



**Fastmark 4000 Series with  
PAL™ Print and Program Language**

**Barcode Label Printer**

**User's Guide**

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Part No. 110135 A

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## **IMPORTANT SAFETY INSTRUCTIONS AND OTHER NOTICES**

- This label printer complies with the requirements in Part 15 of FCC rules for a Class A computing device. Operation of this equipment in a residential area may cause unacceptable interference to radio and TV reception, requiring the operator to take whatever steps are necessary to correct the interference.
- Place the printer on a flat, firm and solid surface.
- Do not place the printer near a heat source or near water.
- Refer to the specification label on the bottom of this printer and ensure that your power source exactly meets these requirements.
- Do not open the printer during operation to avoid electrical shock.
- Do not attempt to disassemble this printer if it malfunctions.
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## CONVENTIONS

Some of the procedures in this guide contain special notices that highlight important information:

- Note** Indicate information that you should know to help your printer run properly and efficiently.
- Caution** Indicate guidelines that, if not followed, can cause damage to equipment.
- Warning** Indicate a situation where there may be a danger to you.
- Important** Indicate that the associated material needs to be done to ensure proper printer operation.

The use of the term's *right* and *left* assume that you are looking at the front of the printer.

## TECHNICAL SUPPORT

Please contact your local dealer first for technical support. Your dealer is knowledgeable about driver installation, application software and general printer operation. If you still need factory technical support after contacting your dealer, you may mail any problems through the E-mail account, "www.amtdatasouth.com". You can also get the most updated driver or application from the web site "<http://www.amtdatasouth.com>".

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## INTRODUCTION

The FM4602 / FM4603 are high-performance, low-cost Direct Thermal/Thermal Transfer labeling printers featuring the PAL™ Print and Program language.

PAL™ Print and Program language is an interpretive page description language that allows printers to move beyond the role of normal printers. In addition to supporting traditional text, bar code, and graphics print sequences common to other printers, PAL™ Print and Program language also serves as a general purpose programming language. This combination of sequence based printing commands and programming ability allows printers to provide unique solutions such as:

- Intelligently read and interpret legacy data streams without host system programming changes. Add or replace printers without changing the data streams. For example, this tremendous flexibility permits changing from dot matrix text or card embosser's to high quality thermal printing with bar codes *without changing the original data from the host.*
- Store label formats and databases in the printer.
- Store PAL™ programs in the printer to create powerful stand-alone applications that don't require a host or PC connection.
- Create and store PAL™ programs in the printer, which allow it to operate even if the host system goes down.
- Read data from an optional keyboard, scanner, scale, etc. and combine this data with fixed formats to create powerful labeling solutions.
- Perform math calculations and perform logical decisions within the printer

PAL™ Print and Program presents many exciting possibilities for rethinking the printer's role within any industry setting.

The User's Manual will help you understand basic operations of the printer such as set-up, installation, configuration and maintenance. For detailed information on the PAL™ Print and Program language, please refer to the **PAL™ Print and Program Reference Manual**. Before reading the manual you should first identify your printer model. The printer model name is located on the back of the printer on its product label.

# MODEL OVERVIEW

## Models

The PAL™ Print and Program versions of the Fastmark FM4000 series are currently comprised of 2 models:

FM4602 (200DPI)

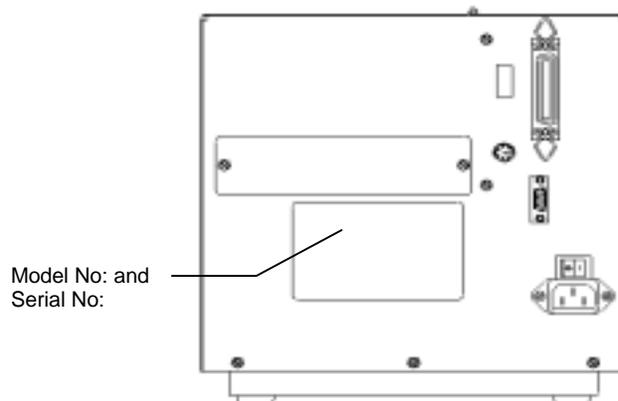
FM4603 (300 DPI)

These models are similar in many ways. The FM4602 has a print head resolution of 200 DPI versus 300 DPI on the FM4603. Throughout this manual instructions and illustrations applying to a particular model will be labeled accordingly otherwise the instructions apply to all models.

**NOTE:** The model number is printed on the compliance label attached to the back of the printer. After un-packing please record the model number below for reference.

**MODEL No:** \_\_\_\_\_

**SERIAL No:** \_\_\_\_\_



**Figure 1 – Model and Serial Number Location**

## Model Features

For detailed feature specifications, please refer to Appendix A. Below is a brief summary of printer features:

### Standard Features

- ❑ **PAL™ Print and Program Language.** The PAL™ Print and Programming Language is a powerful printer language combining both exceptional printing abilities with flexible programming abilities. Because it is designed as both a printing and programming language, it is extremely powerful, flexible, and efficient compared to any other thermal printer language on the market today.
- **PAL™ Print** ability: Free Type font engine with smooth scaling and rotation, graphics with internal scaling, lines, boxes, all popular linear and 2D bar code types. Full rotation and scaling of coordinate system. Ability to define and use print procedures.
- **PAL™ Programming** ability: General I/O, file handling, loops, procedures, floating point math, logical operators, database access, procedure definitions, string manipulations, time/date functions.
- ❑ Ability to store and run printer resident PAL™ programs enabling powerful solutions for a wide variety of print applications.
- ❑ Powerful included Windows Drivers which enable any Windows application to easily access printer resident bar codes and fonts.
- ❑ Back-lit LCD
- ❑ Side Load Media Access for simplified media and ribbon loading
- ❑ Adjustable see through and reflective media detection sensor
- ❑ Ribbon out sensor
- ❑ Serial and Parallel ports standard
- ❑ PS/2 keyboard interface standard
- ❑ All popular linear and 2D bar codes
- ❑ Adjustable media holder for 3 inch and 1.5 inch cores (requires mechanical adjustment)
- ❑ Ink in or Ink out ribbons (requires mechanical adjustment)
- ❑ Adjustable print head pressure for varying width media
- ❑ Rugged all metal print mechanism and cover with media view window.
- ❑ Auto-switching power supply

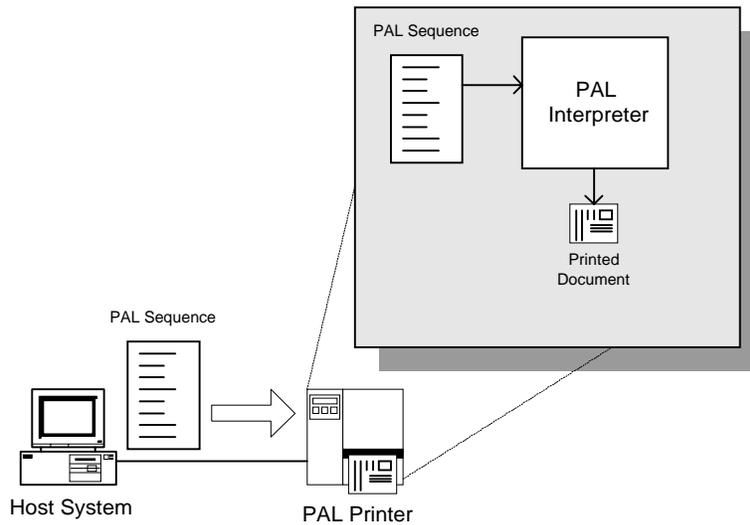
# PAL™ PRINT AND PROGRAM OVERVIEW

Printers featuring PAL™ Print and Program ability can be used in several ways in any given environment. This section describes 3 common ways this advanced capability is used. Details of how to take advantage of this advanced ability can be found in the **PAL™ Print and Program Reference Manual**. For help and assistance determining the best way to use this ability in your situation, please consult your sales representative.

## Traditional Printing

This environment represents the most common use of printers. Generally a single print job (PAL™ print sequences) generates a single label. In this role the PAL™ Print and Program interpreter accepts the print job, performs the required operator processing and prints the; label, tag, or ticket. Using a Windows driver in conjunction with a Windows application program is a typical way to print in this environment. Alternatively, PAL™ print sequences may also be generated by any host application written to take advantage of this powerful language.

When a PAL™ capable printer is used this way, no special “PAL™ program” must be loaded on the printer. Print sequences generated by a Windows driver or host program are simply sent to the printer resulting in print output just like traditional printers.



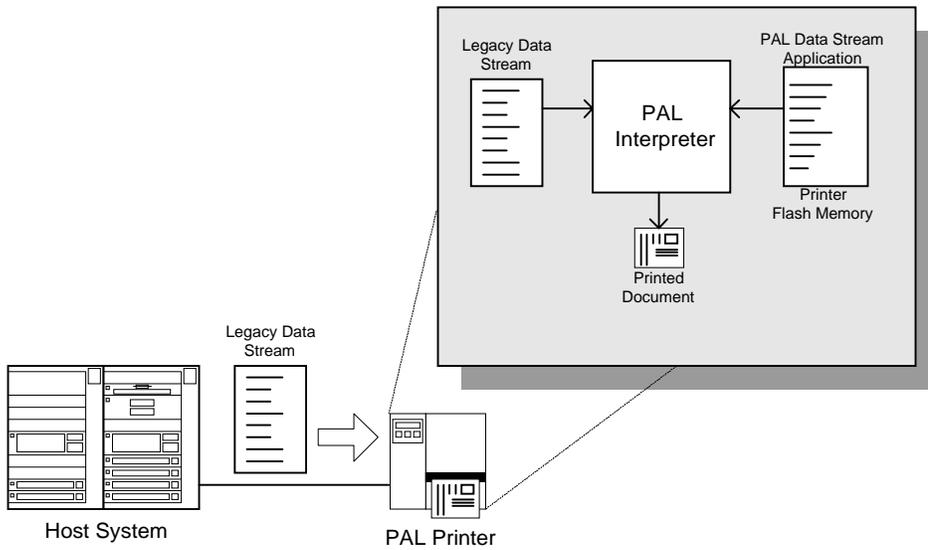
**Figure 2 – Traditional Printing**

## Legacy Data Stream Interpretation

PAL™ Print and Program capable printers uniquely address applications where upgrading to modern cost effective technology is desired. Often cost-prohibitive software reprogramming to change a data stream prevents an organization from moving to new printing technologies.

Using a PAL™ Print and Program capable printer solves this problem. In this case a PAL™ program is written which interprets a data stream normally sent to the legacy device being replaced. This program is stored on the printer and is automatically executed each time the printer is powered on. This program is able to produce a new label format based on this legacy data. Even though the host computer is sending the exact same legacy data to the printer, the label format can be completely different. For example the new format may include bar codes, scaled and/or rotated fonts, lines, logo's etc. Even though the legacy device being replaced does not support these print abilities, the new label format can.

For example, text only outputs such as produced by a dot-matrix printer or card embosser may now be presented in a more functional format. Information in the data stream can be reformatted into any size font in any rotation, or even printed as bar code. This example demonstrates how PAL™ Print and Program capable printer can replace a legacy print device with no host software changes required.



**Figure 3 – Legacy Data stream Interpretation**

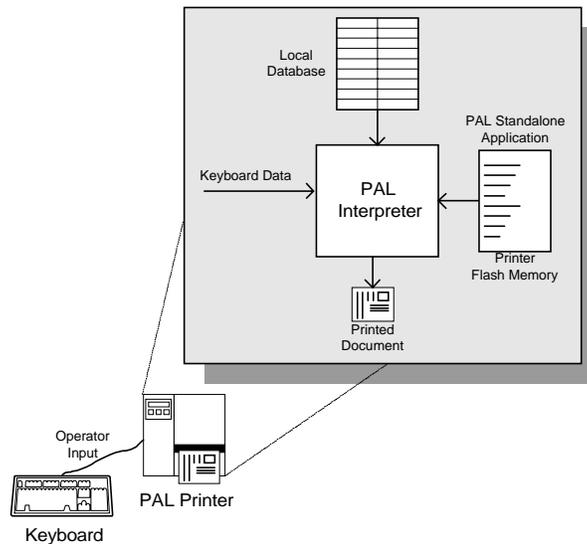
## Standalone/Downtime Applications

PAL™ Print and Program capable printers may be programmed to operate independent of a PC/host connection. This standalone ability may be used in cases where no PC/host connection is needed or as a fail-safe backup when the PC/host or network is unavailable.

The Standalone Application program is stored in the printer memory and can accept input from a PS/2 keyboard, bar code scanner, or other serial devices such as an electronic scale. These programs may use the printer's LCD to prompt for user input and may also include databases. Unlike other bar code printers that allow basic static forms to be loaded in the printer, PAL™ Print and Program capable printers provide advanced abilities. Examples of these advanced capabilities are:

- ❑ Ability to operate on line from host or off line in stand-alone mode
- ❑ Ability to range check user input
- ❑ Ability to combine data from multiple fields into a single bar code
- ❑ Ability to access database stored in printer
- ❑ Ability to perform math calculations (addition, subtraction, multiplication, division, etc.)
- ❑ Ability to perform logical calculations (equal to, less than, greater than, etc.)

Shown below is an example where a stand-alone PAL™ application and database is stored in the printer. Operator input combined with internal database information is used to create a label. For example, this application could request a part number and physical dimensions of a particular part by prompting for this information on the printer LCD. After the operator inputs the requested information on the PS/2 keyboard, the printer could calculate the volume, and then based on the part number lookup the part description in a database to produce a label.



**Figure 4 – Stand Alone Operation**

## UNPACKING AND INSPECTION

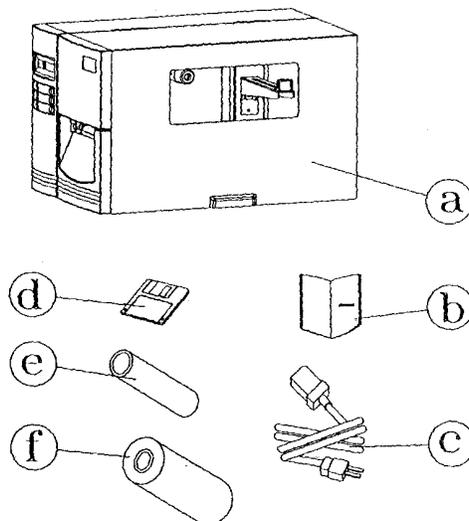
This section is provided to assist you in taking the printer from the shipping container to the application environment and ready for use.

1. Remove top foam packing piece.
2. Lift printer straight up out of box carefully with adequate assistance.
3. Remove accessory kit and supplies.
4. Remove printer from plastic bag.

**NOTE:** Save box and all packing materials for future use, in the event the printer needs to be shipped. Units returned for service in non approved packaging may void the warranty or increase repair costs due to shipping damage.

Verify that the printer box contains the following materials when unpacking:

- a. Printer
- b. Quick Start Up Guide
- c. Power cord
- d. CD or disks with User's manual and Windows drivers
- e. Take up Core
- f. A *sample* ribbon roll and a take-up ribbon core.
- g. A *sample* media roll (not pictured)



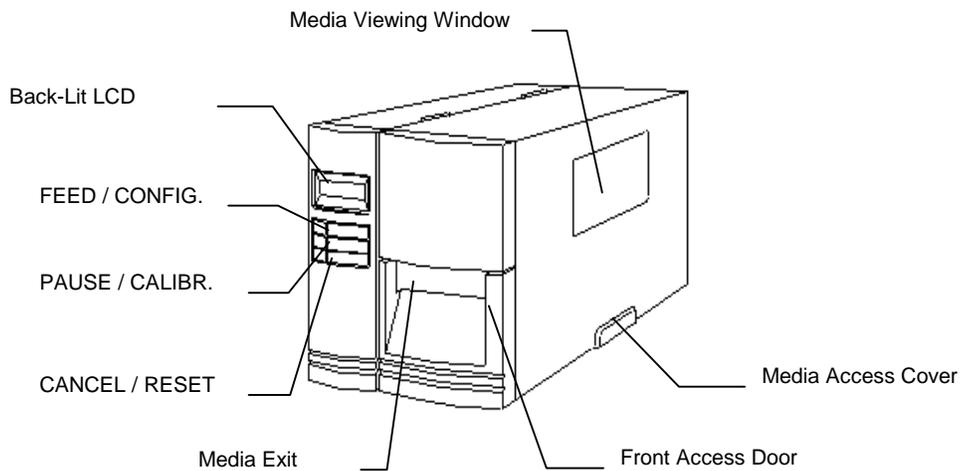
**Figure 5 - Shipped with Printer**

# INSTALLATION AND CONFIGURATION

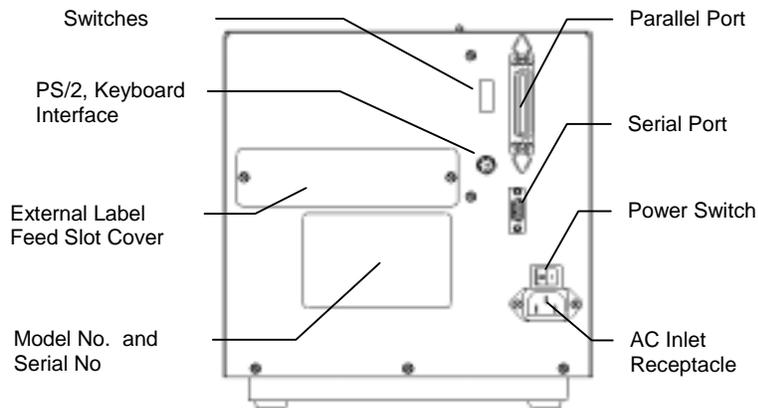
## Setting up the Printer

Before setting up the printer you should first consider the following:

- Flat stable surface with sufficient clearance to allow for interface cables and media loading.
- Free from excessive direct sunlight, temperature, humidity, dust, dirt, and debris.
- Near a grounded AC power receptacle wired in compliance with local ordinances.



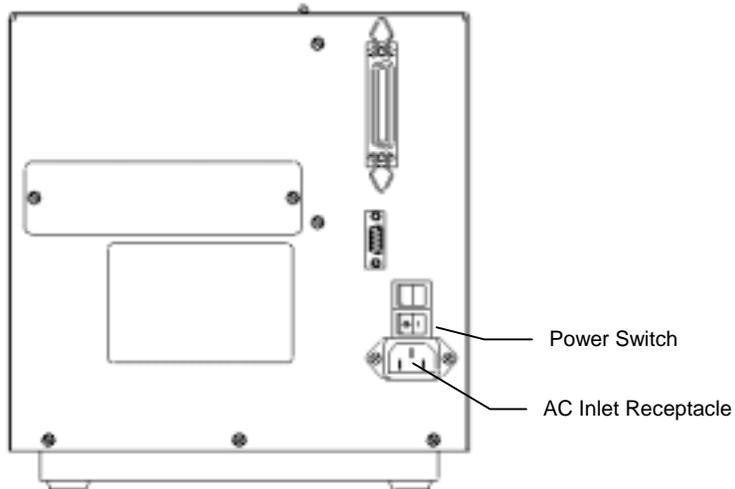
**Figure 6 - Front and Side View**



**Figure 7 - Back Panel**

## Connecting the Power Cord

1. Ensure printer **Power Switch** is off "0".
2. Connect the power cord to the **AC Inlet Receptacle** located on the back of the printer.
3. Connect AC power plug to a suitable AC source.
4. Connect either Centronics Parallel cable or RS-232 Cable.

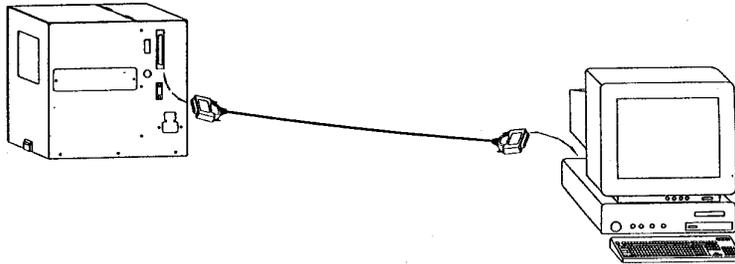


**Figure 8 - Power Cord Connection**

## Connecting the Printer to Your Host

1. You can connect the printer with any standard Centronics cable to the parallel port of the host computer or network print server.
2. Or, you can connect the printer with a serial cable to the RS-232C port of your computer or terminal. (For PC compatibles, the RS-232C port is COM1, COM2 or COM3.)

**NOTE:** Using Centronics allows for higher communication speed than serial.



**Figure 9 - Communication Cable**

3. If you use the serial port with your own cable, refer to the **Appendix B** and check the pin connection. Be sure that the speed (baud rate) and protocol are the same between printer and host.

**Caution: Pin 9 on the serial port is directly connected to +5volts DC. It is suggested that this pin be not connected in your cable, unless required.**

To change the Baud Rate:

Refer to the section **KEYPAD OPERATION** for instructions on how to use the keypad setup mode including setting baud rate and other communication features.

Default serial port settings:

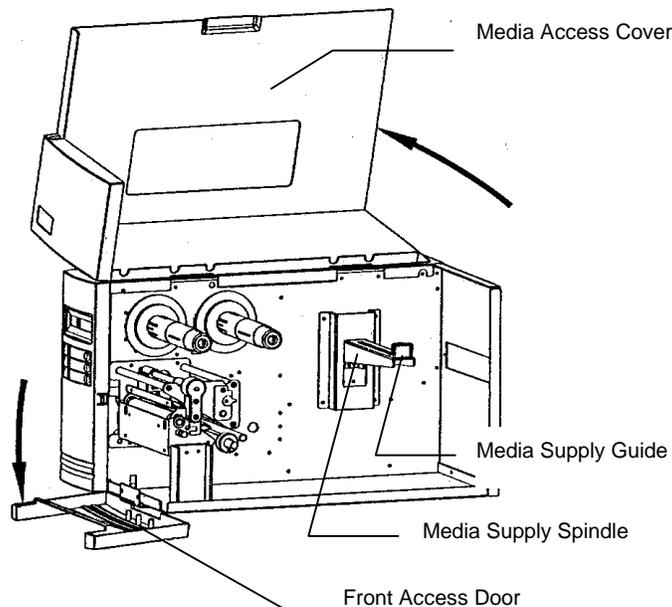
Speed (baud rate)	9600
Data format	1 start bit, 8 data bits and 1 stop bit.
Parity	None
Handshaking (Flow control)	XON/XOFF and RTS/CTS

## Loading the Ribbon

### *Thermal Transfer Media only*

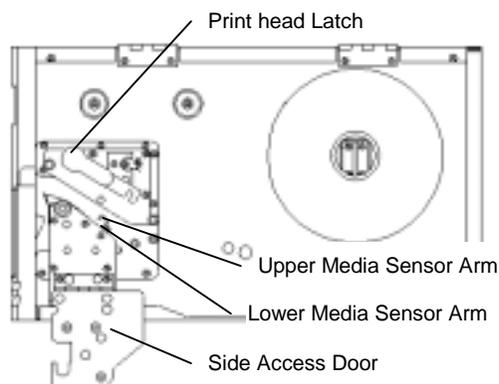
If Direct Thermal Media is used, skip to the section Loading Media.

1. Open the **Media Access Cover** by lifting it up until it rests upon the top of the printer.
2. Open the **Front Access Door** by rotating it down.



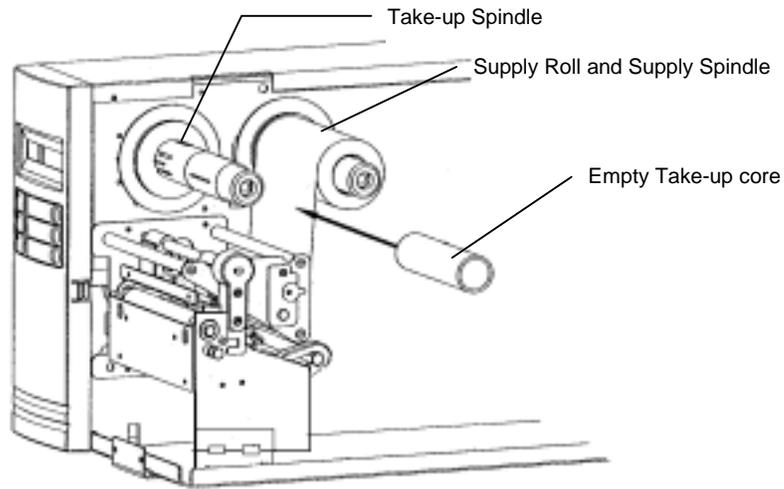
**Figure 10 - Open Media Access Cover**

3. Rotate the Green **Print head latch** counter-clockwise to open the print head module.
4. Rotate the **Side Access Door** down to allow the ribbon to be loaded under the print head module. This will allow you to slide the ribbon under the print head without having to thread it under the module.



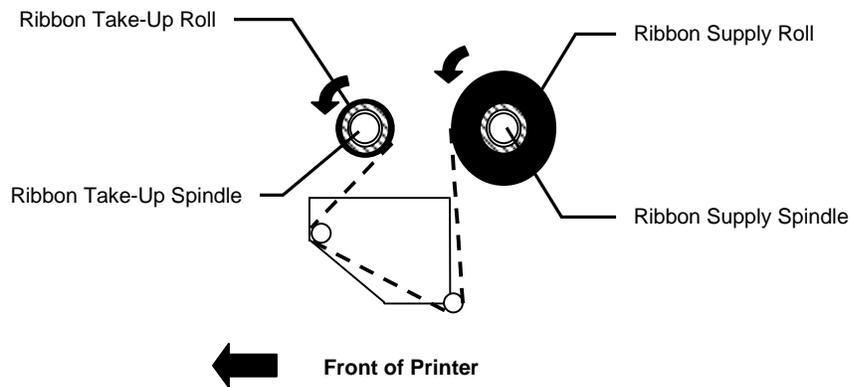
**Figure 11 - Print head Latch and Side Access Cover**

5. Unwrap the ribbon and place the **Ribbon Supply Roll** on the **Ribbon Supply Spindle** located towards back of printer.



**Figure 12 - Ribbon Take-Up Core**

6. Place the **Ribbon Take-up** core on the **Ribbon Take-Up Spindle** located towards the front of the printer.
7. Slide both cores completely towards the center of the printer.
8. Route the ribbon under the print mechanism.
9. **Important:** Route **ribbon under and around back** of **Ribbon Take-Up Core** before attaching using tape or adhesive leader.
10. Tighten ribbon by manually rotating the Take-up Core counter-clockwise.



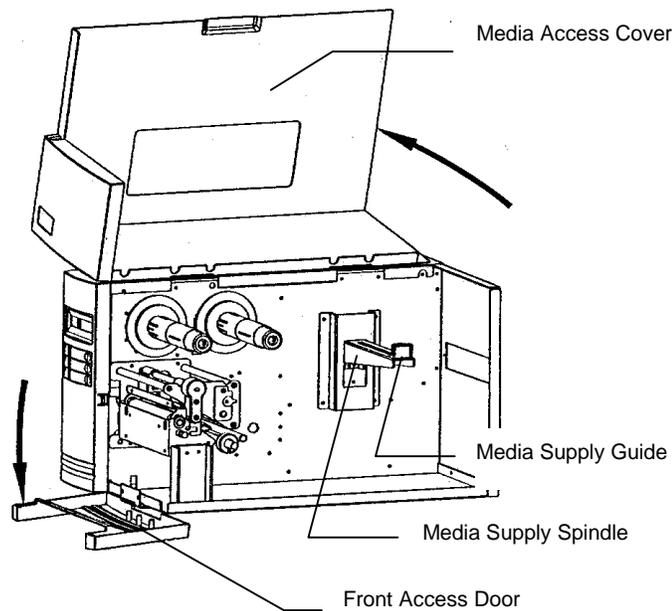
**Figure 13 - Ribbon Routing**

11. **Important:** To ensure proper ribbon operation complete the following checklist:

- ❑ Ribbon is wound ink in and feeding off the top of the **Ribbon Supply Roll**.
  - ❑ Ribbon is re-wound on **Take Up Roll** from the bottom.
  - ❑ Ribbon is routed above the **Upper Media Sensor Arm**. Only the media should be below this arm.
  - ❑ When properly loaded both the **Ribbon Supply** and **Ribbon Take-Up Rolls** will be rotating **counterclockwise** as shown on the **Ribbon Routing** picture.
- ❑ Verify Thermal Transfer is enabled (see keypad setup section).

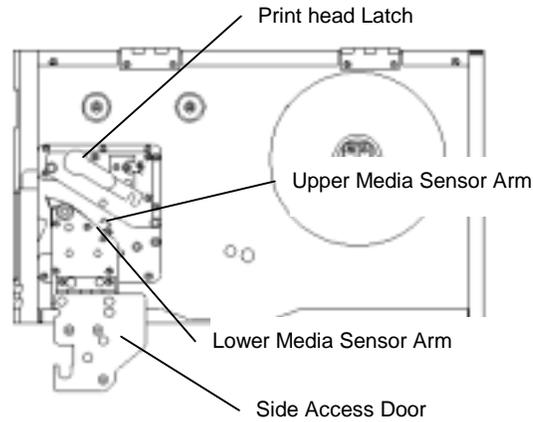
## Loading Media

1. Fully open **Media Access Cover**.
2. Open the **Front Access Door** by rotating down.



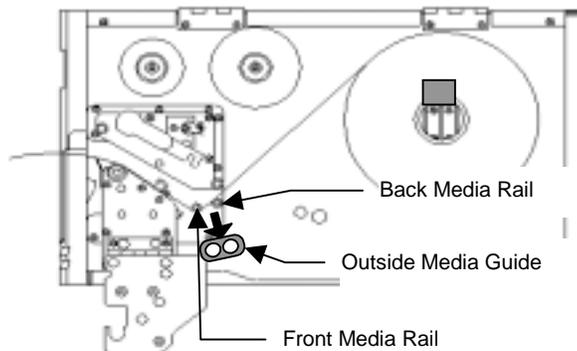
**Figure 14 - Open Media Access Cover**

3. Rotate the green **Print head Latch** counterclockwise to open the print head.
4. Rotate the **Side Access Door** down to allow the media to be loaded under the print head module.



**Figure 15 - Print head Latch and Side Access Cover**

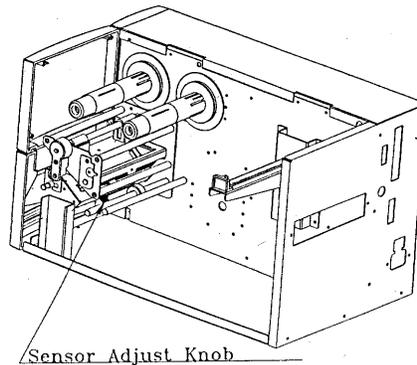
5. Slide the **Media Supply Guide** to the full widest position.
6. Ensure the media is face out with the labels feeding from the top of the roll. If not obtain correctly wound media from your supplier
7. Place the media roll on the **Media Supply Spindle**.
8. Slide the roll fully towards the center of the printer.
9. Slide the **Media Supply Guide** towards the center of the printer until it is snug against the media.
10. Slide the green **Outside Media Guide** off the **Front** and **Back Media Rails** by pulling straight out.



**Figure 16 - Outside Media Guide**

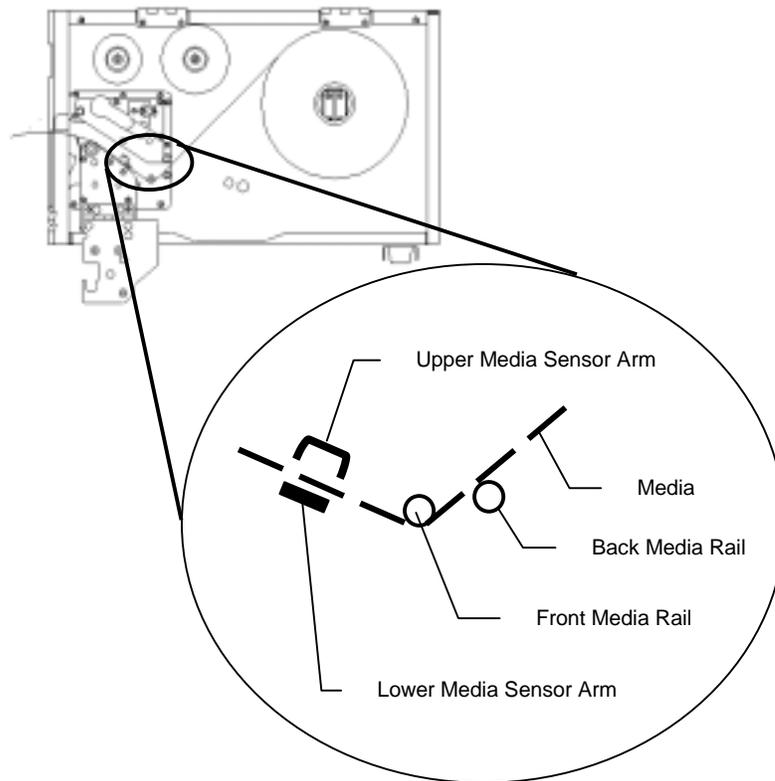
11. Thread the media over the **Back Media Rail** and under the **Front Media Rail**.
12. Continue feeding the media through the black **Upper** and **Lower Media Sensor Arms** located under the print module.
13. Place the green **Outside Media Guide** (smooth side in) back onto the **Front** and **Back Media Rails**.
14. Slide the **Outside Media Guide** towards the center of the printer until it just touches but does not buckle the media.
15. If needed, grasp the Sensor Adjust Knob and slide in or out to move the Media Sensor to the position on the media to be sensed.

**NOTE:** With the print head open and viewing from the front, the location of the media sensor on the sensor arm is indicated by a small triangle. Normally any location directly over the label gap is sufficient. In some cases, this sensor will need to be precisely located for example to see a hole in a wristband. *Locate this sensor before running the label calibration test.*



**Figure 17 - Media Sensor Adjust Knob**

16. **Important:** To ensure proper media feeding and sensor operation, complete the following checklist:
  - Media is wound Face Out (print side out) and feeding off the top of the roll. (*Very important otherwise media may peel and stick to the media rails.*)
  - Media is routed exactly as shown over the **Back Media Rail** and under the **Front Media Rail**.
  - Media is routed between the **Upper** and **Lower Media Sensor Arms** located under print module.
  - The **green Outside Media Guide** has been re-installed.
  - If required, the media sensor is adjusted directly over the notch (hole) or gap.



**Figure 18 - Media Routing**

17. Rotate the **Side Access Door** up to close.
18. Rotate the green **Print Head Latch** clockwise fully to lock the print head and **Side Access Door** shut.

## Changing Position of the Media Supply Spindle

The printer can store under the Media Access Cover an 8-inch outer diameter media roll that is wound on either 1.5 inch or 3 inch inner cores. When the Media Access Cover is closed touching on either the Media Cover or the bottom of the printer could cause unnecessary drag on the form. The printer's **Media Supply Spindle** can be moved to accommodate these issues.

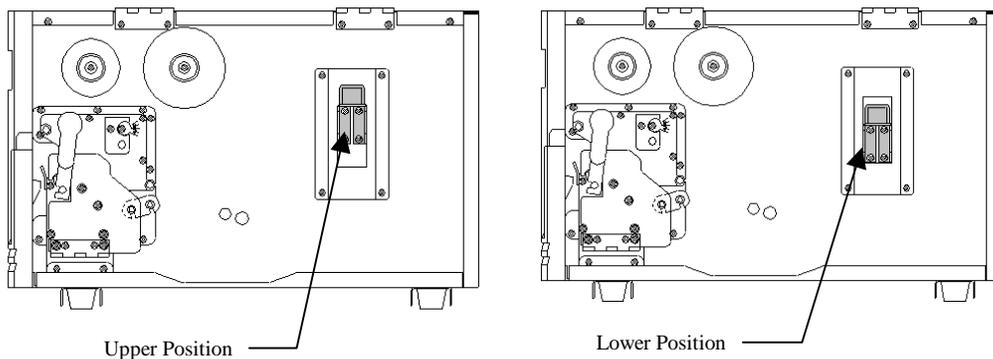
### To change the position of the Media Spindle:

1. Turn off the printer.
2. Remove the media from the Media Spindle.
3. Using a Phillips Screwdriver remove the 4 screws holding the Media Spindle to the center of the printer.
4. Slide the Media Spindle to the appropriate position.

**1.5 inch inner core: Media Spindle needs to be in the Lower position.**

**3-inch inner core: Media Spindle needs to be in the Upper Position.**

5. Using a Phillips Screwdriver, install the 4 removed screws.
6. Reload the Media into the printer.



**Figure 19 - Media Spindle Location**

## Calibrating Media Sensors

**Important:** The first time media is installed, the Media Sensors must be calibrated. After the first calibration no further calibration is required unless the media type (length, color, backing material, etc.) is changed or irregular feeding occurs.

1. Ensure the printer is powered off.
2. Verify that the media is properly loaded and routed as detailed in Loading Media Section.
3. Verify the Media Sensor is properly positioned directly over the object to be sensed (gap, hole, notch).
4. While pressing ***and holding*** the **PAUSE/CALIBR.** button, power on the printer.
5. Release the **PAUSE/CALIBR.** button when the media begins to feed.
6. When feeding stops the printer has completed the Label Sensor Calibration procedure. The LCD will indicate if the calibration was successful or not and display the form and gap length. If unsuccessful, refer to the section Loading Media and verify each step.
7. When the printer completes the Label Sensor Calibration procedure it will save the related parameters (sensor, label length, gap/notch/hole length) to EEPROM.

## Printing the Configuration Label

1. Power off the printer.
2. Make sure that 4 inch wide media is installed. The Self-test will print the maximum width of the installed label.
3. Press ***and hold*** the **FEED/Config** button.
4. Power on the printer.
5. Release the **FEED/Config** button when the media begins to feed.

**NOTE:** The following figure is an example configuration printout. The feature setting on your printer may vary based on any setup changes made or firmware version installed in the printer.

<b>Media Type</b>	<b>Thermal Transfer</b>
<b>Media Sensing</b>	<b>Gap</b>
<b>Sensor Threshold</b>	<b>70</b>
<b>Media Length</b>	<b>4.00 Inches</b>
<b>Media Width</b>	<b>4.00 Inches</b>
<b>Present Distance</b>	<b>+0.24 Inches</b>
<b>Present Sensor</b>	<b>Disabled</b>
<b>Vert Print Align</b>	<b>0.00 Inches</b>
<b>Horz Print Align</b>	<b>+0.20 Inches</b>
<b>Vert Size Adjust</b>	<b>0</b>
<b>Print Darkness</b>	<b>-8</b>
<b>Print Speed</b>	<b>6</b>
<b>Interface Select</b>	<b>Auto Select</b>
<b>COM1: Baud Rate</b>	<b>9600</b>
<b>COM1: Parity</b>	<b>None</b>
<b>COM1: Data Bits</b>	<b>8</b>
<b>COM1: Handshake</b>	<b>RTS &amp; XON</b>
<b>COM1: PAL Xmit</b>	<b>Disabled</b>
<b>Emulation Mode</b>	<b>PAL Emulation</b>
<b>Date</b>	<b>Not Installed</b>
<b>Time</b>	<b>Not Installed</b>
<b>Daylight Saving</b>	<b>Disabled</b>
<b>Firmware Rev.</b>	<b>110152 B</b>
<b>Max Media Length</b>	<b>12.00 Inches</b>
<b>Keypad Lockout</b>	<b>Disabled</b>
<b>Label Count</b>	<b>582</b>
<b>Drive A:</b>	<b>131072</b>
<b>Drive B:</b>	<b>262144</b>
<b>Drive C:</b>	<b>0</b>
<b>Drive D:</b>	<b>32768</b>

**Figure 20 - Configuration Print Sample**

# KEYPAD OPERATION

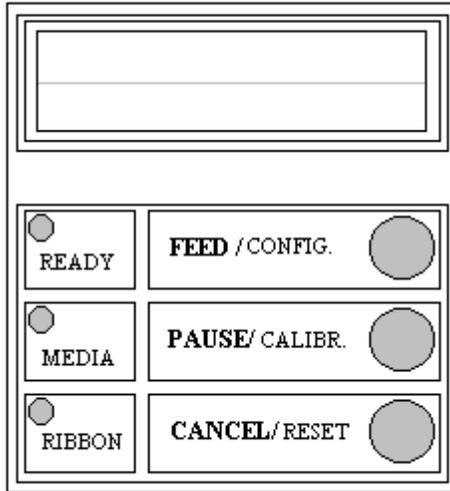


Figure 21 - Fastmark 4000 Series Front Panel

## LED Description

<i>LED</i>	<i>Function</i>
○ READY	<p><b>ON:</b> Printer is online</p> <p><b>OFF:</b> Printer is either off line or in setup mode</p> <p><b>Steady Blinking:</b> System error occurred. (See LCD for description of error and refer to Trouble Shooting Section)</p> <p><b>Flickering:</b> Printer is receiving data from serial or parallel interface</p>
○ MEDIA	<p><b>OFF:</b> No media errors detected</p> <p><b>Steady Blinking:</b> Media error occurred. (See LCD for description of error and refer to Trouble Shooting Section)</p>
○ RIBBON	<p><b>OFF:</b> No ribbon errors detected</p> <p><b>Steady Blinking:</b> Ribbon error occurred. (See LCD for description of error and refer to Trouble Shooting Sections)</p>

## Key Operation

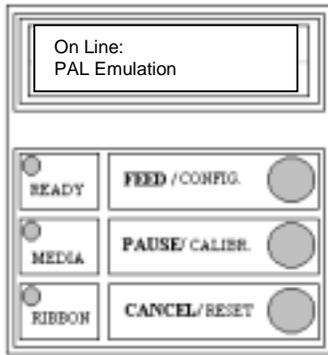
The Front Panel keys serve multiple functions. Refer to the following tables for their specific functions.

### Power up key functions

The table below indicates the function performed when a key is pressed and held while the printer is powered up.

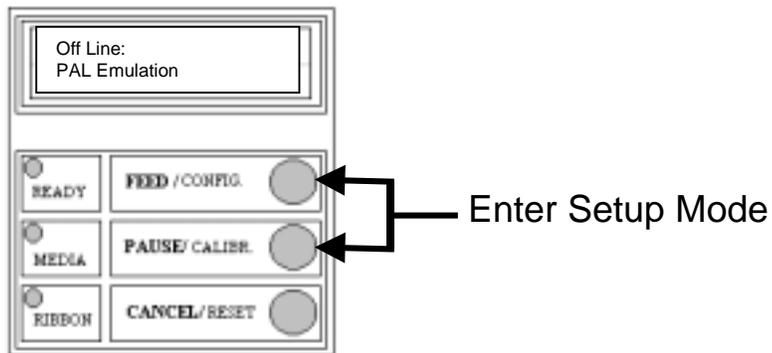
<b>Key</b>	<b>Function</b>
<b>FEED</b>	The printer generates a configuration label showing current feature settings, firmware revision, and PAL™ drive storage capacity.
<b>PAUSE</b>	The printer performs a Calibration test which adjusts the sensor sensitivity, measures the label length, and measures gap/notch. hole. These values are stored in non-volatile memory.
<b>CANCEL</b>	<b>PAL™ program loaded:</b> When a PAL™ program is loaded it runs automatically on power up. Pressing this key bypasses the program and places the printer in normal mode. The most common reason to bypass a PAL™ program on power up is to allow a new or updated program to be loaded in the printer. <b>No PAL™ program loaded:</b> No function.

## On Line key functions



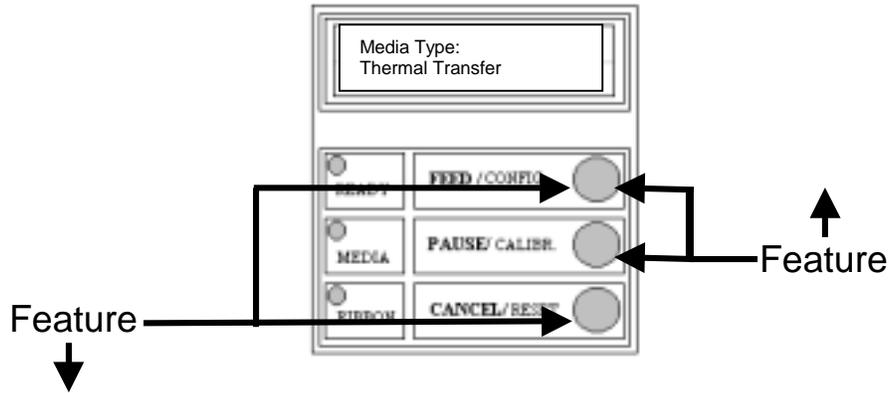
<i>Key</i>	<i>Function</i>
<b>FEED</b>	No function.
<b>PAUSE</b>	Places the printer Off Line.
<b>CANCEL</b>	No function

## Off Line key functions



<i>Key</i>	<i>Function</i>
<b>FEED</b>	Feeds one label.
<b>PAUSE</b>	Places the printer On Line.
<b>FEED + PAUSE</b>	Pressing FEED and PAUSE simultaneously places the printer in Setup Mode.
<b>FEED + CANCEL</b>	Pressing FEED and CANCEL simultaneously also places the printer in Setup Mode.

## Setup Key Functions while in Changing Feature Mode

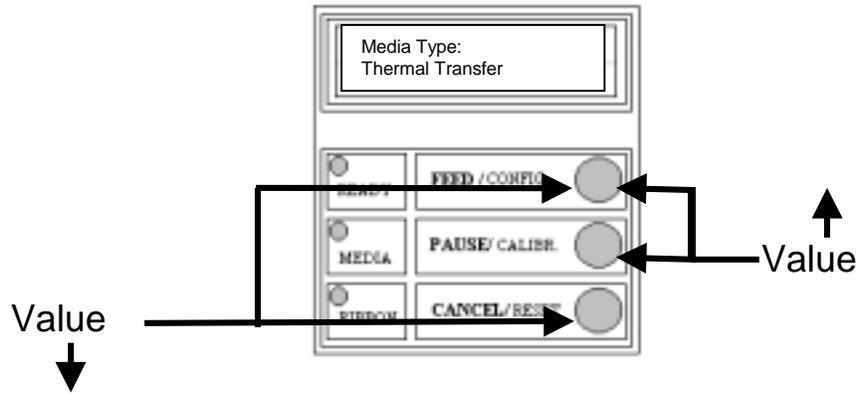


(LCD Top Line Not Blinking)

<b>Key</b>	<b>Function</b>
<b>FEED + PAUSE</b>	While holding the FEED key, each press of the PAUSE key scrolls <b>up</b> through the list of features by one feature. Holding the PAUSE key scrolls up through the feature list. This list wraps from the first feature to the last feature in the list. <i>See the Setup Menu section for more information.</i>
<b>FEED + CANCEL</b>	While holding the FEED key, each press of the CANCEL key scrolls <b>down</b> through the list of features by one feature. Holding the CANCEL key scrolls down through the feature list. This list wraps from the last feature to the first feature in the list. <i>See the I Setup Menu section for more information.</i>
<b>PAUSE</b>	Exits Setup Mode
<b>CANCEL</b>	Changes the setup mode from Changing Features to Changing Value Mode.

**TIP:** Hold the Feed button with the middle finger while using the index finger to press either PAUSE or CANCEL. This way it is easy and quick to scroll either up or down the feature list.

## Setup Key Functions while in Changing Value Mode



(LCD Top Line Blinking)

<b>Button</b>	<b>Function</b>
<b>FEED + PAUSE</b>	While holding the FEED key, each press of the PAUSE key increases the value or scrolls up through the list of values. Holding the PAUSE key continuously scrolls through the available feature values. This list wraps from the upper limit to the lower limit of the particular feature being adjusted. <i>See the Front Panel Setup Menu section for more information.</i>
<b>FEED + CANCEL</b>	While holding the FEED key, each press of the CANCEL key decreases the value or scrolls down through the list of values. Holding the CANCEL key continuously scrolls through the available feature values. This list wraps from the lower limit to the upper limit of the particular feature being adjusted. <i>See the Front Panel Setup Menu section for more information.</i>
<b>CANCEL</b>	Stores the selected feature value then changes setup mode back to Changing Feature Mode.

**TIP:** Hold the Feed button with the middle finger while using the index finger to press either PAUSE or CANCEL. This way it is easy and quick to scroll either up or down the value list.

## LCD Display

The front panel is equipped with a 2 row by 16 character back-lit Liquid Crystal Display (LCD).

The basic function of the display is to:

- ❑ Display the printer line status
- ❑ Display error conditions
- ❑ Display the name and state of a PAL™ program loaded and running on the printer.
- ❑ Display setup features and values.
- ❑ Display data prompts requesting data from an attached keyboard or bar code reader. These prompts vary depending on the individual PAL™ program loaded on the printer.

### Standard On Line Display (no PAL™ program loaded)

After power on the following message is displayed on the LCD

On Line:
PAL Emulation

### Standard Off Line Display

When the printer is placed Off Line the following message is displayed even when a . PAL™ program is loaded. When placing the printer back On Line, any message previously written to the LCD is automatically restored.

Off Line:
PAL Emulation

### Typical Setup Mode Display

During setup mode, the top line displays the feature name and the bottom line displays the feature value. When the top line is not blinking, the feature may be selected. When the top line is blinking, the value may be adjusted.

Media Type
Thermal Transfer

### Typical Display with a PAL™ program loaded

If a PAL™ program is loaded on the printer, the message displayed on the LCD will vary depending on the application but may be similar to the following:

General Hospital
Waiting for Data

### With stand-alone PAL™ application loaded

If a PAL™ program is loaded on the printer which operates in stand-alone mode (no connection to host or PC), the message displayed on the keypad will vary depending on the application but may be similar to the following:

Enter Patient ID
[                    ]

### Error Conditions

When the printer detects an error condition, the top line displays the error and the bottom line displays instructions on correcting the error.

Error: Media Out
Open Print Head

## Setup Menu Operation

The standard feature settings are stored in non-volatile memory. These settings are detected and applied at power up. After power up, any changes made to the standard feature settings will take effect immediately. At power down the current standard feature settings are saved to non-volatile memory. Any feature values modified by PAL™ sequences are also retained on power down unless the keypad is locked.

### Setup Example

- 1) Press **PAUSE** to place printer Off Line.
- 2) Press **FEED + PAUSE** Simultaneously to enter Setup Mode.
- 3) Press **and hold FEED** then:
  - Press **PAUSE** to scroll up the list of features.
  - Press **CANCEL** to scroll down the list of features.
- 4) After the desired **feature** is selected, release the **FEED** key.
- 5) Press the **CANCEL** key to change from "Changing Feature Mode" to "Changing Value Mode". The top line of the LCD should be blinking.
- 6) Press **and hold** the **FEED** key then:
  - Press **PAUSE** to scroll up or increase the value.
  - Press **CANCEL** to scroll down or decrease the value.
- 7) After the desired **value** is selected, release the **FEED** key.
- 8) Press the **CANCEL** key to store the selected value and change back to "Changing Feature Mode". Top line should not be blinking.
- 9) Repeat starting with Step 3 for all features which need adjusting. When finished press the **PAUSE** key to exit Setup Mode and return to On Line state.

**NOTE:** Refer to the table on the next page for a list of features and values which may be adjusted if needed.

## Setup Feature and Value List

FEATURE NAME	VALUE RANGE	DESCRIPTION
Media Type	[ Direct Thermal, Thermal Transfer ]	Set to Thermal Transfer if ribbon is used.
Media Sensing	[Gap, Continuous, Black Bar ]	Set to match media sensing method.
Calibrate Media	(Form Length / Gap Length) automatically displayed and are not adjustable from this feature.	Pressing <b>CANCEL</b> initiates the media calibration. The detected media length and Gap are displayed. Not required when Media Sensing is set to Continuous
Sensor Threshold	[ 0-255]	Automatically set by Calibration mode.
Media Length	[ 0.25 - 12.00] (Inches)	Automatically set by Calibration mode
Media Width	[ 0.5 - 4.05] (Inches, 4602) [ 0.5 - 4.25] (Inches, 4603)	Set to media width used.
Present Distance	[ 0.00 - 1.00 ] (Inches)	Adjust to position label at tear bar. If optional Peel and Present kit is installed, this feature will specify how far the label is presented.
Present Sensor	[Enable, Disable]	This feature controls the operation of the optional present sensor. When installed and enabled, the printer suspends printing after each label until it is removed by the operator. This is typically used when the peel and present option is installed but could also be used with the tear bar.

## Setup Feature and Value List (continued)

Vert Print Align	[ -0.50 - +0.50 ] (Inches)	Adjust to move printed image up or down on label. Positive values move image up. Negative values move image down.
Horz Print Align	[ 0.00 - 1.00 ] (Inches)	Adjust to move printed image left or right. Larger values move the image to the right.
Vert Size Adjust	[ -60 - + 60 ]	Vertically expands or compresses print image. Negative values are compressed, positive values are expanded.
Print Darkness	[ -12 - +12 ]	Adjust for optimal print darkness. Positive values are darker.
Print Speed	[ 2, 3, 4, 5, 6 ] (IPS)	Adjusts print speed.
Interface Select	[ Parallel Only, Serial Only, Auto Select ]	Selects active interface while ignoring non-selected interface. Setting to Auto Select enables both interfaces and performs automatic port arbitration.
COM1: Baud Rate	[ 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600 ]	Set to match host.
COM1: Parity	[ None, Odd, Even ]	Set to match host.
COM1: Data Bits	[ 7, 8 ]	Set to match host.
COM1: Handshake	[ RTS, XON/XOFF, RTS & XON, None ]	Set to match host.
COM1: PAL Xmit	[ Enabled, Disabled ]	Enables or disables transmission of PAL messages over serial interface.

## Setup Feature and Value List (continued)

Emulation Mode	[ PAL, ASCII, Hex, Display ]	Selects active emulation. ASCII emulation is a basic text emulation. Hex and Display emulation's are used for printing data in a format which shows the exact data being received by the printer. This is useful trouble shooting communications or host programming issues.
Date	[MM/DD/YYYY]	If RTC option is installed, this feature allows the date to be set. Press the Cancel key to select Month/Date/Year to modify. Press FEED+PAUSE or FEED+CANCEL to modify then press Cancel again to select next parameter. When the full date is displayed the change is complete.
Time	[HH:MM:SS]	If RTC option is installed, this feature allows the time to be set. The hour is set in 24 hour format (0-23). Press the Cancel key to select Hour:Minutes:Seconds to modify. Press FEED+PAUSE or FEED+CANCEL to modify then press Cancel again to select next parameter. When the full time is displayed the change is complete.
Daylight Savings	[Enabled, Disabled]	If RTC option is installed, this feature specifies whether the time is automatically updated for Daylight Savings time.
Print Features	N/A	Press <b>CANCEL</b> to print the feature list.
Print Test Label	N/A	Press <b>CANCEL</b> to print a test label.
Firmware Rev.	N/A	Firmware P/N and revision

## **PS/2 Keyboard Interface**

A PS/2 keyboard interface is standard on the FM4602 and FM4603. This allows keyboard input or PAL™ programs running on the printer. Typically a PAL™ program is written to write prompts to the printer LCD requesting data from the user. This data can then be entered on the keyboard. The use of a keyboard wedge cable also allows the use of a bar code scanner. In this case when prompted the user can either type in the requested information on the keyboard or use the scanner to read bar code data.

## **PAL™ PRINT LANGUAGE INTRODUCTION**

This section provides an introduction to basic PAL™ print language abilities including fonts and bar codes. For information regarding PAL™ programming abilities, creating stand-alone applications, and other advanced topics please refer to the Fastmark PAL™ Print and Program Reference Manual.

The Windows driver included with the printer is an excellent method to generate PAL™ print sequence based commands. For example, to easily determine which PAL™ print sequences are used to produce a given label format, the Windows driver can be used to generate the necessary commands. In this case the basic label format would be generated using a Windows program, then the "print to file" option is selected. This will produce a file containing the exact commands required to produce a given label format. Using this file as a template a programmer can incorporate the necessary commands into the host or Windows based application. For more information refer to the section titled **Using the Windows Driver To Produce PAL™ Print Command Examples**.

## Smooth Scalable Fonts

PAL™ Print and Program capable printers allow a font to be selected by name, scaled, rotated, and placed on the drawing service. The table below lists the unique names used to select the fonts and a print sample for each showing the point size. Please refer to the PAL™ Print and Program Reference manual for detailed information on the use of fonts.

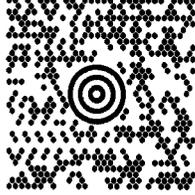
Font	Point Size	PAL™ Identifier	Sample
Sans Serif	6	Sans6.00pt	ABCDEFGHIabcdefghijkl012345678
Sans Serif	8	Sans8.00pt	ABCDEFGHIabcdefghijkl01234567
Sans Serif	10	Sans10.00pt	ABCDEFGHIabcdefghijkl0123456
Sans Serif	12	Sans12.00pt	ABCDEFGHIabcdefghijkl012345
Sans Serif	14	Sans14.00pt	ABCDEabcde01234
Sans Serif	18	Sans18.00pt	ABCDabcd0123
Sans Serif	24	Sans24.00pt	ABCabc012
Sans Serif	36	Sans36.00pt	ABab01
OCRB	6	OCRB6.00pt	ABCDEFGHIabcdefghijkl012345678
OCRB	8	OCRB8.00pt	ABCDEFGHIabcdefghijkl01234567
OCRB	10	OCRB10.00pt	ABCDEFGHIabcdefghijkl012345
OCRB	12	OCRB12.00pt	ABCDEabcde01234
OCRB	14	OCRB14.00pt	ABCDabcd0123

Table 1 – PAL™ Font List and Samples

## Supported Bar Codes

PAL™ Print and Program capable printers allow a bar code to be selected by name, rotated if needed, and placed on the drawing service. All popular linear and 2D bar codes are supported. Depending on bar code type, a number of parameters may be adjusted as needed for example human readable, height, X dimension, check digits. Please refer to the PAL™ Print and Program Reference manual for detail information on the use of bar codes.

Bar Code	PAL™ Identifier	Sample
Code 39	/Code39	 *123456*
Code 93	/Code93	 1234567890
Code 128 A, B and C	/Code128	 12345678
Interleave 2 of 5	/I2of5	 1234567890
UPC-A	/UPCA	 1 23456 78901 2
UPC-E	/UPCE	 0 234560 1
EAN-8	/EAN8	 1234 5670
EAN-13	/EAN13	 0 012345 678905

Codabar	/Codabar	 12345678
Postnet	/Postnet	
Maxicode	/Maxicode	
MSI Plessey	/MSI	 123448
PDF-417	/PDF417	

**Table 2 – PAL Bar Code List and Samples**

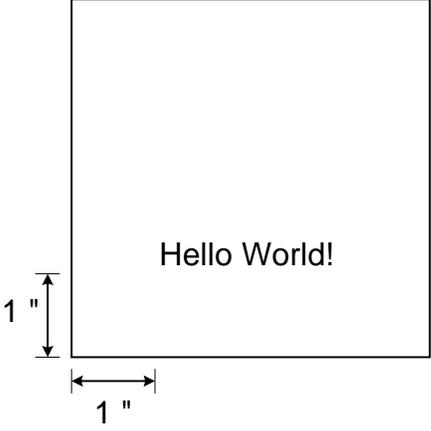
## **PAL™ Print and Program Label Tutorial**

This Label Tutorial provides instructional steps showing the basic commands needed to create labels using PAL™ Print and Programming Language. This section covers some of the most common sequences used to print fonts, bar codes, lines etc. Each label introduces a basic concept and builds on the preceding label. Upon completion of the tutorial, a label consisting of text in two orientations, a line, a box and a bar code will be covered.

The examples may be created using a text editor and saved for subsequent transmission to the printer using the FlashWiz program found on the product CD, using the DOS copy command, or the send file command that is implemented in most terminal emulators.

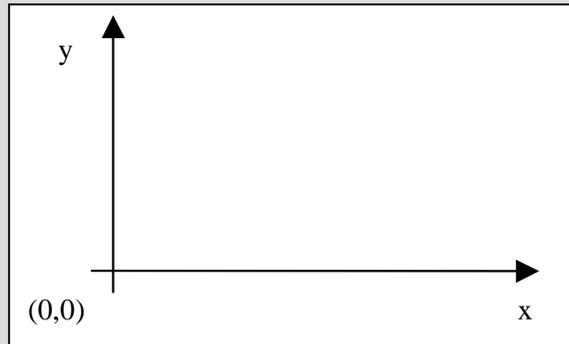
For a deeper understanding of the concepts behind the sample label and the programming capabilities of PAL™, please refer to the PAL™ Print and Program Reference Manual.

***NOTE: The PAL™ Print and Program command interpreter is case sensitive! All commands must be entered exactly as shown in the examples.***

<b>Printing Text on a Label</b>	
Label Output	PAL™ Command Sequences
	<pre> /Sans12.00pt <b>findfont</b> 12 <b>scalefont</b> <b>setfont</b> 72 72 <b>moveto</b> (Hello World!) <b>show</b> 1 <b>_showpages</b> </pre>
<p><b>Purpose:</b> Demonstrate how to print simple text on a label.</p>	
<p><b>findfont</b> - Establish the font to use</p> <p><i>The fontname is preceded by a “/”. In this example, a Sans Serif 12 point font was chosen. See Table 1 for supported fonts.</i></p>	
<p><b>scalefont</b> – Scale the selected font’s size in points</p> <p><i>It is typical to use the value indicated in the selected font. In this example, since Sans12.00pt was the selected font, the scaling was set to 12. Optionally, the command may be used to scale the font to a different size (e.g. 13 or 11)</i></p>	
<p><b>setfont</b> - Set the current font to the scaled font defined by the scalefont operator</p> <p><i>This font will be used for all subsequent text unless another font is chosen.</i></p>	
<p><b>moveto</b> - Position the drawing cursor at the desired location</p> <p><i>Moves the cursor position 1 inch to the right and 1 inch from the bottom (see box on next page for description of coordinate system).</i></p>	
<p><b>show</b> – Place the text on the label</p> <p><i>The text to be printed is enclosed by parentheses. The lower left-hand corner of the text is placed at the current cursor position. In this example the cursor position is established with the moveto command as described above.</i></p>	
<p><b>_showpages</b> - Print the created label</p> <p><i>The “1” in the example indicates that one label is to be printed. If printing 10 labels, the command would be 10 _showpages.</i></p>	

## PAL™ Print and Program Coordinate System

The default coordinate system used by PAL™ Print and Program Language is a traditional Cartesian coordinate system with the origin at the lower left-hand corner of the drawing surface:



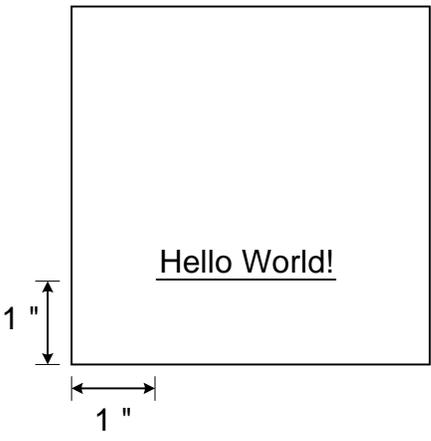
**PAL Coordinate System**

An internal “cursor” is maintained by PAL™ that keeps track of where to put the next print object, i.e. text or lines, etc. At power up this internal cursor is set to the origin or (0,0).

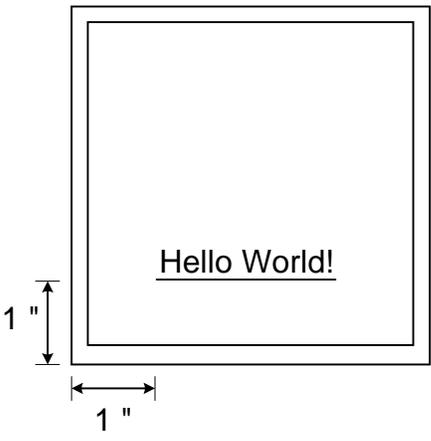
The default unit used for measuring distance in this coordinate system is the point. A point is a common typographical unit equivalent to  $1/72$ ". There are 72 points to an inch. The example sets the “cursor” to 72,72 to place text at a point 1 inch to right of the origin and 1 inch above.

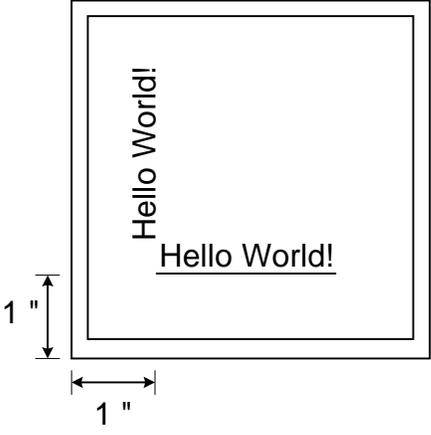
Some printing commands such as *show* will change the location of the cursor. This happens for example after a text string is put on the label. After the text has been written to the label, the cursor is updated to point to the end of the text in preparation for the next string.

## Printing a Line

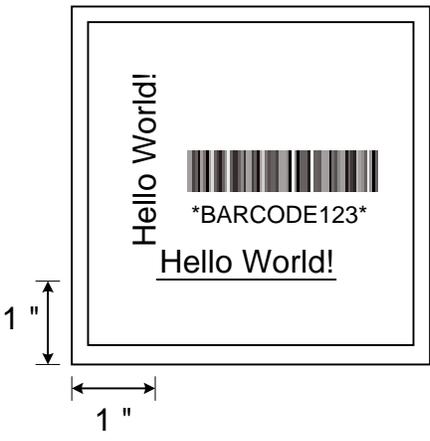
Label Output	PAL™ Command Sequences
	<pre> /Sans12.00pt <b>findfont</b> 12 <b>scalefont</b> <b>setfont</b> 72 72 <b>moveto</b> (Hello World!) <b>show</b> 72 68 <b>moveto</b> 144 68 <b>lineto</b> <b>stroke</b> 1 <b>_showpages</b> </pre>
<p><b>Purpose:</b> Demonstrate drawing lines on a label. This example underlines the “Hello World!” text from the previous example.</p>	
<p><b>moveto</b> - Position the drawing cursor at the desired location</p> <p><i>The line will be positioned near the same location as the text, a bit lower in the y direction to allow for a small space between the bottom of the text and the line. This example uses the value 68, 4 points below the text (4/72 inches).</i></p>	
<p><b>lineto</b> – Set the dimensions for the line</p> <p><i>The line will be drawn from the current position (72,68) to the position set by the lineto (144,68). The vertical position did not change resulting in a horizontal line stretching between the x locations of 72 and 144.</i></p>	
<p><b>stroke</b> – Draw the line</p> <p><i>Actually draws the line specified by the lineto command.</i></p>	

## Printing a Box

Label Output	PAL™ Command Sequences
	<pre> /Sans12.00pt <b>findfont</b> 12 <b>scalefont</b> <b>setfont</b> 72 72 <b>moveto</b> (Hello World!) <b>show</b> 72 68 <b>moveto</b> 144 68 <b>lineto</b> <b>30 30 moveto</b> <b>258 30 lineto</b> <b>258 258 lineto</b> <b>30 258 lineto</b> <b>closepath</b> <b>2 setlinewidth</b> <b>stroke</b> <b>1 _showpages</b> </pre>
<p><b>Purpose:</b> Demonstrate the drawing of a rectangular box. This example builds on the previous example by drawing a frame around the label. A 4" x 4" (288 points x 288 points) label is used in this example. The frame will be placed within 30 points of the edge of the label.</p>	
<p><b>moveto</b> - Position the drawing cursor at the desired location</p> <p><i>This example assumes a 4" x 4" label (288 points x 288 points). A frame is drawn by moving to the starting point with the moveto operator.</i></p>	
<p><b>lineto</b> - Set the dimensions for the line</p> <p><i>Forms three sides of the box with three separate lineto operators.</i></p>	
<p><b>closepath</b> - Close the shape</p> <p><i>A box is drawn by drawing 3 sides of the box with the lineto operator followed by closepath, which closes the box by drawing the last line. It is important to use this operator to close a shape since the imaging algorithms may or may not actually close the shape due to rounding errors in the algorithm.</i></p>	
<p><b>setlinewidth</b> - Set the width of the lines</p> <p><i>The width is set in points. In this example, the line width is set to 2 points. The this line width value will remain the effective value for all lines until changed.</i></p>	

<b>Rotate a Text Object</b>	
Label Output	PAL™ Command Sequences
	<pre> /Sans12.00pt <b>findfont</b> 12 <b>scalefont</b> <b>setfont</b> 72 72 <b>moveto</b> (Hello World!) <b>show</b> 72 68 <b>moveto</b> 144 68 <b>lineto</b> 30 30 <b>moveto</b> 258 30 <b>lineto</b> 258 258 <b>lineto</b> 30 258 <b>lineto</b> <b>closepath</b> <b>stroke</b> 72 90 <b>moveto</b> 90 <b>rotate</b> (Hello World!) <b>show</b> -90 <b>rotate</b>  <b>1 _showpages</b> </pre>
<p><b>Purpose:</b> Demonstrate how to rotate text. This example builds on the previous example by placing another instance of “Hello World!” rotated 90 degrees.</p>	
<p><b>moveto</b> - Position the drawing cursor at the desired location</p> <p><i>The text will be located at the same x position and slightly higher in the y direction relative to the previous text.</i></p>	
<p><b>rotate</b> - Rotate the coordinate system</p> <p><i>In this example the coordinate system is rotated 90 degrees. Since the entire drawing surface is being rotated, it is important to reset the rotation by the same amount in the opposite direction (-90 degrees) after text has been placed.</i></p>	
<p><b>show</b> - Place the text on the label</p> <p><i>The text to be printed is enclosed by parentheses. The lower left-hand corner of the text is placed at the current cursor position.</i></p>	

## Printing a Bar Code

Label Output	PAL™ Command Sequence
	<pre> /Sans12.00pt <b>findfont</b> 12 <b>scalefont</b> <b>setfont</b> 72 72 <b>moveto</b> (Hello World!) <b>show</b> 72 68 <b>moveto</b> 144 68 <b>lineto</b> 30 30 <b>moveto</b> 258 30 <b>lineto</b> 258 258 <b>lineto</b> 30 258 <b>lineto</b> <b>closepath</b> <b>stroke</b> 72 90 <b>moveto</b> 90 <b>rotate</b> (Hello World!) <b>show</b> -90 <b>rotate</b> <b>100 100 moveto</b> <b>(BARCODE123) /Code39 _barcode</b> <b>1 _showpages</b> </pre>
<p><b>Purpose:</b> Demonstrate how to print a bar code. This example builds on the previous example by placing a bar code near the center of the label.</p>	
<p><b>Moveto</b> - Position the drawing cursor at the desired location</p> <p><i>Position cursor at desired location for bar code.</i></p>	
<p><b>(BARCODE123)</b> – String object defining the barcode content.</p> <p><i>The parentheses delimit the text string and are not part of the barcode. The actual bar code value in this case is BARCODE123, i.e. parentheses not included.</i></p>	
<p><b>_barcode</b> – Place the specified bar code on the label</p> <p><i>The type of bar code is referenced by a '/' followed by the name of the bar code type. For a list of supported bar codes, see Table 2.</i></p>	

# INTRODUCTION TO PAL™ ADVANCED TOPICS

## Advanced Overview

As previously mentioned the PAL™ Print and Program Language is both a powerful printing and programming language. For example the included Windows driver takes advantage of the powerful printing portion of the language. Your VAR or internal programming staff may take advantage of some of the programming abilities. The fact that a single printer language supports both capabilities is unique. PAL™ Print and Program enabled printers can be used in many ways not supported by traditional printers.

A full technical description of the PAL™ Print and Program Language is beyond the scope of this manual. Please refer to the PAL™ Print and Program Language Reference manual for details.

For assistance developing PAL™ applications or solutions for your unique labeling requirements, please contact your sales representative.

## **PAL™ Print and Program Language Features**

- ❑ Page Description Language
- ❑ No control Codes (easy to pass through networks, filters, etc.)
- ❑ Compatible with midrange and mainframe computers and any host or PC programming language.
- ❑ Is an executable language
  - Procedures can be defined
  - Functions
  - Conditional statements
  - Loops
- ❑ Can create and use simple and/or complex data formats
- ❑ Can gain full access to resident printer features
  - LCD
  - Interfaces
  - Keys
  - Keyboards
  - Internal Memory drives
- ❑ Language is Reverse Polish Notation (RPN)
  - Like HP Calculator
  - Arguments first then operators i.e.  $4\ 6\ +$  versus  $4 + 6 =$
  - Data passed on stack
- ❑ PAL™ Coding Structure is Free Form
  - All operators, objects, and data are separated by whitespace: CR, CR+LF, LF, LF+CR, Tab, or Space.
  - Extra lines in data are OK
  - Comments may be added preceded by % character.
- ❑ Powerful Object handling
  - Basic Objects: Integers, Fixed-Point, Boolean
  - Composite Objects: String, Name, Arrays, Dictionaries, Procedures

## Sample Demo Files

Several text files containing PAL™ examples are included on the product CD. These files show programming techniques and examples, which may be incorporated into host or PC programming or just used as reference. Each text file includes descriptive comments within the file. Below is a description of each file:

File Name	Description
Pal_Procs_and_Formats.txt	This file contains a number of print utilities written as PAL procedures. These were designed to illustrate common printing commands and the use of common PAL operators. These utilities once defined may simplify common printing functions. Also within this file is a number of sample label Formats. These label formats make extensive use of the print utilities defined in this file. These formats show how once a label format is defined it may be used by simply listing the variable data and calling the format name.
Format_Demo.txt	This file shows how to call up and use the label formats defined in the file Pal_Procs_and_Formats.txt
Proc_Demo.txt	This file shows how to call up and use the print utility procedures defined in Pal_Procs_and_Formats.txt.
Proc_Template.txt	This file shows the format of the calls to the print utility procedures defined in Pal_Procs_and_Formats.txt
Format_Template.txt	This file can be used to define new label formats. It includes all the print utilities defined in Pal_Procs_and_Format.txt. Once new label formats are defined, this file may be copied to the printer and the new formats may be called up and used as demonstrated by the other files.

**Note:** Before using any of the print utility procedures or label format procedures defined in the text file Pal\_Procs\_and\_Formats.txt, this file must be copied to the printer so that the PAL interpreter can parse these new procedures. The FlashWiz utility included on the product CD may be used to copy this file to the printer prior to use.

## Example of a Procedure defined in PAL™

The following procedure is defined in Pal\_Procs\_and\_Formats.txt and illustrates how PAL commands may be combined in a procedure to create a completely new function or capability. The file Pal\_Procs\_and\_Formats.txt must be copied to the printer prior to using any of these utilities. The following utility shows how PAL operators are used to create a simple Box draw procedure. This Box procedure makes use of another procedure defined called inchopts. This procedure takes measurements in inches and converts to points which is the native unit used by PAL. The advantage of using a procedure like this to draw boxes is to simplify the use of the PAL language. Instead of issuing 7 PAL commands to draw a box, this single procedure may be called with 5 parameters (lower left corner x,y, upper right corner x,y, and line width).

```
%=====
% Box draw procedure
% Usage:  botX(in.)  botY(in.)  topX(in.)  topY(in.)  lwidth(in.)  Box
% Example: 0.1      0.1      3.9      1.9      0.01      Box
%
%              (topX, topY)
%              +-----*
%              |         |
%              *-----+
%              (botX, botY)
%=====
/Box
{

  /lwidth exch def
  /topY exch def
  /topX exch def
  /botY exch def
  /botX exch def

  botX inchopts botY inchopts moveto
  botX inchopts topY inchopts lineto
  topX inchopts topY inchopts lineto
  topX inchopts botY inchopts lineto
  closepath
  lwidth inchopts setlinewidth
  stroke

} bind def
```

## Example of calling a Procedure from a host application

The two lines preceded by % are comment lines ignored by the PAL interpreter and don't actually need to be transmitted to the printer. The last line shows the actual call to the procedure named Box defined in Pal\_Procs\_and\_Formats.txt. Note that floating point numbers must have a leading 0 for example 0.1 instead of .1. Also note while the example below uses many spaces between parameters, this is only for clarity and only a single whitespace character is actually needed i.e. 0.1 0.1 3.9 1.9 0.01 Box would also work.

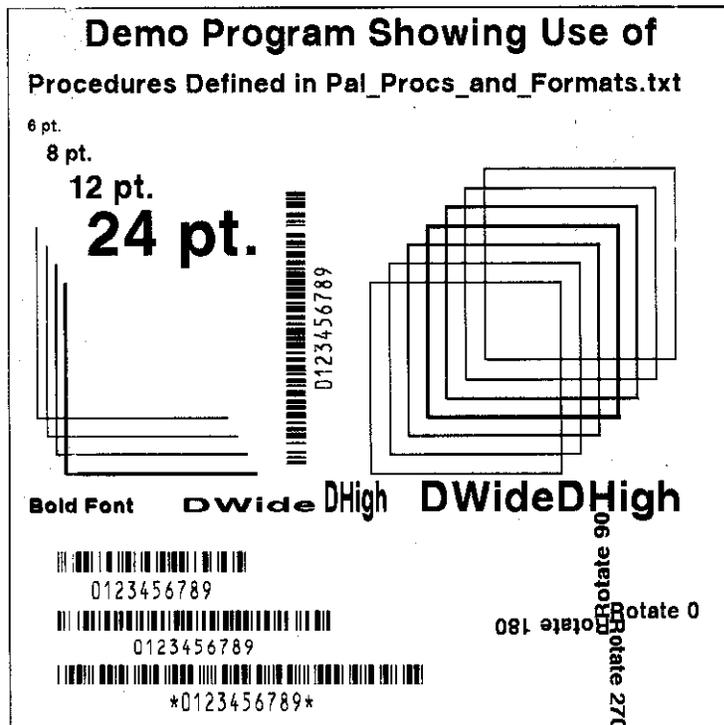
```
% Box draw
% botX(in.) botY(in.) topX(in.) topY(in.) lwidth(in.) Box
% 0.1      0.1      3.9      1.9      0.01      Box
```

## Demo Label showing use of Print Utility Procedures

After the file Pal\_Procs\_and\_Formats.txt has been copied to the printer, a number of new procedures are now defined in the printer (until powered off). These procedures have been written specifically to demonstrate how to use the Pal Print and Program operators to produce printed output. These procedures also provide easy ways to print various objects without actually needing to know the PAL language. The print utility procedures may be incorporated into custom programming or just used as reference to better understand the Pal™ Print and Program operators. After downloading Pal\_Procs\_and\_Formats.txt to the printer, copy the file Proc\_Demo.txt to the printer. This file uses the various print utility procedures defined to produce a demo label. Using a text editor, open the file Proc\_Demo.txt file to see how these various utilities may be used as shown in the demo label print sample below.

The interesting thing to note in the Proc\_Demo.txt file is that the only actual PAL operator used is the showpage operator. The other procedure names used such as Printfont and Printbarcode are not native PAL operators but new procedures defined. A careful study of the definition of these procedures will reveal the actual PAL operators used.

The basics of creating procedures and using them in the PAL language should start to make sense after reviewing how the procedures are defined (in Pal\_Procs\_and\_Formats.txt) and how they can be used (in Proc\_Demo.txt). New procedures performing virtually any task can now be written using the PAL™ Print and Program Reference manual for detailed information on additional PAL operators. The existing procedures may be modified as needed to meet requirements or completely new procedures may be written.



## Example of How to Define Label Formats

The example below shows how a label format can be defined as a PAL procedure. This label format called `Mailing_Label` uses 5 variables. Notice how the variables are defined in reverse order compared to how this format is called. This format is defined in `Pal_Procs_and_Formats.txt`. Looking at this file will also reveal that this procedure makes use of the print utility procedures also defined in this file. Instead of using these print utilities, these formats could also use direct PAL operators. This approach however allows label formats to be defined with very little knowledge of the PAL Print and Program Language. In this label format the procedures `Printfont`, `PrintBoldfont`, and `Printbarcode` are used. These are not native PAL operators but new procedures also defined in this file. Using print utility procedures like this in the label format makes it easy to define formats using inches as the measurement system with very little knowledge of PAL operators.

The procedure below defines a label format called `Mailing_Label`. This name is case sensitive. The first 5 lines after the `{` character assign the passed parameters to names. These names are in turn used when needed to pass information to PAL operators or in this case other PAL procedures. When the label format is called, the very first parameter specified will be the name. Notice in the definition below that the `Name` variable is actually the last defined. This is due to the stack based nature of PAL. The first defined parameter on the stack is the last off the stack (just like a stack of plates for example, last one stacked is first one off). The line below shows that at an X,Y position of 0.25", 0.75", the name variable will be printed in bold at a size of 12 points with no rotation. This `PrintBoldfont` procedure makes it easy to place text of any size and rotation at any position just by specifying the parameters in correct order then calling the `PrintBoldfont`.

```
0.25 0.75 0 12 Name PrintBoldfont
```

It should also be noted that the label format defined below is actually just another PAL procedure definition just like the `PrintBoldfont`. Parameters are passed to these procedures in the same way. The big difference is that the PAL operator ***showpage*** is included in the label format procedure which will actually cause a label to be printed each time this format is called.

```
%=====
% Mailing_Label procedure definition
% Usage:  Name      Street      CityState      Zip5      Zip4      Mailing_Label
% Example: (John Doe) (1234 Main St.) (Anytown, NC) (12345) (1234) Mailing_Label
%=====
/Mailing_Label
{
  /Zip4  exch def
  /Zip5  exch def
  /CityState exch def
  /Street exch def
  /Name  exch def

  0.25 0.75 0 12 Name PrintBoldfont
  0.25 0.55 0 12 Street Printfont
  0.25 0.35 0 12 CityState ( ) concat Zip5 concat (-) concat Zip4 concat Printfont

  0.1 0.1 0 0.1 Zip4 Zip5 concat /Postnet Printbarcode

  showpage

} bind def
```

## Example of calling Label Format from Host Application

The example below shows how a form named Mailing\_Label which was defined in the file Pal\_Procs\_and\_Formats.txt may be called from a host or PC application. The file Pal\_Procs\_and\_Formats.txt must be copied to the printer first before the label format is defined. Also it is possible to store the formats in Flash memory which is an advanced topic not covered here. Other examples of calling these formats may be found in Format\_Demo.txt

Notice how strings are enclosed in (). Also notice how variables are separated by whitespace which may be a single space character or a CR+LF. Two possible call formats are shown below each producing the same output as the label sample below shows..

The actual label format name is shown in bold for clarity.

```
(John Doe)
(1234 Main St.)
(Anytown, NC)
(12345) (1234)
Mailing_Label
```

Or an equivalent format:

```
(John Doe) (1234 Main St.) (Anytown, NC) (12345) (1234)
Mailing_Label
```

Print sample produced by label format Mailing\_Label.

**John Doe**  
**1234 Main St.**  
**Anytown, NC 12345-1234**



# WINDOWS PRINTER DRIVER

## Windows 2000 Driver Installation

1. From the task bar select Start->Settings->Printers.

The printers folder should be displayed.

2. Double click the Add Printer icon.

- The Add Printer Wizard dialog should be displayed.
- Click the Next button.

3. Select the Local printer option and click the Next button.

4. Select the desired printer port and click the Next button.

5. From the Manufacturers list dialog click the Have Disk button.

6. From the Install From Disk dialog browse to the location of the driver files and click OK.

7. From the Install from Disk dialog, the fm46w2k.inf file should be displayed. Select this file and click OK.

7. Click OK from the Install From Disk dialog.

8. The Add Printer Wizard should now display the available models for this driver. Select the model you wish to install and click Next.

9. Select Replace existing driver and click Next.

10. From the Name your printer dialog, enter the name you wish to call the printer. This name will be displayed in the Printers Dialog. Also, if you want this printer to be the default system printer, click this check box now. Click the Next button.

11. Select the desired option from the Printer Sharing dialog and click Next.

12. Select No to the print test page question since the test page does not fit within the printers page size and click Next.

13. Click the Finish button on the Completing the Add Printer Wizard. A printer icon should be added to the list of printers.

If you have set the printer as the default printer, the driver is now ready for use.

If you did not set the printer as the default printer, you can change the setting by right clicking on the printers' icon and select 'Set as Default' from the dialog.

If you are replacing an existing driver, you may have to reboot your system in order to reload the new driver.

## Windows XP Driver Installation

1. Go to the Printers and Faxes folder.
2. Double click the Add Printer icon. The Add Printer Wizard dialog should be displayed. Click the Next button.
3. Select the Local printer option and click the Next button.
4. Select the desired printer port and click the Next button.
5. From the Manufacturers list dialog click the Have Disk button.
6. From the Install From Disk dialog browse to the location of the driver files and click OK.
7. From the Install from Disk dialog, the file fm46w2k.inf should be displayed. Select this file and click OK.
7. Click OK from the Install From Disk dialog.
8. The Add Printer Wizard should now display the available models for this driver. Select the model you wish to install and click Next.
9. Select No to the print test page question since the test page does not fit within the printers page size and click Next.
10. Click the Finish button on the Completing the Add Printer Wizard. A printer icon should be added to the list of printers.

If you have set the printer as the default printer, the driver is now ready for use.

If you did not set the printer as the default printer, you can change the setting by right clicking on the printers' icon and select 'Set as Default' from the dialog.

If you are replacing an existing driver, you may have to reboot your system in order to reload the new driver.

## Selecting Printer Fonts

When the driver is installed, a custom True Type font is also installed called AMTDS Sans Serif which closely matches the resident scalable font in the printer. This font may be printed in a variety of point sizes. Using this font increases print speed and minimizes the data transmitted to the printer. Use of other True Type fonts are supported but are printed as graphics. To use the printer resident font:

- 1) For each size font highlight the font using the mouse.
- 2) From your applications font selection list, select AMTDS Sans Serif font.
- 3) Using your applications font size ability, select the point size as needed to produce the size font desired.

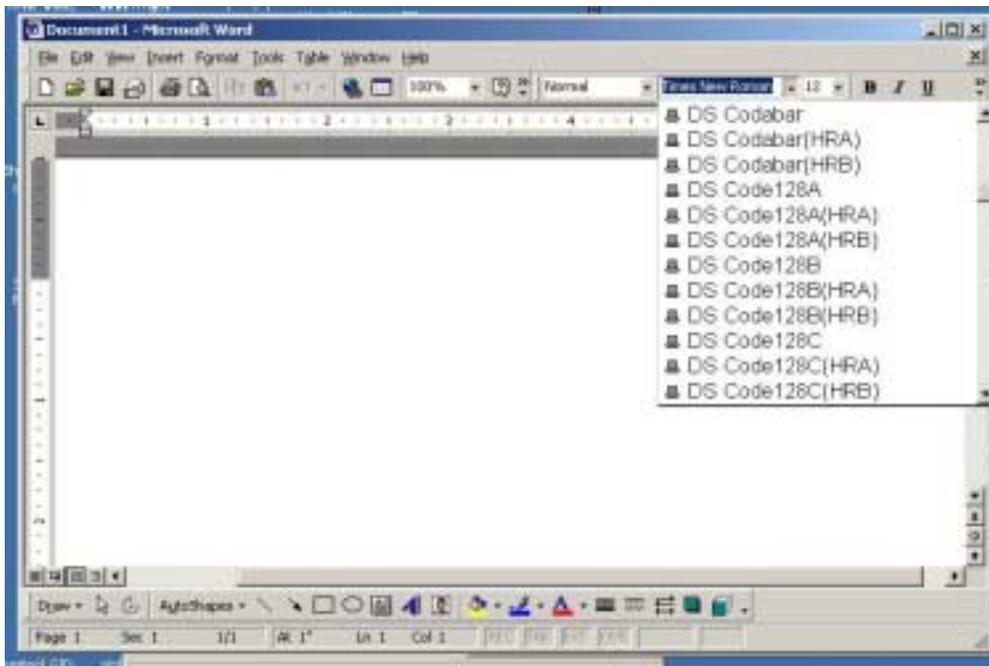
Repeat for all text area's for which you will use the printer resident font.

## Printing Bar Codes From Windows Applications

Using the Fastmark PAL™ Windows driver, printing bar codes from any Windows application is possible. These bar codes are printed using the internal bar code ability of the printer resulting in superior bar code quality. The following steps indicate how to do this:

- 1) Ensure the Fastmark PAL™ Driver is selected within this application.
- 2) Select the media size to be used for this label.
- 3) Position the text or numeric data at the approximate position it is to be printed at using whatever methods are possible within the particular program you are using. You can use a text box if supported by your application.
- 4) If your application supports text rotation, you can do this now. Some applications may require you to use a "text box" to generate rotated text.
- 5) Highlight this text or numeric data as you normally would before changing the font.
- 6) Using the normal method of selecting fonts such as a pull down menu, select one of the bar code fonts displayed such as DS Code 128A.

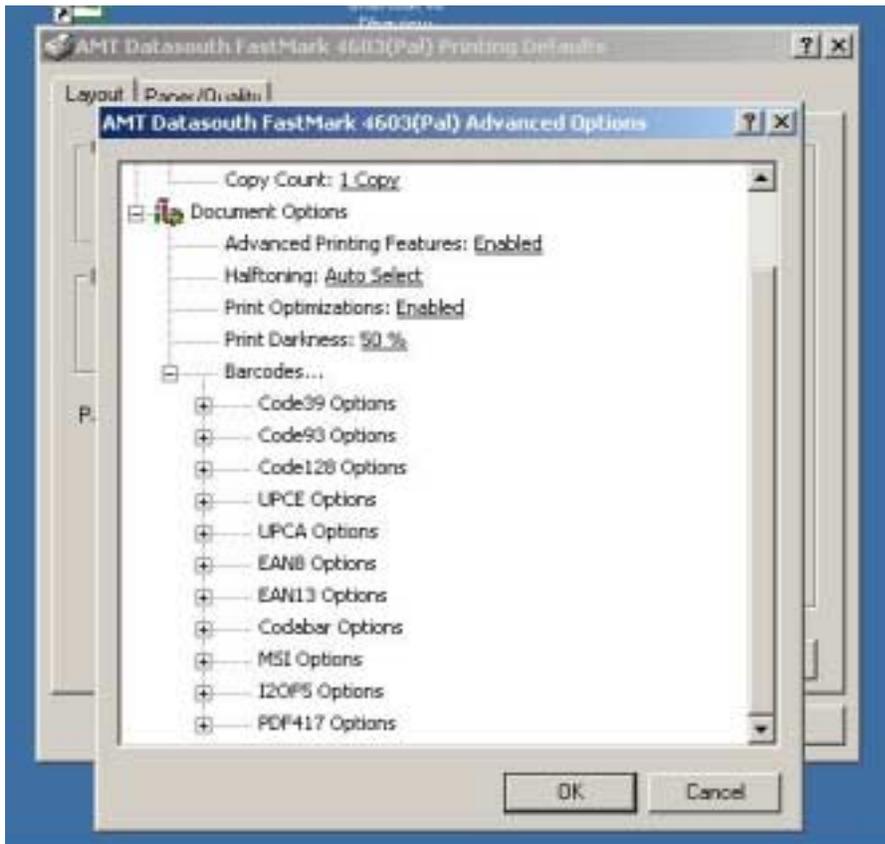
**Note:** the font will still be displayed as text or numeric data however when printed will appear as a barcode.



## Adjusting the Windows Driver Bar Codes

Using the method just described, any Windows application can produce bar codes using the Fastmark drivers. Simply selecting the font as a bar code font does this. The driver also provides ways to finely adjust the bar code printed. For example, human readable text may be enabled or disabled. The X dimension may be adjusted. Depending on the bar code type other parameters may be adjusted for example enabling or disabling a check digit.

Each bar code property may be accessed by selecting the driver then Advanced Options dialog box. Each bar code type is listed. Click on the + symbol to expand the possible selections for a particular bar code. Then the settings for that bar code may be adjusted and will be saved with the current document.



## Using the Windows Driver To Produce PAL™ Print Command Examples

To use the Windows driver to produce a PAL™ sample for use in host programming do the following:

- 1) Design the label as needed using suitable Windows application.
- 2) Where possible always use the printer resident font such as AMTDS Sans Serif.
- 3) Use bar code fonts for data fields to be printed as bar codes. Use the driver Advanced Properties dialog box to select various options for the bar codes to be printed.
- 4) While working on the label format, print to the attached Fastmark printer as needed to finally adjust the position of text, lines, boxes, graphics, and bar codes.
- 5) When the printed output closely matches the desired output, use the Print to File option of the driver and give the output a descriptive name with a .txt extension. For example shipping.txt.
- 6) Edit this text file using any text editor for a sample PAL™ Print and Program commands. This file may be further adjusted referring to the PAL™ Print and Program Reference Manual, or used as is. It may be incorporated into a host program or just used as a reference.

# TROUBLESHOOTING AND MAINTENANCE

The following errors may be detected and displayed by the printer. In each case either the Ready, Media, or Ribbon LED will blink steady.

## Printer Detected Errors

LCD ERROR MESSAGE	DESCRIPTION	RECOVERY
Error: Power Fail	The printer has detected +24VDC has dropped below a minimum acceptable level causing the printer to back up all settings to EEPROM.	Turn printer off, wait 5 seconds and turn back on.
Error: Printhead Open	Printer has detected the print head latch is open.	Verify media and ribbon is loaded properly. Fully close latch by rotating clockwise. Press FEED to recover, CANCEL to remove any pending print job from printer buffer.
Error: Media Out	The printer has detected a media out condition while printing or feeding media.	Open print head and replace media. Close print head and refer to LCD for recovery options. If media appears to be loaded, check for proper routing, check Media Sensing feature to make sure it matches media type used either gap or black bar. Run the media calibration test.
Error: Media Feed	A media feed error is displayed when the printer is unable to find the top of form indication as configured either gap, or black bar.	Open print head and verify media is loaded correctly. Check the feature Media Sensing and verify it is set to the type of media used either gap, or black bar. Close print head and refer to LCD for recovery options. If problem repeats, verify the small arrow on the media sensor arm is directly over the object to be sensed (gap or hole) then run the Media Calibration test.

Error: Ribbon Out	Reported when the printer detects the end of ribbon while printing or feeding media after the current label is complete.	Open the print head, remove old ribbon cores, replace with new ribbon ensuring the routing is correct. Close print head and follow recovery procedures. If this is direct thermal application, change Media Type feature to Direct Thermal.
Error: Image System	Error reported by the imaging sub-system indicating a memory shortage or other graphics problem.	Press the CANCEL key to remove current print job. Cycle power on the printer. Verify communications settings are correct. Re-send print job.
Error: Data Format	The printer has detected a data format or parity error on the serial port. This could be caused by improper settings between host and printer or a glitch in data transmission such as a PC being powered up.	Press the CANCEL key to clear the error and print buffer. Resend the print job. If the error occurs again verify baud rate, data bits, and parity settings match host and cable pin out are correct.
Error: Data Overrun	This error is unlikely to occur and would indicate data is being transmitted to the printer faster than it can be processed. If this error does occur it might indicate a faulty parallel cable or other communication problem.	Press the CANCEL key then cycle power on the printer. If the error occurs again verify all communication features are set to match host and quality interface cables correctly pinned out are used.
Error: Buffer Overflow	This error indicates the printers incoming print buffer (FIFO) has overflowed. The most common cause of this error is improper handshaking between the printer and host due to improper settings or improper cable.	Press the CANCEL key and re-send the print job. If the error occurs again verify all communication features are set to match host and quality interface cables correctly pinned out are used.

Error: Keyboard Overflow	This error indicates the incoming keyboard buffer has overflowed. This can occur if the PAL™ application running on the printer is not reading keyboard input.	Press the CANCEL key to clear the error. If the error repeats cycle printer power. If it still repeats report the error to the programming staff which created the currently loaded application.
Error: Keyboard Comm	Indicates a communication error between the printer and attached PS/2. This can occur if the keyboard is hot plugged or possibly indicates a problem with the keyboard.	Press the CANCEL key to clear the error. If the error repeats cycle power on the printer. If it still repeats verify the keyboard connector is fully plugged in, try another brand or model keyboard.
Software Locked	This error is reported when PAL™ Print and Program firmware is loaded into a printer after another type of firmware was previously installed. Since PAL™ Print and Program firmware is Copyrighted, a special code is needed to enable it.	Call your sales representative for information on how to correct this error.

## User Detected Errors

The following issues may be detected by the user but are not reported by the printer.

### Vertical streaks in the print

This could indicate a dirty or faulty print head. Clean the print head first. Verify the media does not have excessive paper fibers or dust. Verify there are no nicks or burrs anywhere in the paper path such as a scratched rail. If no other source of streaks can be found replace the print head.

### Vertical gaps in the print

This could indicate a dirty or faulty print head. First clean the print head. Verify the width dial on the side of the mechanism is set properly (counterclockwise for narrow, clockwise for wider media). Verify the ribbon is not wrinkling. Verify darkness feature is set high enough. Manually add force to the print head bracket in the area of the streaks. If the streaks go away the print head itself is not the cause.

### Ribbon bunches and does not take up smoothly

The ribbon may be routed UNDER the media sensor bracket. Make sure the ribbon is above this black plastic bracket. Adjust the metal ribbon guide plate mounted to front of print head. Loosen screws in this plate and adjust so ribbon remains even on both sides.

### Media peels off on metal rails

Thoroughly clean rails to remove adhesive. Media MUST be face out type feeding off top of roll and router OVER back media rail and UNDER front media rail exactly as shown in media loaded section.

### Poor print out quality

- ❑ Verify type of media and ribbon (if used) are compatible.
- ❑ Verify ribbon is not being used with direct thermal media.
- ❑ Lower print speed and adjust print darkness.
- ❑ Verify print head is clean.
- ❑ Verify platen roller is clean.
- ❑ Verify width adjustment dial on side of mechanism set properly: a) loosen two screws on dial b) move counter clockwise for narrow media c) clockwise for wider medial d) Re-tighten two screws on dial.
- ❑ Verify media and ribbon are both loaded exactly as described in media and ribbon loading sections.
- ❑ Replace print head if print out is streaked or missing and all of above does not resolve.

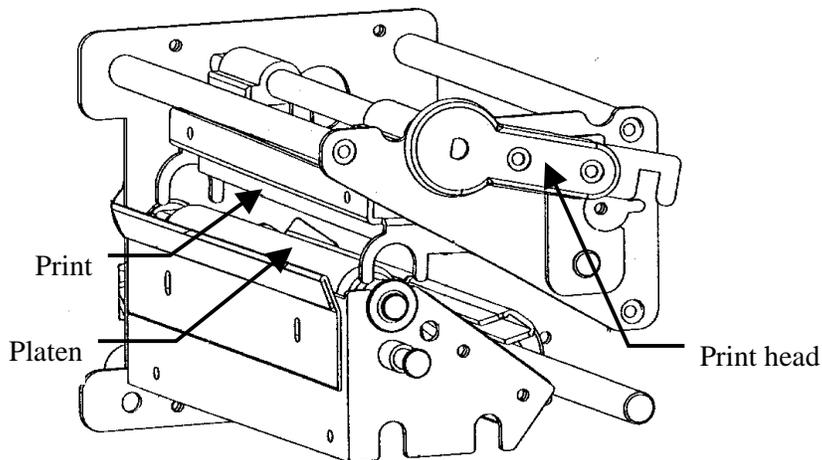
## Preventive Maintenance

Before performing preventive or any other maintenance be sure to turn off the printer power.

### Cleaning the Print head (TPH)

1. Turn off the printer, open the covers, Print head module and remove the ribbon.
2. Rub the print head with a piece of cotton, which has been moistened with alcohol.
3. Check for any traces of black coloring or adhesive on the cotton after cleaning.
4. Repeat if necessary until the cotton is clean after it is passed over the head.

**Figure 22 - Print head (TPH) Maintenance**



**Note:** The print head should be cleaned at least every time the ribbon is replaced and more often depending on actual usage and conditions.

### Cleaning the Platen roller

Using cotton swab moistened with alcohol, clean the roller.

**Note:** The roller should be cleaned whenever it has been in contact with foreign materials such as dust or adhesives.

### Cleaning the media compartment

Clean the media compartment with cotton, which has been moistened with mild detergent.

Every time a media roll is printed this compartment should be cleaned to reduce the incidence dust.

## Appendix A: GENERAL SPECIFICATIONS

**NOTE:** The FM4402 does not support the PAL™ Print and Program Language but is included here for reference only.

Specification	Model FM4402	Model FM4602	Model FM4603
Resolution	203 DPI (8 dots/mm)	203 DPI (8 dots/mm)	304 DPI (12 dots/mm)
Print method	Direct thermal and thermal transfer		
Onboard RAM	512K bytes	2M bytes	
Maximum label roll diameter	8 in. (203 mm) outside diameter 1.5 in. to 3.0 in. (38 mm to 76 mm) inside diameter		
Label indexing	Black stripe and gap		
Ribbon types	Wax, Wax/resin and Resin		
Ribbon size	OD 3 in. (75mm) ID 1 in. (25 mm)		
I/O Interface	RS-232 serial and Centronics parallel ports with auto polling	RS-232 serial and Centronics parallel ports with auto polling for both ports. PS/2 keyboard I/F for keyboard and barcode reader	
Dimension	9.8 in. x 16.0 in. x 10.2 in. (width x depth x height) (250 mm x 410 mm x 260 mm)		
Weight	26.8 lbs. (12 Kg)	24.6 lbs. (11 kg)	
Electrical	CE, UL, CUL, FCC class A 110/220 VAC $\pm$ 10%, 50/60 Hz		
Operating temperature	40° to 140°F (4° to 38°C)		
Storage temperature	-40° to 140°F (-40° to 60°C)		
Humidity	15 to 85% RH		
Windows driver	Windows 2000 and XP		
Printer emulation	PPLA, PPLB	Pal, Text, Display, Hex	
Media type	Roll-feed, die-cut, continuous, fan-fold, tags, ticket in thermal paper or plain paper.		
Maximum print width	4.09 in (104 mm)	4.09 in (104 mm)	4.25 in (108 mm)
Maximum print length	45 in. (1143 mm)	80 in. (2032mm)	106 in. (2692mm)
Maximum print speed	1 to 4 inches per second. (25.4 to 101.6mm)	2 to 6 inches per second (50.8 to 152.4mm)	
Front panel	3 buttons 3 LED indicators	3 buttons 3 LED indicators Back Lit LCD display (16x2)	
Back panel	Parallel and serial I/F	8-bit DIP switch, PS/2, parallel and serial I/F	

## Appendix B: INTERFACE SPECIFICATIONS

This appendix presents the interface specifications of I/O ports for the printer. These specifications include pin assignments, protocols and detailed information about how to properly interface your printer with your host or terminal.

### Serial

The RS-232 connector on the printer side is a female, DB-9.

Pin	Direction	Definition
1	In	DSR
2	In	RxData
3	Out	TxDData
5	-	Ground
6	Out	DTR
7	Out	RTS
8	In	CTS
9	Out	+5V

*Note: Pin 9 is reserved for KDU (keyboard device unit) only, therefore do not connect this pin if you are using a general host like a PC.*

**Connection with host:**

Host 25S <u>(PC or compatible)</u>	Printer 9P	Host 9S <u>(PC or compatible)</u>	Printer 9P
DTR 20	..... 1 DSR	DTR 4	..... 1 DSR
DSR 6	..... 6 DTR	DSR 6	..... 6 DTR
TX 2	..... 2 RX	TX 3	..... 2 RX
RX 3	..... 3 TX	RX 2	..... 3 TX
CTS 5	..... 7 RTS	CTS 8	..... 7 RTS
RTS 4	..... 8 CTR	RTS 7	..... 8 CTS
GND 7	..... 5 GND	GND 5	..... 5 GND

Alternatively you can connect the 3 wires in the following way.

Host 25S <u>(PC or compatible)</u>	Printer 9P	Host 9S <u>(PC or compatible)</u>	Printer 9P
TX 2	..... 2 RX	TX 3	..... 2 RX
RX 3	..... 3 TX	RX 2	..... 3 TX
GND 7	..... 5 GND	GND 5	..... 5 GND
pin 4	<input type="checkbox"/>	pin 4	<input type="checkbox"/>
pin 5	<input type="checkbox"/>	pin 6	<input type="checkbox"/>
pin 6	<input type="checkbox"/>	pin 7	<input type="checkbox"/>
pin 20	<input type="checkbox"/>	pin 8	<input type="checkbox"/>

The simplest way to connect to other hosts (not PC compatible) or terminals is:

Printer		Terminal/Host
Pin 2- RxData	.....	TxData
Pin 3- TxData	.....	RxData
Pin 5- Ground	.....	Ground

In general as long as the data quantity is not too large or you use Xon/Xoff as flow control, there will be no flow control issues.

**Serial port settings**

Baud Rate, Parity, Data Bits, and Handshaking mode are all using the front panel setup mode.

## Parallel (Centronics)

The parallel port is a standard 36-pin Centronics. Its pin assignments are listed as following.

Pin	Direction	Definition	Pin	Direction	Definition
1	In	/STROBE	13	Out	SELECT
2	In	Data 1	14,15		NC
3	In	Data 2	16	-	Ground
4	In	Data 3	17	-	Ground
5	In	Data 4	18		NC
6	In	Data 5	19 to 30	-	Ground
7	In	Data 6	31		NC
8	In	Data 7	32	Out	/Fault
9	In	Data 8	33 to 36	-	NC
10	Out	/ACK			
11	Out	BUSY			
12	Out	PE			

## Auto Interface Select

The setup feature Interface Select controls the operation of interface arbitration. One of 3 settings is possible:

**Parallel Only:** With this setting the serial interface is ignored

**Serial Only:** With this setting the parallel interface is ignored

**Auto Select:** With this setting, the printer automatically arbitrates between the parallel and serial interfaces. The first interface to go active maintains active status while the other interface is held busy. After a time out period, the other interface is placed in a ready state.

## Appendix C: ASCII TABLE

The following table may be used to determine HEX values of ASCII characters.

For example the character A is hex 41 commonly shown as 0x41H.

	0	1	2	3	4	5	6	7
0	NUL			0	@	P	`	P
1	SOH	XON	!	1	A	Q	a	Q
2	STX		"	2	B	R	b	R
3		XOFF	#	3	C	S	c	S
4			\$	4	D	T	d	T
5		NAK	%	5	E	U	e	U
6	ACK		&	6	F	V	f	V
7	BEL		'	7	G	W	g	W
8	BS		(	8	H	X	h	X
9			)	9	I	Y	i	Y
A	LF		*	:	J	Z	j	Z
B		ESC	+	;	K	[	k	{
C	FF		,	<	L	\	l	
D	CR		-	=	M	]	m	}
E	SO	RS	.	>	N	^	n	~
F	SI	US	/	?	O	_	o	DEL

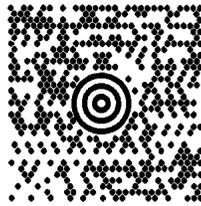
# Appendix D: SELF TEST PRINT SAMPLE

## AMT Datasouth FastMark Test Label



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SansSerif 6pt  
SansSerif 8pt  
SansSerif 10pt  
SansSerif 12pt  
SansSerif 16pt  
SansSerif 18pt



# Appendix E: HIDDEN KEYPAD FEATURES

## Hidden Setup Feature and Value List

To access the hidden list of features, select the Firmware Rev. feature then press the Cancel key twice. The hidden feature list is now enabled and may be selected by pressing and holding the FEED key then pressing the Cancel key to scroll into this list.

FEATURE	VALUES	DESCRIPTION
Ripple Pattern	N/A	Press the Cancel key to initiate a rolling ASCII ripple pattern.
Factory Defaults	N/A	Pressing the Cancel key resets all keypad features to factory defaults. If the RTC clock is installed, these features are not reset. The Label Count Feature can not be reset. Caution: This feature could cause a loss of communication with host if interface features have been modified.
F/W Update Mode	N/A	Pressing the Cancel key causes main firmware control to be halted and boot load firmware to be loaded. This mode has a distinct setup mode feature list allowing serial port parameters to be adjusted for the firmware download. See Appendix F on firmware updates for more information.
Max Media Length	[12-106] inches	This feature sets the maximum length media that the printer will recognize. In normal setup mode, this value sets the upper limit on the Media Length feature to avoid excessive menu scrolling. This also controls how long of a label the printer will look for when performing a label calibration. Increase this value if media over 12 inches long is used.

## Hidden Setup Feature and Value List (Continued)

Keypad Lockout	[Enabled, Disabled]	When Keypad Lockout is Enabled, the value of features may be viewed but not changed. Also, any feature value which may be changed from downline using a PAL operator is also locked out from change. This feature may be used to keep users from modifying features or to override host changes if needed.
Label Count	N/A	This feature displays the number of labels printed since the printer was manufactured. The total label length issued by the printer will be dependant on the label length used. For example if 4 inch label stock is used and the Label Count feature indicates 100, then 400 inches of media have been printed.

## Appendix F: UPDATING PRINTER FIRMWARE

Occasionally there may be a need to update printer firmware either to enhance capabilities or correct issues. Updating firmware via the serial or parallel interface is possible only after activating the printers boot mode firmware. There are 2 ways to do this:

- 1) Selecting the F/W Update mode from the hidden menu.
  - ❑ Activate the hidden menu as described in Appendix E.
  - ❑ Scroll to the feature F/W Update Mode
  - ❑ Press the Cancel key to activate boot mode firmware
- 2) Powering on the printer with DIP switch 7 set in the ON position.
  - ❑ Power the printer off.
  - ❑ Set DIP switch 7 ON which is located on the back of the printer.
  - ❑ Power on the printer

**Note: When using method 2 to activate boot mode, be sure to turn DIP switch 7 OFF after the firmware update is complete before rebooting or cycling power on the printer.**

Either method will activate the boot mode firmware enabling printer firmware to be updated as described below.

After boot mode firmware is activated, the LCD will show the following.

Off line:
F/W Update Mode

The only possible actions at this point are to enter boot mode setup mode or cycle power to exit this mode (after setting DIP SW 7 OFF). This setup mode works like normal setup mode except the feature list is limited to specific features used during firmware updates. Press the **FEED** + **PAUSE** keys to enter boot mode setup mode. The available features are described below:

FEATURE	VALUES	DESCRIPTION
Download New F/W	N/A	<p>Press the <b>CANCEL</b> key to start download mode. The display will change to:</p> <p>Download New F/W Waiting For Data / &lt;CANCEL to Stop&gt;</p> <p>The printer will be waiting on a firmware update file on either the Parallel or Serial ports. If needed, be sure to configure the interface features below prior to starting the firmware download. The utility FlashWiz included on the product CD is an excellent tool for downloading firmware files.</p>
Reboot System	N/A	<p>To exit boot mode and return to normal PAL firmware mode, press the Cancel key. Ensure DIP SW 7 is off or boot mode firmware will run again. After a firmware update is complete, this feature is automatically selected and allows the printer to be rebooted with the newly loaded firmware.</p>
Interface Select		<p>Identical to feature in standard setup mode.</p>
COM1: Baud Rate		<p>Defaults to 57K baud when in boot mode. Change to</p>

		match host if needed.
COM1: Parity		Change to match host if needed.
COM1: Data Bits		Change to match host if needed.
COM1: Handshake		Change to match host if needed.
Firmware Rev.		Displays revision of boot code currently loaded. The boot code can only be updated by changing Flash chips located on main board.