

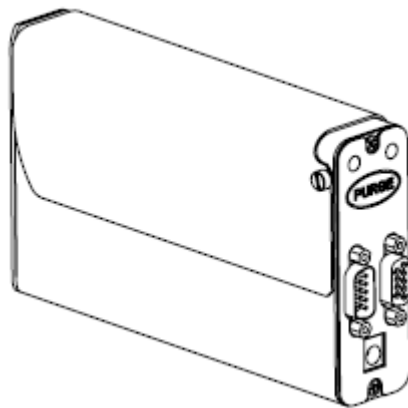


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ATD IP500 Thermal Ink-jet Operator Manual



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Disclaimer

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

All rights reserved

Ink Cartridge: The IP500 has been engineered and designed to work with ATD ink Cartridges. The IP500's Smart Level Ink Detection System, which provides ink level monitoring to ensure complete ink usage and product safety , will not function if non-ATD ink cartridges are fitted.

Warranty:

The IP500 Thermal Jet system, including all components unless otherwise specified, carries a limited warranty.

The inks and conditioners used with the IP500 Thermal Jet system carry a limited warranty.

For all warranty terms and conditions, contact ATD for a complete copy of the Limited Warranty Statement.

Copyright

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Revision history

V1.0.0 31/10/09

V1.0.1 23/01/10

Minor text corrections. New programme locations on CD.

Section 1: Safety and Ink Cartridge Usage

Following is a list of safety symbols and their meanings, which are found throughout this manual. Pay attention to these symbols where they appear in the manual.



Wear safety Goggles when performing the procedure described



Caution or Warning! Denotes possible personal injury and/or damage to equipment



Caution or Warning! Denotes possible personal injury and/or damage due to electrical hazard.



NOTE: (will be followed by a brief comment or explanation.)



ESD protection should be worn when servicing internal printed circuit boards. After service to the equipment is completed, replace all protective devices such as grounding cables and covers before operating the equipment.



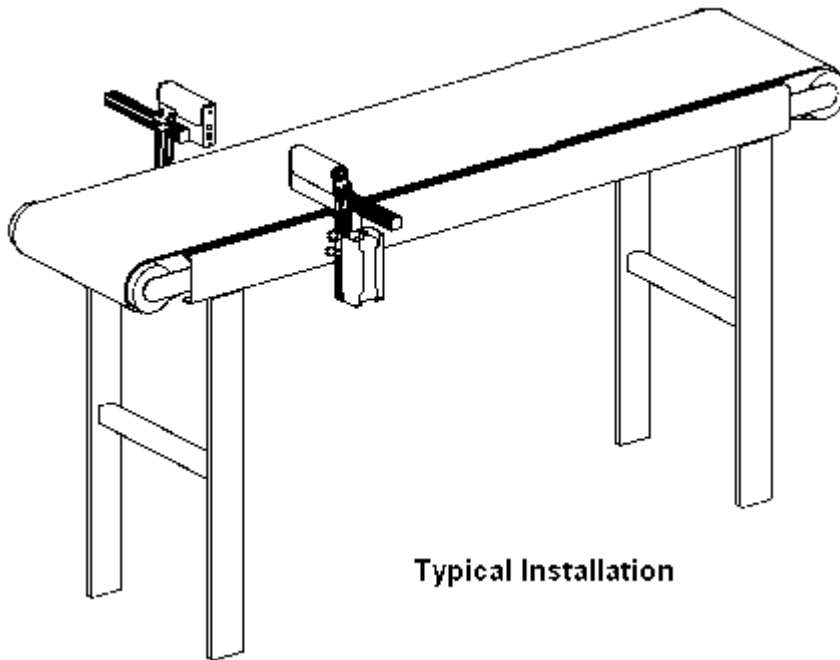
It is extremely important to:

- Clean up all spills with the appropriate solvents immediately and dispose of all waste according to local and state regulations.
- Wear safety glasses and protective clothing, including gloves, when handling all inks and conditioners.
- Store inks and solvents under the recommended conditions found on the MSDS (Material Safety Data Sheet).



Ink Cartridge: The IP500 has been engineered and designed to work with ATD ink cartridges. The IP500's **Smart Level Ink Detection System**, which provides ink level monitoring to ensure complete ink usage and product safety, will not be functional if used with non-ATD ink cartridges.

Section 2: Quick Start

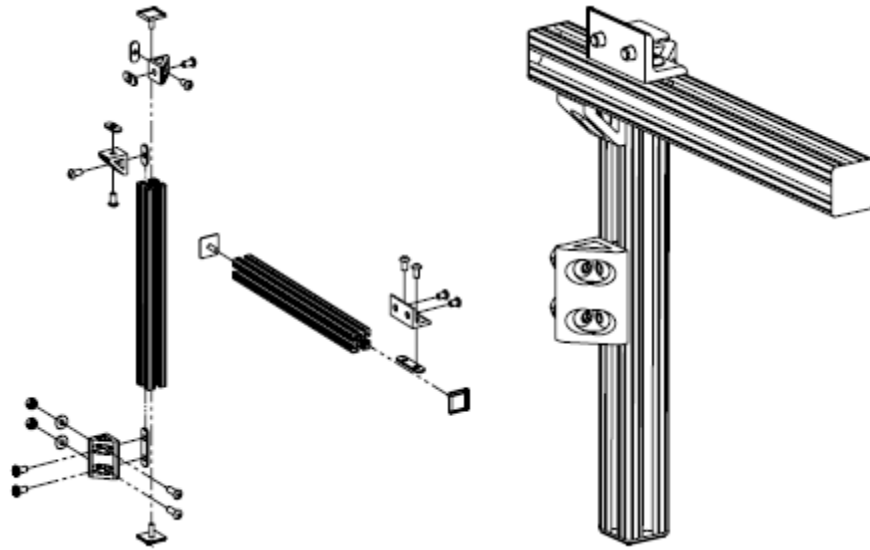


Typical Installation

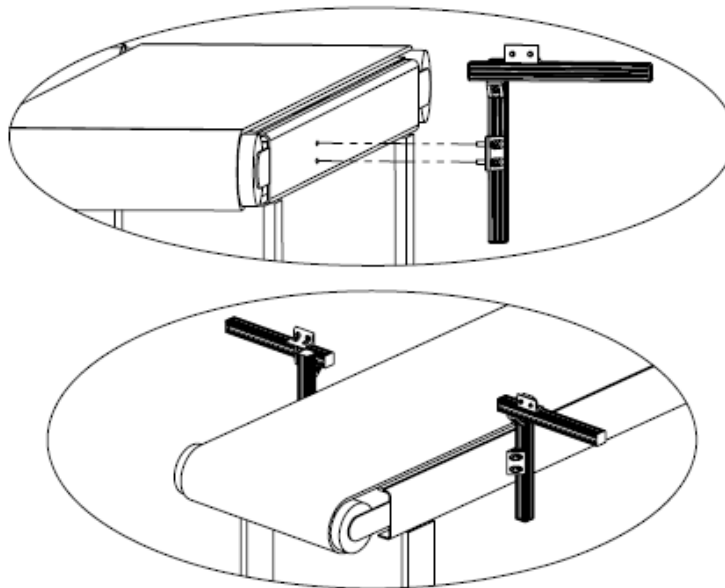
Pack Contents:

- IP500 Print Head
- Bracketry Kit
- Power Supply, 15 V
- Power Supply Bracket
- Power Cord
- Software CD

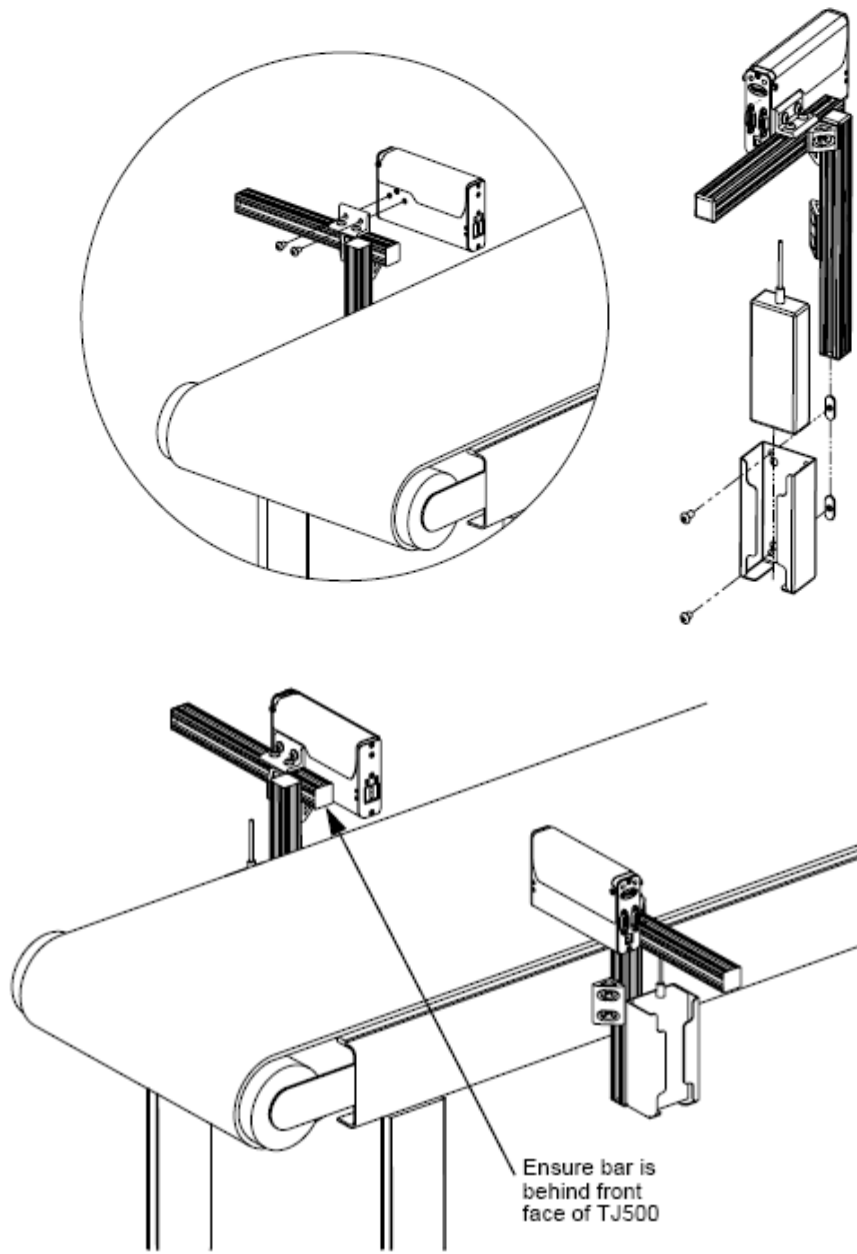
Step 1: Assemble Bracketry



Step 2: Assemble Bracketry to Conveyor

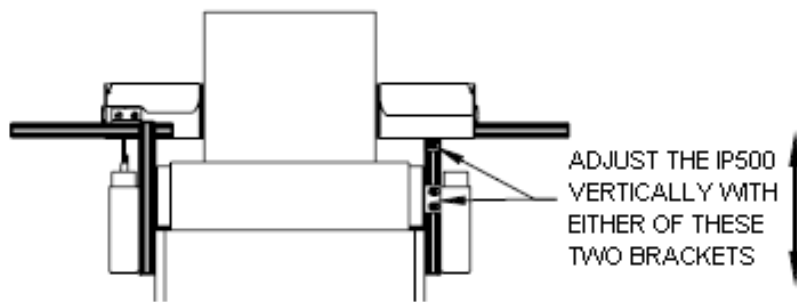


Step 3: Assembly of IP500 and PSU to Bracketry

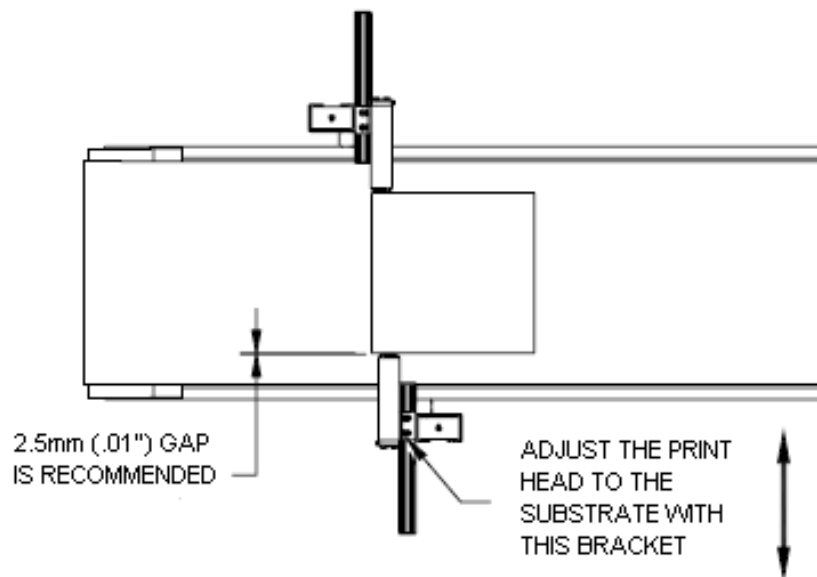


Step 4: Adjust The IP500 Print Head to Substrate

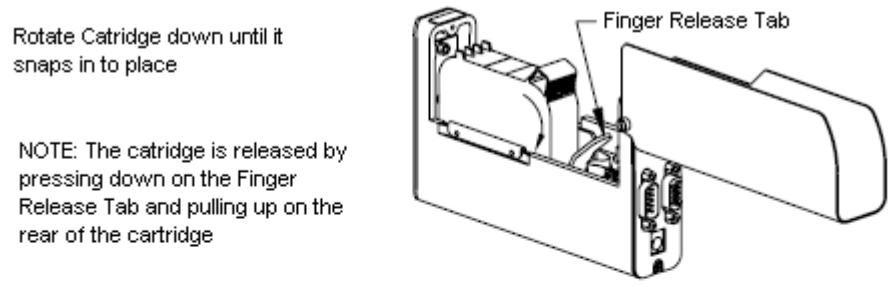
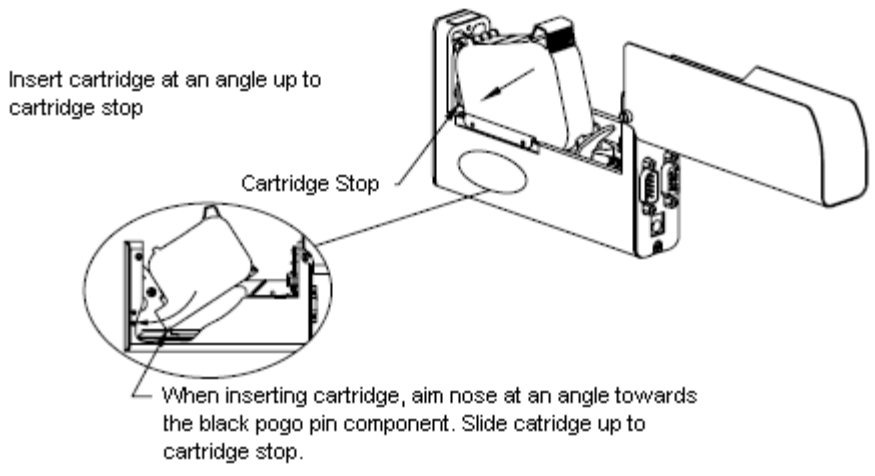
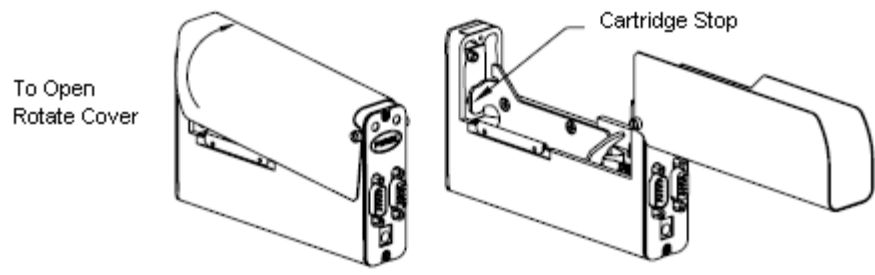
Adjust the IP500 vertically to meet print requirement



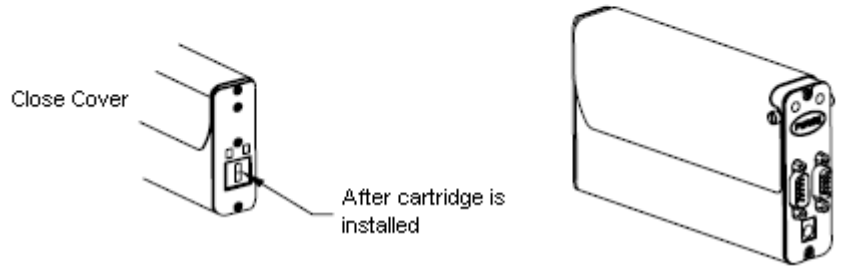
Adjust the IP500 horizontally to set the print gap



Step 5: Insert Cartridge into Print Head



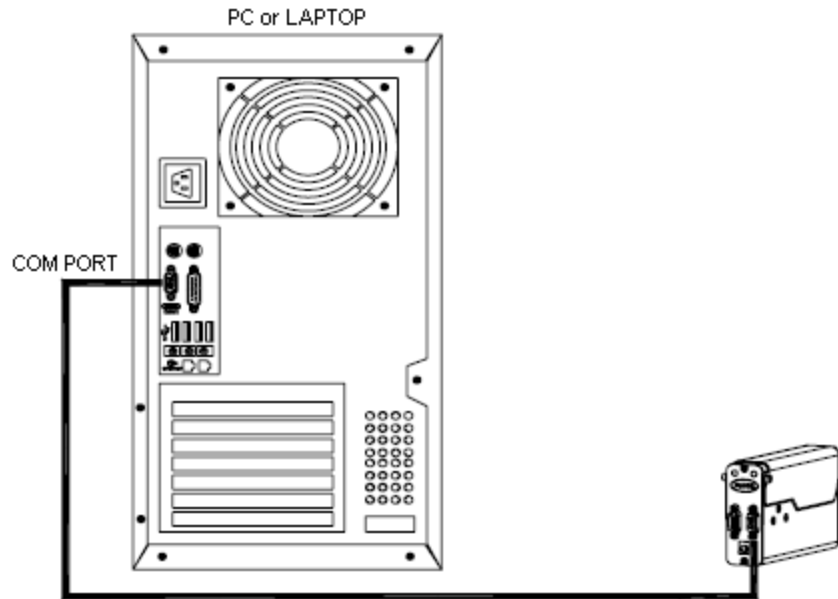
NOTE: The cartridge is released by
pressing down on the Finger
Release Tab and pulling up on the
rear of the cartridge



Step 6: Cabling, Power, and Serial Port Setup



CAUTION: The Power should be disconnected from the print head prior to connecting any external device such as the PC. Electrical arcing may occur if external cabling is connected or disconnected while power is supplied to the IP500



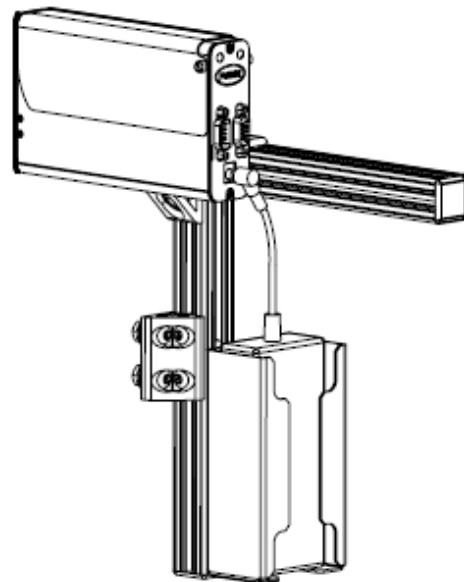
CAUTION: The Power should be disconnected from the print head prior to connecting any external device such as the PC. Electrical arcing may occur if external cabling is connected or disconnected while power is supplied to the IP500

Install the power plug from the previously mounted PSU in to the jack plug situated on the rear of the IP500 print head

Press and hold the "PURGE" button on the rear of the IP500 while slowly moving a piece of paper in front of the IP500 cartridge. Print several purge images and validate that all channels are printing. If not refer to "SECTION 4: Maintenance and Shutdowns" on page 21



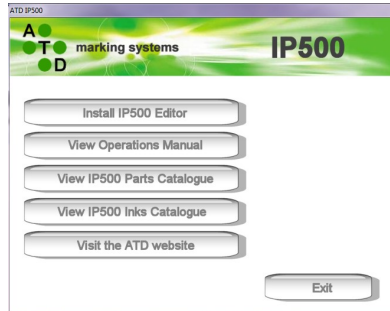
NOTE: Do not rub the face of the ink cartridge with the print material as it will scratch the orifice array and affect the print quality



Install the IP500 PC software using the CD included with the system:

Note: Before installing the software confirm that the PC has an unused serial port. If it does not, install a serial port (internal card or USB) before installing the IP500 software.

Insert the CD and wait for the options screen.




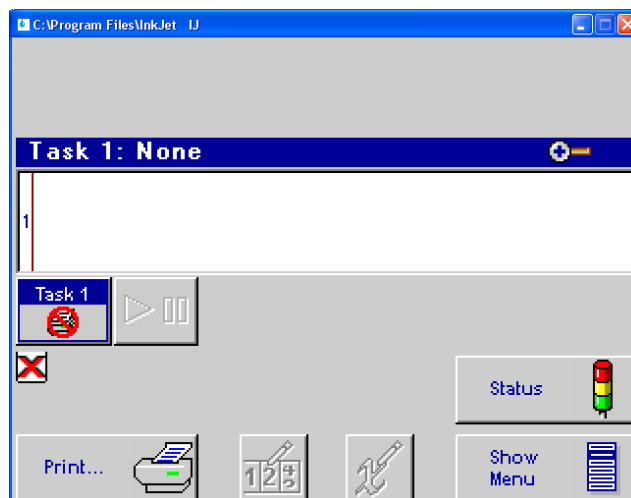
Click the 'Install IP500 Editor' button. Follow the installation prompts.

If the options screen does not run automatically browse to the CD and run 'IP500_CD.exe' or open the 'Editor' folder and run 'IP500_Editor.exe'

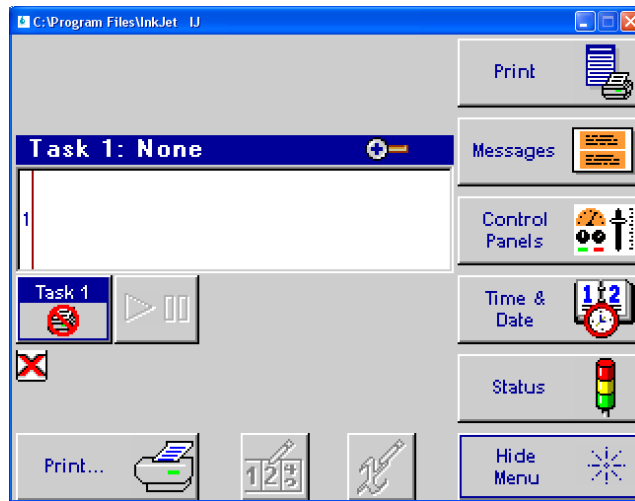
If you are installing under Vista or Windows7 it is recommended that you do not install to the default location ('C:\ Program Files' folder). Create a folder in the root (say 'C:\IP500') and install to there (Vista's security settings may prevent the programme saving data in the 'Program Files' sub-folders).



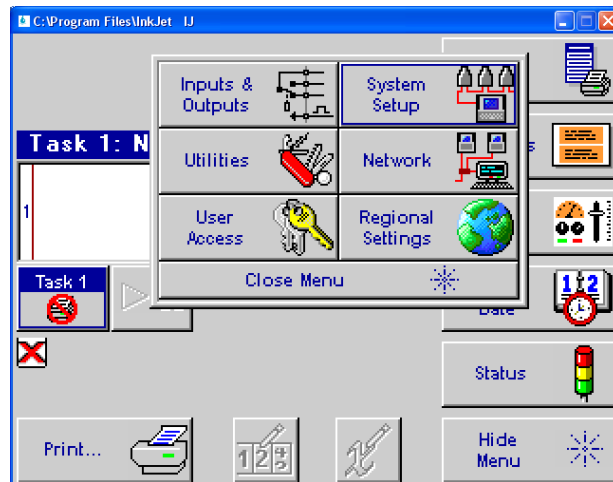
After installation launch the programme by clicking the desktop icon  or run 'ij.exe' from the folder you chose for installation.



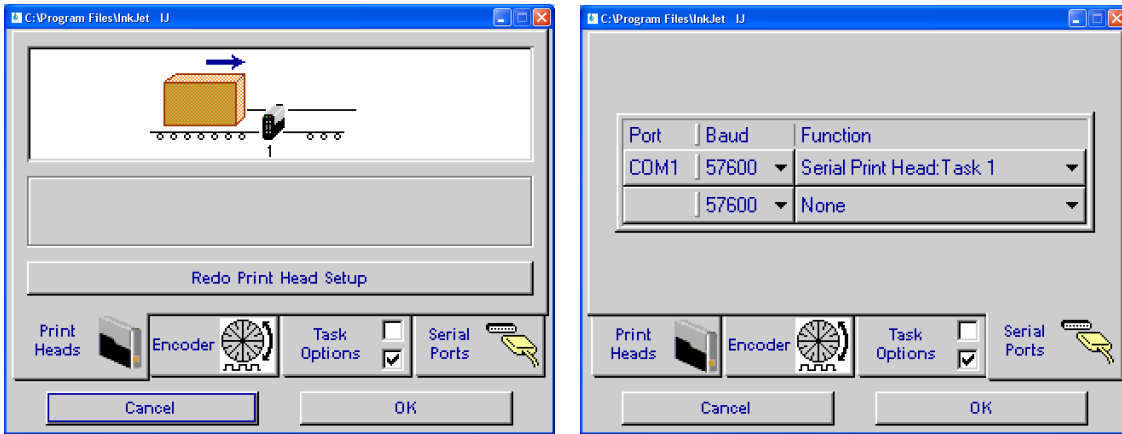
Ensure the Main Screen menu is present via the **Hide Menu / Show Menu** button



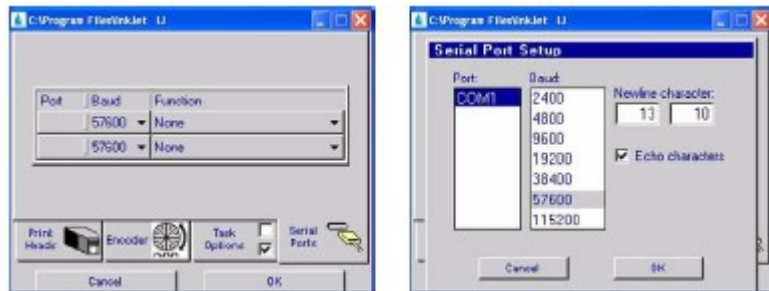
Press the **Control Panels** button.



Press the **System Setup** button and then the **Serial Ports** tab.



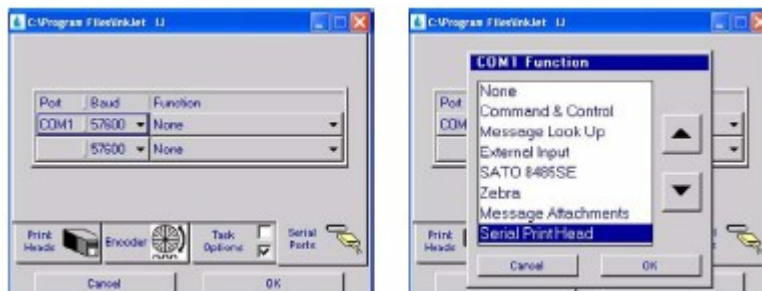
Press the first **Port/Baud** button and ensure the baud rate is set for **576500**.



Select the COM port from the list. This is the port on the PC that the serial cable is connected to. If a USB to Serial converter is being used the device will appear in the list of ports, however it may be necessary to determine which port number has been assigned to the device by trial and error (or look in the Device Manager for a listing of installed COM ports).

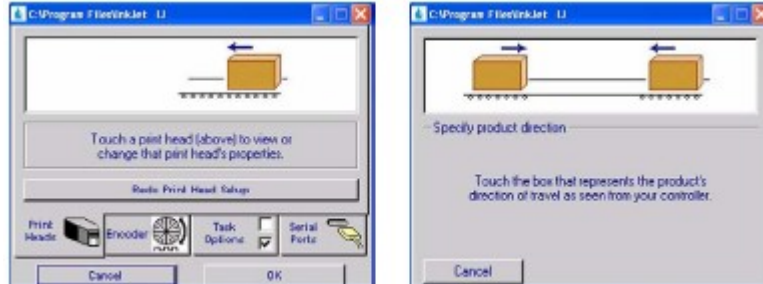
Press the **OK** button to exit the **Serial Port Setup** screen.

Press the **Function** button and select the **Serial Print Head** option. Press the **OK** button to exit the **Function** screen.



Step 7: Configure the Print Head

Press the **Print Heads** tab and then the **Redo Print Head Setup** button. Select the desired direction.



Select the number of print heads and identify the first in the daisy chain.



Print head setup is complete.

Next, select the **Encoder** tab:

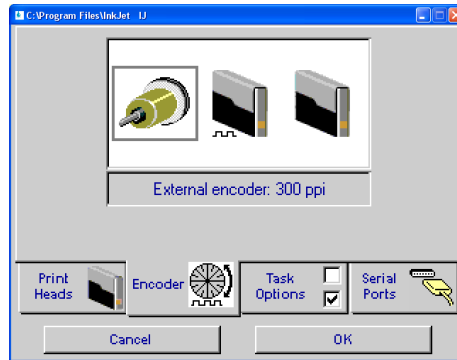
Click one of the three options:

External Encoder:

This option should be used if the line speed varies. The encoder will track the changes and produce constant size characters.

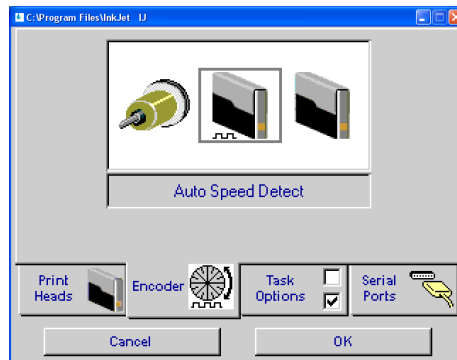
Line Speed is measured by an externally mounted encoder and connected to the last IP500 in the daisy chain. The encoder should be configured to produce 300 pulses per inch (11.8 pulses per mm) of product travel.

The encoder and wheel supplied by ATD (IP50-SPA00001) will be pre-configured for this rate. If the encoder is to be connected directly to a shaft the pulses per revolution may need adjusting. Contact ATD for assistance.



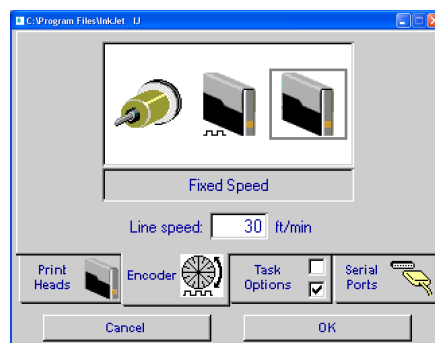
Auto Speed Detect:

The line speed is automatically detected via the IP500 photocells built into the front of the printhead. This is the easiest option and should be chosen if possible.

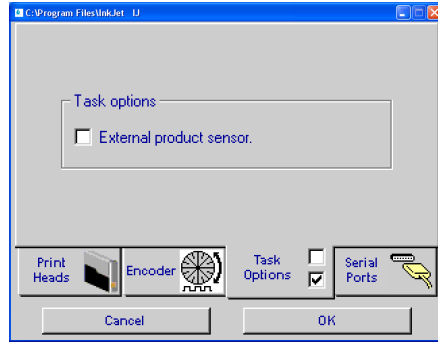


Fixed Speed:

The operator enters the desired line speed value. This option should be chosen if the line speed is constant but an external product sensor is being used (see below)



Click the Task Options tab:



If an external product sensor is being used (normally a photo-cell) tick the **External Product Sensor** box:

If the box is cleared printing will be triggered when a product passes the built in detector in the front of the printhead.

Note: selecting External Product Sensor disables the Auto Speed Detect function. Select either Encoder or the Fixed Speed option on the Encoder tab.

Click **OK** to save the configuration and return to the Main Screen.

Step 8: Create a Message

From the Main Screen show the Main Menu then select the **Messages** button and then the **New** button to enter the message editor.

Step 9: Message Editor

Creating a new text field
Click somewhere in the Message Printhead number

Message Display area

Next Field selection

Font selection

Operator Manual

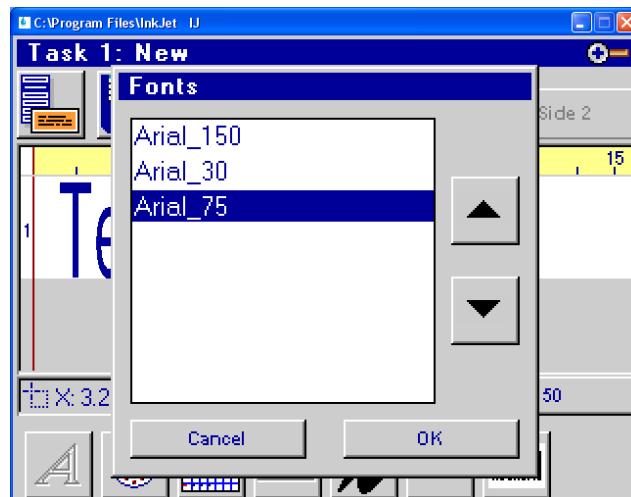


When the cursor is displayed in the message area entering text on the keyboard will automatically create a new text field at the cursor position, using whatever font is currently selected.

Click on the Message Display area to finish entering text.

Selecting a Font

Click the Font button and select a new font:



Click in the message area to position the cursor and enter some text:



Note: Editor will prevent one field overlapping another. It will either display the cursor in red, or bring up a warning message.

Click in a clear area of the message display to finish entering the field text.



Editing existing text

Click on one of the fields:

The field is highlighted. The text can be edited in the box at the bottom of the screen.

Click on the Font button to select a new font for the field.

Moving a field

Click on one of the fields:

The field is highlighted.

Hold down the left mouse button and drag the field to position it in the message display area. The area will automatically scroll with the dragging.

If a field disappears from the message display area when it scrolls use the **Next Field** button to step to it.

Note: the fields will snap to allowed vertical positions. Fields using smaller fonts are automatically aligned to a 'grid' in the message display area.

Field limitations

The IP500 can print a maximum of two fields at the same time (one above the other). It is possible to enter more fields one above the other in the Editor screen if the fields use the small Arial_30 font, however the IP500 will not be able to print all the fields.

Time, Date, Counter, Bitmap, Variable Text and Barcode fields.

Click to position the cursor in the Message Display area then click the required field button at the bottom of the screen:



Details of the field can then be set (see the section Programming the IP500 for more details).

Once the field has been created (with the selected font) it can be amended by clicking it to highlight it, then clicking the Field button in the bottom of the screen:



The example shows a Time field highlighted. Click the Time field button to amend the format, or the Font button to change the font.

Deleting a Field

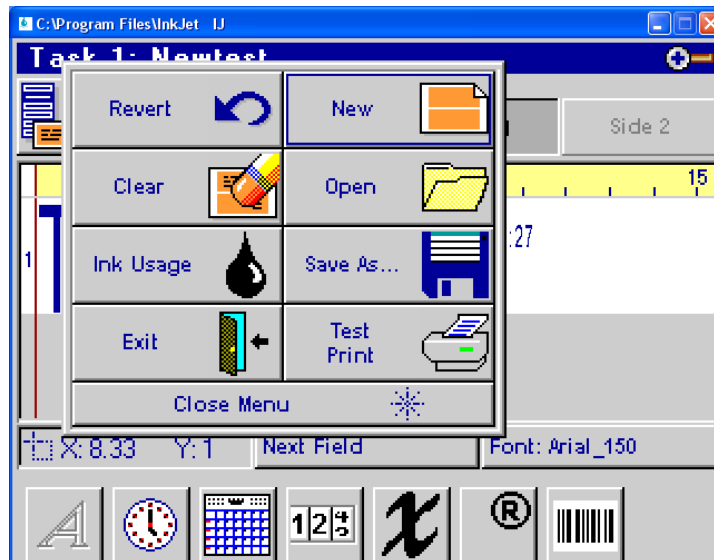
To delete a text field click on it to highlight it and then erase all the text in the box at the bottom of the screen.

To erase other types of field click on it to highlight it and then press the **DEL** key on the keyboard.

Saving the message



Click the **File Menu** button :



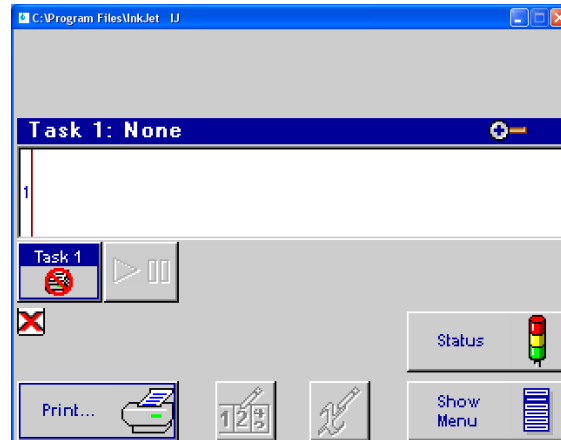
Click **Save As...** , enter a name for the message then click **Save**

Exiting the Editor

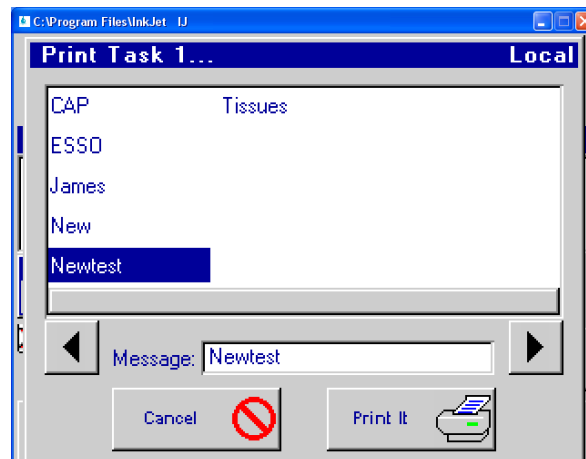
Click the **File Menu** button again and select **Exit**

Step 10 : Printing a Message

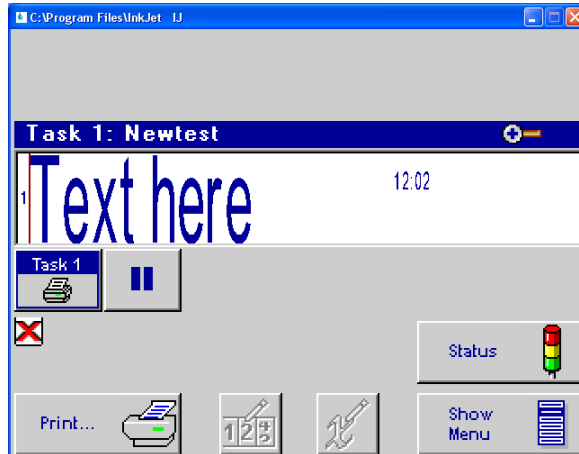
From the Main Screen menu, push the **Print** button.



Click the required message to highlight it:



Press the **Print It** button:



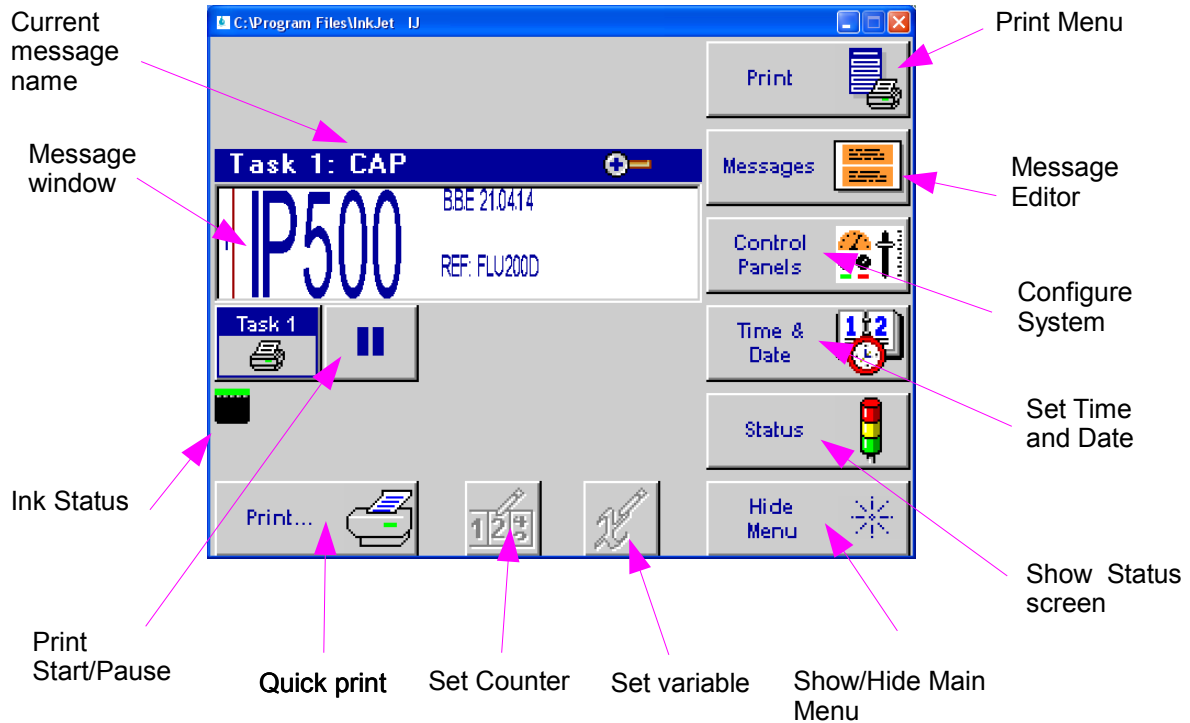
The message will print on the next photocell trigger.

Pass a product in front of the printhead to trigger the photo-cell.

The position of the printing on the product can be adjusted from the Product Setup screen (see Section 3, Programming the IP500)

Section 3: Programming the IP500

Main Screen



Message Window

- Displays the current print message.
- Updated approximately every seven seconds, so it likely will not show each print.
- Long print messages can be viewed by using the **F1** and **F2** keys to scroll the message left and right, respectively.
- White or beige bars represent a print head in the daisy chain and are identified by their respective numbering.
- The header displays the name of the message currently selected

Print Start/Pause

If a message is currently printing, pressing the Pause button will discontinue printing after the message completes printing.



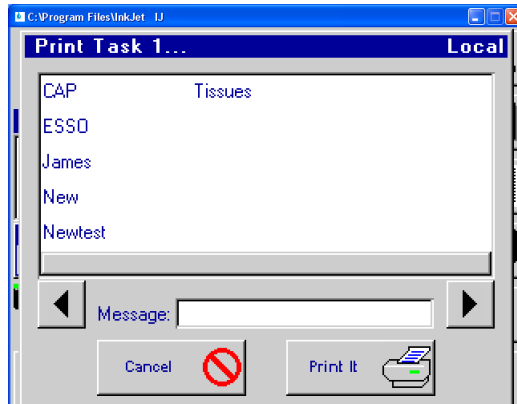
If the message is paused press the Start button. Print will resume on the next product detected.



Quick Print Select



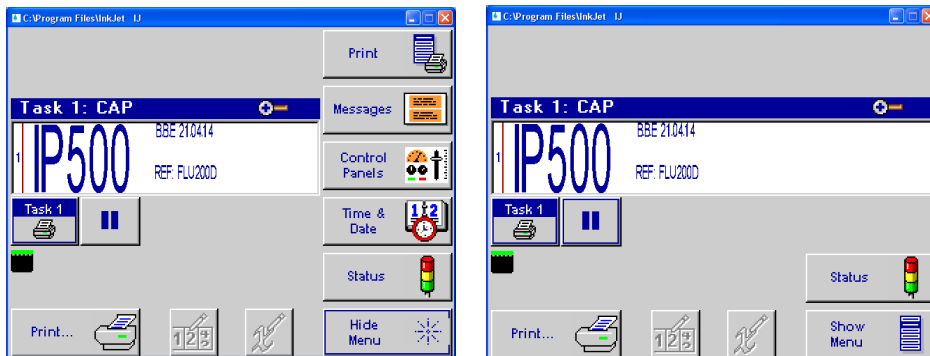
Press the Quick Print button to bring up the Message Selection screen:



Click to highlight the required message then click **Print It**

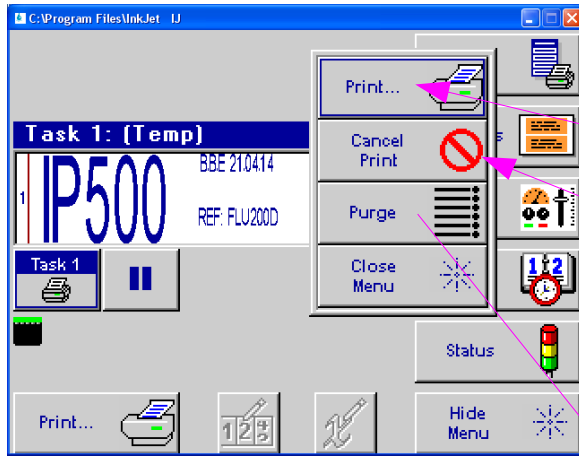
Main Menu

Click the **Hide/Show Menu** to collapse or expand the Main Menu:



Print Button

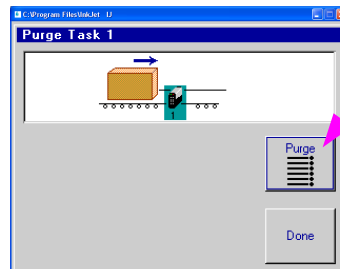
Displays the Print Menu:



Displays the Message Select screen

Cancels printing

Click to test fire the printhead.



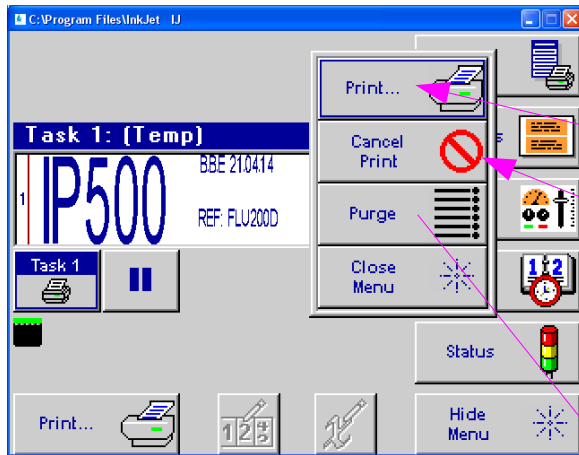
Hold some paper in front of the head to check all the nozzles are firing.

Repeat as necessary.

Set Counter Set Variable

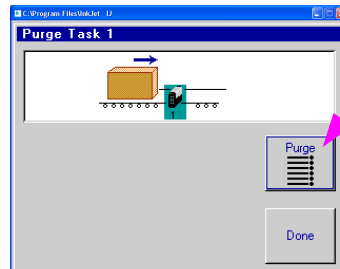
Neither of these options are available from the Main screen. Click **Print** and select the message again to enter a new value.

Print Button (Main Menu)



Displays the Message Select screen

Cancels printing



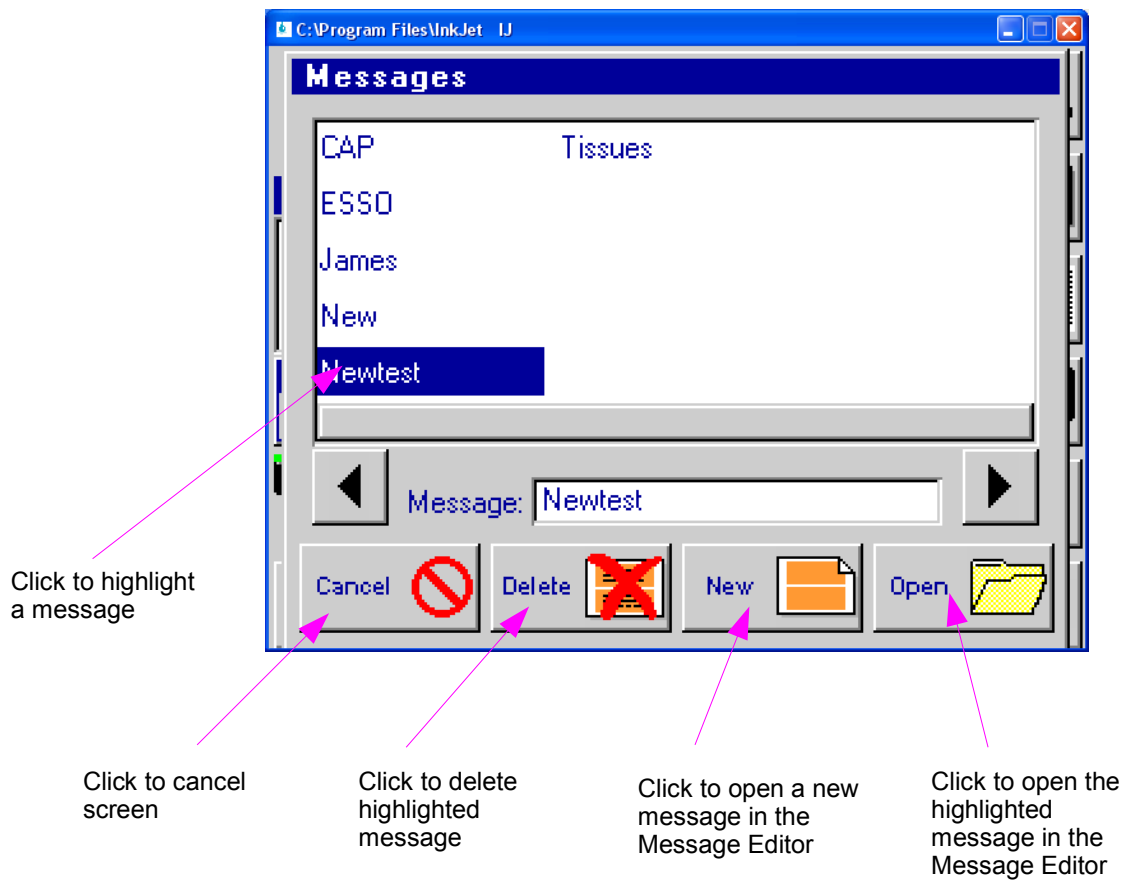
Click to test fire the printhead.

Hold some paper in front of the head to check all the nozzles are firing.

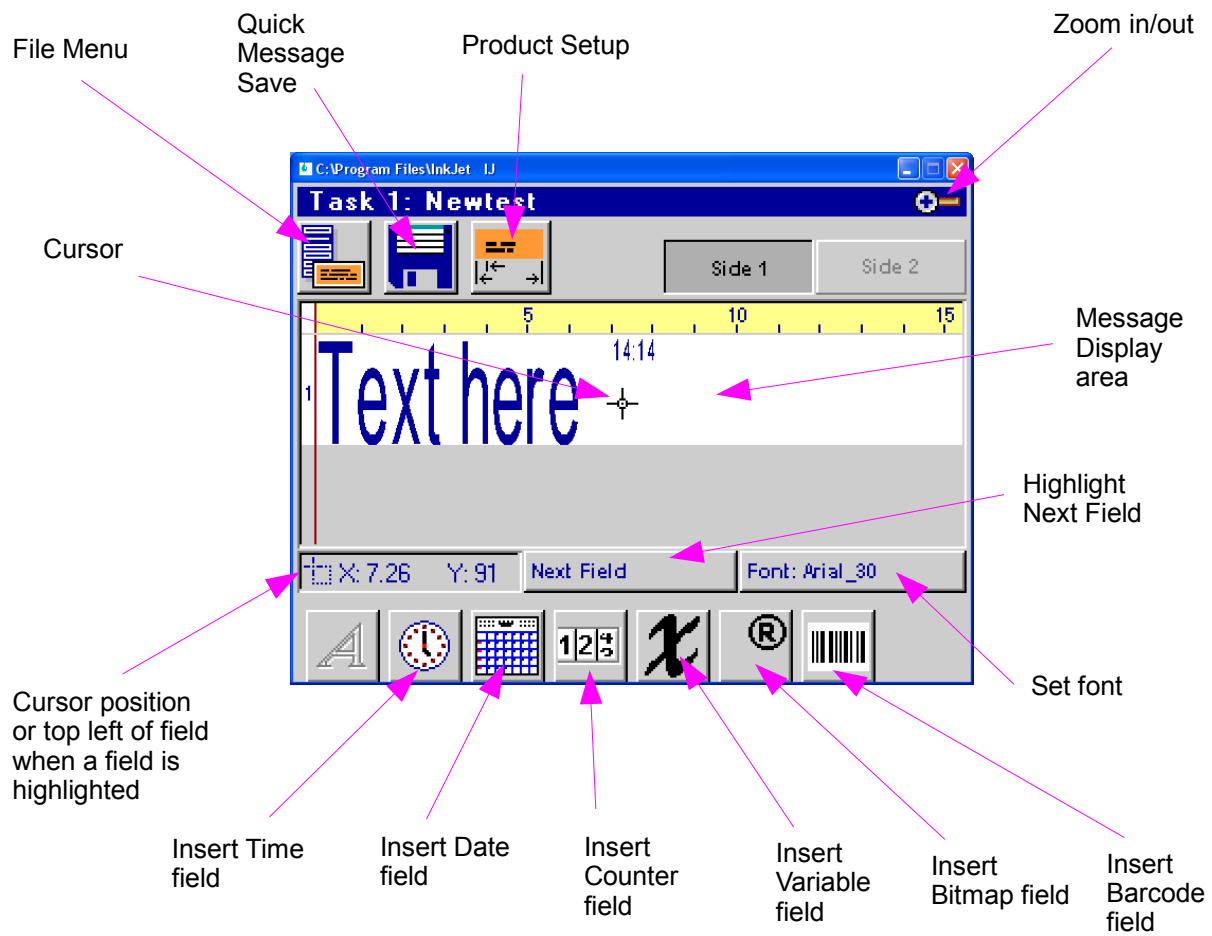
Repeat as necessary.

Messages Button (Main Menu)

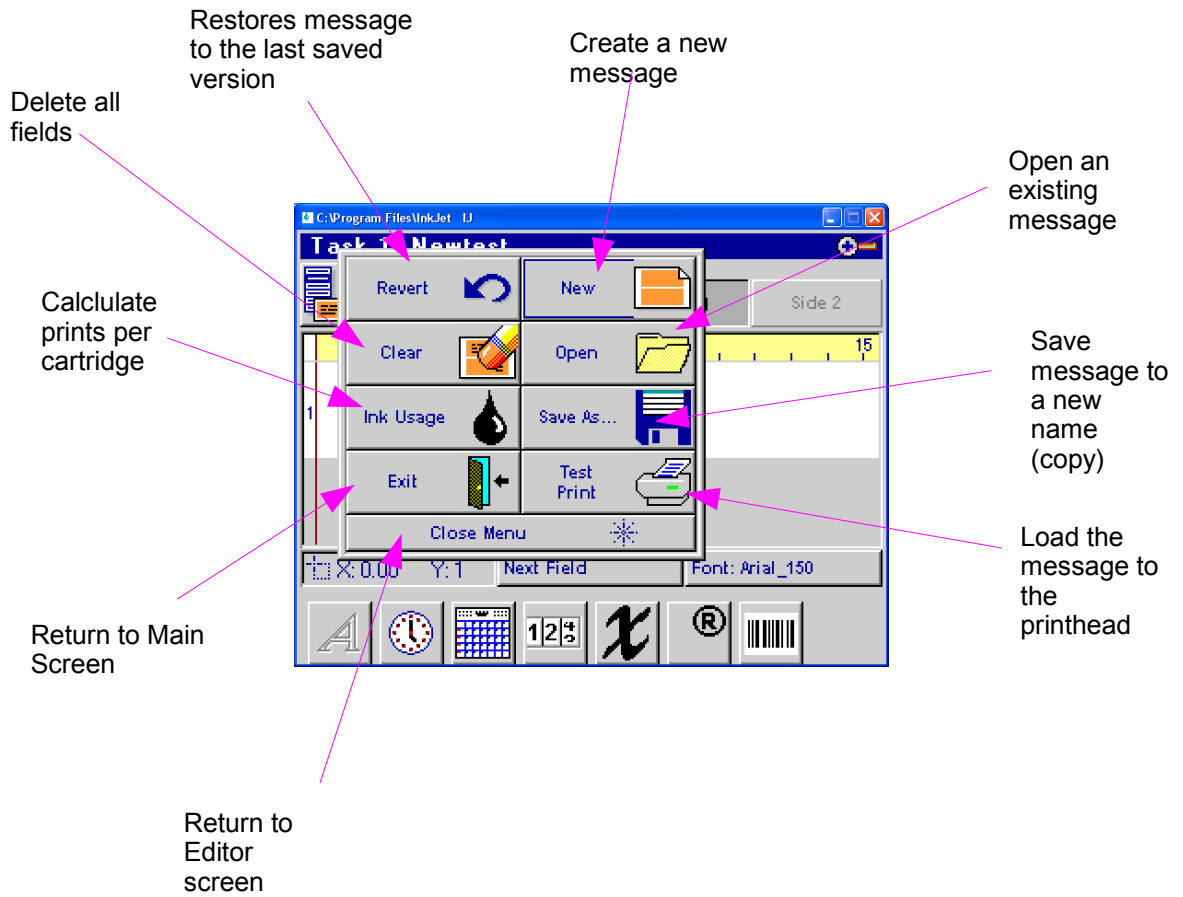
Edit, create and delete messages:



Message Editor Screen

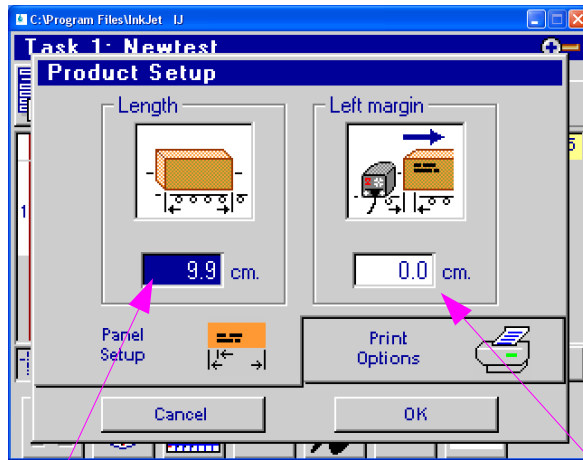


File Menu Screen



Product Setup Screen

Panel Setup tab



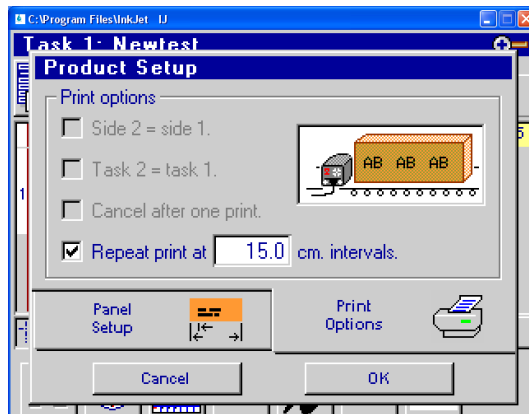
This sets the length of the Message Display area that fields can be positioned within.

Normally this value would be the length of the product.

Sets the position where the printing begins from the edge of the product

Note: if an External Product Detector is fitted the margin starts where the product triggers the detector. It is recommended that the detector is placed as close to the printhead as is practical. See Appendix D for a fuller explanation.

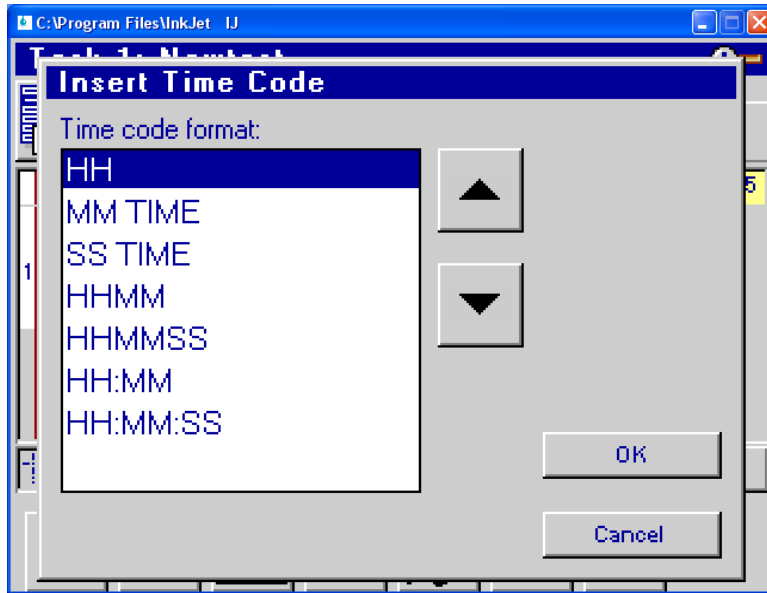
Print Option tab



To print once on each product clear the check box

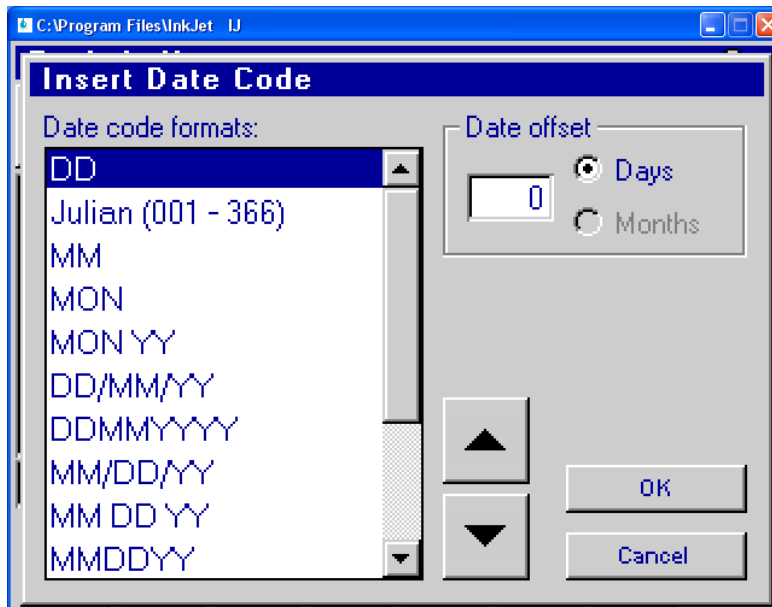
Tick the Repeat Print check box and set the repeat print length as required to print multiple times on the product.

Time Field Screen



Select the required format for the Time field. The field will be printed with the currently selected font. This can be changed by selecting the field and choosing another font.

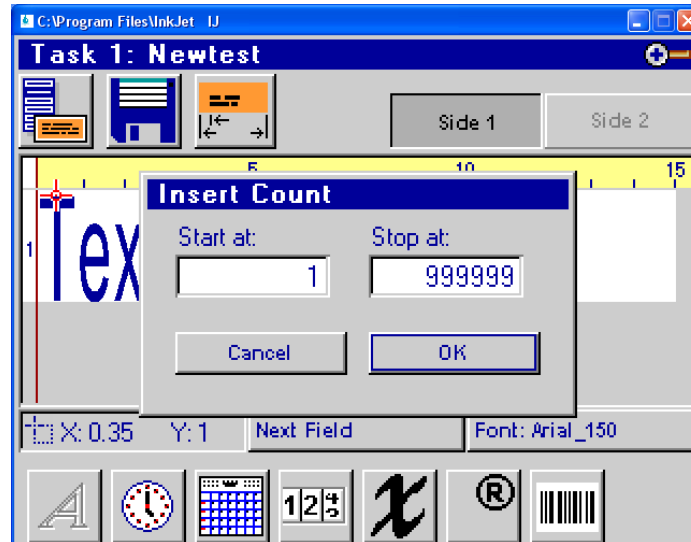
Date Field Screen



Select the required format for the Date field. The field will be printed with the currently selected font. This can be changed by selecting the field and choosing another font.

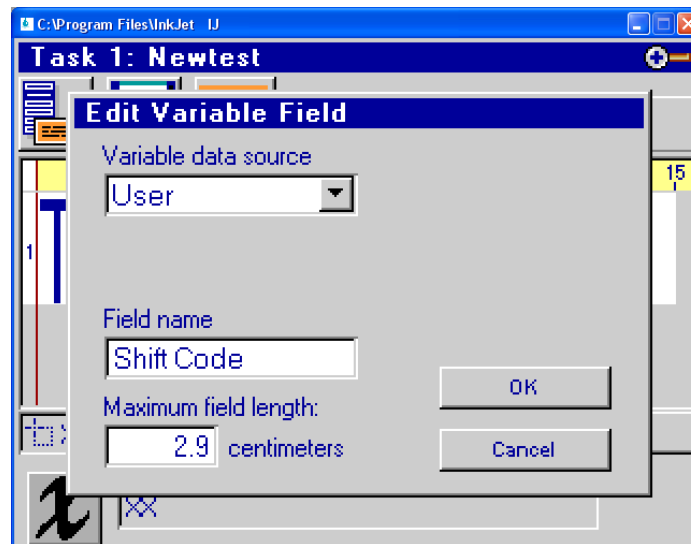
The date can be offset forward from the current date by the number of days entered in the Date Offset box.

Counter Field Screen



Insert the Start (next print) and Stop values.

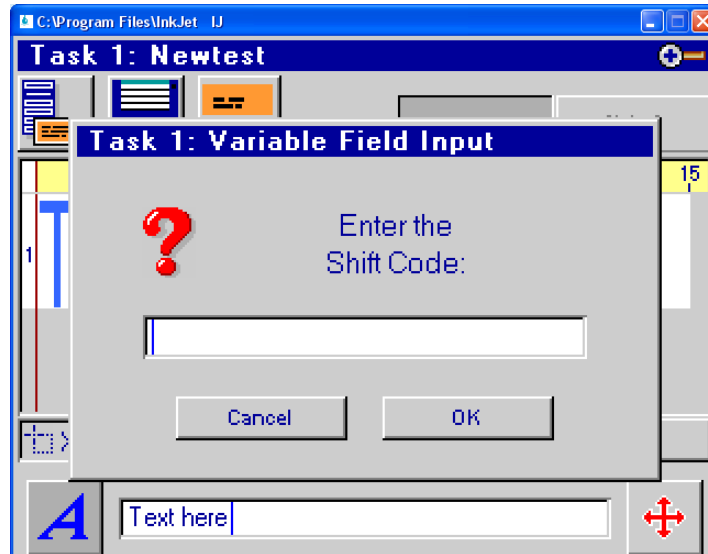
Variable Field Screen



Variables allow users to put information into the message without using the Editor. The IP500 will prompt the user for the information to put into the field when the message is selected for printing.

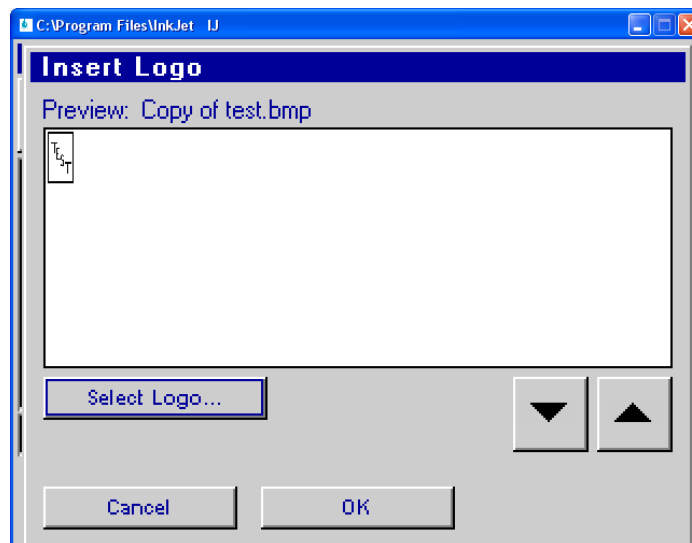
Select '**User**' for the variable's data source.

The **Field name** ('Shift Code' in the example) will form part of the prompt when the message is selected for printing:



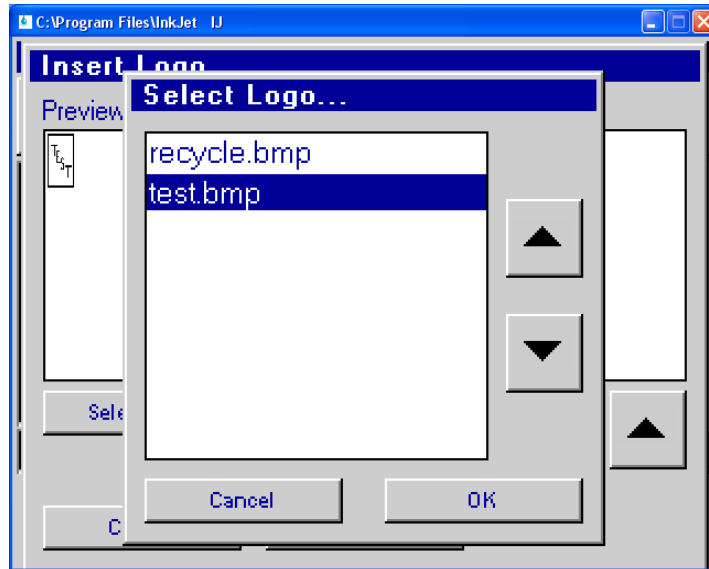
Set the maximum length for the field to prevent data from overwriting another field.

Bitmap Field Screen



Use the ▲▼ keys to select the required logo.

Alternatively click 'Select Logo' and choose from the list

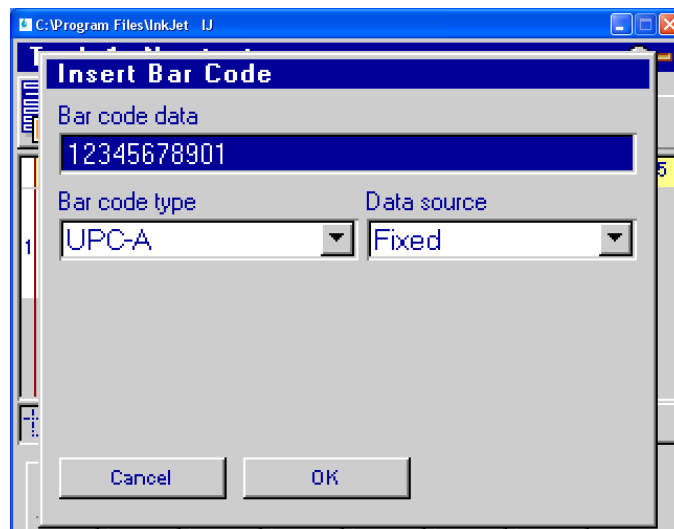


Note: the logos shown in the list are the .bmp files found in the **bmpps** sub-folder of the installation folder. Move any bitmaps files you wish to print to that location first.

The default installation folder is '**program files\inkjet\bmpps**'. If you have installed the Inkjet programme in a different location move the required bitmaps files to the '**bmpps**' sub-folder of that location first.

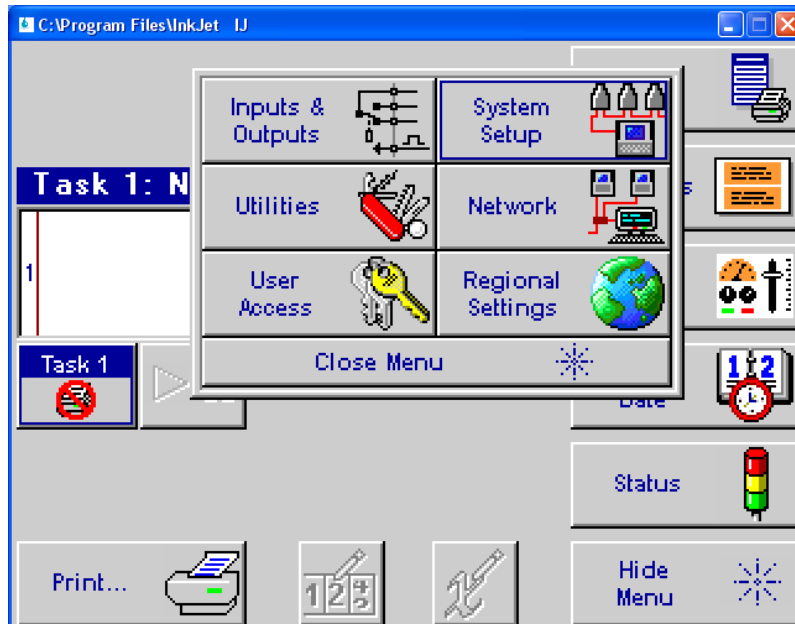
The bitmaps files must be loaded to the IP500 printer using the TJ_500.exe programme before they can be printed. The IP500 can support up to 3 bitmap files in its memory. See Appendix H for more information.

Barcode Field Screen



Enter the 11 digits for the UPC-A barcode (the value of the 12th digit will be calculated by the IP500).

Control Panels Menu



Inputs and Outputs

Not relevant to the IP500. Settings will have no effect

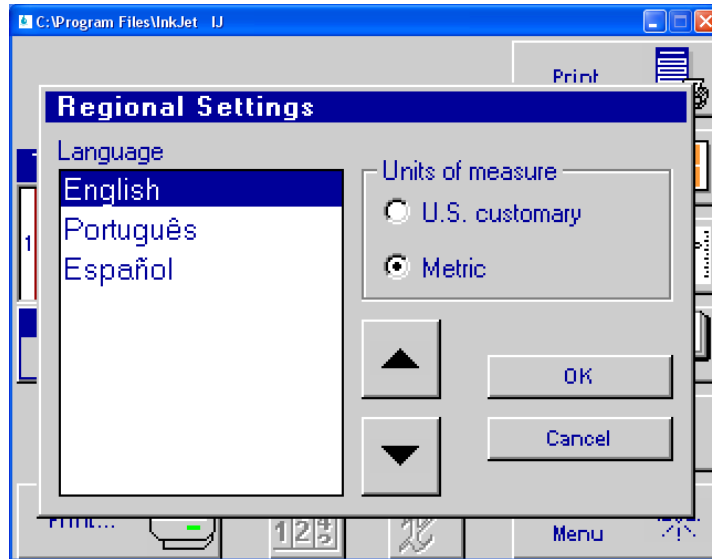
Network

Not relevant to the IP500. Settings will have no effect

System Setup

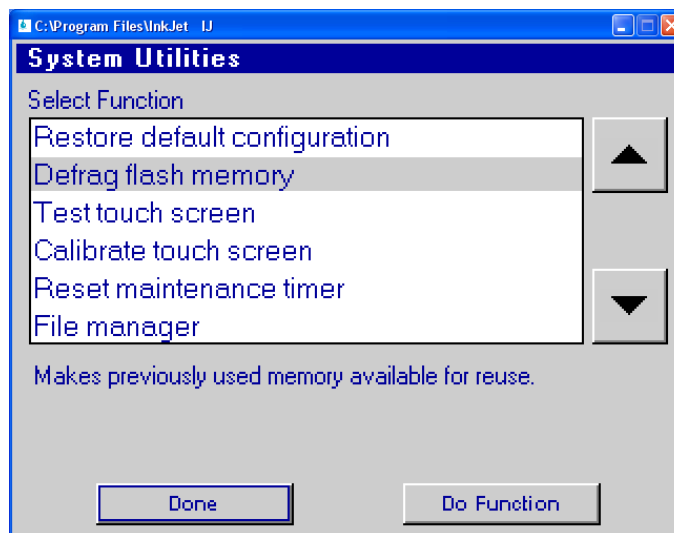
See Section 2, Quick Start for details

Regional Settings



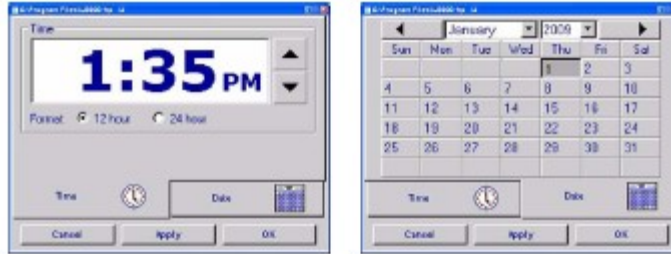
Select the User language for this programme, and the units of measure (inches or metric)

Utilities:



These functions are not relevant to IP500 operation, or are for service use only.

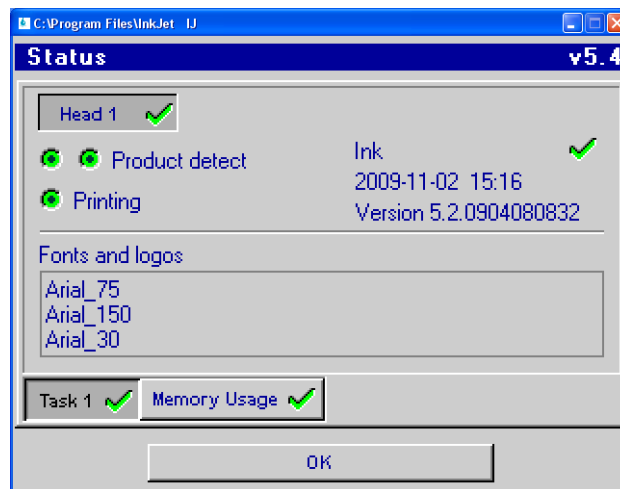
Time & Date Setting Screens



Sets the IP500 clock and calendar (to ensure accurate time and date fields).

Status Screen

For Service/diagnostic use:



Section 4: Maintenance & Shutdowns

Daily Maintenance, Ink Cartridge

Prior to shift start-up, the cartridge orifice array should be cleaned of any debris build up:



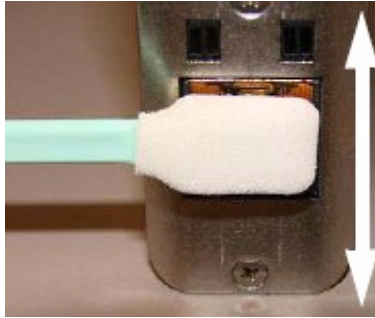
Equipment:



- Deionized or distilled water
- Sponge Swabs (p/n: IP50-SPA00005)

Procedure:

- Lightly dampen sponge swab with de-ionized water.
- Rub up and down across the orifice face with **light** force several times with one side of the sponge swab.



- Turn the swab over and make one final light rub stroke top to bottom.



- The printhead should be clean and free from ink
 - Immediately press and hold the PURGE button on the rear of the print head for 5-10 seconds to clear any excess de-ionized water in the orifices. Because ink will eject during the channel purging, a piece of paper, cloth, or comparable material should be held in front of the orifice array.
 - Do NOT hold the ink catch material against the orifice array as print quality will be degraded.
 - If print quality becomes unsatisfactory during operation this procedure can be repeated.

Weekly to Monthly Maintenance, Print Head

Debris and ink build up on the print head enclosure / cover can be removed using a soft cloth lightly dampened with deionized water.

Take care NOT to wipe the cartridge orifice array.

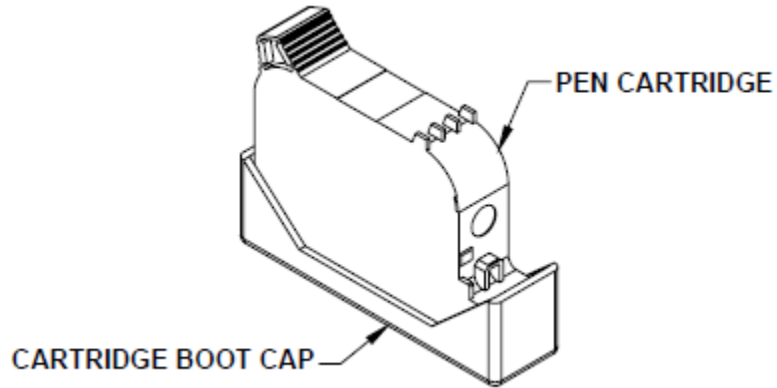
Shutdowns Less Than 3 Days

The ink cartridge can remain in the print head uncapped. When restarting the print head, follow the Daily Maintenance procedure.

Shutdowns More Than 3 Days

For extended shutdowns, follow the Daily Maintenance procedure, remove the ink cartridge from the print head and store in the optional Cartridge Boot Cap (p/n:IP50-SPA00009).

Genuine ATD ink cartridges will store the ink used in the cartridge memory, so proper ink level monitoring can continue when the cartridge is re-fitted for use.



Section 5: Troubleshooting

No Print

System Symptom	Possible Cause	Actions
No print head power / green LED on rear of print head	<ul style="list-style-type: none"> • Power Supply • AC Source 	<ul style="list-style-type: none"> • Check power supply light indicator. • Check for AC power source between power supply input limits.
PURGE button on rear of head does not appear to work	<ul style="list-style-type: none"> • Ink cartridge is damaged or empty • Print head Board fault 	<ul style="list-style-type: none"> • Replace with new cartridge and repeat PURGE. • Replace print head printed circuit board or print head.
Print head purges but won't print desired message	<ul style="list-style-type: none"> • Loose or missing cables • Controller or PC software not configured for Serial Print Head • Encoder Malfunction • Product not triggering photocell. 	<ul style="list-style-type: none"> • Tighten or install all cables. • Ensure print head(s) are configured as serial. See Section 2: Quick Start, Step 6: Cabling, Power, and Serial Port Setup • Ensure encoder is installed and plugged into the last print head in the daisy chain. • If the encoder is installed, navigate to the controller Status screen from the Home screen. While the encoder is turning, check the line speed for greater than 0 m/min. • Ensure the product is within 3mm of the front face of the print head. • If an external photocell is installed, then validate the setting from the Control Panels, System Setup, Task Options Tab.

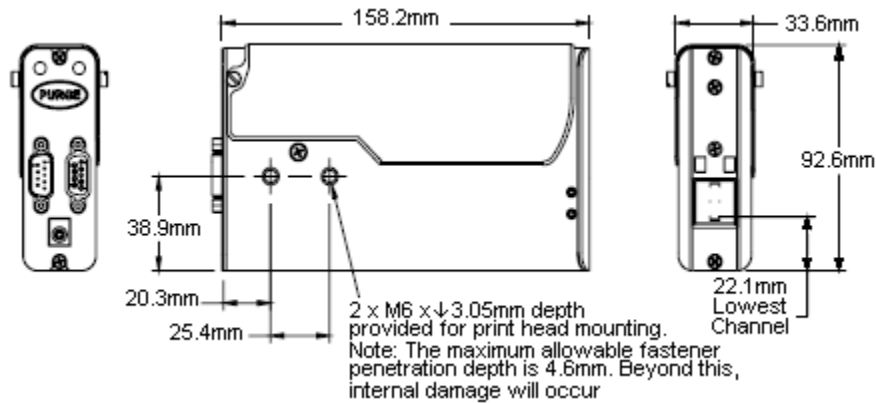
Poor Print Quality

System Symptom	Possible Cause	Actions
Print is foggy or light	<ul style="list-style-type: none"> • Print head is mounted greater than ~3mm away from the substrate 	<ul style="list-style-type: none"> • Adjust the print head according to Section 2: Quick Start, See Step 4: Adjust IP500 Printhead to substrate. <p>If the product surface is not consistently</p>

	<ul style="list-style-type: none"> • There are large air currents near 	<p>positioned the IP500 roller and retractor set may be necessary (part no. IP50_SPA00013)</p> <ul style="list-style-type: none"> • Locate print head in an area where there are minimal currents or provide wind barriers.
Print image is missing channels or has multiple lines or segments	<ul style="list-style-type: none"> • Pen cartridge face is dirty • Pen cartridge face is damaged at the orifice array • Pen cartridge is not properly seated in the print head 	<ul style="list-style-type: none"> • Clean the pen face per Section 4: Maintenance & Shutdowns. • Replace damaged pen cartridge with new. • Remove cartridge and reinsert according to Section 2: Quick Start, Step 5.

Appendix A: Specifications

IP500:



Weight: 0.6 kg

Enclosure

Anodized Aluminum and Stainless Steel

Electrical

15 VDC from power supply to print head

Power Supply: 90-260 VAC, 50/60 Hz, 1.5 A max.(per PSU)

Print Speed

200 fpm, 300 dpi continuous

Print Resolution

300 dpi

Throw Distance

Recommended Gap: 2.5 mm

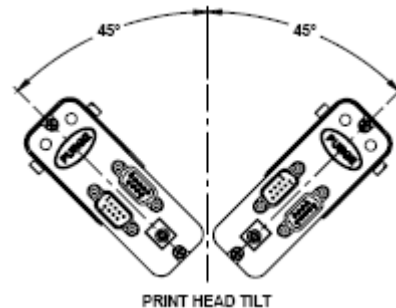
Maximum Gap: 6.3 mm

Print Direction

Between horizontal and downwards

Print Head Tilt

+/-45° from vertical



Maximum Number of Vertical Fields

2 per print head

File Storage

Three factory installed fonts: Arial 30, 75, and 150

Up to three bitmap files: 150 dots tall

(12.7mm) X 2046 wide (173 mm)

Environment

Ambient operating temperature: 50°F to 104°F (10°C to 40°C)

Operating Humidity: 10% - 80% RH

Ink Type

Porous Black or Non-porous Black

Ink Cartridge

The IP500 has been engineered and designed to work with ATD ink cartridges. The IP500's **Smart Level Ink Detection System** , which provides ink level monitoring to ensure complete ink usage and product safety, will not be functional if used with non-ATD ink cartridges.

Appendix B: Theory of Operation

IP500 TIJ Technology

The IP500 print head is a form of Thermal Ink Jet (TIJ) based on the hp® 45A cartridge. TIJ technology works on the principle of rapidly heating ink at any particular addressable channel. As the ink is heating, it ejects from the orifice of any combination of channels. Because channel orifice sizes are very small, many more orifices can be compacted in the same amount of space as conventional print technologies. With more orifices per vertical inch / millimeter, a much higher resolution image can be produced.

IP500 Operation

Up to four IP500 print heads can be daisy chained. A message can be sent down to the IP500(s) via the included GUI software interface program for a computer. Additionally, the IP500 can be programmed to print one or two lines of print, and any combination of alpha / numeric, date / time, count, variable, logo, or UPC-A barcode fields. Logo's cannot be longer than 2046 columns (173 mm). Variable fields can only be changed when the message is selected to print.

The GUI interface computer can be disconnected from the print head daisy chain while printing; however, status information to the GUI will be lost until reconnected.

Essentially the GUI interface provides the initial setup and message information. After the operator sends the print command, the IP500 takes over and the GUI only reports status information.

Ink Cartridge Ink Status

Each ink cartridge contains approximately 42 mL of ink and has been programmed at ATD so as to make full use of ink level status. When a new cartridge is snapped into the IP500, it is identified and ink level is monitored. As the ink depletes to 10% ink, remaining, Ink Low, the red LED on the rear of the print head turns on steady. The red LED changes to slow flashing, Ink Out, when there is approximately 2% ink volume remaining. The ink cartridge should be replaced at this point. At 0% ink volume remaining, the red LED changes to fast flashing indicating that the cartridge is empty and print is disabled. Ink status is reported back to the GUI software as long as they are connected to the print head daisy chain.

Appendix C: Font Samples

Arial 30- 3.1 mm:

AaBbCcDdEeFf
1234567890

Arial 75 -6.35 mm:

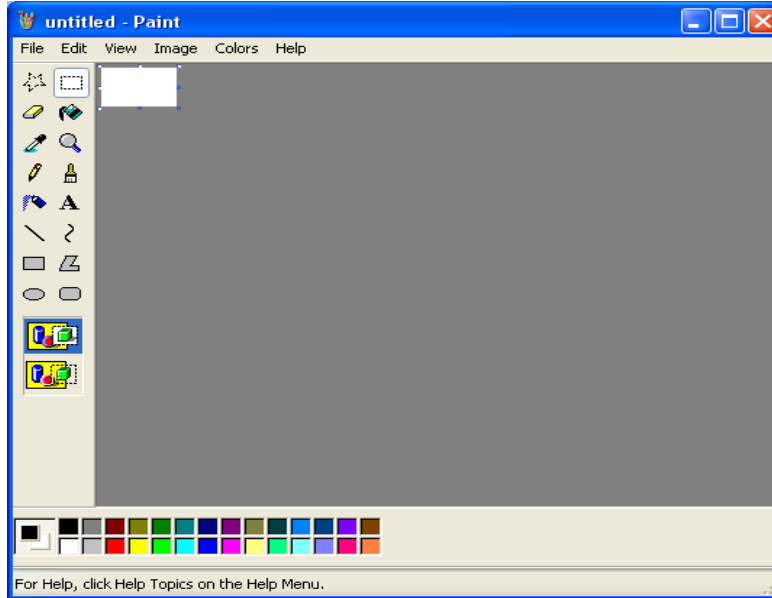
AaBbCcDdEeFf
1234567890

Arial 150 -12.7 mm:

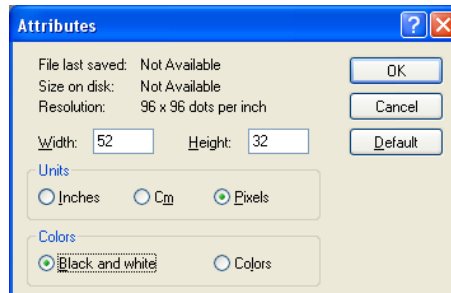
AaBbCcDdEeFf
1234567890

Appendix E: Creating Logo Files

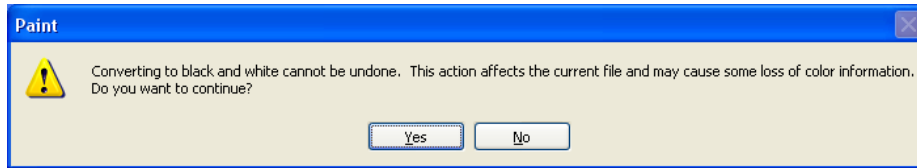
Open **Paint** from a PC by selecting **Start, Programs, Accessories**, and then **Paint**. Bring up the **Attributes** dialog box by selecting **Image** and then **Attributes**.



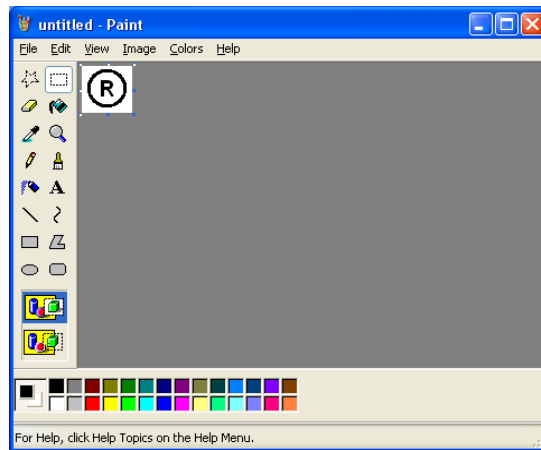
Enter the **Width** and **Height** of the logo in **Pixels**. The maximum number of pixels for width and height is 2046 and 150, respectively. Select **Black and white** for the Colors.



Choose **Yes** at the screen prompt to convert to black and white if applicable.

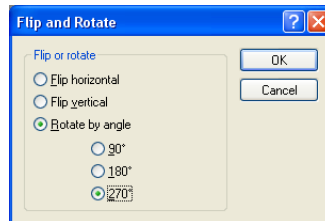


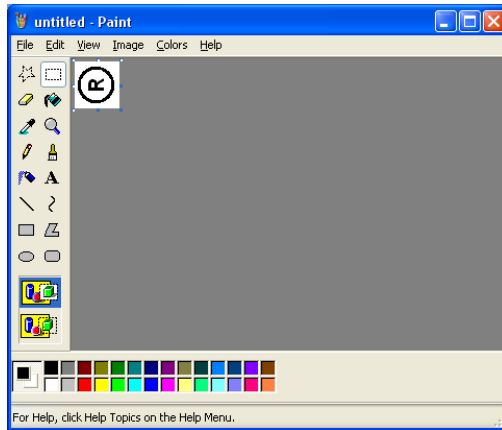
Define the pixels of the logo using the drawing tools:



Bring up the **Flip and Rotate** dialog by selecting **Image, Flip/Rotate**

Select **Rotate by angle**, then **270°**. Click **Ok**.





From the **File Menu**, select **Save As** and save in the "bmps" directory inside of the installation directory (default location "[c:\program files\inkjet\bmps](#)").

Note: bitmaps files that will be used in messages must be uploaded to the IP500 (maximum 3 at any one time). See Appendix F for details.

Appendix F: Uploading Files to the Print Head



CAUTION: Power **must** be disconnected from the print head prior to connecting or disconnecting the PC serial lead, photocell, encoder or print head daisy chain cables.

Electrical arcing may occur if external cabling is connected or disconnected while power is supplied to the unit.

Ensure the firmware upgrade program TJ_*.exe is installed on a local computer (* is the version, and may change from time to time). It can be found on the IP500 CD in the 'Editor' folder. Simply copy the file to the PC.

Connect a DB-9 serial cable between the computer and the print head and re-connect the Power Supply.

Run the TJ_*.exe program and step through the screens until the **Serial port and operations selection** screen appears.

If only BMP and / or font files are to be uploaded, then uncheck the **Upgrade Firmware** box.

Select **Next**.

Select or clear the files to be uploaded. For BMP files, highlight bmp 1, 2, or 3, and **Browse** to the already created bmp file (See "Appendix E: Creating Bitmap Files")

This firmware allows up to 3 font files (*.hfont) and 3 .bmp files to be loaded on any print head at one time.

NOTE: The .bmp file must reside on the PC for message creation, and must be loaded to the print head in order to print it.