format work using multiple imagers.

The pens need to be aligned vertically between one another- up and down 90 degrees to the paper transport direction. This is called the “vertical” direction. The goal is to not have a gap, or white streak, and to not have nozzles overlapping giving a double strike. The pens overlap 4 nozzles mechanically in the shell and the GUI is used to turn off the overlapping nozzles (the image is shifted down by the number of nozzles turned off). Note: the actual number of overlapped nozzles varies based on printer and pen tolerances etc.

The pens also need to be aligned horizontally. This is called the “process” direction or the direction the transport runs. Here the delay from the upstream trigger sensor is adjusted for each pen individually. A one pen imager is always stitched.

Imager Setup

First the imager(s) need to be configured. Enter the Conveyor direction. The paper orientation *must* be TOP (GUI limitation at this time). The document size should be set to 8.5 inches wide and the height to ½ inch times the number of pens to stitch. The height would be 6 inches for the example below. If stitching is desired between imagers the “Stitching” column needs to be set to “All Possible” to create a larger contiguous image. If the Stitching is set to “Internal” data cannot be shared between imagers and will be clipped at the bottom of the above imager. Note that to stitch between imagers the distance Vertically or the “Distance from Top Edge” is known because the last pen of the imager above must overlap the first pen of the imager below by a few nozzles- thus the column is “grayed out”.

To start with the “Distance From Sensor” is entered manually to a distance that is close. After the stitching process is completed (below) the *actual* “Distance From Sensor” will be reported in this table column.

Job - GUI

File Edit View Options Data Help

Record: 14 of 0

Imager Setup Form Design Print Manager Service Station Ink Status IO Status Log

Current Configuration: Default

Job Setup

Form Size: Letter

Width: 8.50 Height: 11.00

Barcode Shaving: Specific Settings

Print Resolution (DPI): Vertical: 600 Horizontal: 300

Paper Orientation: Bottom

Imager Setup

Engine	4th Pen	Distance From Top Edge	Distance From Sensor	Stitching	External I/O
# 1	No	0.0000	3.5000	All Possible	None
# 2	No	1.4867	7.0000	All Possible	None
# 3	No	2.9733	10.5000	All Possible	None
# 4	No	4.4600	14.0000	All Possible	None

Conveyor Direction: ☒ Left To Right ☐ Right To Left

Pen Direction: Pens Down

Add Jet Engine Delete Engine

Fit To Window

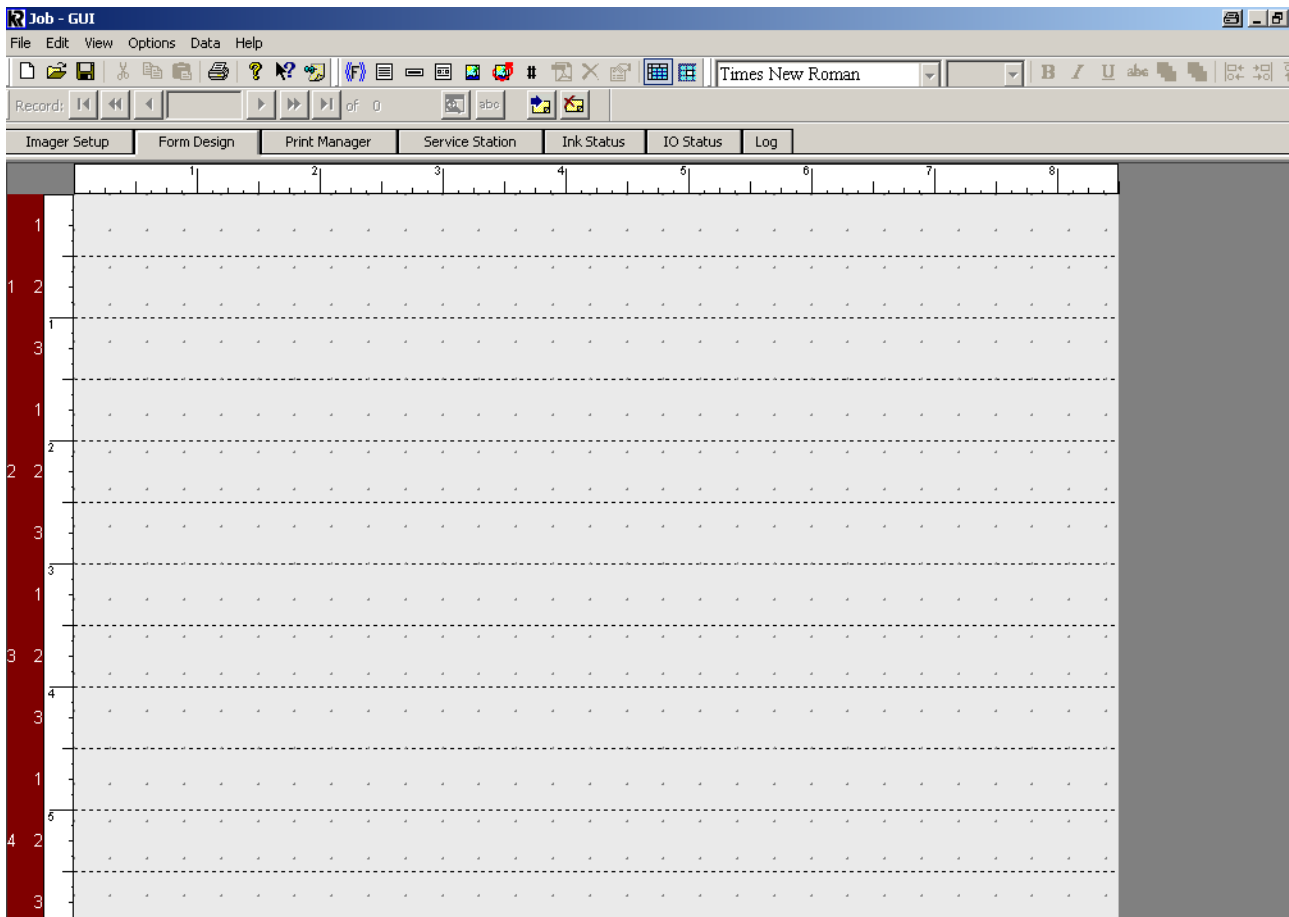
The diagram illustrates the stitching process. Four individual imager outputs, labeled 1 through 4, are shown as overlapping rectangular blocks. Each block contains a small grid of colored squares (cyan, magenta, yellow). These are then stitched together into a single large rectangular area. Within this area, the characters 'CD' and 'AB' are printed in a large, bold, black font. Below the stitched image, a series of arrows points to the right, labeled 'Conveyor Direction'.

Form Design

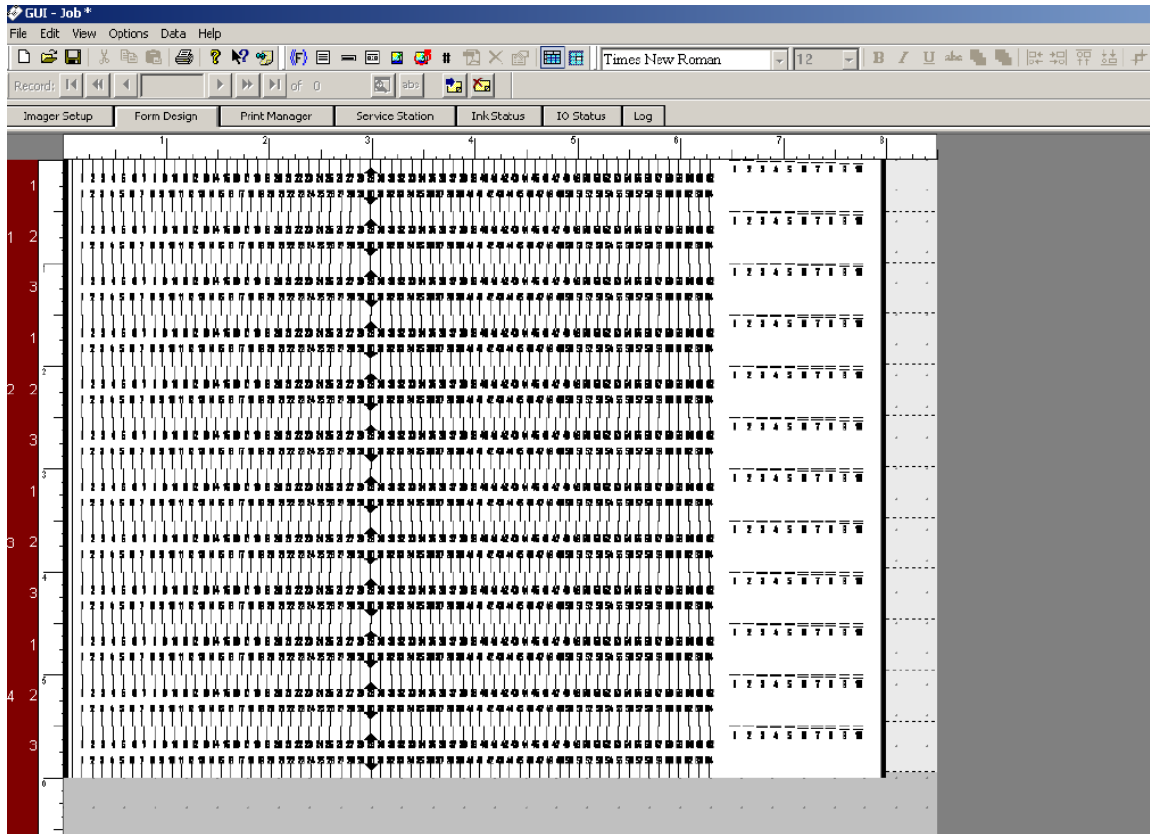
The Form design should look like the picture below. The lines between imagers (and pens) indicate that the image is stitched. A solid line means that the imagers are *not* stitched and the bitmap or text may be clipped. We are only dealing with the pens to stitch here. Also there should not be any space between the pens to stitch, if so go back to the Imager Setup.

The next step is to load the stitching calibration bitmap. The bitmap is provided by NetJet and is located in "C:\jet.engine.gui\bitmaps. Several stitching bitmaps are available depending on the number of imagers to stitch.

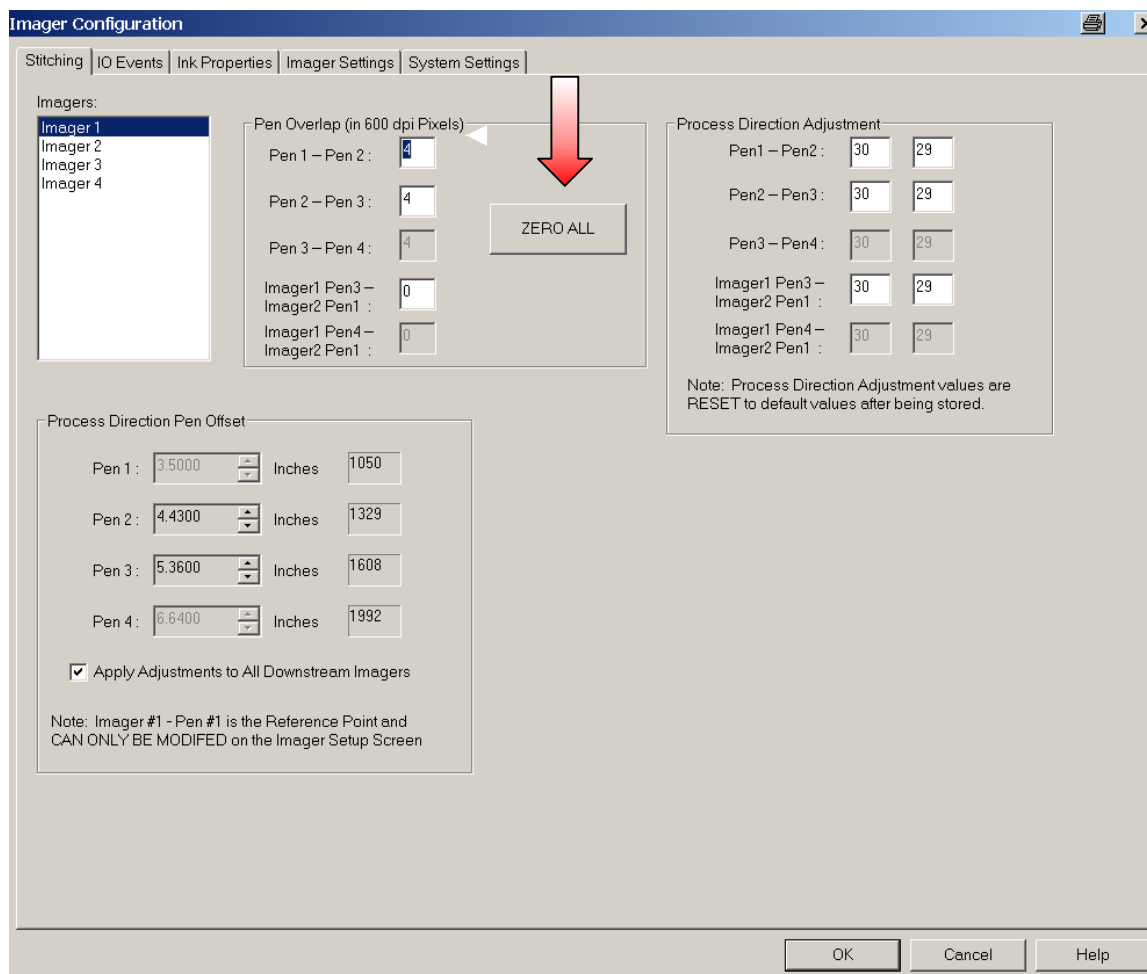
The pens need to be positioned at the top as shown below. This is done by selecting "Top" and the distance from top = 0 in Imager Setup above.



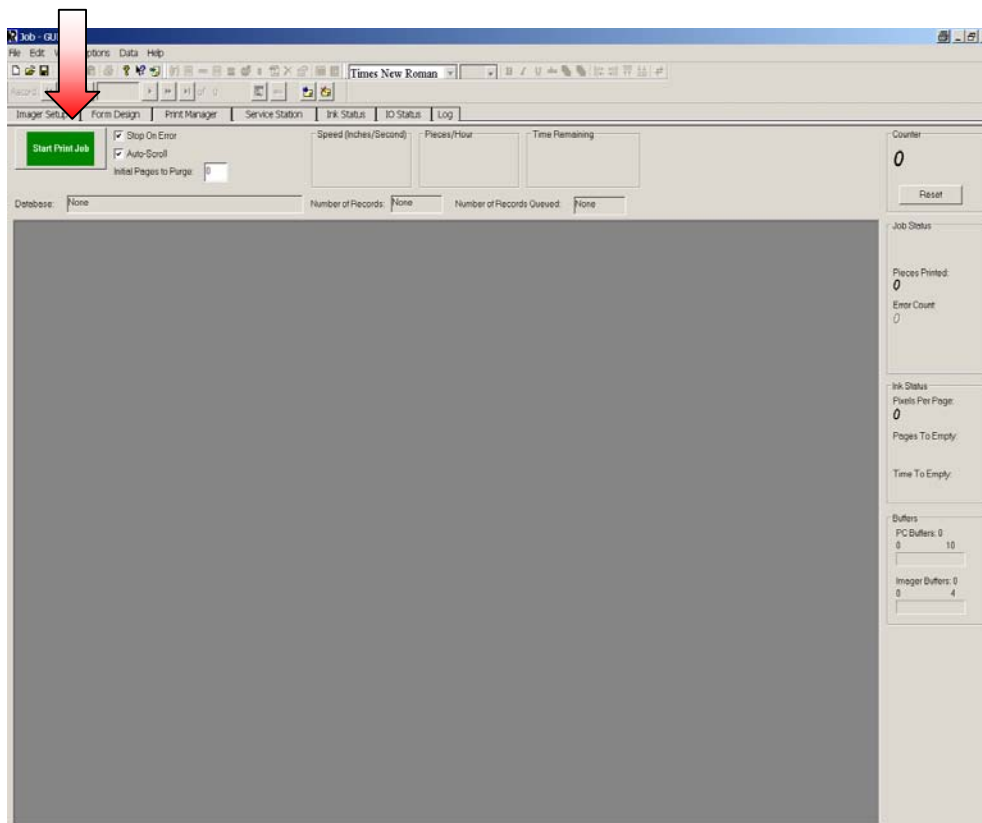
The bitmap should look like below. The bitmap should be in the positioned at the top of the form design window. The bitmap should not be clipped at the bottom or the right hand edge. If there is clipping it can be changed in the Imager Setup by editing Page Size.



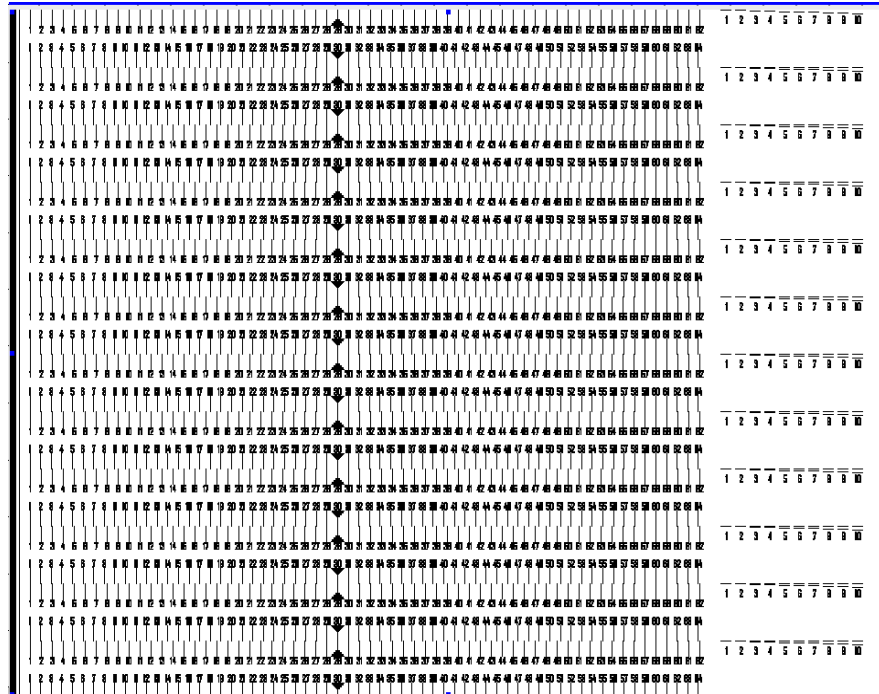
Click on the **Options—Imager Configuration** menu and choose the **Stitching** tab. The imagers have a built-in 4-jet horizontal overlap. By default, these four jets are disabled at startup and must be activated in order to properly calibrate the imagers. Do this by clicking the **Zero All** button as indicated by the arrow.. Each Imager in the system must be set separately.



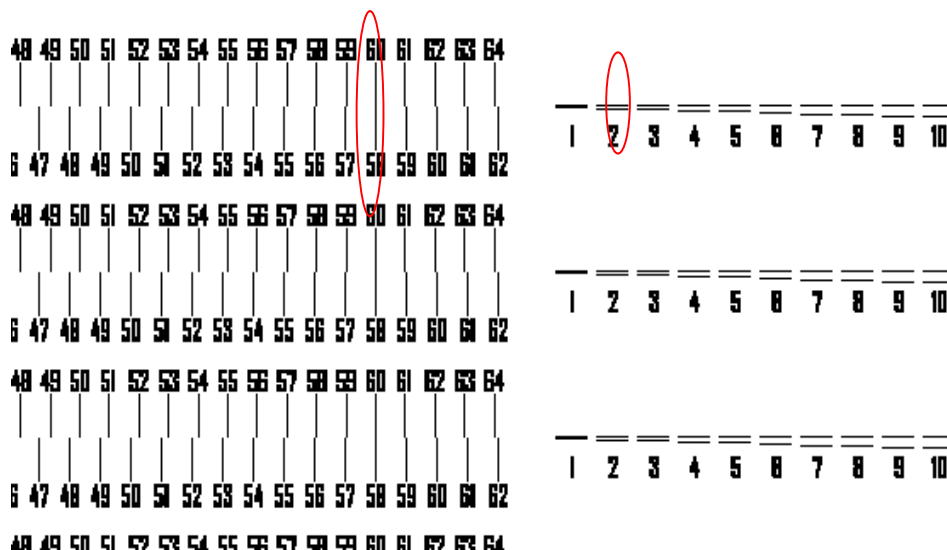
When finished, click **OK** and click on the **Print Manager** tab. Now click the **GREEN Start Print Job** button as indicated by the red arrow. This will send the print job to the imager. When the button turns **RED**, start the transport and send a piece of product down the conveyor. The bitmap will be printed by the imagers.



Examine the printout. The lines on the left represent vertical stitching while those on the right represent horizontal stitching. Note that each pen has printed the calibration pattern. Find the place where the vertical lines match between the pens and circle the numbers. On the right, find the place for each pen where the upper and lower lines are closest together without overlapping.



In the Process Direction section, 60 and 58 are entered as shown. This is where the lines from imager 1 pen 3 and imager 2 pen 1 appeared to line up best.

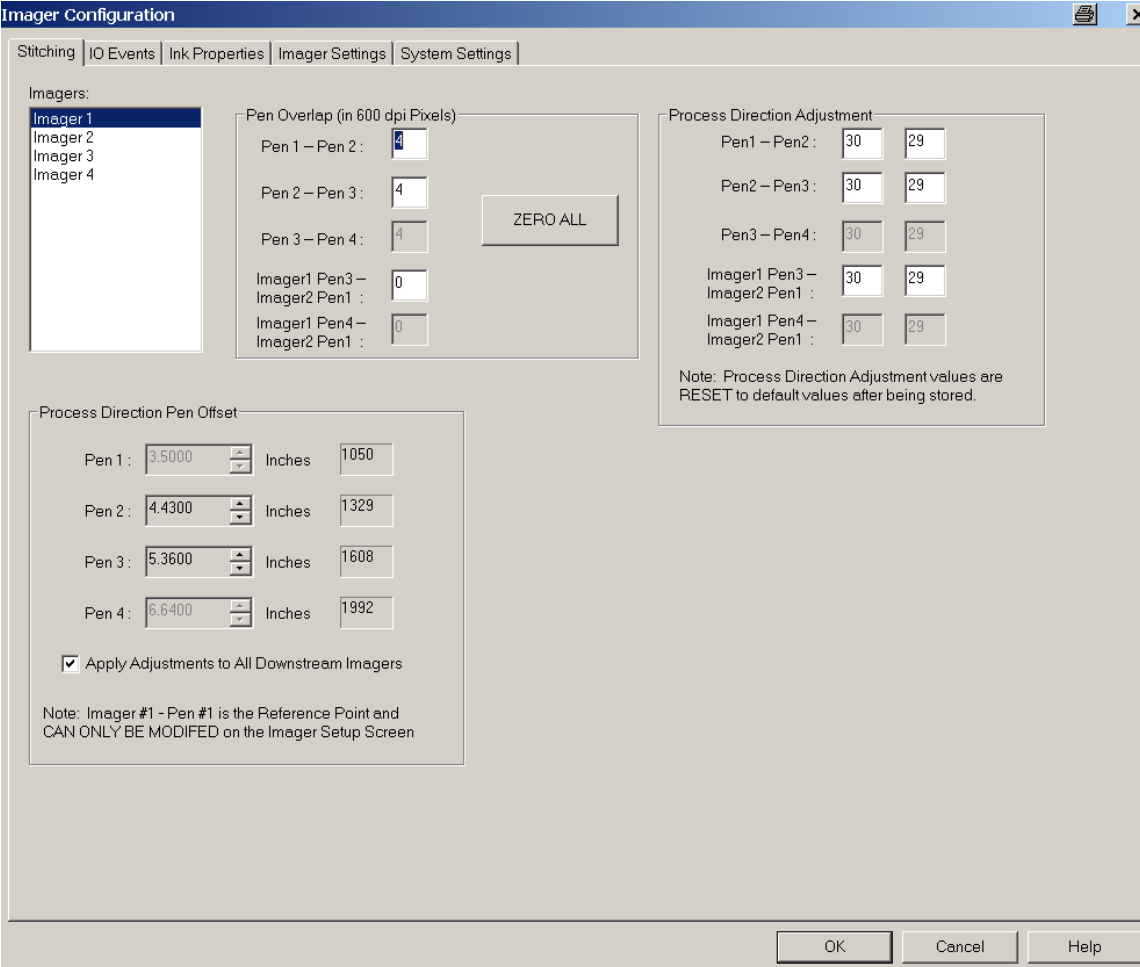


Return to the Stitching page and enter the numbers that were circled on the printout into the appropriate boxes indicated by the arrow. The Pen Overlap section of the screen is for horizontal calibration while the Process Direction Adjustment is for vertical calibration. Using the examples above, 2 is entered into the box shown because for the set of lines generated by imager 1 pen 3 and imager 2 pen 1 the lines at position 3 were closest together without overlapping.

The Goal is to get all the images to line up on the carrots or 30-29.

Process Direction Pen Offset is used to manually stitch in the process direction without using the Stitching Bitmap. It is basically WISIWIG where the offsets are adjusted using the spinner button up and down arrows. The amount that the offset moves is based on the value set for pen offset in the imager configuration tab. The value cannot be entered directly.

The checkbox at the bottom “Apply Adjustments to all downstream imagers” will move all the downstream imagers the same amount. This is great when moving the trigger sensor because only the first pen of imager one needs to be adjusted for the new offset and all the other pens will update automatically.



The image shows a software window titled "Imager Configuration". It has a tabbed interface with tabs for "Stitching", "IO Events", "Ink Properties", "Imager Settings" (which is selected), and "System Settings".

On the left, under "Imagers:", there is a list box containing "Imager 1", "Imager 2", "Imager 3", and "Imager 4". "Imager 1" is selected.

The main area is divided into several sections:

- Pen Overlap (in 600 dpi Pixels):** This section contains four input fields for "Pen 1 - Pen 2", "Pen 2 - Pen 3", "Pen 3 - Pen 4", and "Imager1 Pen3 - Imager2 Pen1". Each field has a value of "4". Below these is a "ZERO ALL" button.
- Process Direction Adjustment:** This section contains six pairs of input fields for "Pen1 - Pen2", "Pen2 - Pen3", "Pen3 - Pen4", "Imager1 Pen3 - Imager2 Pen1", and "Imager1 Pen4 - Imager2 Pen1". Each pair has values of "30" and "29".
- Process Direction Pen Offset:** This section contains four pairs of input fields for "Pen 1", "Pen 2", "Pen 3", and "Pen 4". Each pair has a value in inches (e.g., 3.5000) and a corresponding value in a box (e.g., 1050).

At the bottom of the main area, there is a checkbox labeled "Apply Adjustments to All Downstream Imagers" which is checked. Below it is a note: "Note: Imager #1 - Pen #1 is the Reference Point and CAN ONLY BE MODIFIED on the Imager Setup Screen".

At the bottom right of the window are three buttons: "OK", "Cancel", and "Help".

Note: Process Direction Adjustment values are RESET to default values after being stored.

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12 Notes

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13 Software License Agreement

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