

# Operations Manual

## IJ4000-HMI Controller & IJ4000 Connection HUB



5765-355  
Revision A

# **IJ4000 Controller Operations Manual**

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**5765-355  
Revision A**

The information contained in this manual is correct and accurate at the time of its publication. "The manufacturer" refers to Diagraph through out the body of this document. The manufacturer reserves the right to change or alter any information or technical specifications at any time and without notice.

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## ***IJ4000 Controller***

### **Warranty:**

The IJ4000 controller, including all components unless otherwise specified, carries a limited warranty.

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

# IJ4000 Controller

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## Section 1: Safety

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.



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



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



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



ESD protection should be worn when servicing internal printed circuit boards.

After service to the equipment is completed, replace all protective devices such as grounding cables and covers before operating the equipment.

## Section 2: Controller Functions

### Home Screen

#### Message Window:

- Displays the current print message
- Updated approximately every seven seconds.
- White and/or Beige bars represent the print heads in the daisy chain and are identified by their respective print head numbers.
- The Header displays the task number and file name of the message being printed, if no message is loaded to print, 'None' is displayed.

#### Task Select Button:

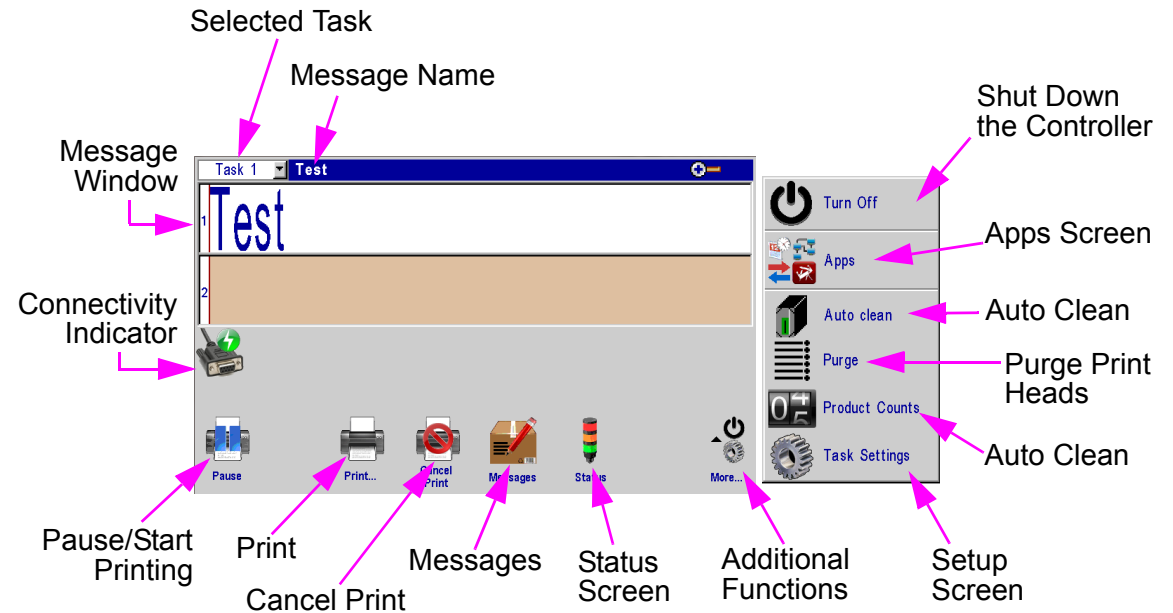
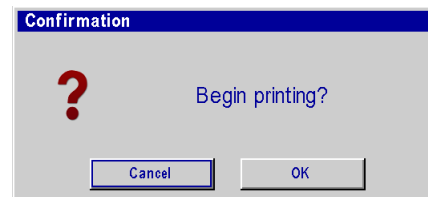
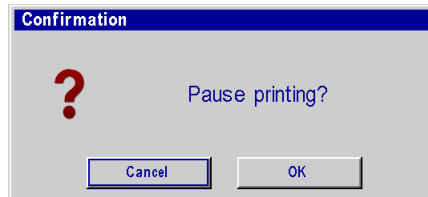


- Places focus on the selected task. This allows one to view what is being printed on either task in the home screen. Additional menu items will vary from one task to the other, depending on print technology.

#### Task Print / Pause Button:



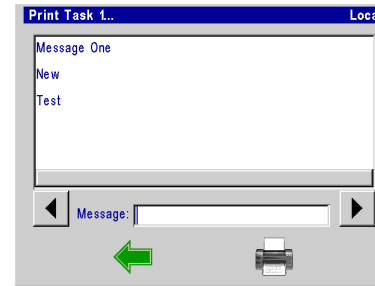
- Start and Stops print after an operator response to a confirmation dialog popup box.
- If a message is currently printing, pressing the pause button will discontinue printing after the message finishes printing.
- If the Play button is pushed, print will resume on the next product detected.





### Quick Print Button:

- Allows access to the **Print** dialog box.
- Select the desired message and press the **Printer** button. The message will print at the next photocell trigger.



### Purge Button:

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

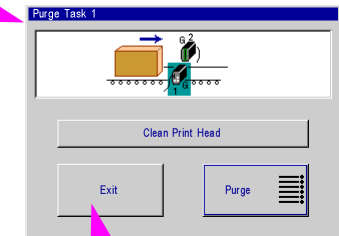
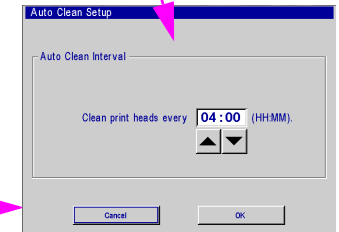


### Status Button:

- Version of controller firmware is located in the upper right corner.
- Displays Product detect.
- Displays Printing or Paused status.
- Version of Controller firmware.



Adjusts the amount of time between Automatic Cleaning Cycles.

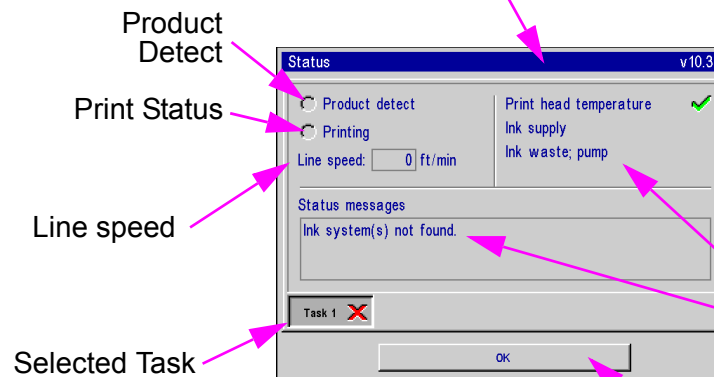


Returns to home screen

Controller Firmware Version. Press version number to display detailed version information.

Print head and Ink supply status.

Return to Home Screen



Product Detect

Print Status

Line speed

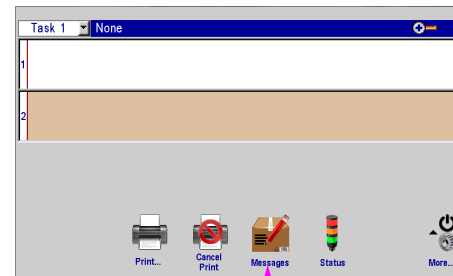
Selected Task

### Message Editor

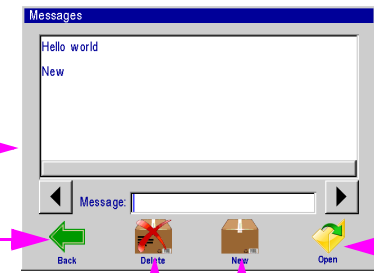


#### Message Button:

- Press the **Message** button on the Home Screen to bring up the Message dialog.
- To create a new message press the **New Message** button.
- To edit an existing message, select the message and then press the **Open** button.
- Editing a message or creating a new message will bring up the message editor.
- To delete a message, select the message and press the delete button.



Message

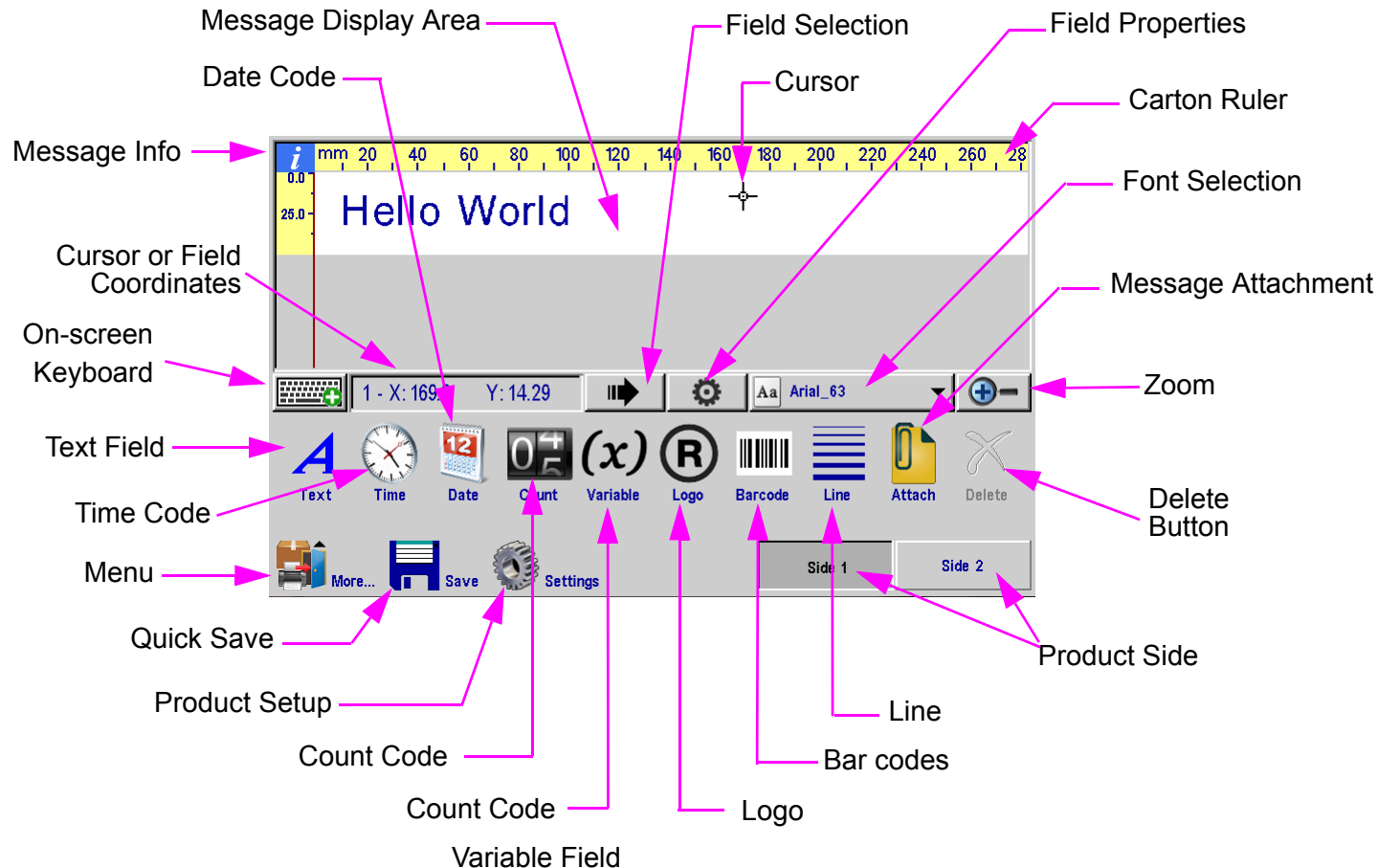


Back

Delete

New Message

Open







### On-Screen Keyboards & Numeric Keypads

#### Keyboard Button:

- Edit Screen only: Press once to show the keyboard; press again to hide it.
- All other screens and dialogs: Keypad or keyboard appears when text or numeric input box is touched.

#### Layer Select:

- Pressing the **Layer Select** button cycles through; letters, numbers & symbols, and extended characters.

#### Language Select Button:

- Changes keyboard layout to that of the language selected. Changes keyboard layout only; user interface language does not change.

#### ESC (Escape):

- Undoes any changes made to any input entry box. If no changes made, hides the keypad or keyboard.
- Edit screen full keyboard: always hides the keyboard.

#### Arrow Keys:

- Moves highlighted fields or the cursor around in the Message Editor.

#### Tab:

- Switches focus between highlighted fields in the Message Editor.

#### Backspace:

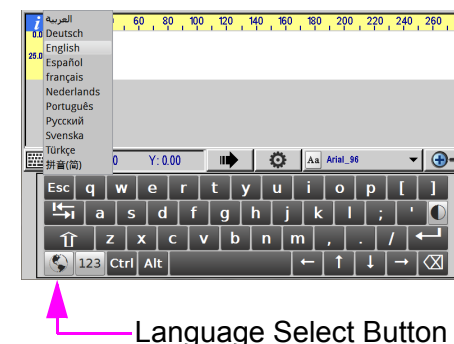
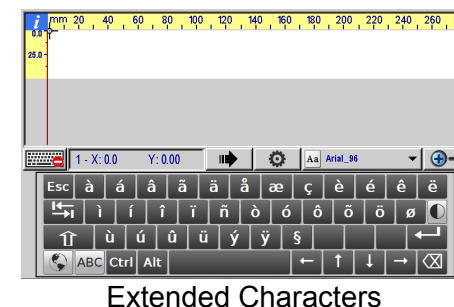
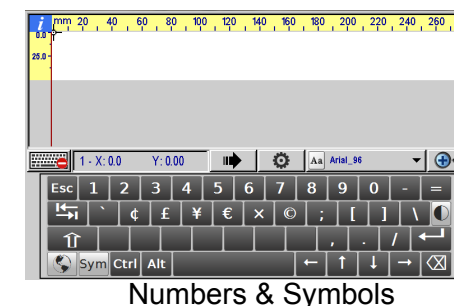
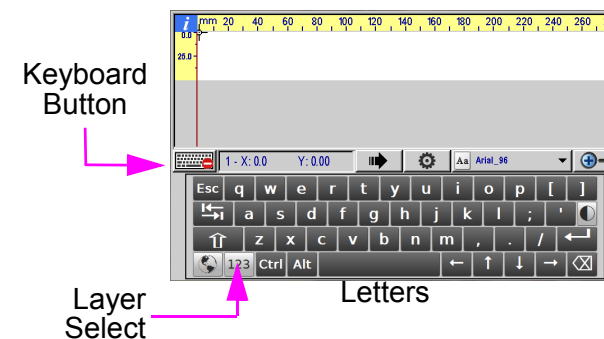
- Deletes the character to the left of the cursor.
- On the edit screen, deletes a highlighted (red) field.

#### Ctrl (Control) in Message Editor:

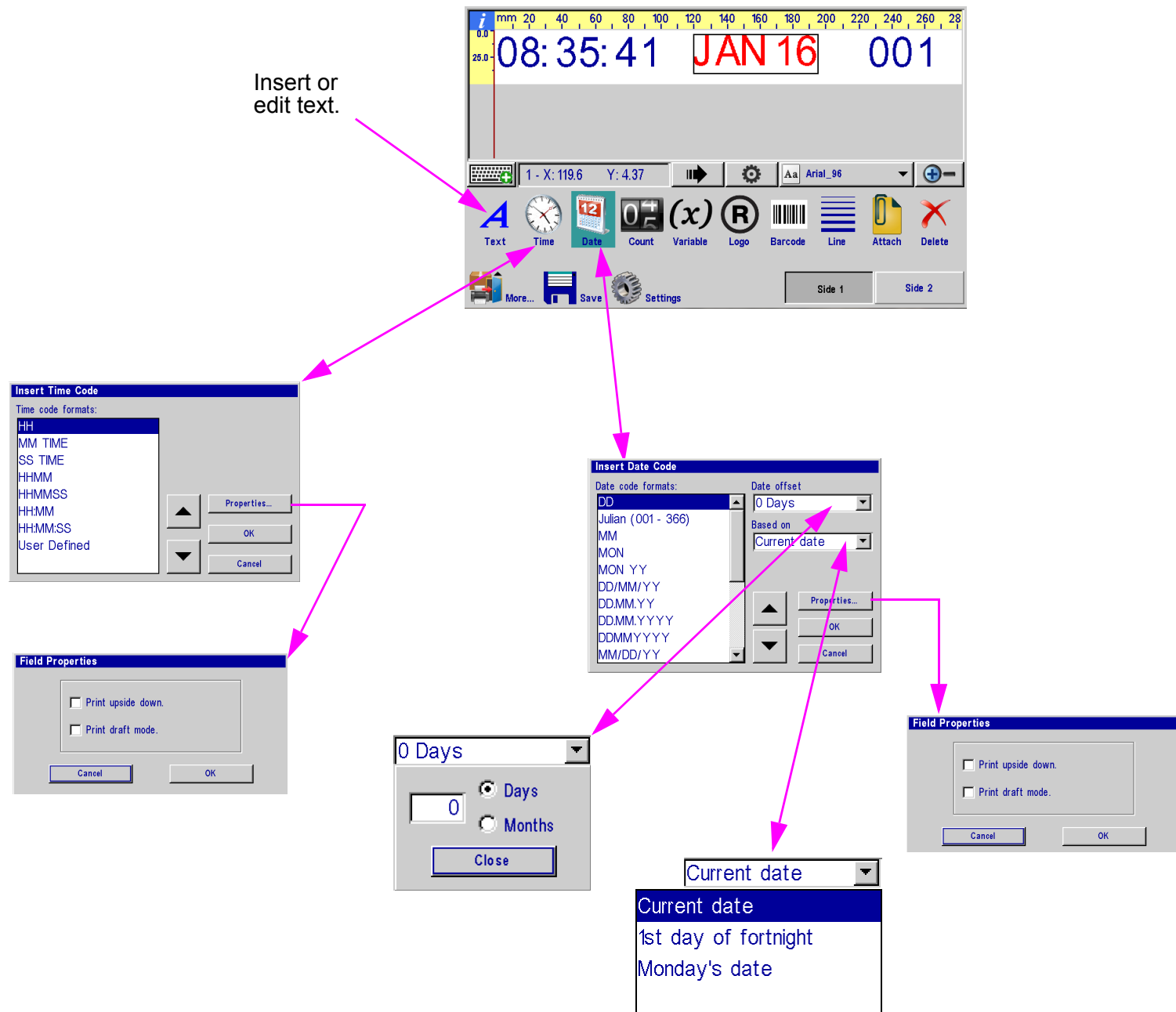
- Amplifies the movement of the arrow keys.
- Press **Ctrl-Enter** to insert a new line in a text field.
- Can use ctrl-c then ctrl-v to copy and paste fields.

#### Shift:

- Press **Shift** once to make the next character upper case.
- Press Shift twice for shift lock. Press Shift again to exit shift lock.



### Time and Date Codes



### Product Counts, Variable Fields, Logos

Maximum  
9-digit count

#### Incrementing Count

Count increments when the 'Start at' value is less than the 'Stop at' value.

#### Decrementing Count

Count decrements when the 'Start at' value is greater than the 'Stop at' value.

Scroll through  
logo images or  
select from list

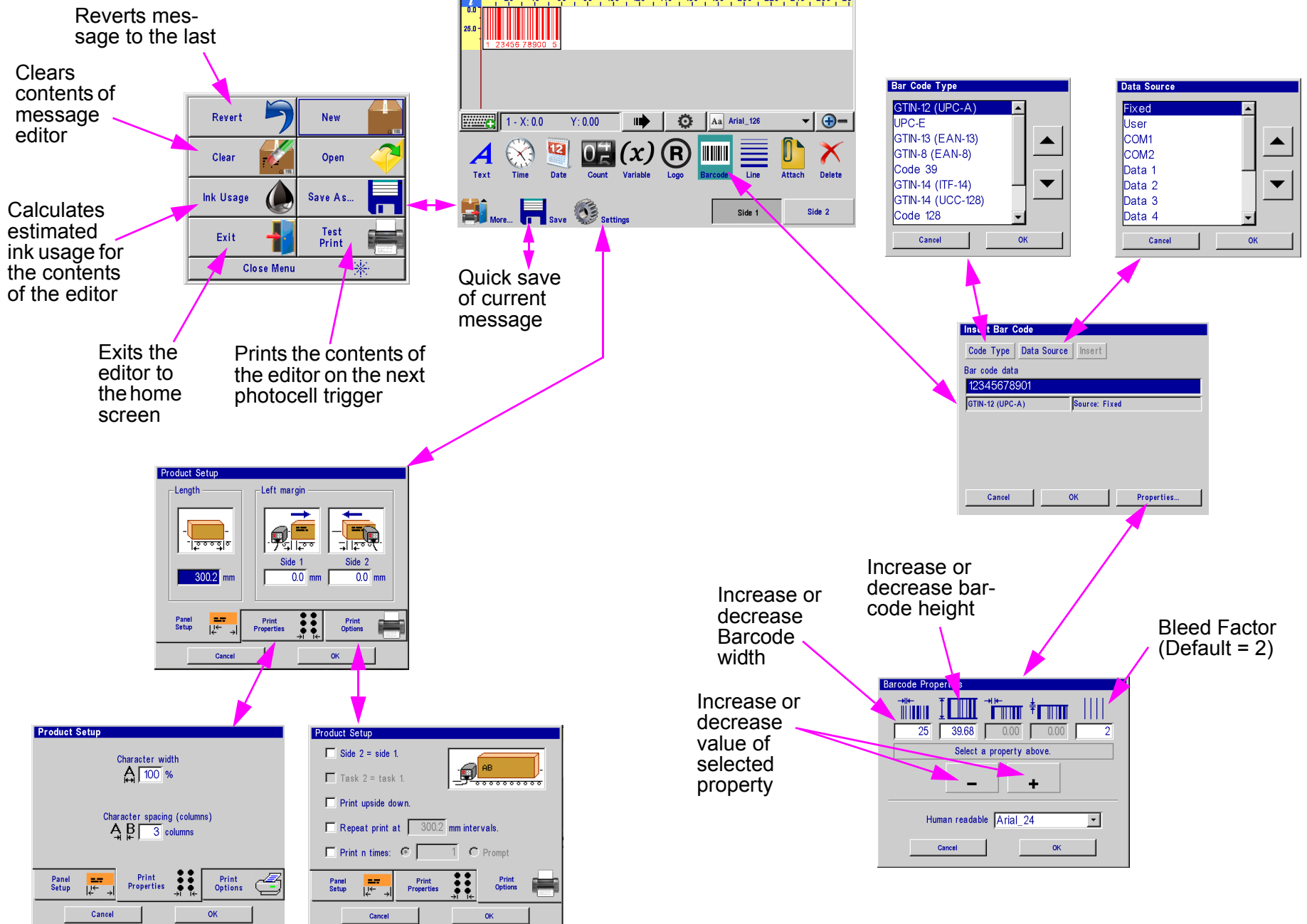
#### Variable Field Data Source

**User:** Print data entered when print message containing the variable field is selected to print.

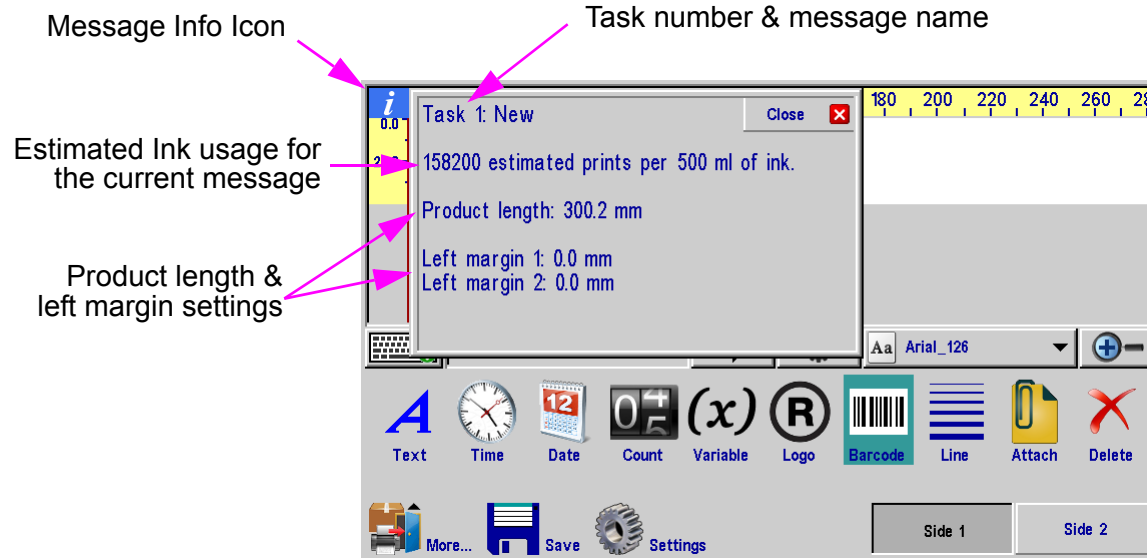
**COM1, COM2:** Data is received through COM1 or COM2 serial port. Data must be received before the message is selected to print.

**Data 1-10:** Data is retrieved from corresponding system variable. User has the option to change the data when the message is selected to print.

### Barcodes, Product setup, & Menu



### Message Info Box

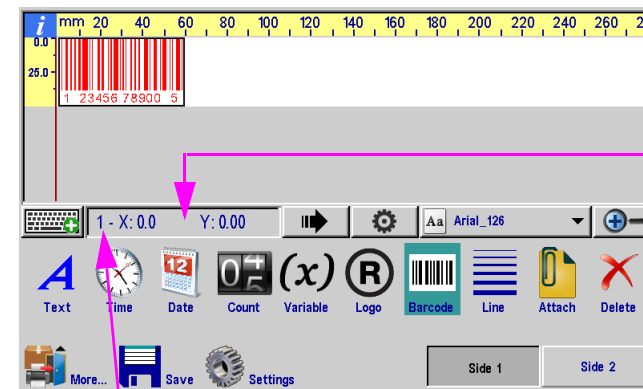


### Direct Entry of Cursor or Field Position

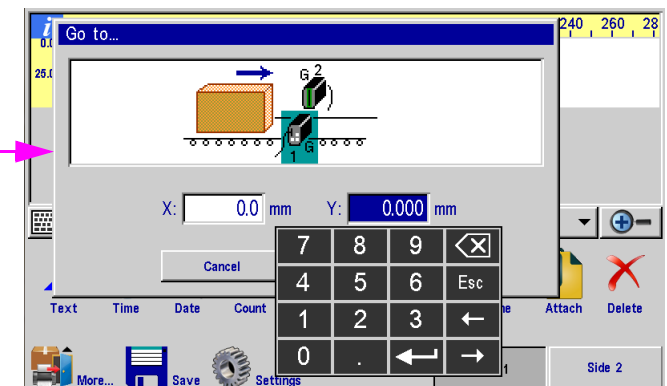
#### Direct Entry Box

**Field:** Selecting the Direct Entry Box while having a field selected will allow the user to manually input the X & Y location of the selected field

**Cursor:** When no fields are selected the Direct Entry Box will allow the user to manually input the X & Y location of the cursor

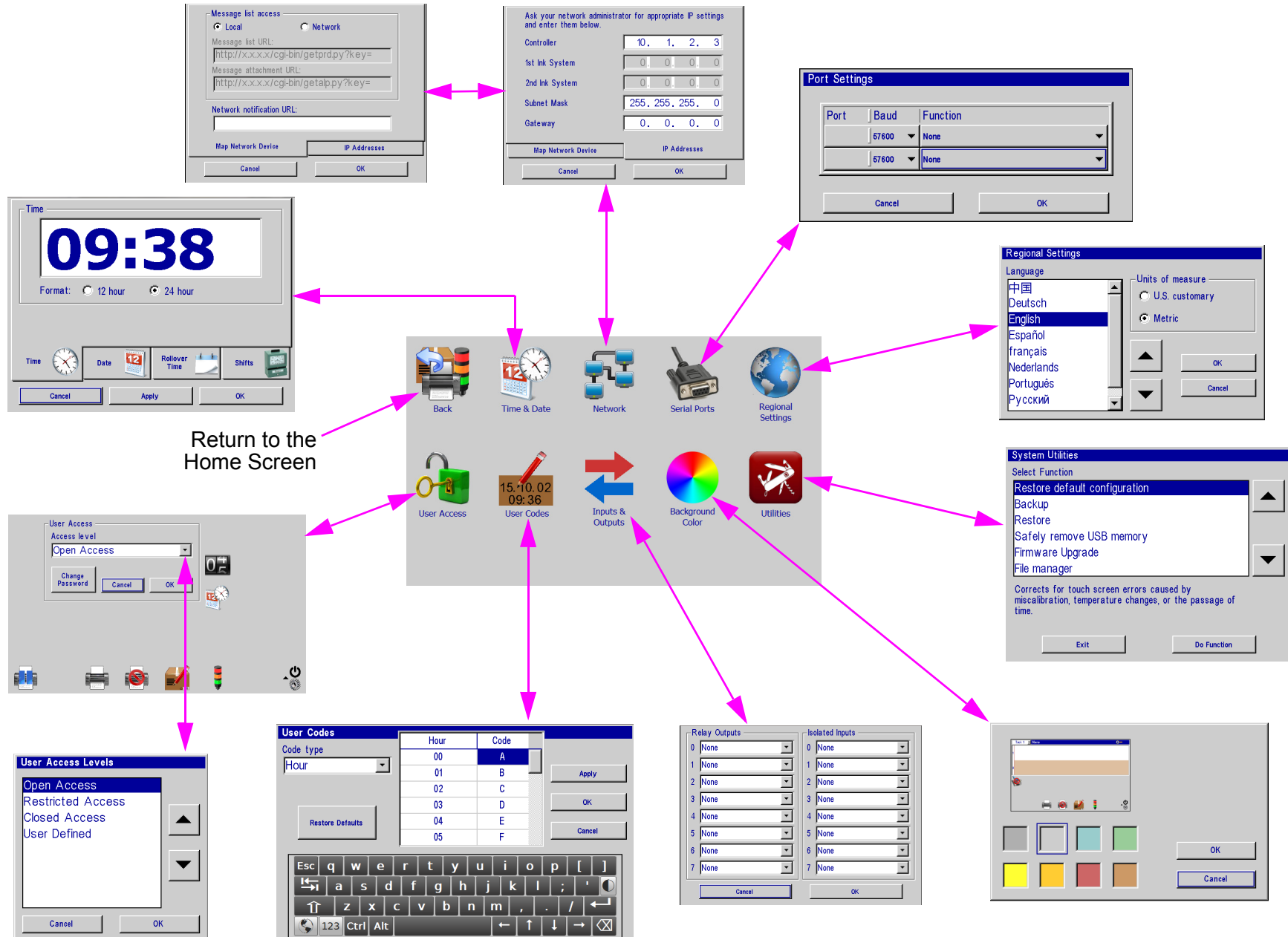


Print Head Number



### The Apps Screen

#### Apps Button



### Time, Date, Shifts, and Rollover Time Screen

The first screenshot shows the 'Time' screen with a large digital display showing '11:16'. Below the display, it says 'Format: 12 hour' and '24 hour'. There are buttons for 'Time', 'Date', 'Rollover Time', 'Shifts', and 'Apps'. The 'Apps' button is highlighted with a green icon. A pink arrow points to the '11:16' display with the text 'Set the controller's time and time format'. Another pink arrow points to the 'OK' button with the text 'Press "Ok" to return to the Apps Screen'.

The second screenshot shows the 'Date' screen with a calendar for January 2016. It has buttons for 'Time', 'Date', 'Rollover Time', 'Shifts', and 'Apps'. The 'Apps' button is highlighted with a green icon.

The third screenshot shows the 'Rollover Time' screen with a large digital display showing '00:00'. It has a text box that says 'Rollover time is the time that day- and date- type auto codes "rollover" from one day to the next.' There are buttons for 'Time', 'Date', 'Rollover Time', 'Shifts', and 'Apps'. The 'Apps' button is highlighted with a green icon.

The fourth screenshot shows the 'Work Shifts' screen with a table for shifts. It has buttons for 'Time', 'Date', 'Rollover Time', 'Shifts', and 'Apps'. The 'Apps' button is highlighted with a green icon.

### User Access

The first screenshot shows the 'User Access Levels' screen with a list of access levels: 'Open Access', 'Restricted Access', 'Closed Access', and 'User Defined'. There are up and down arrow buttons next to the list. The 'User Defined' option is selected. There are 'Cancel' and 'OK' buttons at the bottom.

The second screenshot shows the 'Change Password' screen with three input fields: 'Old password:', 'New password:', and 'Confirm new password:'. There are 'Cancel' and 'OK' buttons at the bottom.

The third screenshot shows the 'User Access' screen. It has a dropdown menu for 'Access level' with 'User Defined' selected. There are 'Change Password', 'Cancel', and 'OK' buttons. Below the buttons, it says 'Press a button to toggle that button's protection on and off.' There are several icons at the bottom: a printer, a padlock, a box, a stack of papers, and a padlock with a key. A pink arrow points to the padlock icon with the text 'Padlock symbol indicates function is password protected.'

The factory set password is **Manager**. Passwords are case sensitive.



**Note:** Users can either select a pre-defined access level from the list or they can select "User Defined" and customize their Access settings by selecting icons on the User Access screen.



### User Codes

User Codes are user-defined time and date codes for printing hour, minute, date, month, and week of the year information.

Code type

Hour

Hour

Qtr Hour

Minute

Day

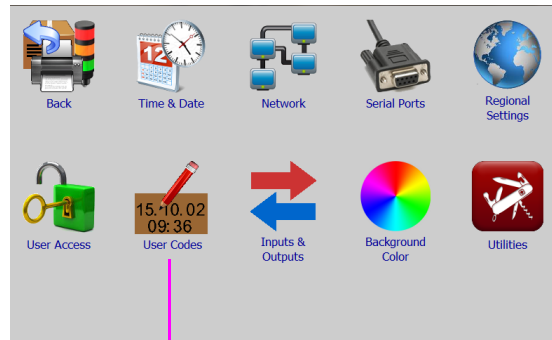
Date

Week

Month

Year

Restore all user codes to the factory default settings



User Codes

Code type

Hour

Hour	Code
00	A
01	B
02	C
03	D
04	E
05	F

Apply

OK

Cancel

Restore Defaults

Esc 1 2 3 4 5 6 7 8 9 0 - =

← → , ; [ ] \ /

↑ ↓

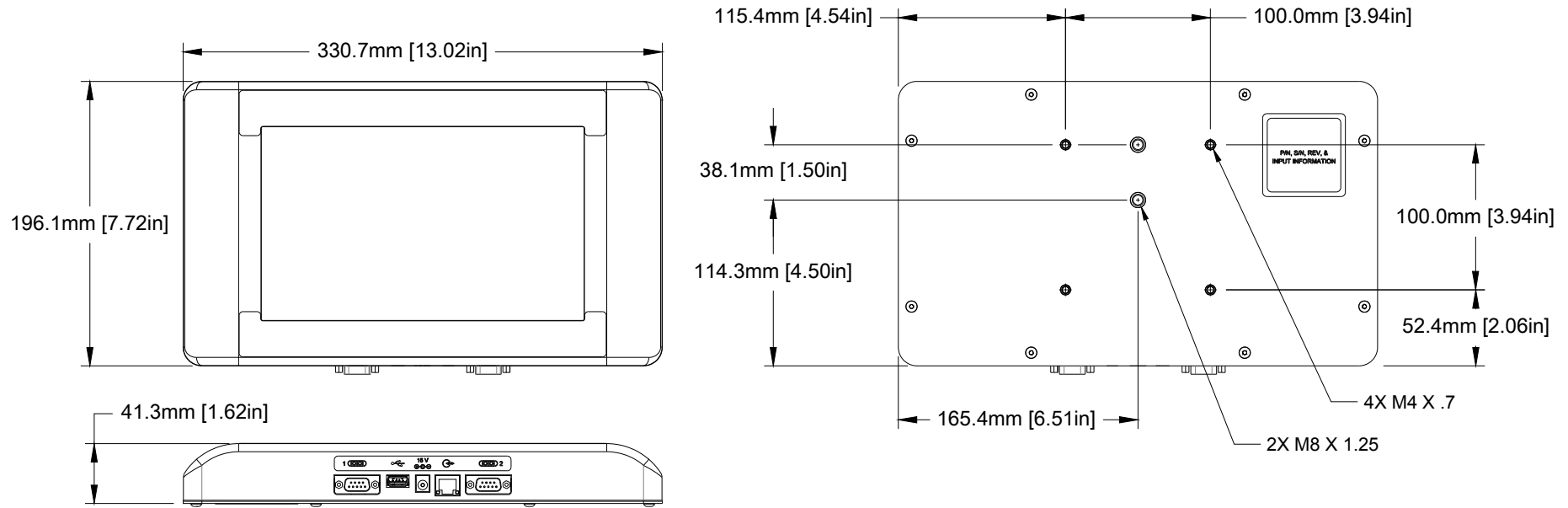
Sym Ctrl Alt

**Apply** allows the user to save and apply changes without exiting the **User Codes** screen.



## Appendix A: Specifications

### Stainless Steel Serial Controller



#### **Size**

Weight: 2.18kg [4.6lb]  
 Height: 196.1mm [7.72in]  
 Width: 330.7mm [13.02in]  
 Depth: 41.3mm [1.62in]

#### **IP Rating**

IP34 (estimated)

#### **Enclosure**

Stainless Steel

#### **User Interface**

Graphical User Interface  
 with on screen keyboard

#### **Fonts**

Unicode

#### **Display**

10.2in [259.08mm] LCD with touch  
 screen, 800 x 480 pixels

#### **Storage**

512 MB flash memory

#### **Ports**

(2) RS-232 ports, 1 USB port,  
 (1) 100 Base-T Ethernet port

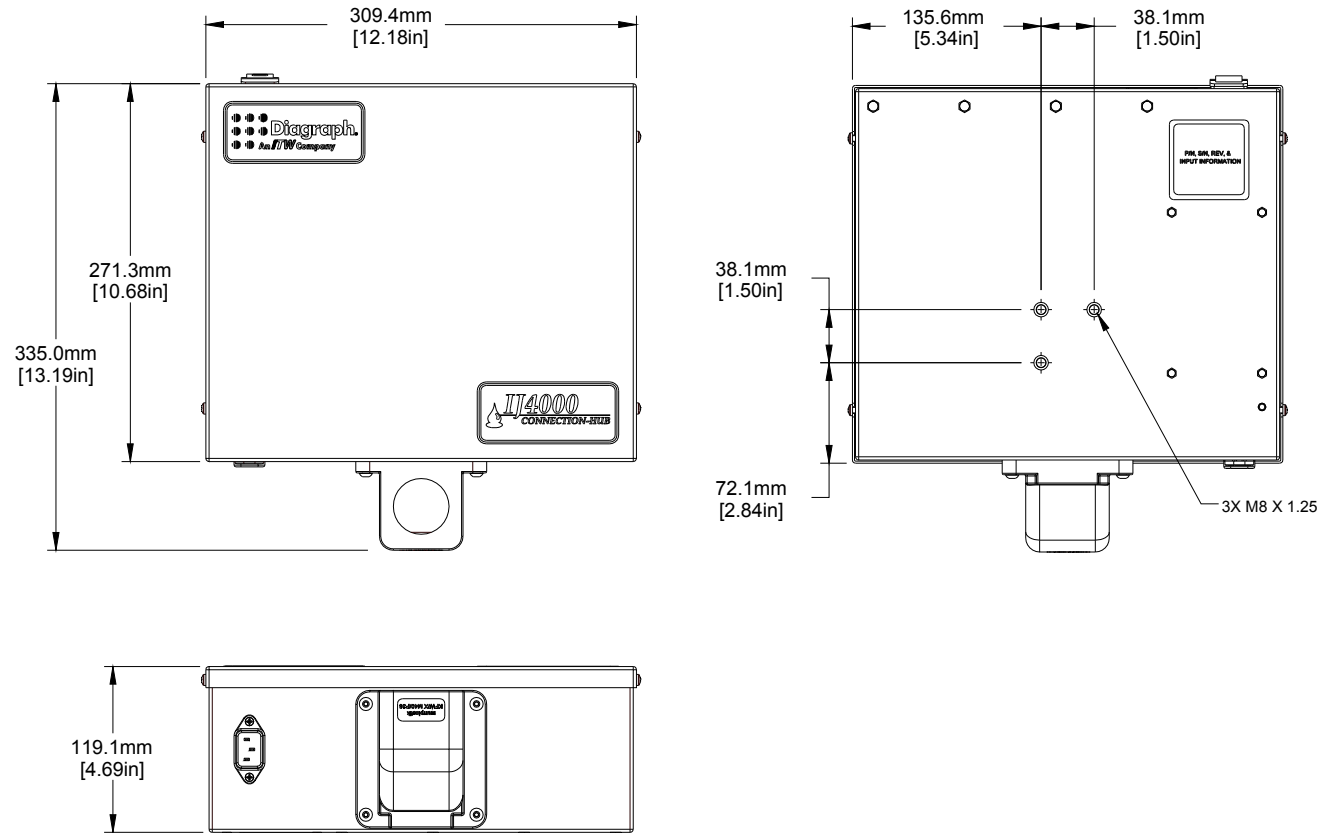
#### **Electrical**

15 VDC from power supply to controller.  
 power supply: 90-260 VAC, 50/0 Hz, 1.5A  
 max.

#### **Environment**

Ambient operating temperature: 5°C to  
 40°C (40°F to 104°F)  
 Operating humidity: 10% - 90%, non con-  
 densing

## IJ4000 Connection - HUB



### **Size**

Weight: 5.22kg [11.50 lb]  
 Height: 335.0mm [13.19in]  
 Width: 309.4mm [12.18in]  
 Depth: 119.1mm [4.69in]

### **IP Rating**

IP54 (estimated)

### **Enclosure**

Stainless steel

### **Fonts**

Unicode

### **Storage**

512 MB flash memory

### **Ports**

(2) RS-232 Ports, (1) USB Port  
 (1) 100 base-T Ethernet Port

### **Electrical**

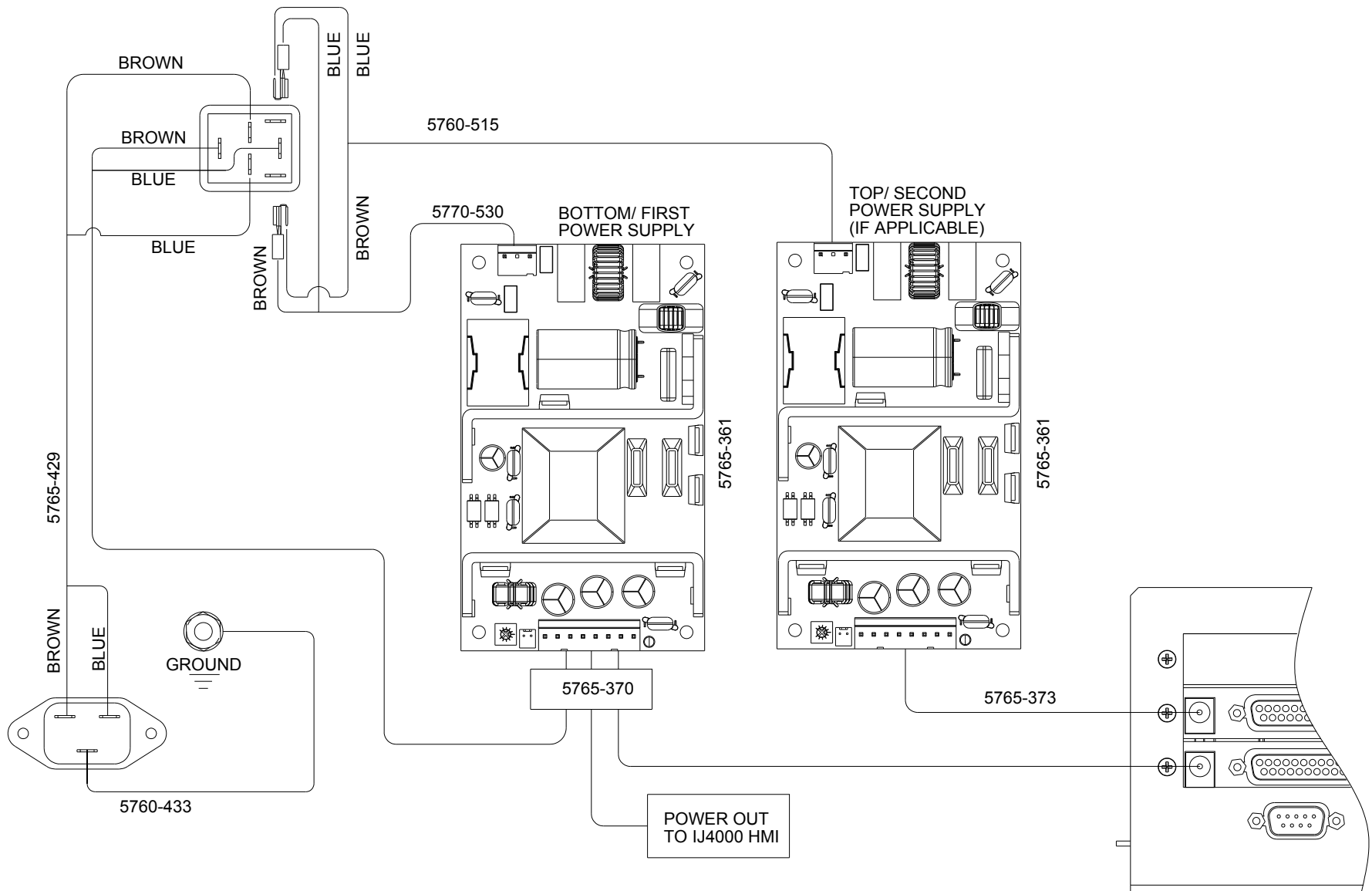
24 VDC, 100W, Internal Power Supply.  
 90-260 VAC, 50/0 Hz, 1.5A max.

### **Environment**

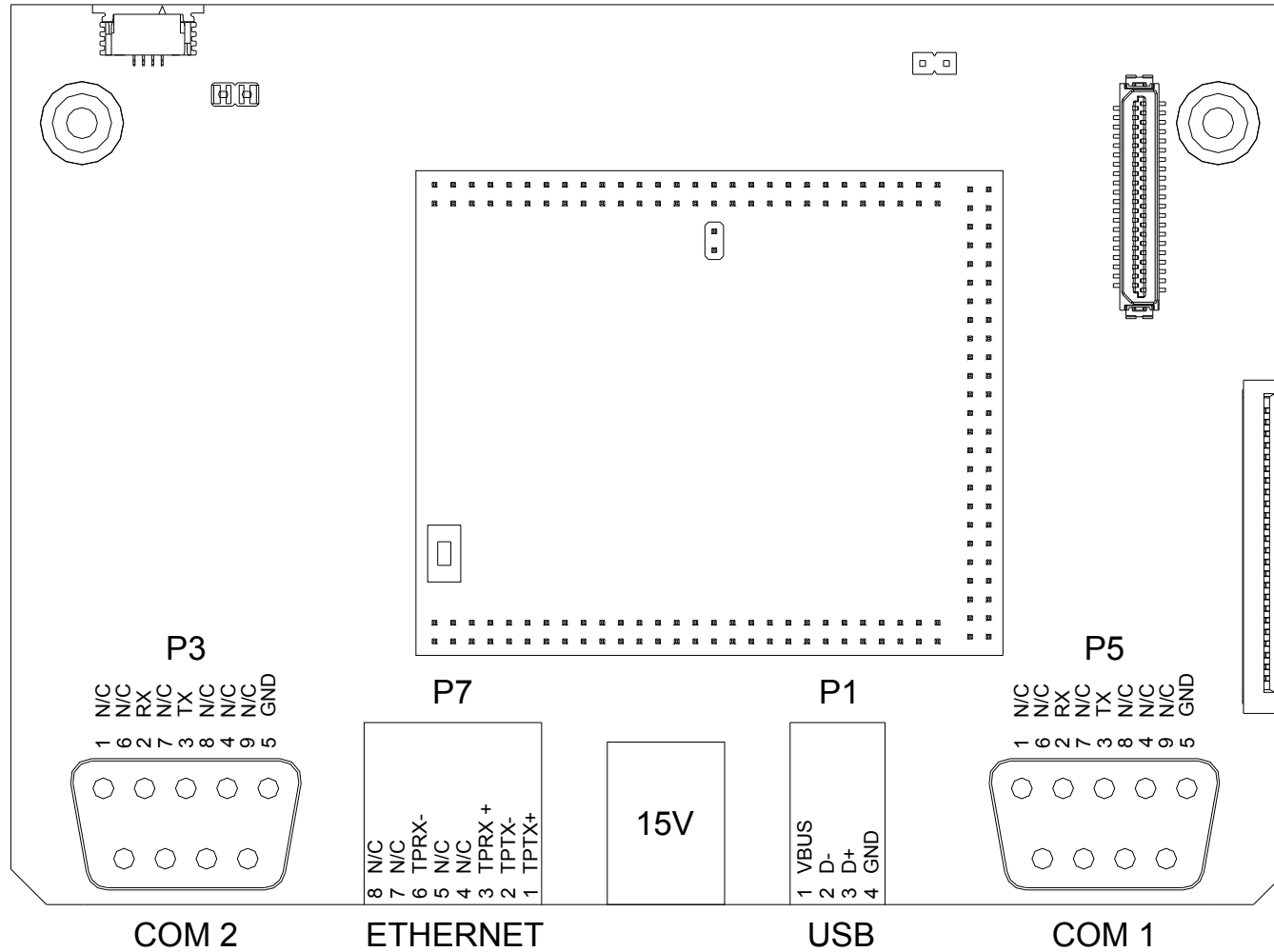
Ambient operating temperature: 5°C to 40°C (40°F to 104°F)  
 Operating humidity: 10% - 90%, non condensing

## System Interconnect Diagram

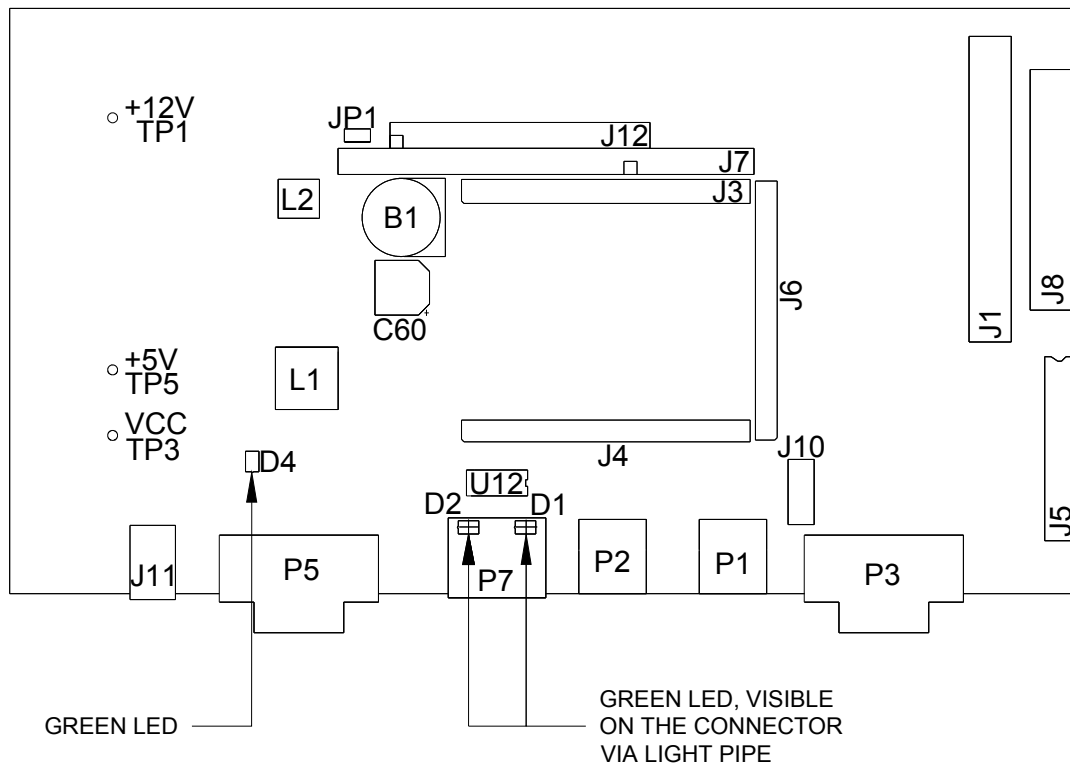
### IJ4000 Connection HUB wiring diagram



## HMI Controller CPU Board

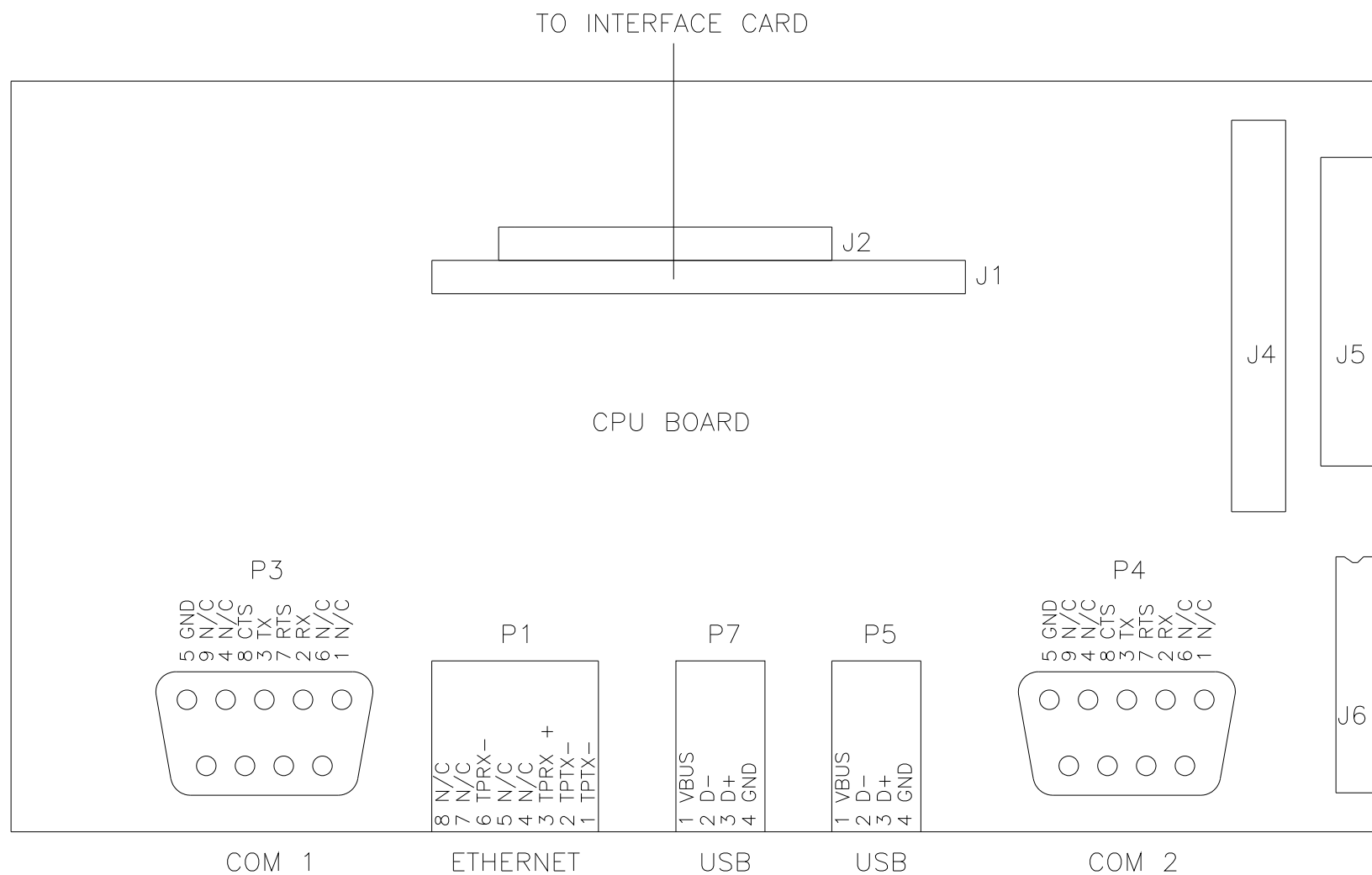


## IJ4000 Connection Hub CPU Board

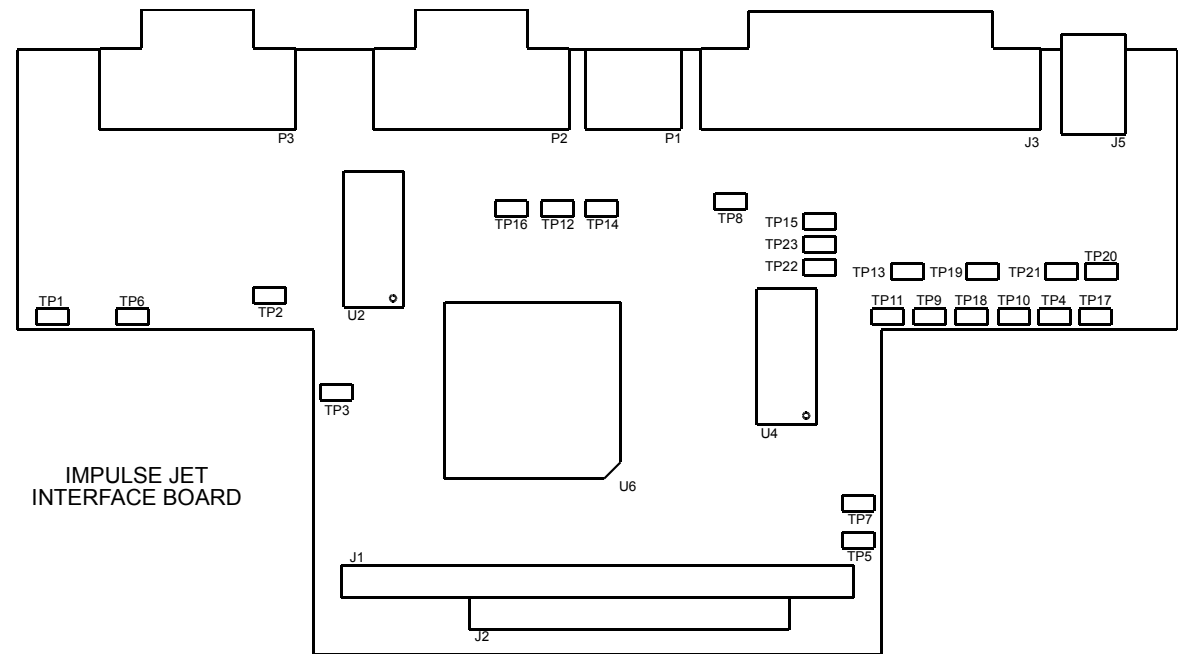


Test Points:	TP1:	12VDC, power for display backlight. Turns on/off with soft powerswitch.
	TP2:	5VDC, power for 5V logic. Also supplies the input voltage to the 3.3V regulator.
	TP3:	3.3VDC, power for 3.3V logic. Also supplies the input voltage to the 1.8V regulator.
	TP4:	1.8VDC, power for the CPU core.
LEDs:	D1:	Ethernet connector, Green. Flashes to indicate network traffic.
	D2:	Ethernet connector, Green. Indicates valid network connection.
	D1:	Yellow, flashes when the CPU is running.(On CPU module)
	D4:	Green, indicates 3.3V is present.
	D2:	Green, indicates 3.3V is present. (On CPU module)

## IJ4000 Connection Hub CPU Board cont...

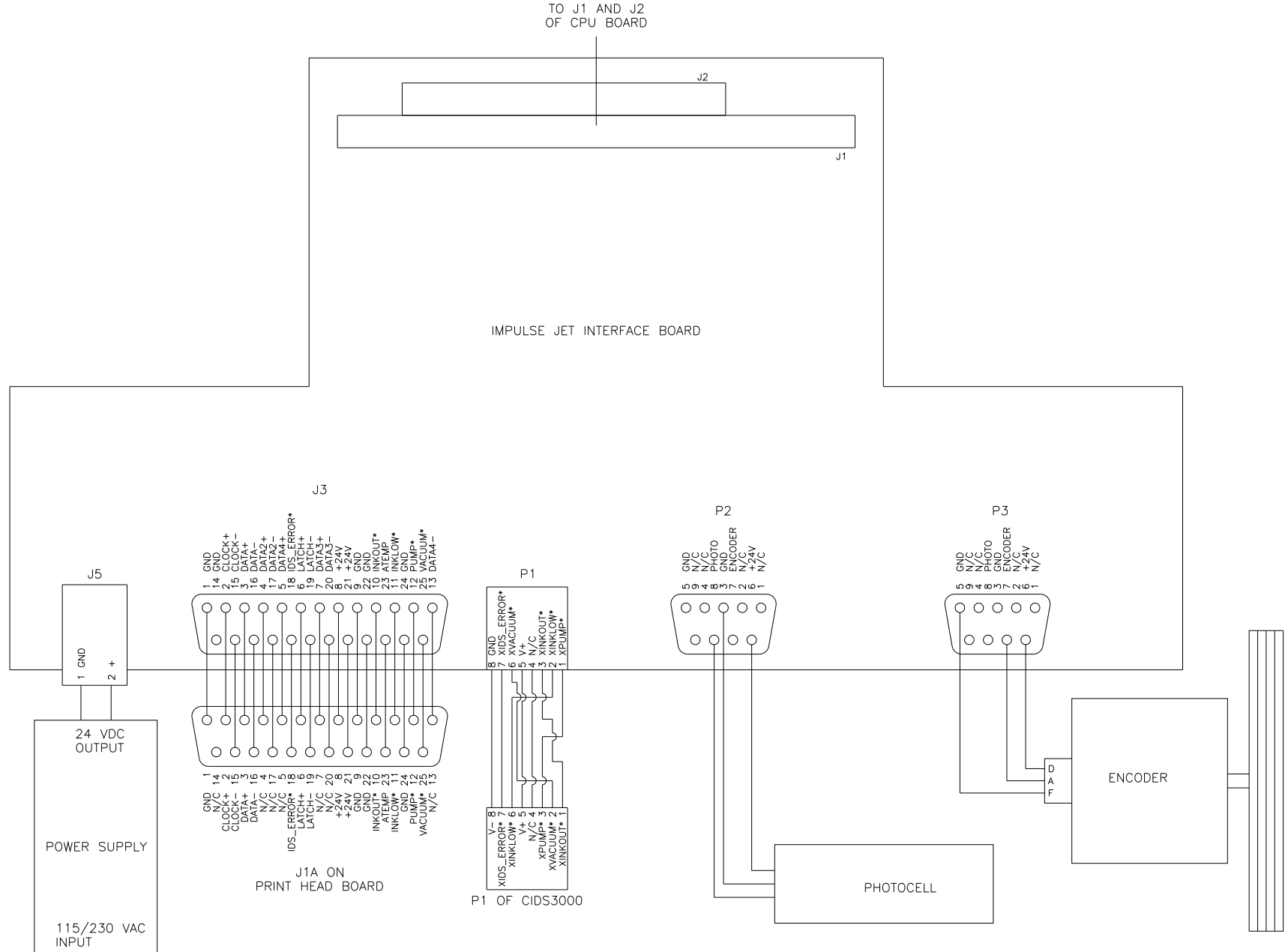


### IJ4000 Print Head Interface Board



Test Points:	TP1:	5VDC.
	TP2:	3.3VDC.
	TP3:	2.5VDC.
	TP4:	GND.
	TP5:	(FPGA) PROGRAM; pulses low to initiate FPGA programming.
	TP6:	(FPGA) INIT; goes LOW to indicate an FPGA programming error.
	TP7:	(FPGA) DONE. LOW when the FPGA is being programmed. High when FPGA programming is complete.
	TP8:	CIDS error signal, active low.
	TP9:	Print head vacuum signal, active high.
	TP10:	CIDS ink low signal, active low.
	TP11:	Print head pump signal, active high.
	TP12:	CIDS ink out signal, active low.
	TP13:	Print head at temperature signal, active low.
	TP14:	CIDS vacuum signal, active low.
	TP15:	Print head ink out signal, active high.
	TP16:	CIDS pump signal, active low.
	TP17:	DC power in (24V).
	TP18:	Print head CLOCK signal.
	TP19:	Print head DATA2 signal.
	TP20:	Print head DATA signal.
	TP21:	Print head LATCH signal.
	TP22:	PHOTOSENSOR signal, active high.
	TP23:	External ENCODER signal.

### IJ4000 Print Head Interface Board cont...

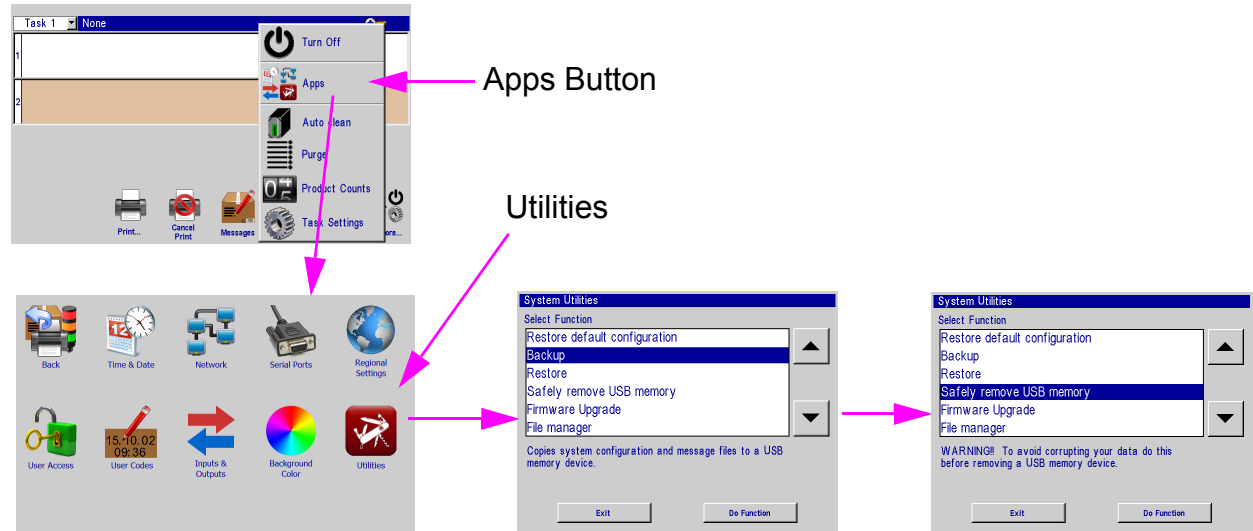




## Appendix B: File System Backup and Restore

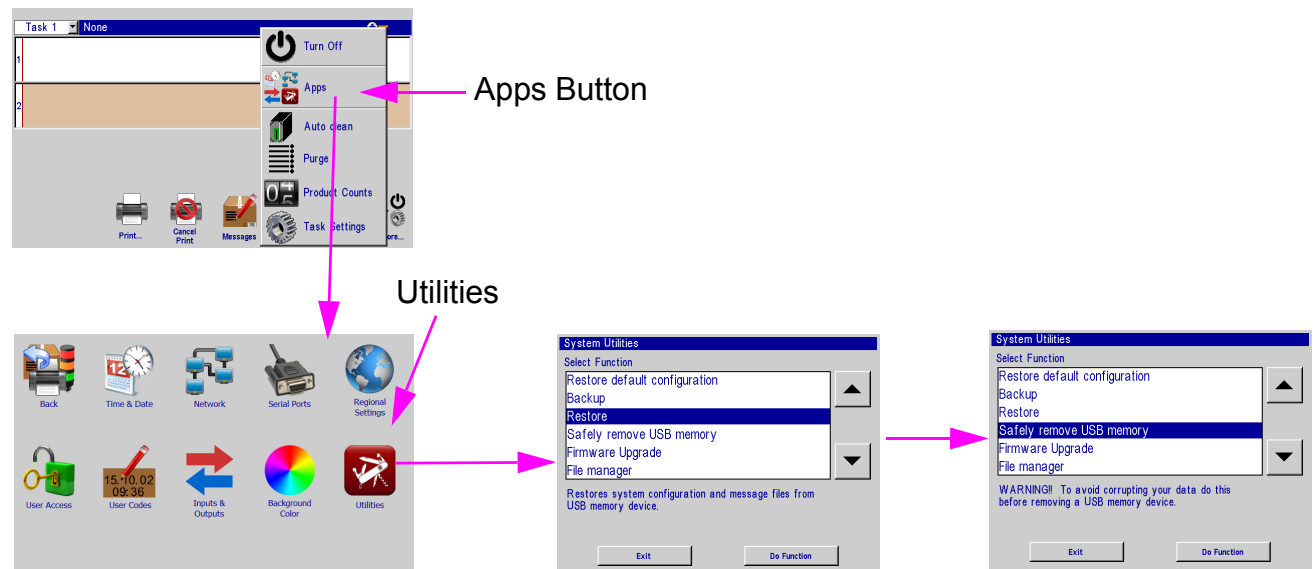
### Backup

1. Insert a USB jump drive into the USB port on the HMI.
2. From the home screen touch **Apps Button** then **Utilities**.
3. From the **Utilities** screen select **Backup**.
4. Enter a file name at the **Backup** dialog popup. "backup" is the default name. This creates a "backup.tgz" file.
5. From the **System Utilities** screen select **Safely remove USB memory**.



### Restore

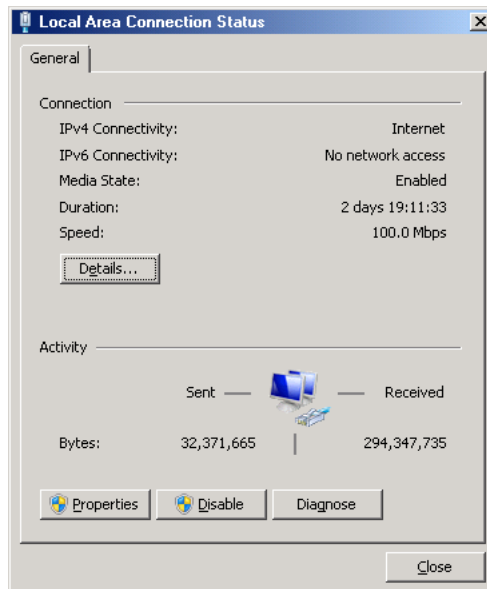
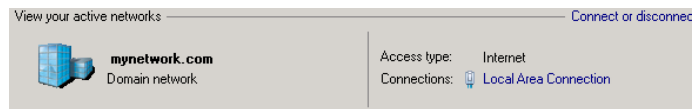
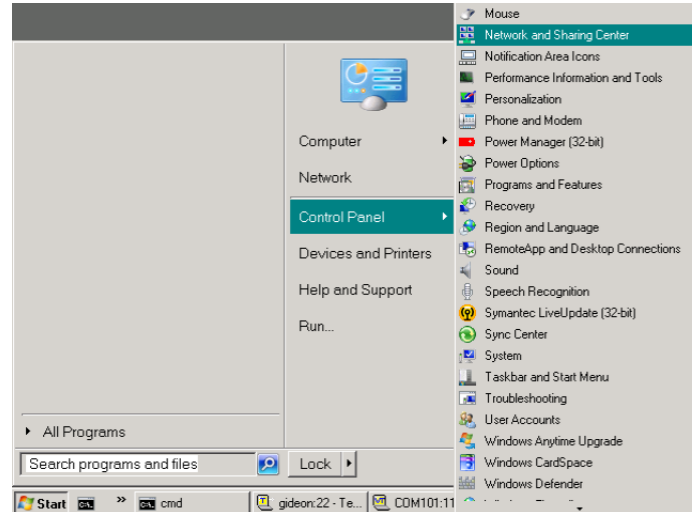
6. Insert a USB jump drive containing a "backup.tgz" file into the USB port on the HMI.
7. From the home screen touch **Apps Panel** then **Utilities**.
8. From the **Utilities** screen select **Restore**.
9. Select the appropriate backup file from the **Restore** dialog popup.
10. From the **System Utilities** screen select **Safely remove USB memory**.



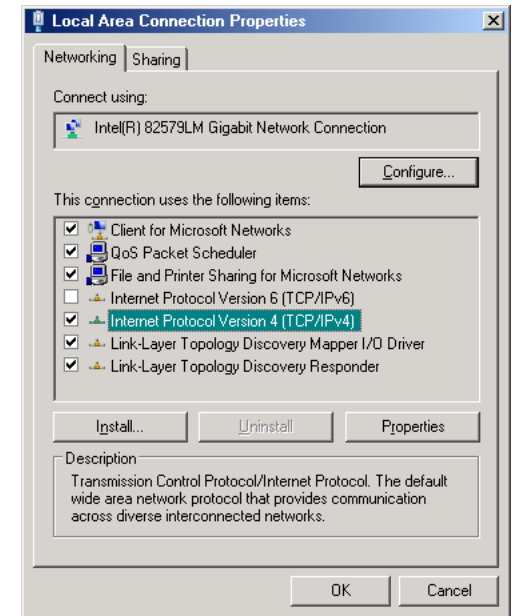
## Appendix C: Configuring a PC to Controller.

### Window 7®

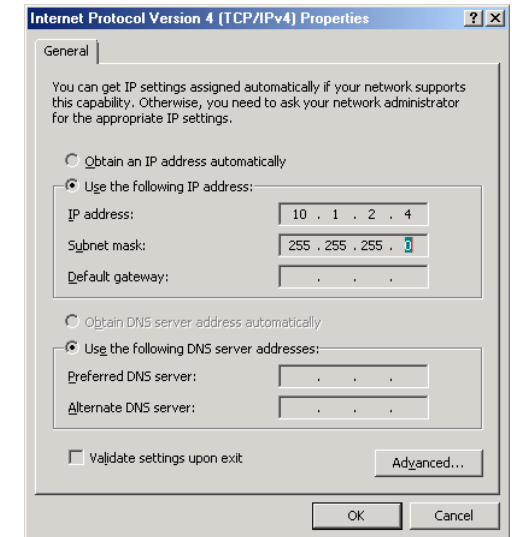
1. Open the **Start Menu**; select **Control Panel**; then **Network and Sharing Center**.
2. Click **Local Area Connection**, then click the **Properties** button.



3. Select **Internet Protocol Version 4 (TCP/IPv4)**. Then click the **Properties** button.



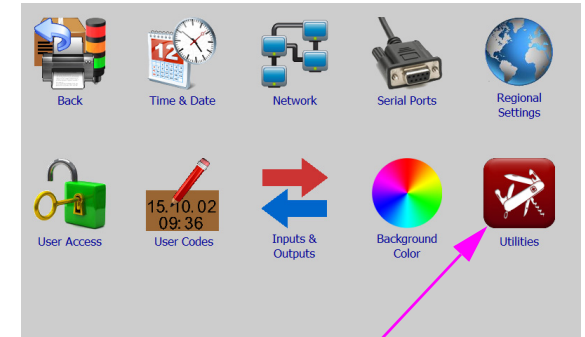
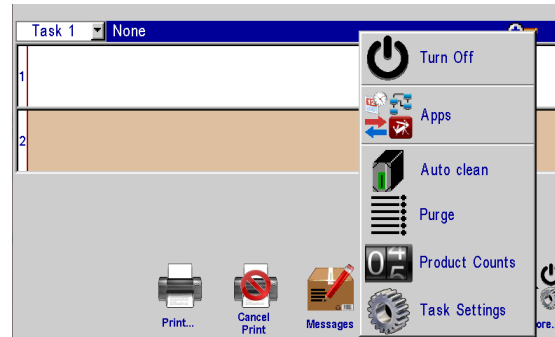
4. Click **Use the following IP address** radio button. Enter and IP address of **10.1.2.4**, a subnet mask of **255.255.255.0**, and click the **OK** button.



## Appendix D: Controller and Print Head File Management

### File Manager

1. If logo or font files are to be transferred, place them on a portable USB storage device and insert it into the HMI USB port.
2. Touch the **Apps** button on the **Home** screen menu, and then select the **Utilities** button.
3. Scroll to the bottom of the **Select Function** list and select **File manager**. Press the **Do Function** button; the **File manager** screen is displayed.



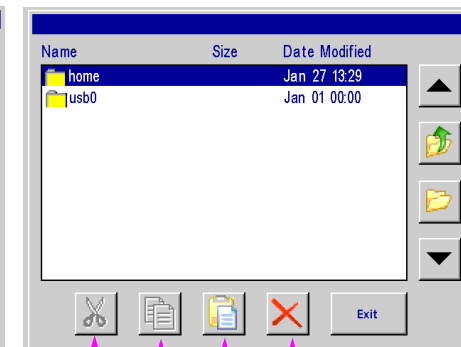
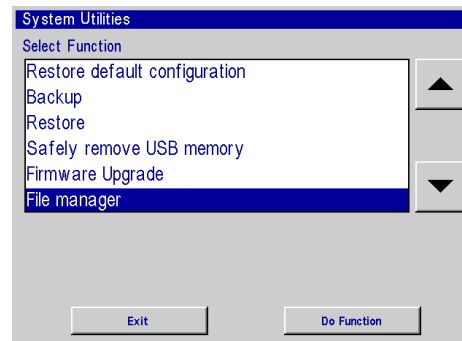
Utilities Button

The **home** folder contains all folders and files related to controller operation.

The **usb0** folder contains all folders and files resident on the USB storage device.



**NOTE: Cut, Copy, Paste, and Delete function the same way as any software. Navigate to any file in any of the folders and perform the desired function.**



Cut Copy Paste Delete

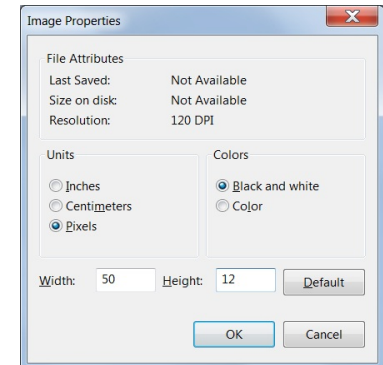
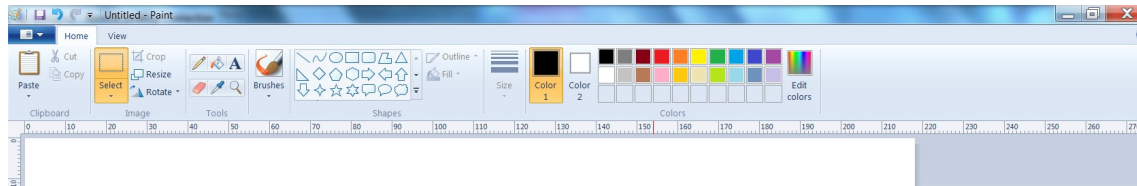
Scroll Up  
Close Folder,  
Go Up One  
Level  
Open Folder  
Scroll down

## Appendix E: Creating Logo Files



**Note:** Logos are not currently available for laser product.

Open **Paint** from a PC by selecting **Start, All Programs, Accessories**, and then **Paint**.



Navigate to the **Image Properties** dialog box via the drop down menu.

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

**Thermal Jet:** Enter the Width and Height of the logo in Pixels. For practical purposes the maximum height of a logo is 150 pixels if the logo is printed with a 1/2" print head, and 300 pixels if printed with a 1" print head. The absolute maximum logo height is 1200 pixels, but logos that cross print head boundaries will likely exhibit registration problems when printed. Maximum logo width is 32,767 pixels, or print columns (109.22 in / 2.77 m when printed at 300 dpi.)

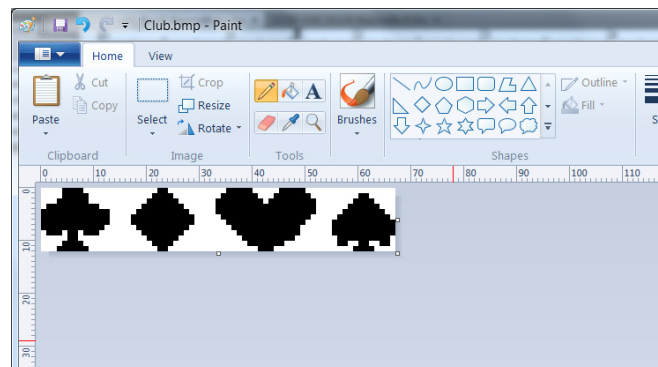
Select **Black and white** for the Colors.

Draw the pixels of the logo using the drawing tools. See the example below.

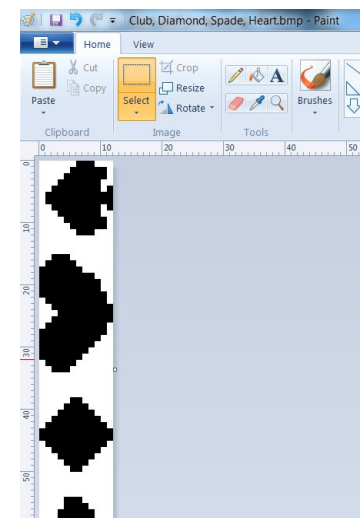
From the **File Menu**, select **Save As** and save the logo with a convenient name and directory location.



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



Next, click the **Rotate** button;  
**Rotate Left 90°** (CCW 90°).

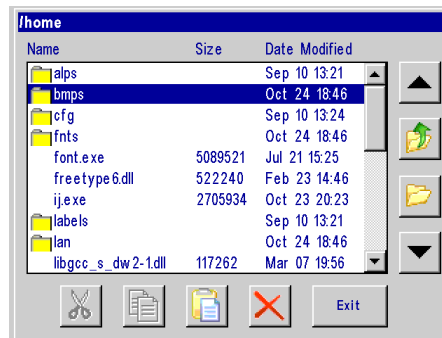
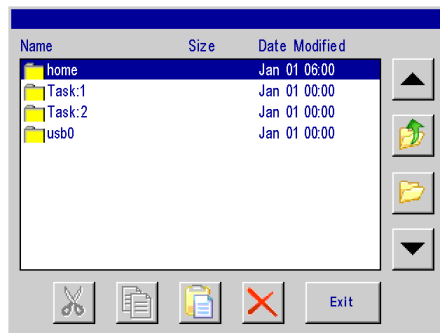


## Appendix F: Transferring Logo and Font Files

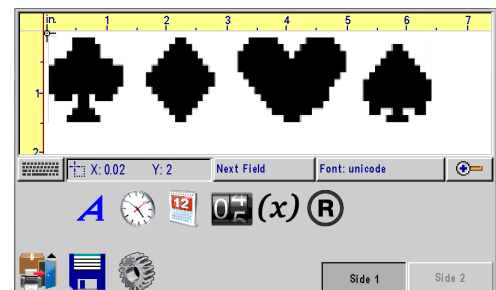
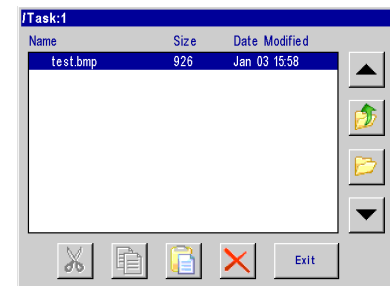
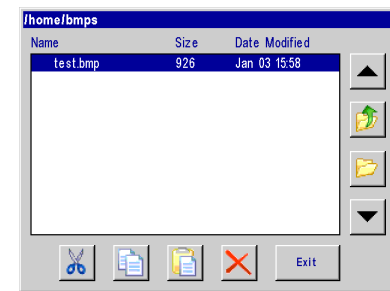


**NOTE:** Files cannot be transferred to the print head while printing. Pause print first.

1. As shown in the “File Manager” section, make sure USB storage device is installed and the **File manager** selection screen is present on the controller.
2. Select the **usb0** folder and press the **Open Folder** icon button.
3. Navigate to a previously saved file, highlight the file and press the **Copy** button. The file is now stored in temporary memory. In this example, a logo file will be transferred.
4. Press the **Close Folder**, then the **Go Up One Level** button until the **File manager** selection screen is present.
5. Select the **home** folder, press the **Open Folder** button, and select the **bmeps** folder.



6. Press the **Paste** button. The logo (bmp) file will appear in the **bmeps** folder.
7. When all desired file transfers are complete, press the **Exit** button.
8. From the **System Utilities** menu, press the **Safely remove USB memory** button, and the **Done**.
9. The file is now available for message creation in the message editor.



## Appendix G: ijRemote Application



The ijRemote application allows the user to connect remotely from their desktop to the IJ4000 system located at the point of printing. An Icon will be located on your Desk top after installing IJ4000 GUI software on your PC.



Connects to the selected IJ4000 Connection Hub



Save any changes made to the list of Connection Hubs.



Undo any unsaved changes.



Adds another IJ4000 Connection Hub to the list.



Edit existing IJ4000 Connection Hub in the list.



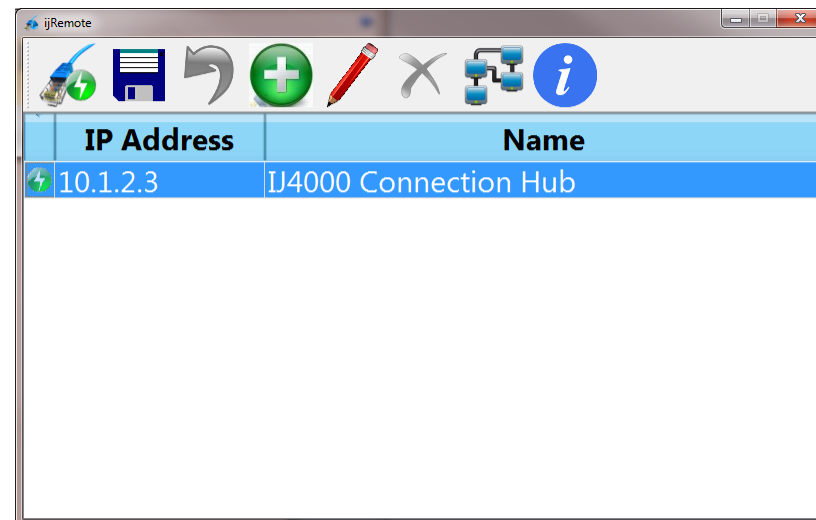
Deletes an IJ4000 Connection Hub from the list.



Shows the current firmware version of the HMI.

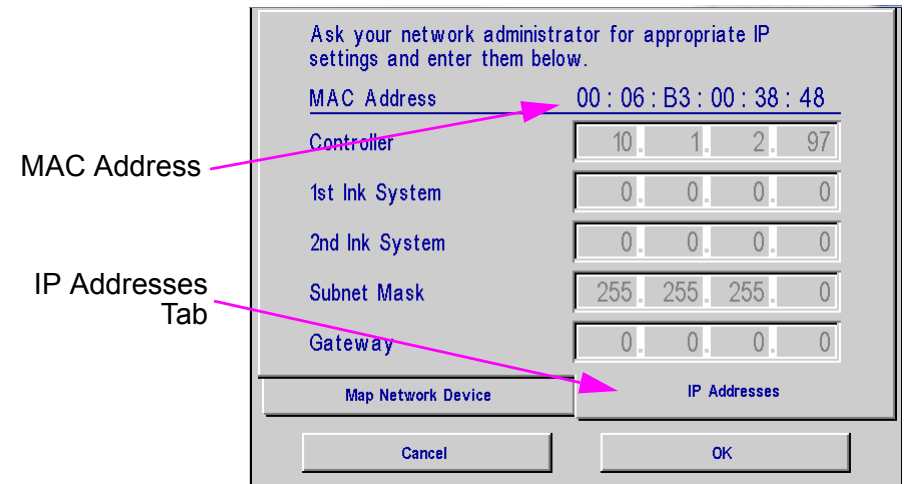
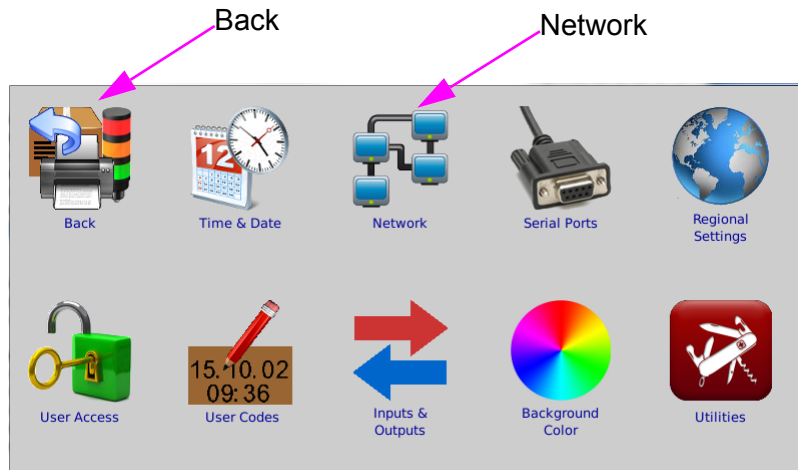
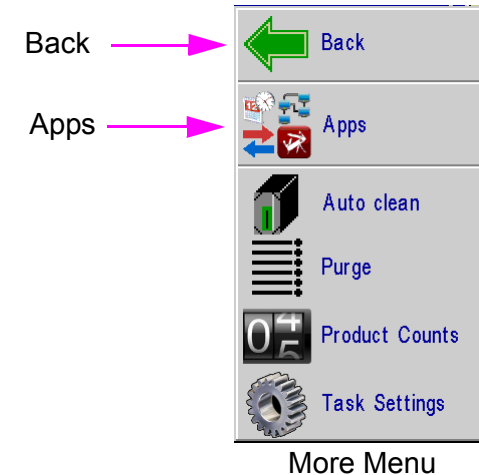
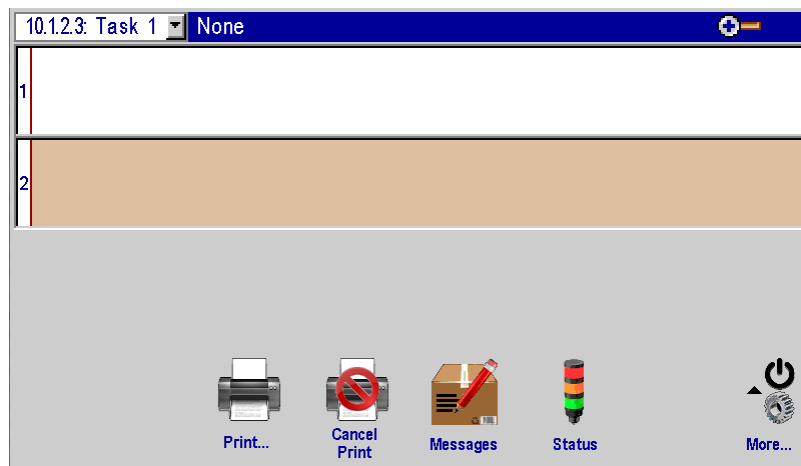


Sets the Network settings of a HMI or Connection Hub using the device's MAC address.



## Adding Multiple HUBs

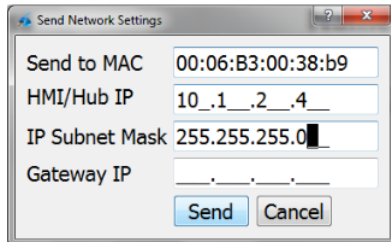
To add additional HUBs to the system, access the **ijRemote** application. If the application is not open, access it from the **Home Screen** by selecting **More**, **Apps**, **Network**, and then the **IP Addresses** tab.



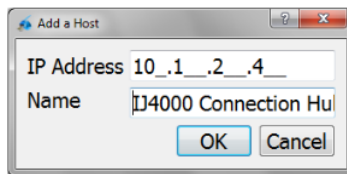
- Record the MAC Address for later use.
- Press **Cancel**, then press **Back** on the **Apps Menu**.
- From the **Home Screen**, select **More** and then **Back** on the **More Menu** to access the ijRemote application.



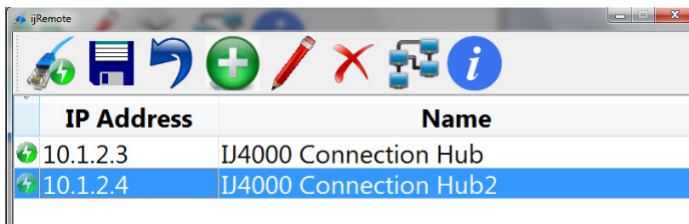
1. Set the IP Address of the HUB using **Network Settings** button.
2. Using the MAC Address of the HUB, set the IP, Subnet Mask and Gateway IP (optional) of HUB. Click **Send**.



3. Add the HUB to the list using the **Add** button. Click **OK**.

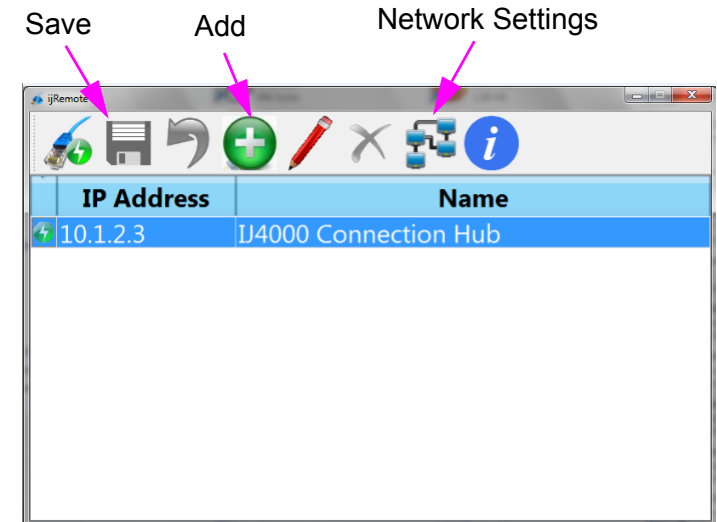


4. Save the list using the **Save** button.

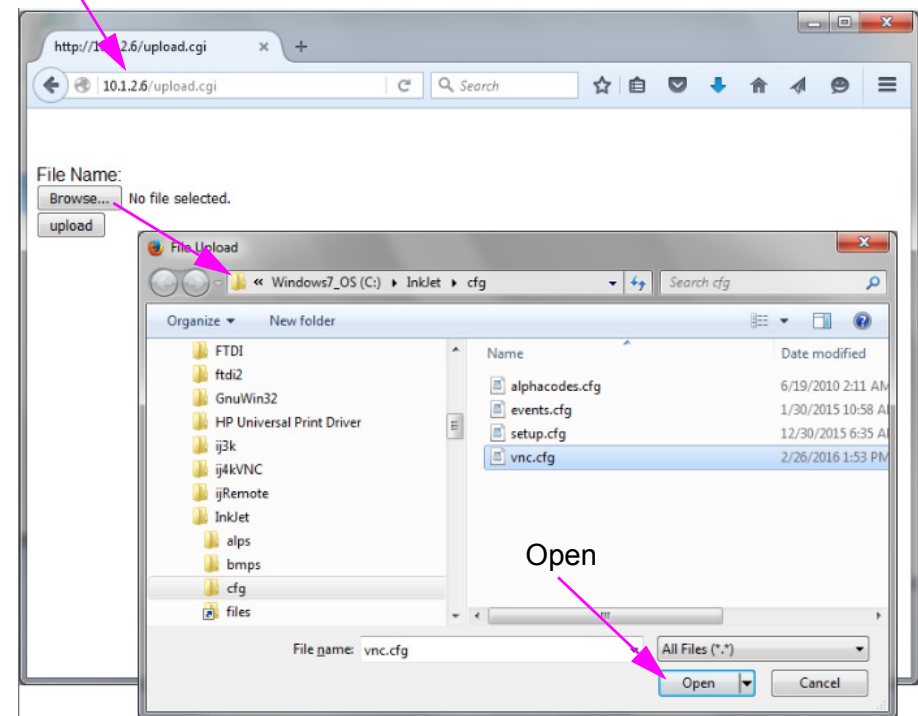


Repeat Steps 1 through 4 for additional HUBs.

5. When all HUBs have been added, transfer the **vnc.cfg** file to the HMI using a web browser.
6. Reboot the HMI by cycling power.



IP Address of HMI

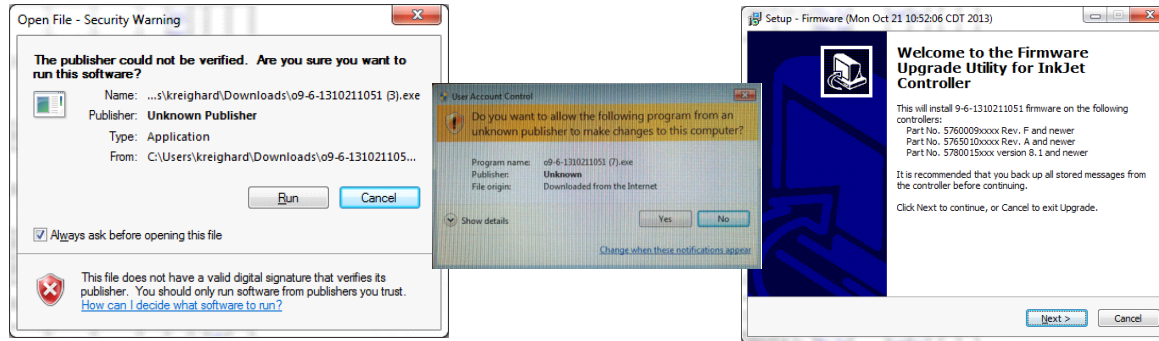




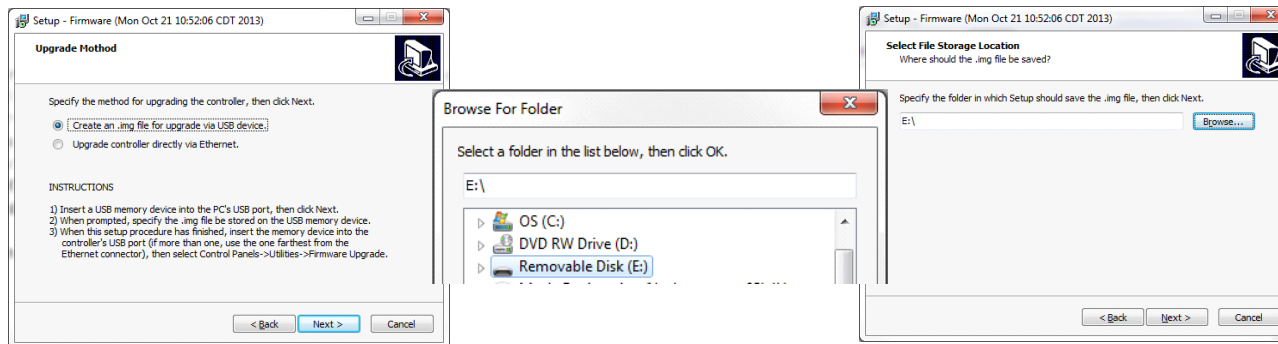
### Appendix I: Updating the HMI & HUB via USB

Download the firmware and save it to a location of your choice.

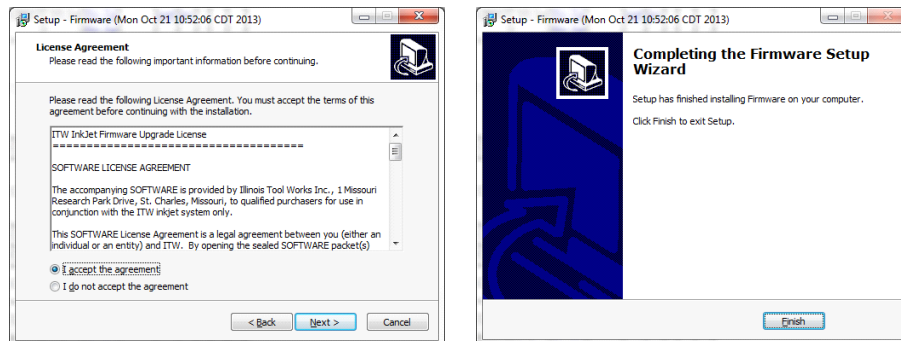
Launch the firmware program and select **Run**. Click **Yes** at the security screen pop-up and click **Next** on the Welcome screen.



Insert a USB memory device into your PC, select **Create an .img file for upgrade via USB device** and click **Next**. Select **Browse**, select your USB drive, click **OK**, then click **Next**.

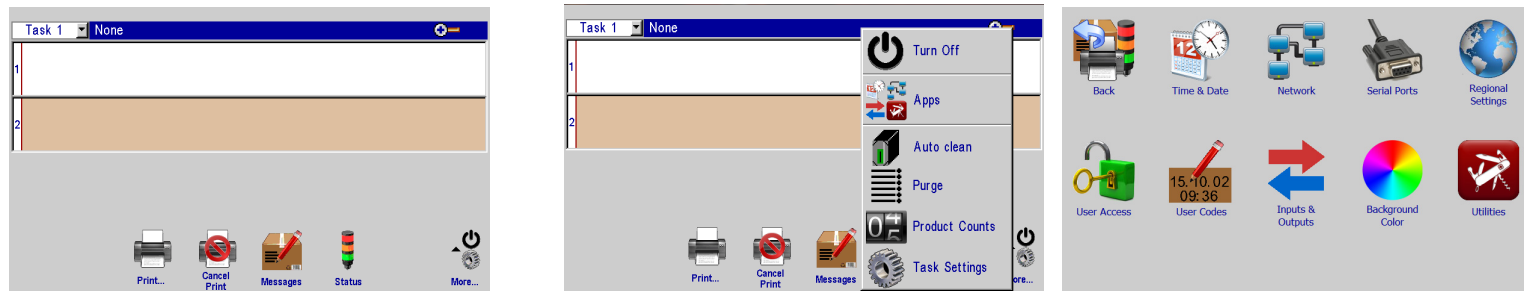


Accept the license agreement and click **Next**. Click **Finish** when the installation is complete.

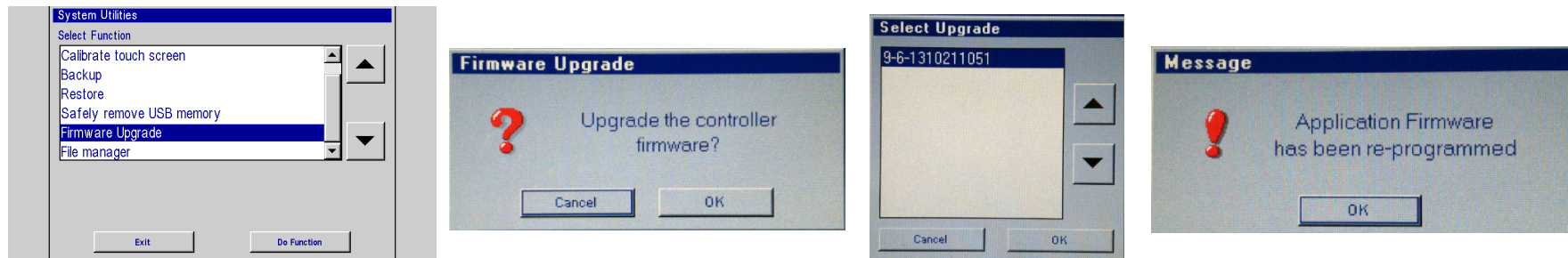


Remove the USB device from our computer and plug it into the HMI

On the controller screen, touch the **More...** button and select the **Apps** button. Select the **Utilities** button.

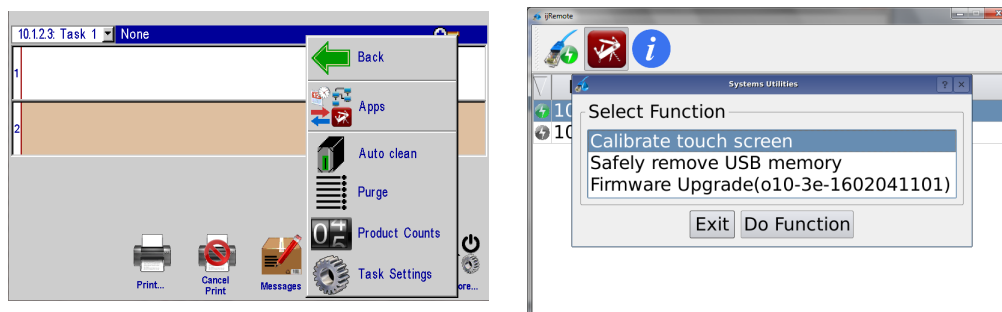


Scroll through the list, select **Firmware Upgrade**, then press the **Do Function** button. Select **OK** to Upgrade the controller firmware. Select Upgrade and press **OK**. Firmware update complete for the HUB.



### Update the HMI

On the controller screen, touch the **More...** button and select the green back arrow button. Press the red utility icon and select firmware Upgrade (version) and then **Do Function**. Firmware update on the HMI is complete.



### Appendix J: Updating the HMI & HUB From a PC via Ethernet

#### Updating the IJ4000-HMI Controller Firmware

Step 1: Download the latest version of Firmware.

Step 2: Disconnect the Ethernet cable that runs from the IJ4000-HUB to the IJ4000-HMI at the HMI.

Step 3: Connect to the IJ4000-HMI from a PC using an Ethernet crossover cable.

Step 4: Run the IJ4000 firmware upgrade program.

Step 5: When the upgrade is complete, disconnect the Ethernet cable from the PC and reconnect to the IJ4000-HMI.

#### Updating the IJ4000 Connection HUB Firmware

Step 1: Download the latest version of Firmware.

Step 2: Disconnect the Ethernet connected to the IJ4000-HMI and plug it into the PC.

Step 3: Run the IJ4000 firmware upgrade program.

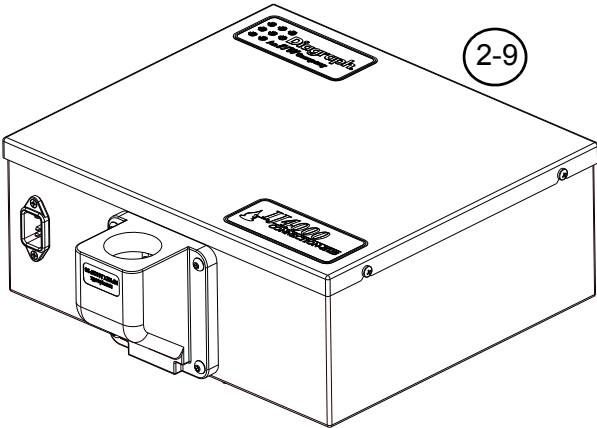
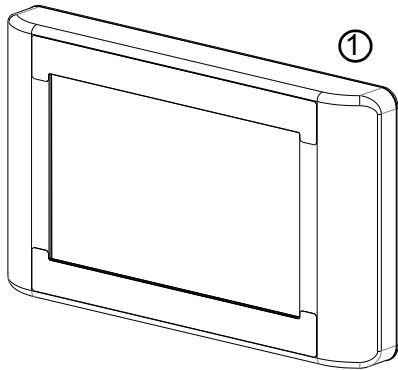
Step 4: When the upgrade is complete, disconnect the Ethernet cable from the PC and reconnect to the IJ4000-HMI.

Appendix K: Part Numbers

System

Major Components

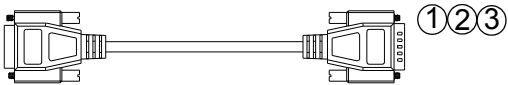
Item	Kit No.	Description	Item	Kit No.	Description
1	5765-004J	IJ4000-HMI, Controller	6	5765-014EJ1	IJ4000 Connection -HUB, International (230 VAC), 1 Card
2	5765-014DJ1	IJ4000 Connection -HUB, Domestic (115 VAC), 1 Card	7	5765-014EJ2	IJ4000 Connection -HUB, International (230 VAC), 2 Card
3	5765-014DJ2	IJ4000 Connection -HUB, Domestic (115 VAC), 2 Card	8	5765-014EJ1-S	IJ4000 Connection -HUB, International (230 VAC), 1 Card, I/O
4	5765-014DJ1-S	IJ4000 Connection -HUB, Domestic (115 VAC), 1 Card, I/O	9	5765-014EJ2-S	IJ4000 Connection -HUB, International (230 VAC), 2 Card, I/O
5	5765-014DJ2-S	IJ4000 Connection -HUB, Domestic (115 VAC), 2 Card, I/O	10		



Service Parts

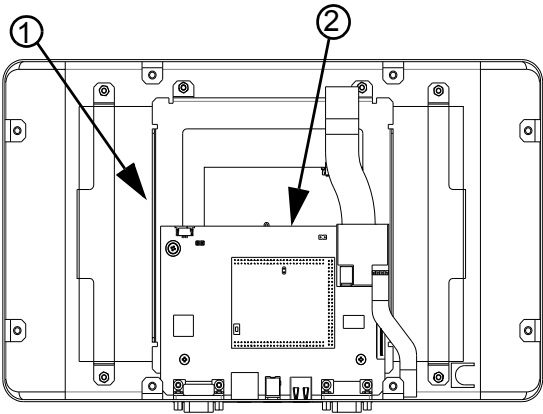
Print Head Cables

Item	Kit No.	Description
1	5760-614-02	Cable, IJ4000 Connection HUB to Print Head, 2'
2	5760-614-10	Cable, IJ4000 Connection HUB to Print Head, 10'
3	5760-614-25	Cable, IJ4000 Connection HUB to Print Head, 25'

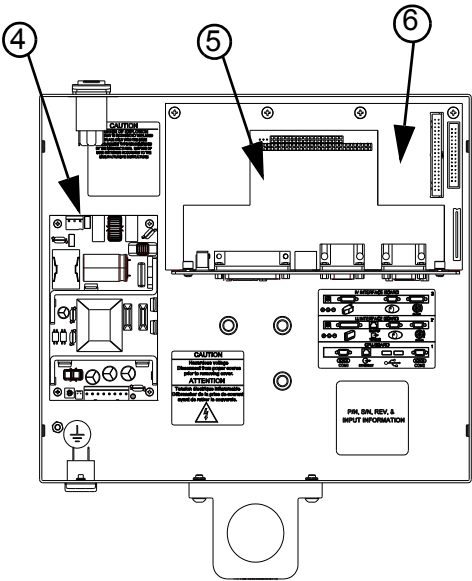


Display, Power Supply, and PCBs

Item	Kit No.	Description	Item	Kit No.	Description
1	5765-221	Kit, Replacement Display, IJ4000-SS, 10.2"	4	5765-247	Kit, Replacement & upgrade, Power Supply, IJ4000 Hub
2	5765-222	Kit, Replacement, CPU, IJ4000-SS	5	5760-332	Kit, Replacement, Impulse Jet Interface Board
3	5760-392	Kit, I/O Board	6	5765-381	Kit, Replacement, CPU



IJ4000 Stainless Steel



IJ4000 Connection HUB