MODEL 428M

DIRECT THERMAL PRINTER

OPERATOR'S MANUAL

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Microcom Corporation is committed to the continual improvement of performance and quality in our products. For this reason, specifications are subject to change without notice.

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FCC Compliance Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions contained in this manual, may cause harmful interference to radio communications.

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Introduction

The Model 428M printer is purposely built to provide a powerful print engine in a small chassis to accommodate a wide variety of kiosk applications. It is designed with a 4" printhead capable of printing up to 8" per second and is available in 203 or 300 dpi. It incorporates the latest features of the proven LDS software found in earlier Microcom Corporation printers.
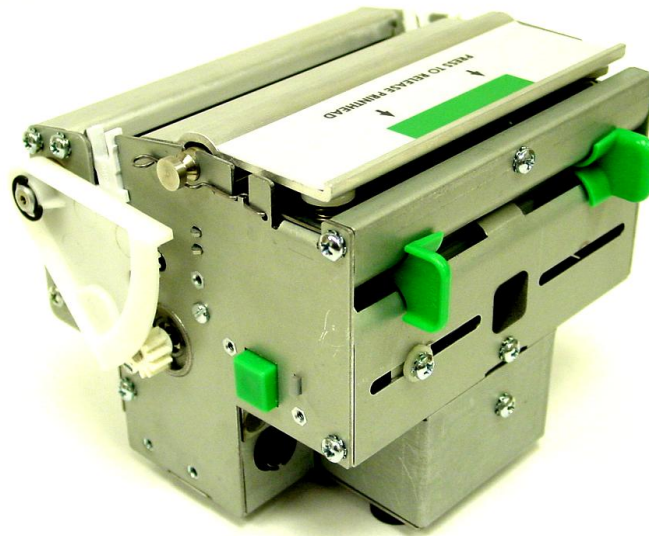
428M Rear Side View
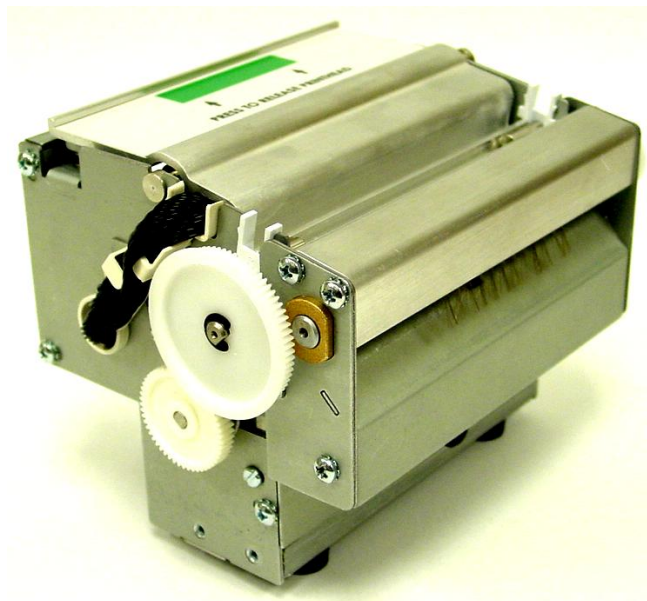
428M Front Side View

Chapter 1: Printer Specifications

1.1 General Specifications

Width *	6.1" (155 mm)
Height *	4.4" (112 mm)
Depth *	5.1" (130 mm)
Weight *	4.2 lbs. (1.9 kg)
Electrical	+24 VDC
Current	3 Amps maximum
Temperature**	40° F – 122° F (5° C – 50° C), operating
Humidity	10% – 85%, non-condensing
SRAM Memory	512 K
Code Flash Memory	512 K
User Flash Memory	8 MB
Agency Approvals	Designed to meet CUL, CE, and complies with FCC Class A
Interface Communications	USB, Version 1.1 supported
Flow Control	XON, XOFF, and CTS
Baud Rate	115200
Parity	Odd, Even, and None
Data Bits	7 or 8

Table 1-1   General Specifications

* NOTE: Listed specifications are based on a standard print mechanism and may vary based on final configuration.

** NOTE: Higher temperature applications are possible, please contact your Microcom Corporation Sales representative for more information.

1.2 Printing Specifications

Print Type	Direct Thermal
Print Resolution	203 DPI (8 dots/mm = 0.0049" per dot) 300 DPI (12 dots/mm = 0.0032" per dot)
Maximum Print Speed	8"/sec. (203 mm/sec.)
Maximum Print Width	203 DPI = 4.098" (104.10mm); 832 dots 300 DPI = 4.252" (108 mm); 1,280 dots
Maximum Print Length	50" (1,270 mm)
Minimum Print Length	0.25" (6 mm)

Table 1-2   Printing Specifications

1.3 Media Specifications

Media Types	Continuous, die-cut, preprinted and tag stock either rolled or fanfold
Maximum Media Thickness*	.011" (.2794 mm)
Maximum Media Width	4.38" (111 mm)

*NOTE: The printers may print on thicker media types depending on the pliability of the material; however, this requires testing and evaluation. Contact your authorized Microcom Corporation representative for additional information regarding testing and evaluation of thicker or rigid media types.

Table 1-3   Media Specifications

Chapter 2:   Features and Options

2.1 Fonts

- 7 (203 DPI) smooth bitmapped alpha-numeric fonts from 6pt to 14pt.
- TrueType® font capability using Microcom Corporation utility program.
- 19 downloadable standard font set.
- All bitmapped fonts expandable in height and width.
- Reverse image printing.
- Rotated: 0 º, 90 º, 180 º, and 270 º.

2.2 Graphics

- Resident Lines feature.
- Storage of fonts, label formats and graphics in both volatile RAM and non-volatile FLASH memory.
- All BMP files may be converted using a Microcom utility program.
- Rotated: 0 º, 90 º, 180 º, and 270 º.

2.3 Bar codes

- ***One-dimensional***
  - Code 39
  - Interleaved 2 of 5
  - Code 128 (A, B, C and Auto)
  - Code 93
  - Codabar
  - Modified Plessey
  - UPC-A
  - UPC-E
  - EAN 8
  - EAN 13
  - UCC/EAN 128
  - Postnet.

- ***Two-dimensional***
  - RSS-14
    - Standard
    - Truncated
    - Stacked
    - Stacked Omni-directional
    - Limited
    - Expanded
  - PDF-417
  - Maxicode

- Rotated: 0 º, 90 º, 180 º, and 270 º.

- Expandable in height and width.

2.4 Special Features

- Chassis designed for minimal footprint
- Integrated cutter assembly
- USB 1.1
- Easy print head cleaning
- Tool less platen roller replacement
- Adjustable media guides for easy label centering
- Automatically adjustable reflective blackline sensor in media guide
- Software controlled contrast adjustment
- Detects label gap, black line, and blow-hole using reflective and transmissive sensors
- Field incrementing, decrementing, and serialization
- Downloadable fonts and graphics (with data compression)
- Internal statistical counters for inches and labels printed
- Remote printer interrogation
- On-site programmable flash memory updates
- Autoload / Alignment of media
- Automatic stock eject on paper-out

2.5 Options

- +24 VDC Universal 100W Desktop Power Supply
- 300 dpi print head
- Pre-Stock Out Sensor Assembly
- Low Paper Sensor Assembly
- Rubber Feet
- Cleaning kit

Chapter 3:   Getting Started

3.1 Unpacking and Inspection

The printer has been packaged in protective foam to help reduce the damage during shipment.

Inspect the shipping container(s) for signs of damage. If damage is evident, contact the shipping company immediately to file a damage claim.

After the printer is removed from the container(s), verify that all the items on the packing list are present and in good condition. The picture below (See Figure 3-1) shows a 428M printer, optional power supply, and optional power cord. Your shipment may contain different items.

The foam and shipping container(s) should be kept and used if the printer is to be shipped at a later time. Additional shipping materials can be ordered by contacting the Microcom Corporation Service Department.

Figure 3-1   Typical Printer Accessories

3.2 Printer Power

Microcom Corporation offers a "desktop" universal power supply as option. Any power supply that conforms to the standard supply specifications listed in Table 3-1 below may be used. The printer requires a universal +24VDC power supply that operates in the 100-240 VAC; 50-60 Hertz range; 4 Amps. The power supply should operate in an "output foldback mode" during an overload situation rather than a shutdown and restart attempt; sometimes referred to as a "Hiccup" mode. Power supply and printer chassis must share a common ground. Contact your Microcom Corporation representative for any questions regarding power adapter requirements and/or specifications.

A 150 watt "desktop" universal power supply with cooling fan is also offered as an option for high temperature applications.

AC Input:	100-240 VAC, 50/60HZ, 4A
DC Output:	+24V @ 0.2 ~4.16A +/- 5%
Power Rating:	100 Watts, no cooling, 50°C
Overload Protection:	Output Voltage Foldback Mode
Maximum Transient Load:	12 cycles @ 2.1ms rep. rate; 35A, 650µs pulse
Printer Power Connector:	Standard 4-pin power mini-DIN

Table 3-1   100 Watt Power Supply, w/o Fan 50°C

AC Input:	100-240 VAC, 50/60 HZ, 4A
DC Output:	+24V @ 0.2 ~6.25A +/- 5%
Power Rating:	150 Watts, internal fan cooling, 60°C
Overload Protection:	Output Voltage Foldback Mode
Maximum Transient Load:	12 cycles @ 2.1 ms rep. rate; 35A, 650 µs pulse
Printer Power Connector:	Standard 4-pin power mini-DIN

Table 3-2   150 Watt Power Supply, with Fan 60°C

View of Optional Desktop Power Supply
Output cable connector

GND ————— +24V

GND ————— +24V
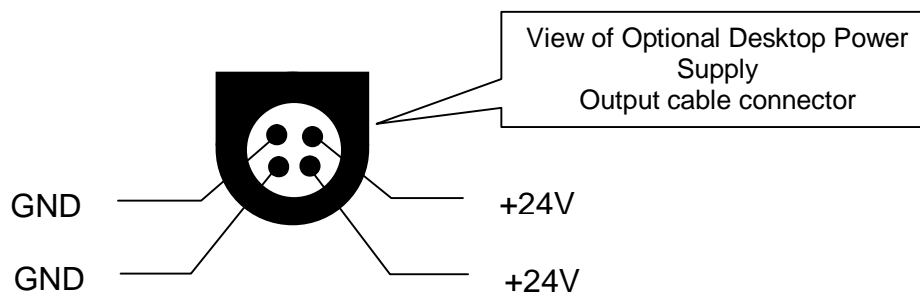
Figure 3-2   Optional Desktop Power Supply Output

AC Input (115-230VAC)

On/Off Switch

DC Output (+24 VDC)
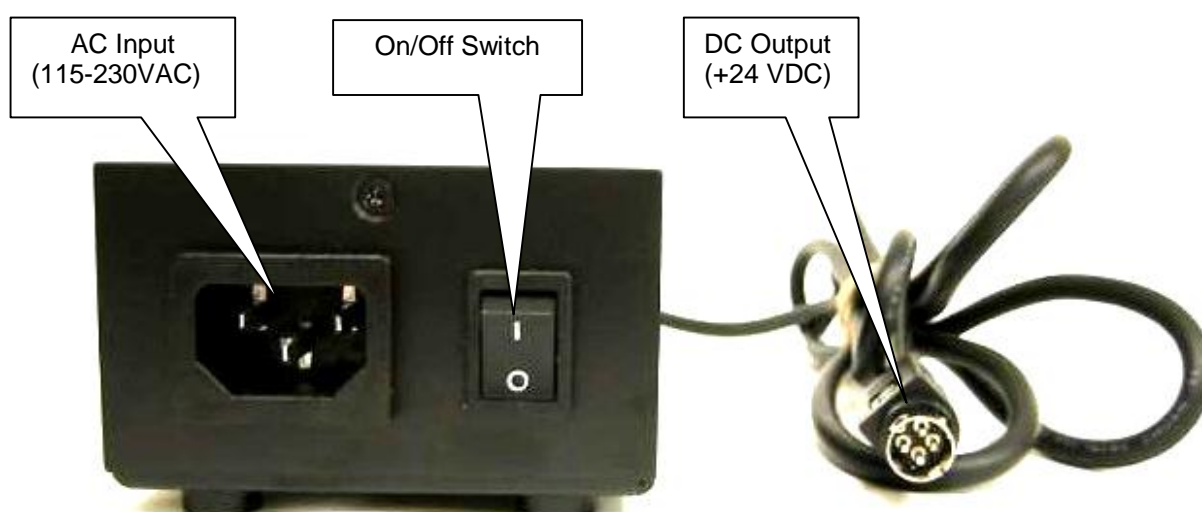
Note: Verify that the printer's On/Off switch is switched "off" before plugging in the power cord into the electrical outlet and the power supply's output cable into the printer.

Figure 3-3   Connecting the Power

3.3 USB Communication Interface

The 428M printer provides a single USB port for communication to a host device. In order to communicate with the printer, the Prolific Technologies USB driver must be installed on the host computer.   This may be downloaded at http://www.microcomcorp.com/drivers.htm. The USB driver provides the host computer a virtual serial communication port allowing the use of a terminal emulation program to communicate with the printer using a standard USB cable with a Type-A (host computer) and Type-B (428M printer) connectors.

3.3.1   USB Driver Setup

This section will guide you on how to install the PL-2303 USB to Serial adaptor under Windows XP, Windows 2000, Windows ME, and Windows 98 operating systems.

Note: Please take notice of the installation order. First, run the InstallShield wizard, connect the USB cable to the printer, and turn the printer "ON."

The following steps will show how to install the device under Windows XP. Basically, the procedures are also somewhat the same for other Windows operating systems.

1. Power on your computer and boot to Windows.

2. Run or double-click the InstallShield driver setup program "PL-2303 Driver Installer.exe". The InstallShield Wizard will be displayed on your screen to inform you that the PL-2303 USB-to-Serial driver will be installed on your computer. Click **Next** to continue and start the installation.

3. Wait until the InstallShield Wizard informs you that driver installation is successfully installed. Click the Finish button to close the InstallShield program.

4. Connect the USB cable to the printer.

5. Power the printer "ON."

6. Windows should detect the driver as **Prolific USB-to-Serial Bridge (ComX)**. Note which Com port is being used by the virtual Com driver.

    Win XP:
    [Start] → [Settings] → [Control Panel] → [System] → [Hardware] →[Device Manager] →[Ports]

    Win 98SE
    [Start] → [Settings] → [Control Panel] → [System] → [Device Manager] →[Ports(Com & LPT)]

7. Double-click the **Prolific USB-to-Serial Bridge (ComX)** to open the **Properties** box. Check **Port Settings** as shown and change to match Figure 3-4 if necessary.

8. Open the terminal emulation program and set Com settings to match the virtual Com port settings.
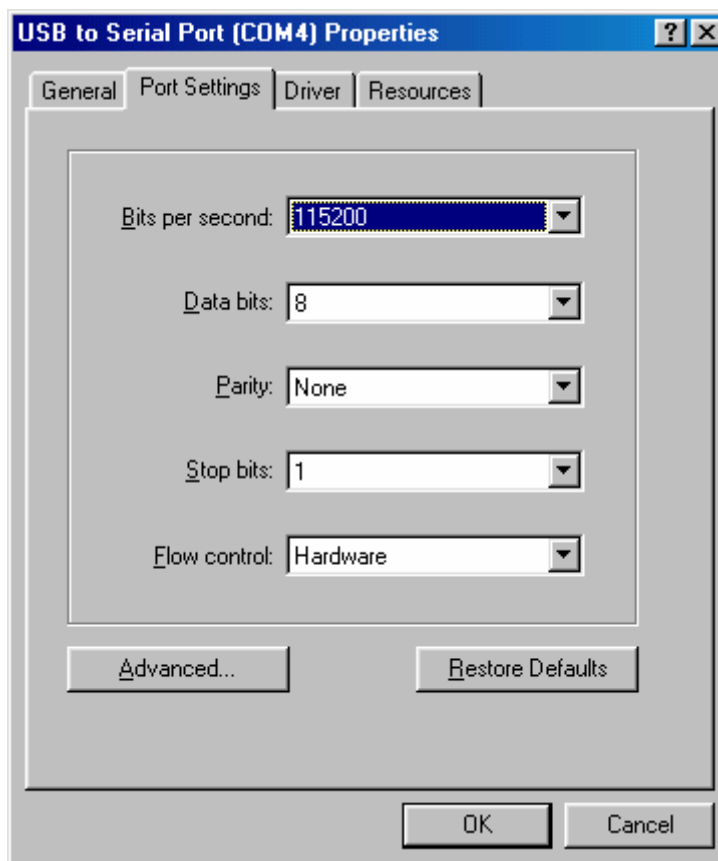
Figure 3-4   USB to Virtual Com Port Properties

3.4 Windows Driver

Some applications may choose to use a Windows driver with the printer's instead of creating a resident LDS driver. The Windows driver typically sends everything over as a graphical image so the overhead impacting performance is greater than if the resident LDS fonts and instructions were used.

A WYSIWYG software package group, Nicelabel, has developed a Windows driver for the Microcom Corporation printer's. The driver has been optimized to use with the Nicelabel software but may also work for other Windows applications. The driver's may be downloaded at http://www.nicelabel.com/Downloads/NiceDrivers.

3.4.1   Windows Driver Setup and Configuration
This section has been created to assist in the installation, setup, and configuration of the Windows Driver. Any problems or issues with the driver should be reported to Nicelabel directly.

Follow the steps outlined below to install and configure the Nicelabel Windows drivers:

1. Download and install the Nicelabel Windows driver by executing the "PRNINST.exe" file.

2. Follow the on screen instructions to successfully install the driver or drivers.
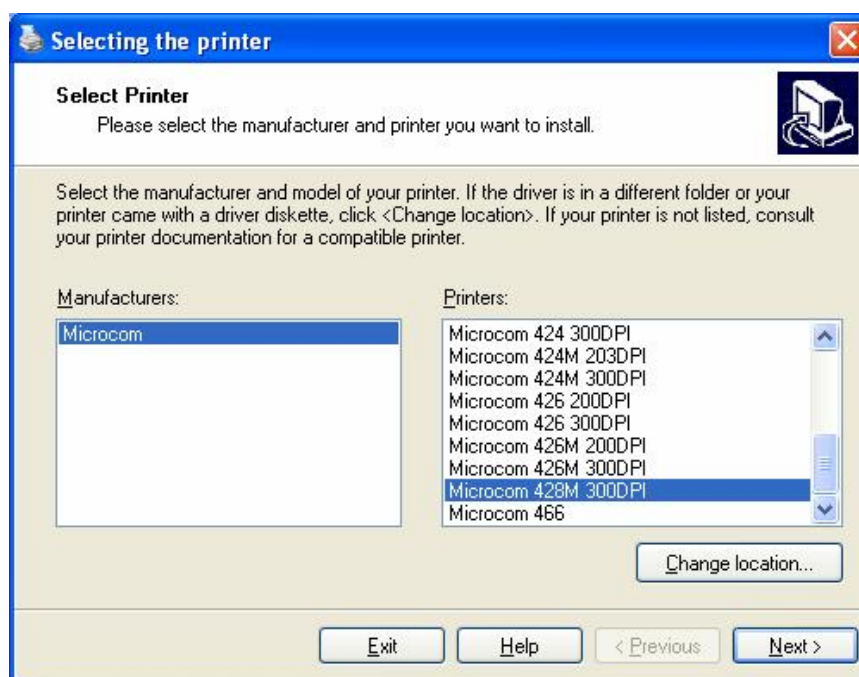
Figure 3-5   Selecting the Windows Printer Driver

After selecting MICROCOM as the printer manufacturer, the printer Model and Printhead resolution should be selected.
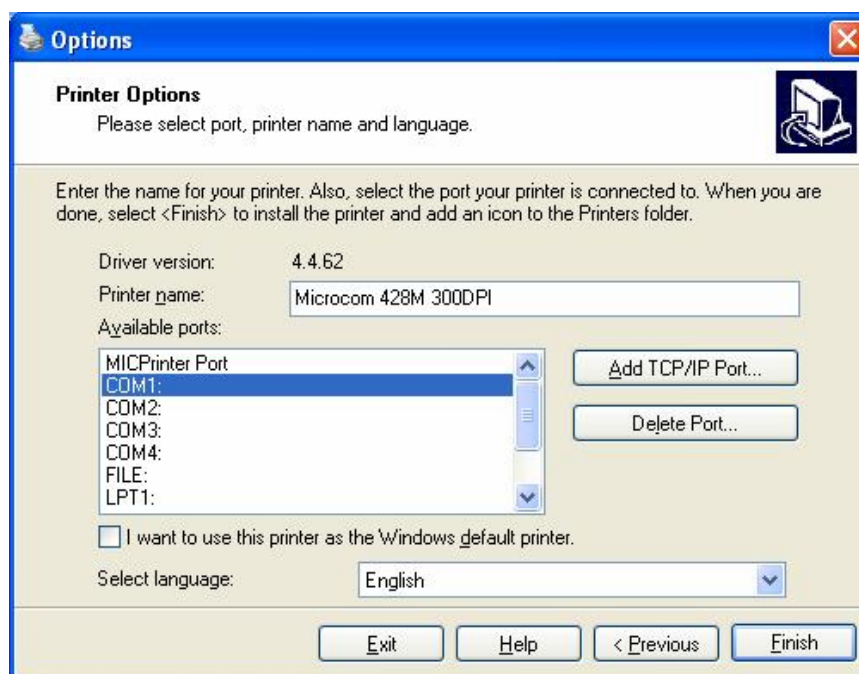
Figure 3-6   Selecting the Windows Printer Driver

Select the printer port that will be used and then select the "Finish" button. Please note that if you need to communicate directly to the communication port using HyperTerminal, TeraTerm Pro, or other VT100 emulation program, you will need to first set the Windows

Driver to PRINT TO FILE before the Windows Operating System will allow communication to occur with these types of programs.

3. After the driver has been installed, you may configure it for your applications use by going to the "Printers and Faxes" folder. You should see the driver that was just installed.

4. Right click on the driver and select "Properties".

PORTS tab

Printing Preferences Button
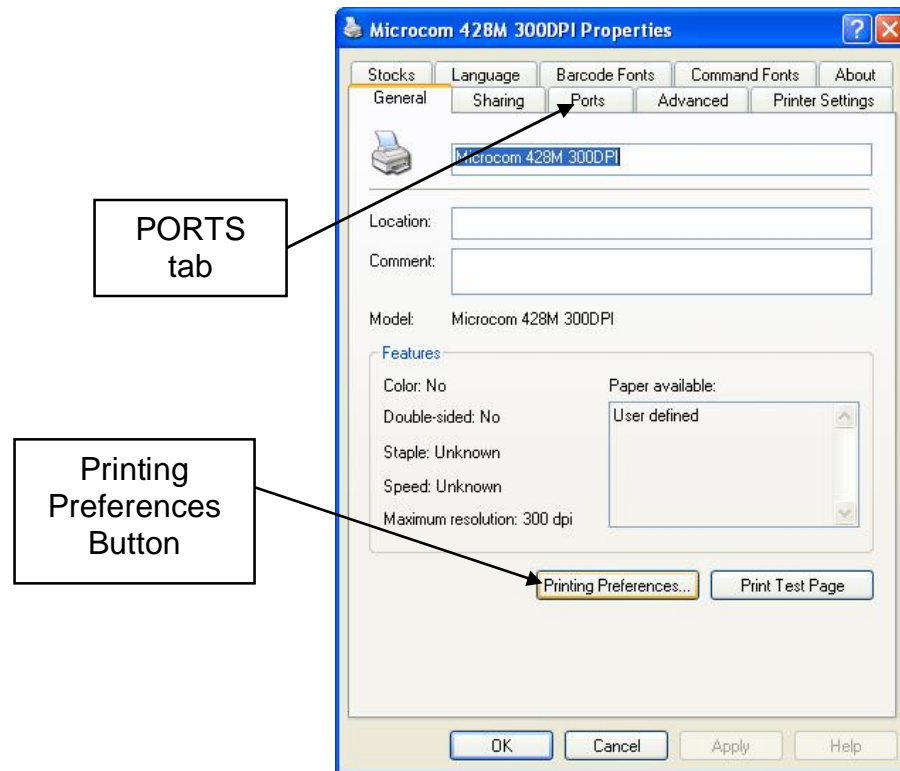
Figure 3-7   Driver Properties Menu

5. Select the "Ports" tab located at the top of Properties Menu. The communication port should be configured to match the printer's communication ports current setting. The printer will not be able to communicate with the host PC if the communication parameters do not match.

You may power the printer up with the print button held in and paper installed to enter the diagnostics mode. After the unit powers on, it will print out its configuration that shows what communication port is selected and what the Baud rate of the printer is set to as well. Configure the host with these parameters making sure that the Flow Control is set to Hardware and the printer should communicate properly.

Please not that the printer needs to be power cycled to exit the diagnostics mode.

Select the "Configure Port" button to set the communication parameters to match the printer's settings.
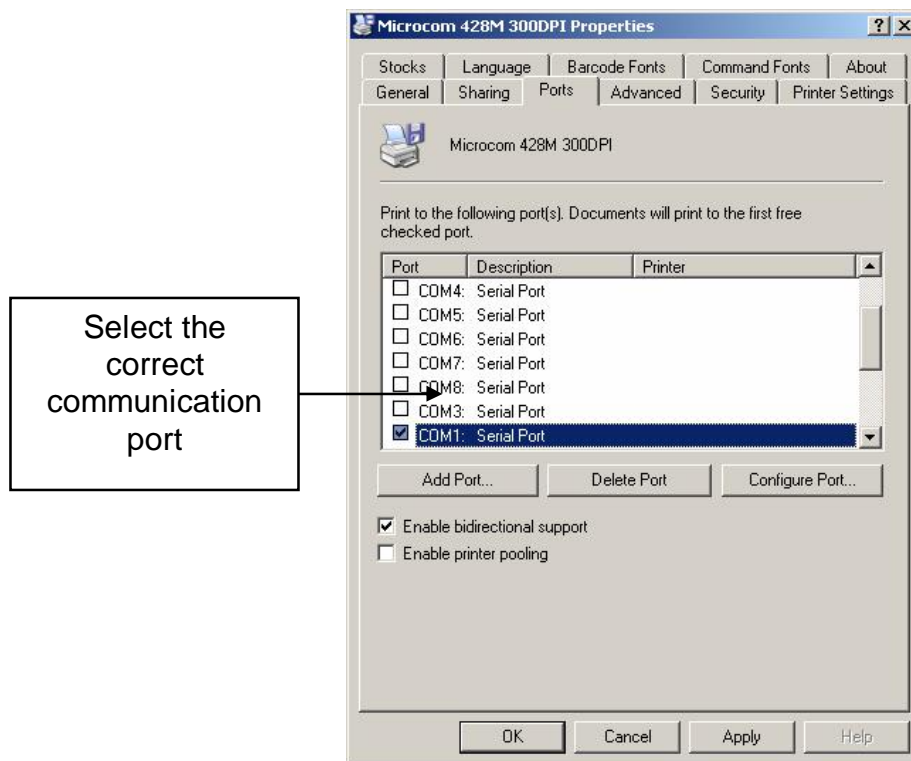
Figure 3-8   Driver Ports Menu
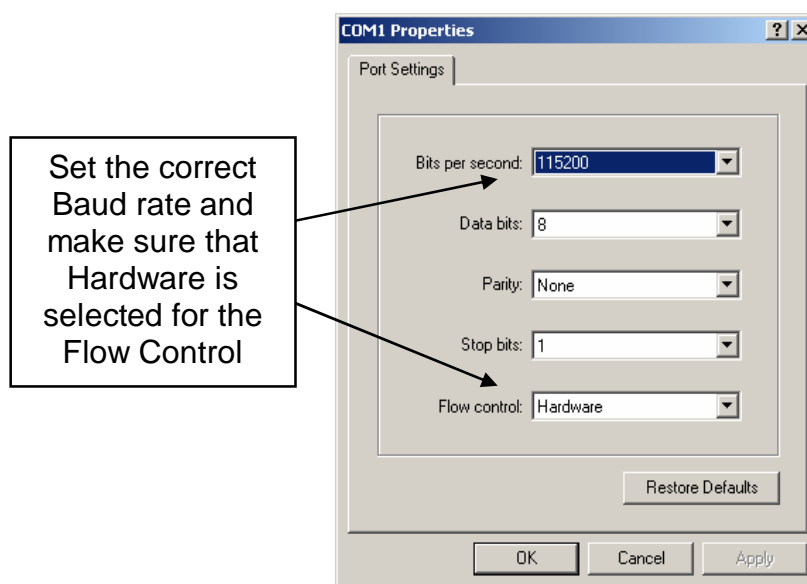
Figure 3-9   Driver Properties Menu

6. Select the "Printing Preferences" button located on the "General" tab that is next to the "Print Test Page" button to configure the driver for your application. The "Printing Preferences" represents the Microcom Corporation specific printer properties and should represent the media that your application is using. Failure to configure this section properly will results if misaligned printing or stock errors to occur.

The "Options" tab sets the media width, height, print speed, darkness of contrast settings. The "Unprintable Area" at the bottom of this window should always be set to "0.00".
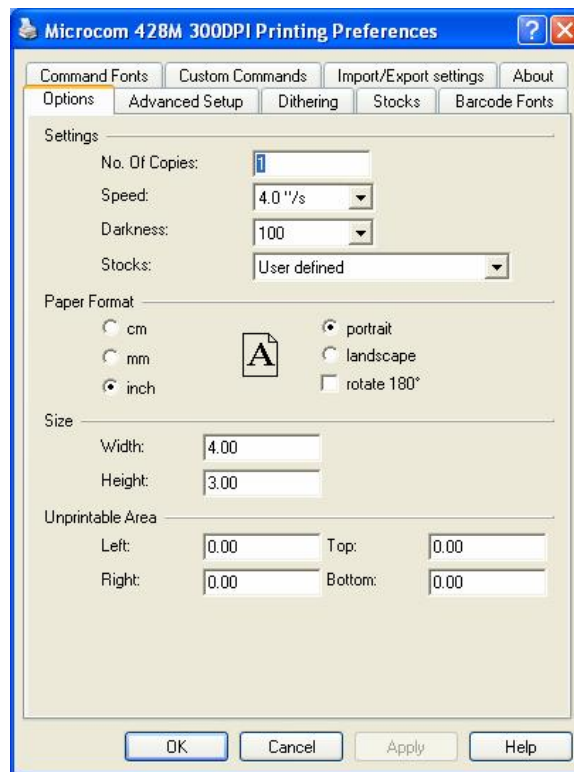
Figure 3-10 Printing Preferences Menu

6. Select the "Advanced Setup" tab to finish configuring the printer driver.
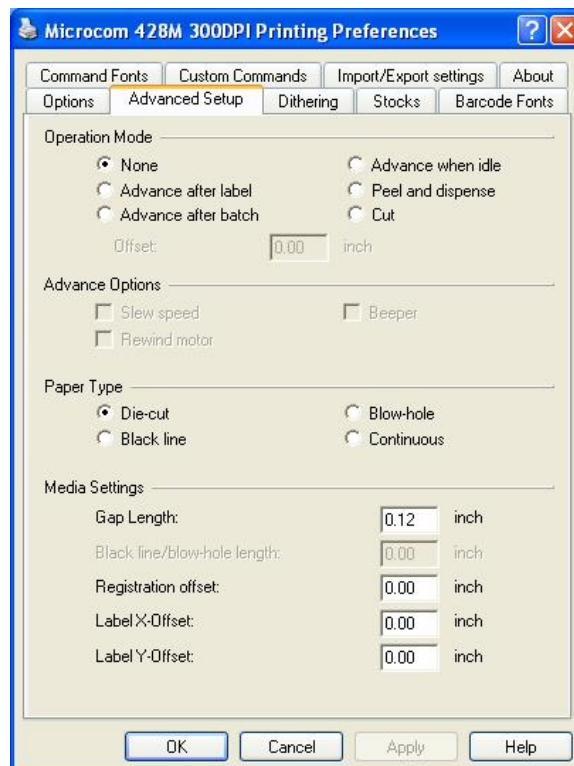
Figure 3-11 Advanced Setup Menu

The "Advanced Tab" is used to configure the post printing operations, registration sensor type, and other critical media specific parameters needed for proper alignment and registration.

The "Operation Mode" sets the post printing operation of the printer. The default is set to NONE. If an option other than NONE is selected, the OFFSET field controls how far the printer will advance the paper after printing. The printer will also retract this distance on the next print job.

> **None** = No dispense mode enabled.
>
> **Advance after label** = the media is advanced after each print. This feature uses the Label Taken Sensor.
>
> **Advance after batch** = the media is advanced after a batch (copies count) of the same label are printed. This feature uses the Label Taken sensor.
>
> **Advance when idle** = the media is advanced when the communication port goes idle. The Label Taken sensor is not needed for this feature.
>
> **Peel and dispense** = the media is advanced after each print. This feature uses the Label Taken Sensor.
>
> **Cut** = the media is advanced and then a CUT cycle is issued after each print.

The "Paper Type" selects what registration sensor is used and depends on the media type being used with the printer.

The "Media Settings" are used to identify the properties of the media being used. These values need to be set correctly for proper registration to occur.

> **Gap Length** = this is the height of the space between the labels on Die Cut media.
>
> **Blackline / Blow hole** = this is the height of the blackline or blowhole used for registration.
>
> **Registration Offset** = this is the distance from the edge of the printable surface to the beginning of the next registration mark.
>
> **Label X Offset** - this parameter is not required. Shifts the fields in the X direction or media width.
>
> **Label Y Offset** - this parameter is not required. Shifts the fields in the Y direction or the media height.

3.4.2   Advanced Windows Driver Features

The Windows driver also provides additional feature to make the driver as flexible as possible. This section is intended to discuss some of the options in greater detail.

3.4.2.1   **Stock Types**

The "Stocks" tab is used to define stock types that are frequently used. This is helpful in that you may select a predefined stock type on the "Options" tab instead of setting up each item separately.
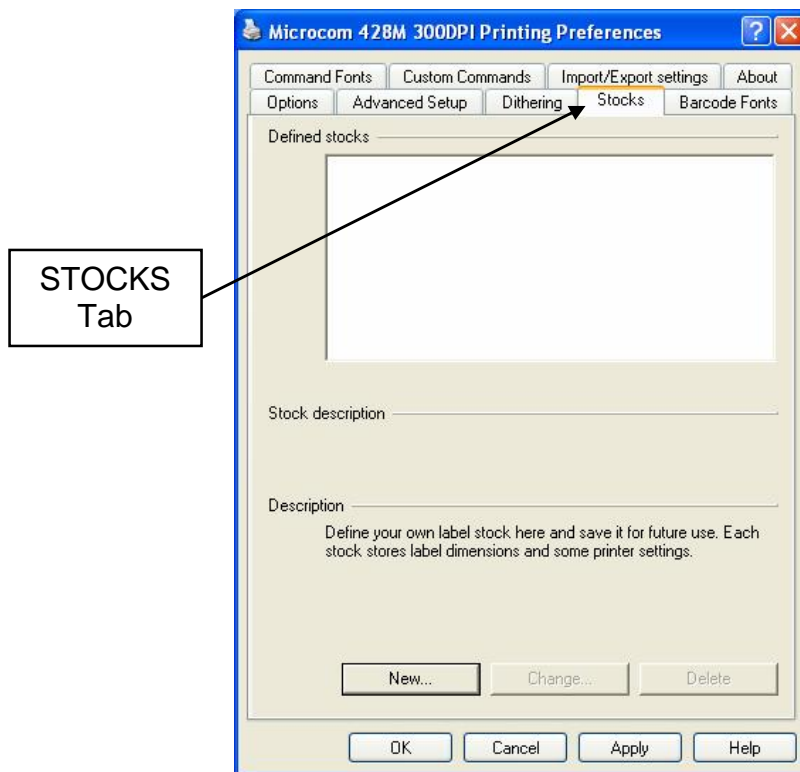
Figure 3-12   Stocks Tab

Once you select a "New" stock, another dialog box opens and you can specify the parameters for the Stock. The stock type is given a NAME that is used to recall the stock type on the Options tab.
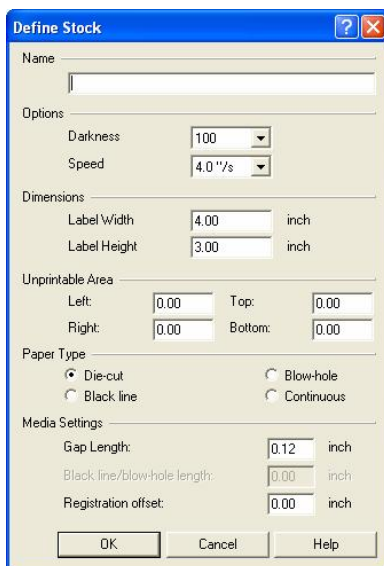
Figure 3-13   Stocks Dialog Box

3.4.2.2   Custom Commands

The Custom Commands tab provides a way to insert data or a file into the data stream. This is helpful if the application requires that a command is overridden to operate properly. This is accomplished by sending the desired command after the command that is generated by the driver and before the unit prints. The printer will process commands in the order that they are received so inserting the replacement value for the command should be sent after the command. Please see the example below for the insertion location.

EXAMPLE FORMAT:

        Start Document
        ^D Commands
        Start Document (data)
        ^D100
        GRAPHIC IMAGE
        Start Page
        ^D57
        FORMAT HEADER
        FORMAT PLACEMENT FIELDS
        ^D56
        ^D2
        FORMAT DATA
        End Page (data)
        ^D3 - (PRINT)
        End Page
        End Document (data)
        End Document
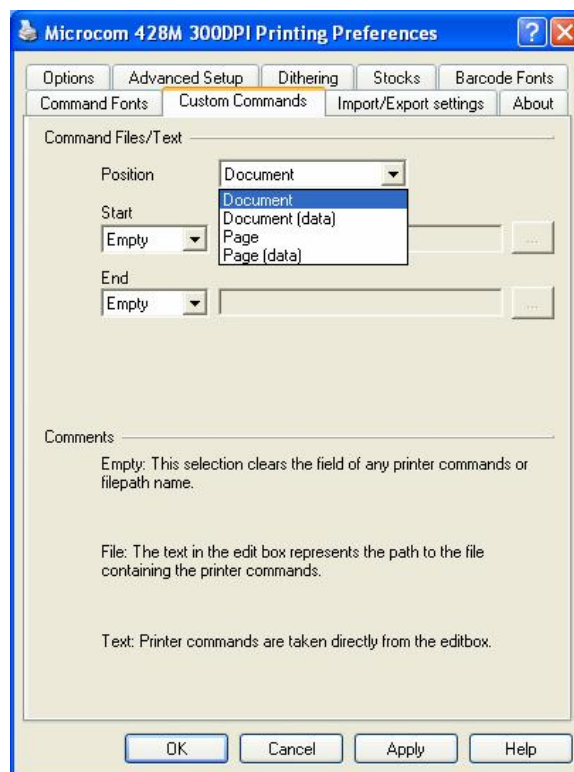
Figure 3-14 Custom Commands Tab

3.4.2.3   **Import/Export Settings**

The driver provides a way to Export or Import the driver configuration file (.drs file). This is helpful in troubleshooting or in helping getting a customer up and running with the proper setup.
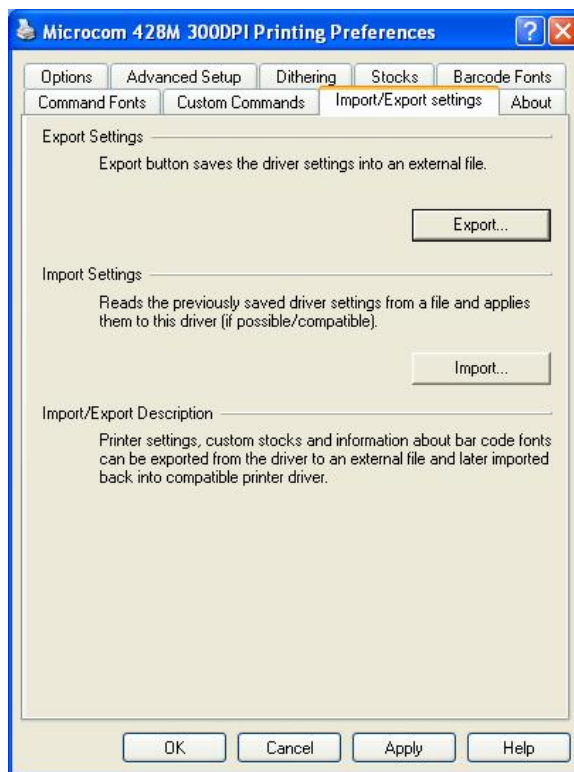
Figure 3-15 Import/Export Settings Tab

3.5 Loading Media

Loading media into the Model 428M printer is an easy process. Follow the instructions below to properly load the media.

1. Feed the media into the paper path, located on the back of the printer, until you feel resistance.

2. Push and hold the Print Button to feed the media through the printer.

3. Once the media exits the front of the printer, release the Print Button.

The printer is also equipped with an Autoload feature. This feature allows the printer to automatically sense new media as it is inserted into the printer, and automatically feed the media to provide proper registration of the first label/tag to either the leading edge or a registration mark. For more details on this feature, please refer to Chapter 5, Autoload Commands.
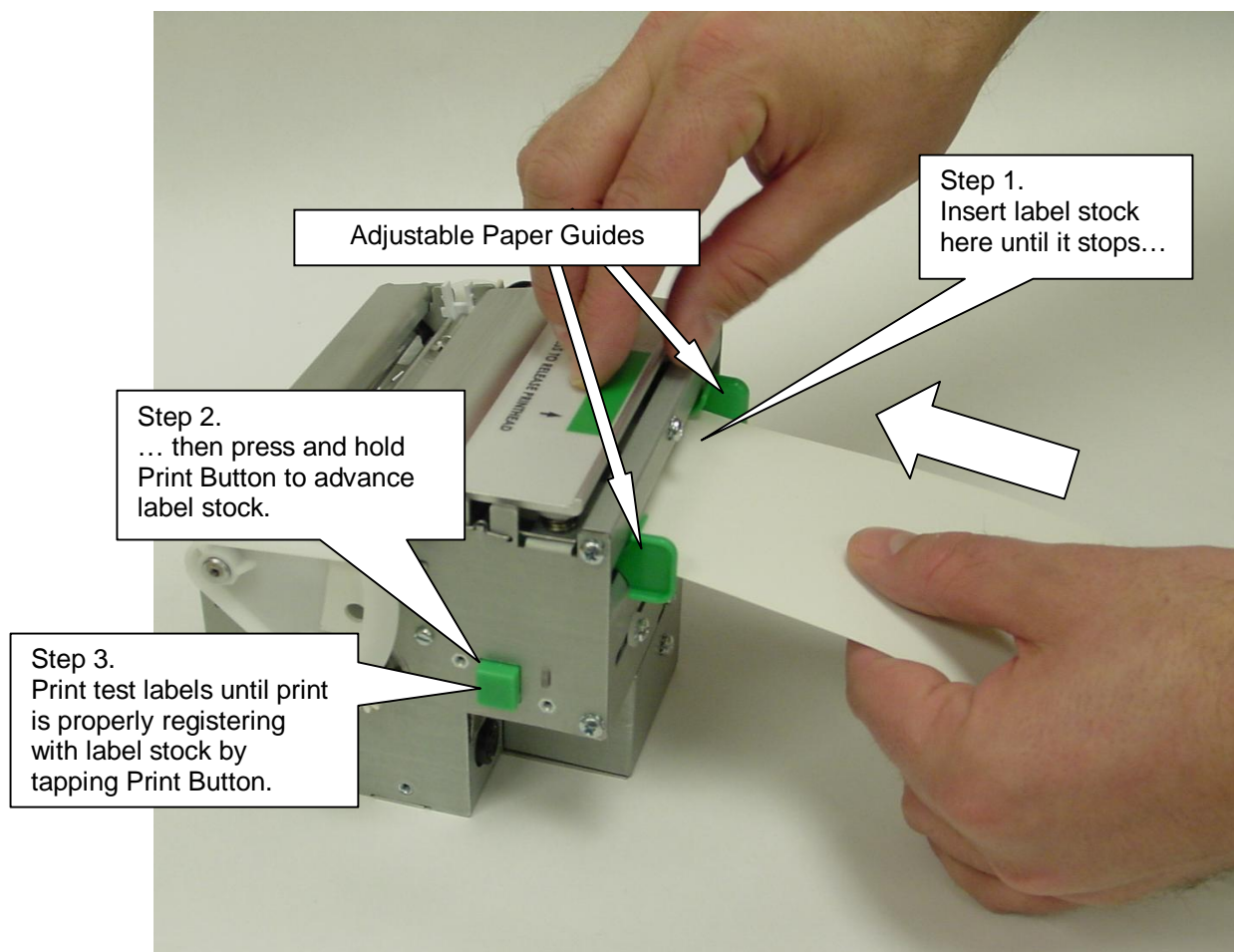
Figure 3-16 Loading Media

3.6 Print Button and Status Indicator Light

The Print Button and the Status Indicator Light are used to identify and perform many functions. This section provides a description to familiarize you with the basic function of the Print Button and the Status Indicator Light.
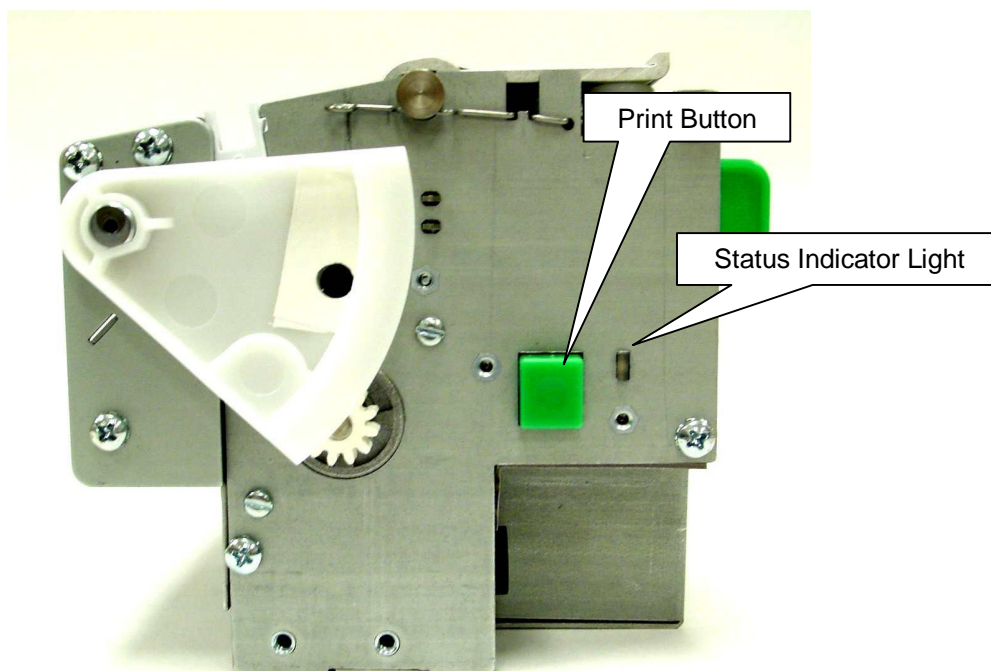
Figure 3-17 Print Button and Status Indicator Light

3.6.1   Print Button

Operation	**Description**
Printing a label	Press the Print Button while the printer is IDLE or PAUSED to reprint the last label. A power up label will print after a power ON cycle when the Print Button is pressed.
Pause printing	Press & hold the Print Button while the printer is printing to enter the PAUSED mode. Press the Print Button again to continue printing.
Feeding labels (Line feed)	Press & hold the Print Button while the printer is IDLE to advance label media. The printer will continue advancing label media until the Print Button is released.

Table 3-3   Print Button Description

3.6.2   Status Indicator Light

Light Color	Description
Solid Green	Indicates that the power is on and the printer is in a ready state.
Solid Red	Indicates an error has occurred. The printer will remain in this state until the condition is removed. If an unexplained error persists, contact your Service Representative.
Solid Amber	The printer is in the Tag/Tear or Peel-and-Dispense mode and is waiting for the label/tag to be taken. OR Indicates that the printer is in the Boot Loader mode (MCB) and is not running the printer application program.
Flashing Red	A cutter error has occurred. OR A memory download operation was not successful. OR Power Spike or low voltage on the AC line. (The printer will remain in this mode until the condition is removed and the printer power is cycled.)
Flashing Amber	Printer is PAUSED,

Table 3-4   Status Indicator Light Description

3.7 Printer Modes

The printer has four primary modes of operation. The different types of modes have an impact on how the Print Button and the Status Indicator Light operate. This section is intended to provide the user with an explanation of these different modes.

3.7.1   Idle Mode: GREEN

The printer is in the IDLE Mode when it is not printing and/or has no pending activity. The indicator light is GREEN, which indicates that the printer is ready to receive label formats and/or commands.

In IDLE Mode the Print Button has several different functions:
        a) Pressing the button quickly will reprint the last label (unless print repetition has been disabled by the ^D22 command bit 4, then a form feed will execute)
        b) If the printer was just turned ON and no formats were sent to the printer, pressing quickly will print the power-up label,
        c) Holding the button depressed: Line Feed until the button is released.

3.7.2   Halted Mode: RED

The printer is in the HALTED Mode when it has stopped due to an error condition.   The Status Indicator Light will be solid red in color when the printer has entered the HALTED Mode. The printer will remain in this mode until the error has been corrected and cleared. Once the error has been cleared, the printer will attempt to execute the previous format and/or commands.

3.7.2.1   Steps to clear the >LOW STOCK< error
        a) Load new label media.
        b) Press the Print Button quickly to start printing.
        c) Press the Print Button until label is properly registering on media.
        d) Press the Print Button again during printing to resume batch printing.

3.7.2.2   Steps to clear the >LOW STOCK< error with "single button error clear"
If Soft Switch #5, Bit #1 is set to "1", then a single quick press of the Print Button will clear the >LOW STOCK< error once the printer has more label media loaded.

3.7.2.3   Automatic Stock Eject on >LOW STOCK<
The printer performs an Automatic Stock Eject operation whenever it runs out of label media. As soon as the >LOW STOCK< condition is detected, the printer feeds the label media forward to clear the drive roller.

The feed distance is just enough to eject the last of the label media past the drive roller and then stop. This happens automatically…the user doesn't have to hit the Print Button.

3.7.3   Paused Mode: Solid or Flashing AMBER

There are several ways that the operator can control the output of the printer. The printer will display either solid or flashing AMBER depending upon the mode of operation. Also, the printer will display a solid AMBER during a FLASH update operation.

Solid AMBER   A printed tag/label is waiting to be taken by the operator when the printer is in a Tag/Tear (^D97) or Peel-and-Dispense (^D98) mode.

                                  The printer is in the Bootloader or updating the application stored in flash memory.

Flashing AMBER   Press and holding the Print Button during tag/label printing will cause the printer to pause. It will resume printing by pressing the Print Button again.

3.7.4   Diagnostic Mode

The Diagnostic Mode temporarily powers up the printer using factory default parameters. Also, the printer's current user configuration parameters and statistical information are printed out on a Status Label. This provides useful information to help diagnose and troubleshoot problems. The printer will use the factory default parameters until the printer has been reset using a soft reset or by cycling power. The printer will then return to the configuration shown on the Status Label.

3.7.4.1 Entering Diagnostic Mode

To enter the Diagnostic Mode, press and hold the Print Button "IN" while turning the printer "ON." Release the Print Button after printer begins to feed media. The printer will enter the DIAGNOSTICS Mode, and print the Statistics label and a print test pattern. The printers will autodetect for the active serial or USB port at 115200 Baud when in this mode.

The printer's normal Soft Switch settings are ignored, and factory default settings are loaded into the printer. These default settings will remain in effect until the printer power is cycled, the RESET command is issued (^A1^D143), or a Soft RESTART command is issued (^D32). These are the only ways to get out of the DIAGNOSTICS mode.

3.7.4.2 Statistics Label

The Statistics Label may be printed either by entering the DIAGNOSTICS Mode or sending the Printing Statistics Command.

```
PRINTER SERIAL #: 00516645051
PRINTED LABELS: 303
PRINTED INCHES: 1533
TOTAL INCHES: 1571
POWER ON HOURS: 32.8
CUTTER TYPE: Guillotine
CUTTER ENABLED?: YES
CUTTER COUNTS: 1789
KIOSK CUT MODE: Disabled
KIOSK DISTANCE: 0
SWITCH BANK 1: 10001010
SWITCH BANK 2: 01010001
SWITCH BANK 3: 00000000
SWITCH BANK 4: 00000000
SWITCH BANK 5: 00000000
SWITCH BANK 6: 00000001
CURRENT COMM PORT: Autoselect USB/RS232
RS232 PARAMETERS: 115200-N-8-1
PRINT HEAD SIZE: 1280
PRINT HEAD DPI: 300
% CONTRAST:  100
D91 GAP VALUE: 30
TOF DISTANCE:  179
STOCK OUT VALUE:  100
PRINTER CODE REV: 02.12.050719A
BOOTLOADER CODE REV: 02.12.050719A
CODE ASSY PN. 071001-0212
```

```
PRINTER SERIAL #: 00516645051
PRINTED LABELS: 303
PRINTED INCHES: 1533
TOTAL INCHES: 1571
POWER ON HOURS: 32.8
CUTTER TYPE: None

KIOSK CUT MODE: Disabled
KIOSK DISTANCE: 0
SWITCH BANK 1: 10001010
SWITCH BANK 2: 01010001
SWITCH BANK 3: 00000000
SWITCH BANK 4: 00000000
SWITCH BANK 5: 00000000
SWITCH BANK 6: 01110010
CURRENT COMM PORT: Autoselect USB/RS232
RS232 PARAMETERS: 115200-N-8-1
PRINT HEAD SIZE: 1280
PRINT HEAD DPI: 300
% CONTRAST:  100
D91 GAP VALUE: 30
TOF DISTANCE:  160
STOCK OUT VALUE:  100
PRINTER CODE REV: 02.12.050719A
BOOTLOADER CODE REV: 02.12.050719A
CODE ASSY PN. 071001-0212
```

Figure 3-18 Status Label (Examples)

3.8 Sensor Inputs
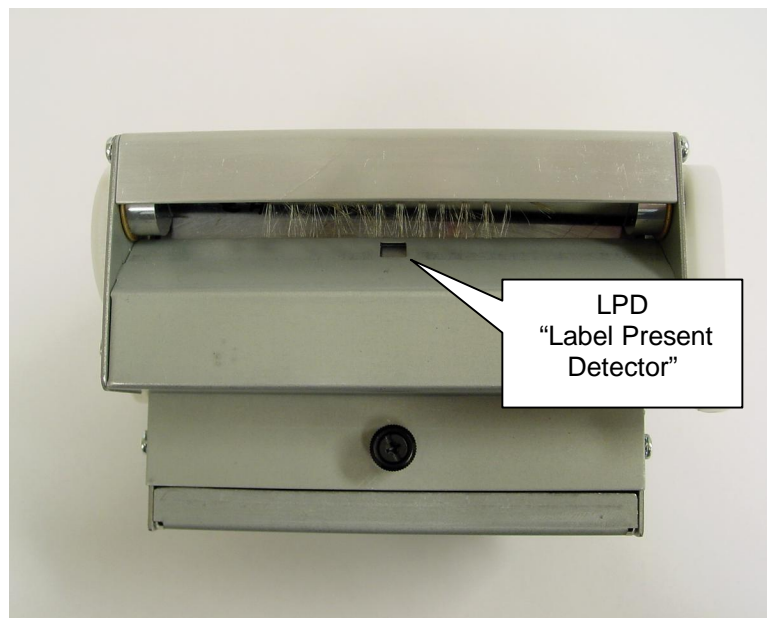
Figure 3-19 LPD "Label Present Detector Location

Sensor Ports

1) LPD (Label Present Detector). Used to detect when media is present and is used in conjunction with the TOF (Top-Of-Form) operation. A potentiometer is provided to adjust the distance over which the LPD sensor will detect reflections. The maximum range may be adjusted over a distance of 0.20" ⇨ 0.85". Distances are measured from the surface of the sensor to the reflecting surface. This pot may be used to decrease sensor range to avoid false reflections from stationary objects such as a cutter.

2) PAPER LOW configuration. This general purpose input is a reflective sensor typically used with custom applications to sense when stock is running low at the stock source. This enables the operator to replenish stock before a >LOW STOCK< condition occurs and since it is typically more distant from the Print Head than the PSO "Pre-Stock Out Sensor," would be less critical . The active state of the signal is programmable thru Soft switch #3, bit #4 (^D23 command). An active state will return an >INPUT 2< response when queried. The maximum pick-up range not adjustable and is set to sense a reflection up to 0.80" from the sensor's surface.

3) PSO "Pre-Stock Out Sensor" configuration. The optional Pre-Stock Sensor Assembly contains a sensor that may be used to warn of an eminent stock out (>LOW STOCK<) conditions before printing occurs preventing unwanted partially printed formats. . The active state of the signal is programmable thru Soft switch #3, bit #2 (^D23 command). An active state will return an >INPUT 1< response when queried. The maximum pick-up range not adjustable and is set to sense a reflection up to 0.80" from the sensor's surface.
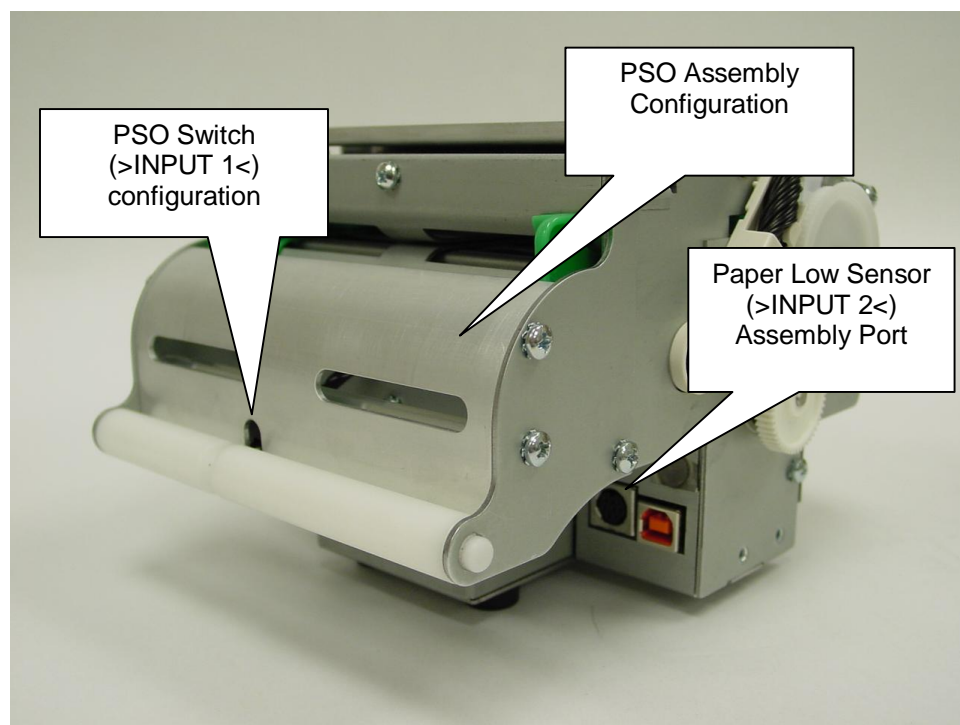
Figure 3-20   428M Shown with Optional Pre-Stock Out Assembly

Chapter 4:   Designing Labels Using LDS

Label Design Software (LDS) refers to the control language resident in the printer used to create labels. All bitmapped fonts, character sets and bar codes are resident in the printer. Additional fonts and graphic images may be sent from a host and stored in the printer's memory.

A label format is produced by a series of 5 steps:

1. Control commands to define printer operation.
2. A format header to define the label height, width, print speed, etc…
3. Field data that defines the placement of text, bar codes, graphics or lines.
4. Actual text data to place in the Field data strings.
5. Control commands to initiate printing.

4.1 Control Characters

Throughout this manual there are references to control characters. In order to print them in this manual, they have been written using standard characters and icons. Escape characters are represented by <ESC> and a carriage return is represented by <CR>. It is important to note that all printer functions, unless otherwise noted, must be followed or terminated with a carriage return (<CR> or HEX 0D). The printer ignores the <LF> (line feed) or HEX 0A character so it is easier to read and troubleshoot files if the <LF> character is sent after the <CR> character.

Note: Control codes are ignored when the printer is configured for binary compression mode (^D23 bit 7).

4.2 LDS Design Exercises

There are many different machines capable of sending information to the printer including main frames, mini-computers, special purpose computers and PC's. For the purpose of simplicity, the design exercises contained in this manual will use one of the easiest methods by using an IBM compatible PC and a VT-100 terminal emulation software program. This method of connection will allow two-way, communication with the printer.

Items required:
- A computer with a Prolific Technologies USB driver installed. (Contact your Microcom Corporation representative for more details.)
- A USB cable with Type-A (host computer) and Type-B (428M printer) connectors.
- A VT-100 terminal emulation program such as HyperTerminal™.
- A text editor that does not add formatting characters such as Microsoft® Notepad.
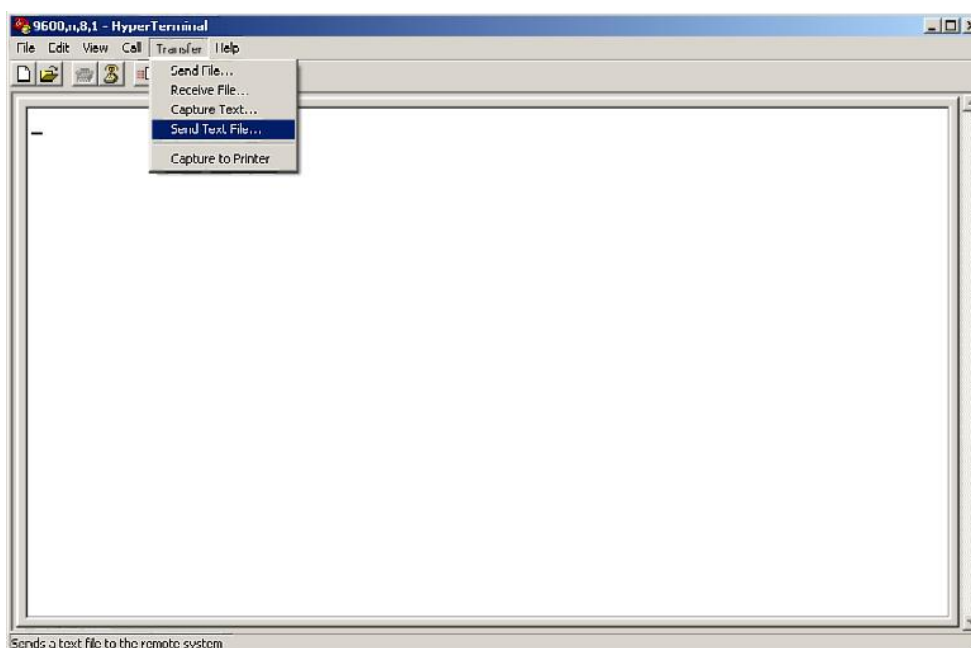
Figure 4-1   HyperTerminal™ Window Example

4.2.1   Format Creation

Special Control code functions (see Chapter 5, Special Control Codes) and/or label formats may be entered directly through the keyboard but this is not the most efficient method if entering a large amount of data or numerous commands. Large formats and/or numerous commands should be entered in an ASCII text editor and then uploaded to the printer. Microsoft® Notepad has been used for the creation of label designs in this manual because it is simple to use and does not add formatting characters.

The LDS programming language uses thermal dots as the unit of measure. All commands and parameters, unless noted otherwise, should be entered using dots. The 428M printer is fitted with a 300 dpi head.

The conversion values for the 300dpi print head:

Dots/mm	*Inch/Dot*
12	0.0033

EXAMPLE: A label that is 2" in length would be (2 x 300) = 600 dots.

The printer can accept either the one-character control code ("Ctrl + E" (HEX05)) or the two-character caret (^) plus alpha character ("^E"). In other words, for a PC keyboard, the same command can be generated either by holding down the "Ctrl" key and pressing the alpha character or by entering the two characters; the "^" (the character generated when you press the "Shift" key and the "6") plus the alpha character. See Chapter 5 for additional information regarding control codes and printer commands.

There are some special features offered by the printer that assist in label design. For example, the auto-size command (^A2^D39 <CR>) provides most of the header format information needed to define the different properties of the media being used. The current

state of the printer is accessed through the enquiry command (^D5 <CR>, Ctrl E, or 5 NULL characters (HEX 00) if binary compression has been enabled). The statistical information of the printer is made available through the use of the ^A0^D29 <CR> or more simply ^D29 <CR> command.

 The following sections of this chapter are intended to provide the user an overview of the LDS language. The overview will include information regarding the label format, header definition, and list the different types of field information available. The combination of these sections and Chapter 5 should provide the user with the information required for easy format creation and printing. Once some understanding of these basis concepts has been achieved, use the Quick Reference Guide in Appendix C for expedient label design.

4.3 Label Design: An Overview

A label format consists of a header record and field records, followed by the text data to be printed. The records describe how the label is to be printed. The header contains information about the label itself such as label height, width, print speed, etc. The field records refer to the data section and contain information about positioning coordinates, and the type of character generation such as text, graphics, bar codes, etc. The number of fields is limited only by the amount of free memory available.

Below is a sample label format created for the Model 428M. We will refer to this format as we break down the steps and components to produce the format. Refer to Figure 4-2 for a printed representation.

^D57 <CR>	A label format is coming.
5,1280,900,19,38,7,0,1,385,0,0 <CR>	Header Information.
1,640,650,8,1,5,0,4,2,2,,,,,0 <CR>	Field #1 format information.
2,640,550,11,1,5,0,4,2,2,,,,,0 <CR>	Field #2 format information.
3,640,450,26,1,5,0,4 <CR>	Field #3 format information.
4,640,300,6,1,5,0,4 <CR>	Field #4 format information.
4,640,150,6,16,3,,4,3,75 <CR>	Field #4 format information.
^D56 <CR>	Signals the end of the label field definition.
^D2 <CR>	Text data is coming.
Microcom <CR>	Text data string #1.
Corporation <CR>	Text data string #2.
Thermal Printing Solutions <CR>	Text data string #3.
012345 <CR>	Text data string #4.
^D3 <CR>	Print format.

The command ^D57<CR> on the first line informs the printer that a format is coming and causes the printer to enter the format entry mode.

The next line is the header information that sets the label size and other pertinent information.

The next five lines are layout and configuration for each data field in the format.

The command ^D56<CR> selects the user's layout or more simply the end of the formatting information.

The command ^D2<CR> instructs the printer to start accepting data for each of the defined field's strings that are entered into the previous format received (between the ^D57 and ^D56 commands). Field #1 defines the placement and configuration for Text Data String #1; Field #2 defines the placement and configuration for Text Data String #2, etc… The label is printed from the bottom left corner to the top of the label.

The next three lines are the text data for the associated field format lines.

Text Data String #4 is being accessed twice. The format places the Text "012345" on the label and then is accessed again placing a Code39 symbol representing "012345" on the label.

The command ^D3<CR> instructs the printer to print.
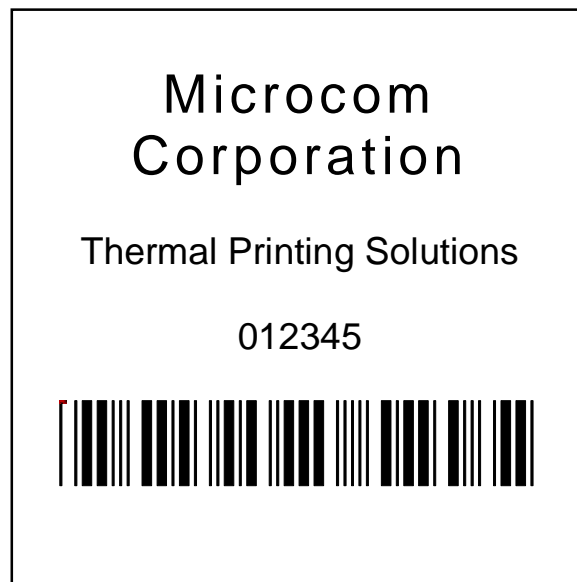
Figure 4-2   3x3 Sample Label

4.4 Label Header

The label header consists of eleven parameters that control the media layout as well as printer configuration. A comma (,) delimiter is used to separate the parameters and a carriage return is required to terminate the header.

The values for header elements requiring measurements are expressed as thermal dots or pixels. Dot or pixel size varies depending upon the print resolution of the print head. The dot size of a 300 dots per inch head (12 dots/mm) is 0.0032". The dot size is the same in both the horizontal and vertical direction. For example, a 4" X 6" label printed with a 300 DPI print head would be 1200 (4 X 300 dots in the horizontal or "X" direction, and 1800 (6 X 300) dots in the "Y" direction.

While the maximum number of dots in the horizontal or "X" direction is limited by print head size, it is virtually unlimited in the vertical or "Y" direction. Vertical dot rows are "stepped" by the drive roller motor.

This is a list of the header element mnemonics for the sample label in Figure 4-2:

HFM,	**LSX,**	**LSY,**	**WEB,**	**GAP,**	**DPS,**	**LCB,**	**AGD,**	**SPG,**	**OFX,**	**OFY**
5	1280	900	19	38	7	0	1	385	0	0

Feed Direction

4" PRINT HEAD

Microcom
Corporation

Thermal Printing Solutions

012345

Web Value
.0625" or
19 Dots

X beginning

This is the
origin; 1,1

Y beginning

LSY
3.0" or 900 Dots

Gap Value
.125" or 38 Dots

4.266" or 1280 Dots
(Total Print Head Dots)
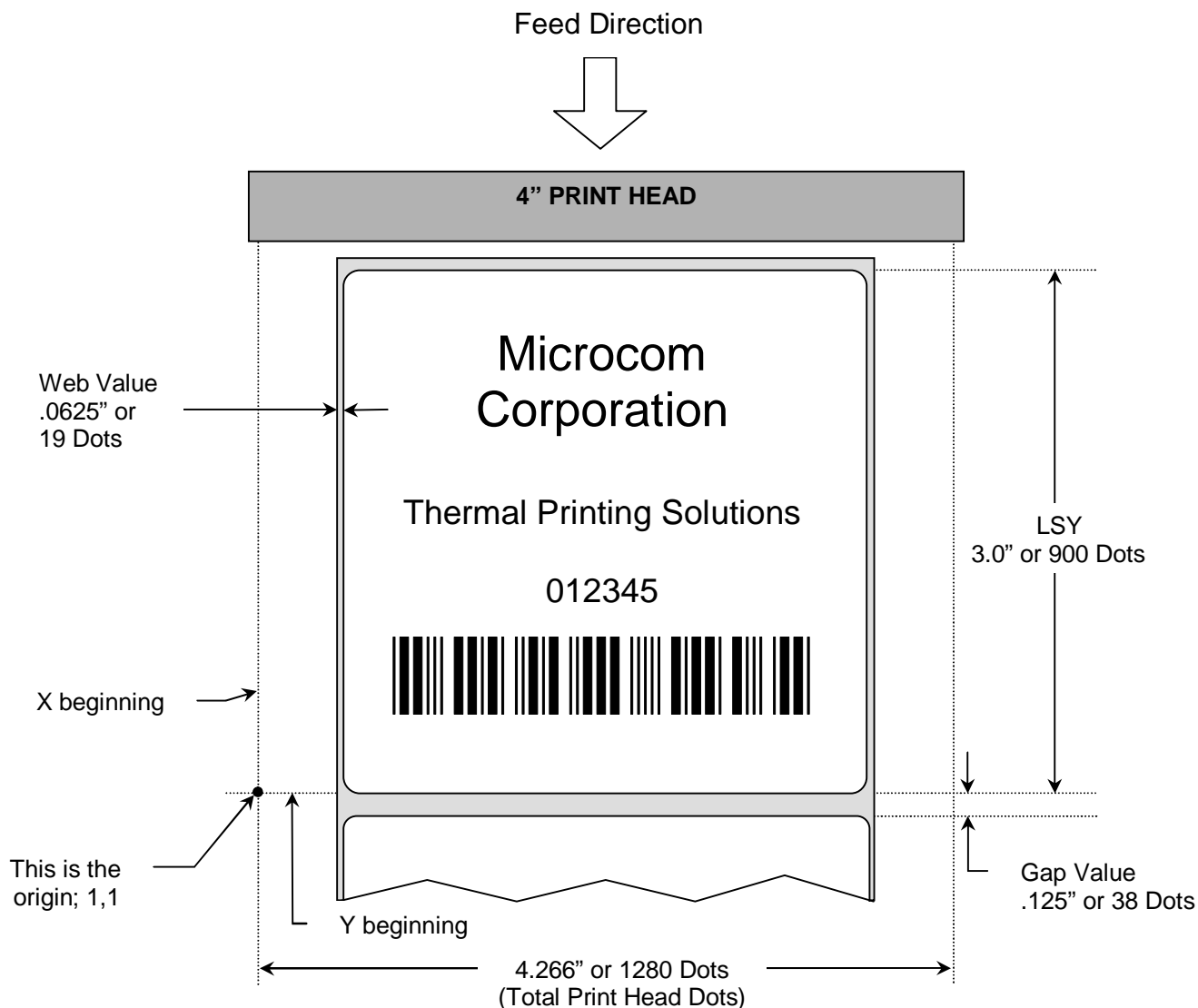
Figure 4-3   Header Elements

4.4.1   HFM   (Number of Fields in Layout)

HFM, LSX, LSY, WEB, GAP, DPS, LCB, AGD, SPG, OFX, OFY

This parameter is used to specify the number of fields in the layout. If more format fields are defined than specified in the HFM parameter, they will be ignored and will not print. The HFM was set to a value of 5 in the format used to create the sample in Figure 4-2. This means that a total of five format fields are to be generated. If the HFM were changed to 4, only the first four format fields would be generated. The HFM value should never be larger that the fields that are actually sent. This would cause the printer to produce corrupt images.

4.4.2   LSX   (Print Head Size X)

HFM, **LSX**, LSY, WEB, GAP, DPS, LCB, AGD, SPG, OFX, OFY

This parameter is used to specify the width of the print head using dots as the unit of measure. The maximum width of the LSX parameter is determined by the width of the print head. LDS has been specifically designed to accommodate a variety of print head widths. The 428M LSX value should always be set to 1280.

4.4.3   LSY   (Label Size Y)

HFM, LSX, **LSY**, WEB, GAP, DPS, LCB, AGD, SPG, OFX, OFY

This parameter is used to specify the height of the label using dots as the unit of measure. The maximum height is virtually unlimited and is dependant only with available printer memory. The label sample (Figure 4-2) LSY measures 3" or 900 dots.

4.4.4   WEB   (Web Size)

HFM, LSX, LSY, **WEB**, GAP, DPS, LCB, AGD, SPG, OFX, OFY

The WEB parameter is the width, measured in dots, of the webbing or backing material that is found on the left side of a die-cut label. This parameter is used to introduce an offset to accommodate the backing of die-cut media. The label sample (Figure 4-2) WEB measures .0625" or 19 dots.

4.4.5   GAP   (GAP Size)

HFM, LSX, LSY, WEB, **GAP**, DPS, LCB, AGD, SPG, OFX, OFY

This parameter is the height, measured in dots, of the registration mark used to identify the beginning of a label. The label sample (Figure 4-2) GAP (distance of the backing material between the labels) measures 0.125" or 38 dots.

4.4.6   DPS   (Print Speed)

HFM, LSX, LSY, WEB, GAP, **DPS**, LCB, AGD, SPG, OFX, OFY

The DPS parameter is used to set the printing speed for the printer. Refer to Table 4-1 for the list of print speeds, DPS values, and corresponding inches per second values. The printer has a default speed of 3.5 inches per second (IPS), which is a DPS value of 7. To print at greater speeds, change the DPS value to a lower setting as shown on Table 4-1. Generally, better print quality is achieved by printing at lower speeds, however this is also dependent on the media and contrast settings as well.

Labels per minute can be calculated by the equation below:

$$\text{Labels per Minute} \quad = \quad \frac{\text{IPS x 60 seconds}}{\text{Label Height}}$$

PRINT SPEED			
DPS VALUE	MM PER SECOND	INCHES PER SECOND	INCHES PER MINUTE
00	203.2	8.0	480
01	190.5	7.5	450
02	177.8	7.0	420
03	165.1	6.5	390
04	152.4	6.0	360
05	139.7	5.5	330
06	127.0	5.0	300
07	114.3	4.5	270
08	101.6	4.0	240
09	88.9	3.5	210
10	76.2	3.0	180
11	63.5	2.5	150
12	50.8	2.0	120
13	38.1	1.5	90

Table 4-1   DPS Values

4.4.7   LCB   (Label Control Byte)

HFM, LSX, LSY, WEB, GAP, DPS, **LCB**, AGD, SPG, OFX, OFY

This parameter selects the method the printer uses for detecting registration marks on the different media types. The428M printer has both upper (transmissive) and lower (reflective) gap detectors as standard equipment. The following sections discuss the LCB settings for the different media types.

4.4.7.1   Die-Cut and Blow-Hole Media (setting = 0)

A selection of "0" in the LCB parameter instructs the printer to detect the leading edge of a die-cut label or a "blow-hole" to identify the start of the next label. In this method light from the lower sensor passes through the stock to the detector in the upper sensor. This is referred to as "transmissive" sensing.   The label sample (Figure 4-2) is die-cut, therefore, the LCB is set to "0".

4.4.7.2   Continuous Media (setting = 2)

If the LCB parameter is set to a value of "2", the printer will not search for a registration mark. The gap detectors are only used for stock out conditions when set for continuous media types. The printer will print all fields that contain data and then advance the media by the amount specified in the SPG parameter of the header when the default AGD of "1" is entered in the header. This means that fields that are left blank or text data for the associating format fields are left empty will not print.

For example: Imagine a receipt format that contains 100 lines. If data is provided for the first 50 lines, the printer will not advance for the remaining 50 lines that have been left blank. The printer would stop immediately after printing the 50th line and then advance the media by the amount specified in the SPG header parameter.

When the AGD header parameter is set to "0", the printer will advance the same amount of media even when text data fields are left blank. In this case, the advance distance is determined by adding the SPG parameter and LSY parameter values.

For example: Imagine the same format as mentioned above that has an LSY value of 900 (3" x 300 = 900), an SPG value of 385, and an AGD value of "0" that contains 100 format lines. If text data is provided for the first 50 lines and the remaining 50 lines are left empty, then the printer will print the first 50 lines, advance the next 50 lines, advance the remaining LSY value, and then finally advance the SPG or 385 dots. Regardless of the format fields, if the LSY is set to 900 and the SPG is set to 385 the printer will advance a total of 1285 dots (900+385=1285).

4.4.7.3   Black Line Media (Reflective) (setting = 3)
The Reflective Black Line method is used when media uses a black line for a registration mark; a "3" should be entered in the LCB parameter. This setting will detect the leading edge of the black line by using the reflective sensor only. The light from the emitter in the lower sensor is reflected down to the detector in the lower sensor.

Note: The transmissive sensor is still used to detect "paper out" conditions.

4.4.8   AGD (Activate Gap Detector)
HFM, LSX, LSY, WEB, GAP, **DPS**, LCB, **AGD**, SPG, OFX, OFY
This parameter selects the number of step (dot rows) that the printer will skip before registration mark sensing is activated. This value is usually set to "1". It is a good idea to set it to a value to ignore areas of pre-printed or perforated stock that might cause incorrect registration mark detection.

4.4.9   SPG (Steps Past Gap)
HFM, LSX, LSY, WEB, GAP, DPS, LCB, AGD, **SPG**, OFX, OFY
This parameter is used to specify the number of steps (thermal dots) to advance the media after a registration mark has been detected.   This parameter is required to properly register print on each label. The table below lists proper SPG settings for particular printer configurations when the LSY is greater than the D2G parameter value, the D2G value is used.

Registration Sensor/Print Head DPI	D2G Value
Transmissive (GAP) / 203 DPI	264
Reflective (Blackline) / 203 DPI	487
Transmissive (GAP) / 300 DPI	385
Reflective (Blackline) / 300 DPI	720

Table 4-2   Dot to Gap Parameters

For media that has a LSY value less than the D2G parameter value in table 4-2, the SPG will need to be calculated. SPG can be calculated using this formula:

SPG = (D2G + LSY - DRM) mod (LSY + SBL)

NOTE: All values are in pixels or dots.

D2G = This is a physical distance from the registration sensor being used to the print head's dot row, and is a specific value for each model; see Table 4-2

LSY = This is the actual height of the media or printable surface in pixels or dots.

DRM = The Distance to Registration Mark is the distance from the leading edge of the printable area to the beginning of the registration mark.

SBL = The Space Between Labels is the non-printable distance between the media, typically found on die-cut labels. If the media contains space between the actual printable portions of the media being used, this would be the SBL parameter. Please note that this does not reflect a blowhole or black line height, as these registration marks are typically positioned within the printable area. When die-cut media is used, this value is also used in the GAP header parameter.

Calculation Examples:

Die-cut Media:
A 203 DPI printer is being used with 3" x 1" media containing a .125" die-cut gap. The SPG would be calculated as follows:
SPG = (D2G + LSY - DRM) mod (LSY + SBL)

SPG = (264 + 203 - 203) mod (203 + 25)

SPG = 264 mod 228

SPG = 36

D2G (264) =	The Dot to Gap distance for the transmissive sensor (Table 4-2).
LSY (203) =	The height of the printable area; 1" x 203 DPI = 203 dots.
SBL (25) =	The Space Between Labels, or die-cut GAP in this case; .125" x 203 DPI = 25 dots.
DRM (203) =	The Distance to Registration Mark is from the leading edge of the printable area to the next registration mark; 1" x 203 DPI = 203 dots.

The SPG may also be determined by adding a line at dot row #1 using Line Draw (See Section 4.7) and adjusting the SPG number up and down to get desirable registration with the line printing at the bottom edge of the media.

4.4.10   OFX   (Offset X Direction)
HFM, LSX, LSY, WEB, GAP, **DPS**, LCB, AGD, SPG, **OFX**, OFY

This parameter is used to move or offset all format fields in the X direction without altering the format fields coordinates themselves.

4.4.11   OFY   (Offset Y Direction)
HFM, LSX, LSY, WEB, GAP, DPS, LCB, AGD, SPG, OFX, **OFY**

This parameter is used to move or offset all format fields in the Y direction without altering the format fields coordinates themselves.

4.5 Sample Header

This is the header for the format used to generate the printed sample in Figure 4-2 followed by a summary of the header values.

            5, 1280, 900,19 ,38 ,7 ,0 ,1 ,385, 0, 0 <CR>

5	=	5 format fields are following the header.
1280	=	LSX (total print head dots) is 1280 dots.
900	=	LSY (label height) measures 3" or 900 dots.
19	=	WEB measures 0.0625" or 19 dots.
38	=	GAP measures 0.125" or 38 dots.
7	=	Print speed (DPS) of 7 = 4.5 inches per second.
0	=	LCB of 0 for die-cut labels.
1	=	AGD of 1 step.
385	=	SPG of 385 for proper placement of the next label.
0	=	No X offset.
0	=	No Y offset.
<CR>	=	A carriage return must follow the header.

4.6 Label Format Fields

The Label Format Fields are used to define the characteristics, placement and representation of the corresponding text data of the individual fields. A format field is broken down into many different parameters. It is not necessary to enter values for all of the parameters (default value will be used if a parameter is left blank) but each parameter must be separated with the comma delimiter (","). A carriage return must follow each format field for proper operation to occur. The values entered must be positive integers for all of the parameters of the format field.

 This is a list of the first label format field element mnemonics for the sample label in Figure 4-2:

TSN, XB, YB, CC, TCI, CGN, FO, FJ, CMX, CMY, CS, TSP, , , AN
** 1, 640, 650, 8, 1, 5, 0, 4, 2, 2, 1, 1, , , 0**
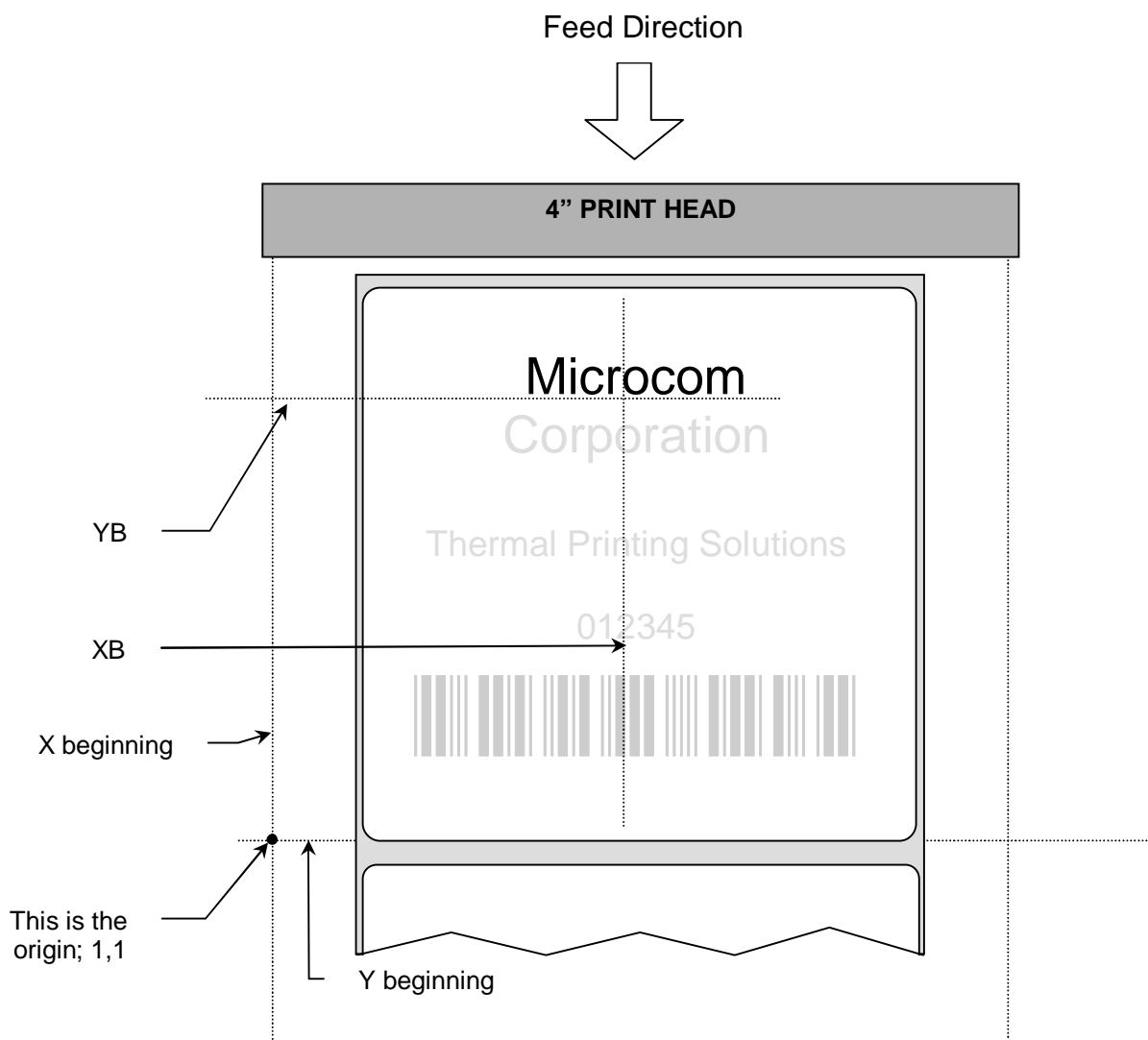
Figure 4-4   Label Format Field Elements

4.6.1   TSN   (Text String Number)

TSN, XB, YB, CC, TCI, CGN, FO, FJ, CMX, CMY, CS, TSP,,, AN

The parameter determines which line of text data will be used for formatting. This allows for more than one field to use the same text data. A TSN of "1" accesses the first line of data. A TSN of "2" accesses the second line of data, and so forth. The text data is the text that follows the "^D2<CR>" command in the label's layout. A graphic image field must point to a text string that contains at least one character. The maximum value for a TSN is 65536.

4.6.2   XB   (X Beginning Coordinate)

TSN, **XB**, YB, CC, TCI, CGN, FO, FJ, CMX, CMY, CS, TSP,,, AN

The X coordinate of the field is measured in thermal dots. The far left edge of the print head, as viewed from the front of the printer, is X coordinate "1". There is no X coordinate of "0". The X coordinates increase in size from the left to right. An XB of 300 would place the field one inch from the left side of the print head. Any offsets required for media that is not as wide as the print head must be manually entered for the XB or the OFX header element may be used.

Example: The print head is 1280 dots, if 3" or 900 dot wide media was used, the offset of 190 should be added to each XB coordinate.

Offset example: 1280 - 900 = 380; 380/2 = 190.

4.6.3   YB   (Y Beginning Coordinate)

TSN, XB, **YB**, CC, TCI, CGN, FO, FJ, CMX, CMY, CS, TSP,,, AN

The Y coordinate of the field is measured in thermal dots. A YB coordinate of 1 would be the bottom edge of the label as viewed front the front of the printer. The Y coordinates increase in size from the bottom to the top of the label. A YB of 300 would place the insertion point one inch from the bottom of the label.

4.6.4   CC   (Character Count)

TSN, XB, YB, **CC**, TCI, CGN, FO, FJ, CMX, CMY, CS, TSP,,, AN

This parameter determines the number of characters that will be used by the format field. If the number of characters in the selected text string is greater than the quantity specified by the CC, the remainder of the text string will be ignored. If the text string has less than the number specified by the CC, then only those characters defined by the text string will be printed. For example, the text string "character count" should have a CC of "15" including the space character. This parameter should be set to a value of "1" if the field is a graphic image.

4.6.5   TCI   (Text Conversion Identifier)

TSN, XB, YB, CC, **TCI**, CGN, FO, FJ, CMX, CMY, CS, TSP,,, AN

The TCI parameter determines how the text string will be printed. The TCI is used to select text, bar codes, lines, downloadable font, or graphics. All of the TCI values used by the 428M printer are listed in Table 4- below. For example, a TCI of "1" for the text string data "012345" would print the text "012345" while a TCI of "15" would produce an "Interleaved 2 of 5" symbol.

TCI VALUE	TCI DESCRIPTION
1	Regular Text (standard embedded fonts, no barcode)
2	Text Surrounded by Asterisks
3*	Text with UPC-A / UPC-E Checksum Digit Added
6	Line Draw
7	FLASH Fonts and Graphics
8	RAM Fonts and Graphics
12	UPC-A Symbol
13	UPC-E Symbol (Send 11 Digits)
14	UPC-E Symbol (Send 7 Digits)
15	Interleaved 2 of 5 Barcode
16	Code 39 Symbol
17*	Text with UPC-E Checksum and Extended Bars Added
20	EAN-13 Symbol
21	EAN-8 Symbol
22*	Text with EAN-13 Checksum and Extended Bars Added
23*	Text with EAN-8 Checksum and Extended Bars Added
24	MSI 1 Symbol (Modified Plessey)
25	MSI 2 Symbol (Modified Plessey)
26	MSI 3 Symbol (Modified Plessey)
28*	Text with MSI Checksum Added – Type 1
29*	Text with MSI Checksum Added – Type 2
32*	Text with UPC-A Checksum and Extended Bars Added
33*	Text with UPC-A with Extended Bars Added
35	RSS14 Barcode
36	Postnet Symbol (Zip+4)
37	Postnet Symbol (Zip+6)
38	MaxiCode Symbol
40	Code 128 Symbol (Automatic Compression)
41	Code 128 Symbol (Manual Compression)
42	Codabar Symbol
43	Code 93 Symbol
46	PDF-417 Symbol
50	UCC/EAN 128 Symbol
51*	Text with EAN 128 Information

* Human Readable - Refer to Chapter 8

Table 4-3   TCI Values

4.6.6   CGN   (Character Generator Number)

TSN, XB, YB, CC, TCI, **CGN**, FO, FJ, CMX, CMY, CS, TSP,,, AN

The CGN parameter is a numeric entry that determines the representation and size of embedded font and bar codes as well as the memory location of graphic images that have been selected by the TCI parameter.

4.6.6.1   Embedded Fonts

The 428M printer provides seven resident Helvetica style 203 DPI embedded fonts that are selected using the CGN when text is selected by the appropriate TCI value.

Embedded Bitmapped Fonts			
CGN VALUE	**POINT SIZE**	**FONT TYPE**	**FONT SAMPLE**
1	6	Swiss™721 Bold	6pt ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890
2	8	Swiss™721 Normal	8pt ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890
3	10	Swiss™721 Normal	10pt ABCDEFGHIJKLMNOPQRSTUVWXYZ
4	12	Swiss™721 Normal	12pt ABCDEFGHIJKLMNOPQRSTU
5	14	Swiss™721 Normal	14pt ABCDEFGHIJKLMNOPQR
7	12	OCR-A	ABCDEFGHIJKLMNOPQRSTUVWXYZ
8	12	OCR-B	ABCDEFGHIJKLMNOPQRSTUVWXYZ

Table 4-4   CGN—Embedded Fonts

4.6.6.2   Downloadable Fonts and Graphics

When selecting downloadable fonts and graphics using TCI value of "7" or "8", the CGN denotes the memory slot (1-255) where the font or graphic has been stored. See Chapters 6 and 7 for additional information regarding downloadable fonts and graphics.

For example: If a graphic had been stored into RAM (volatile) memory slot 1 (see Chapter 5 for additional information), the proper TCI would be "8" and the CGN value would be "1".

The Model 428M also provides a standard downloadable font set containing 19 Helvetica style fonts. These fonts are stored in the printer's non-volatile flash memory and are accessed with a TCI of 7 and the appropriate CGN value. Custom font sets may be loaded into printers at the factory, ask your Microcom Representative for additional information on custom font sets.

Downloadable fonts must be stored in two separate directions; 0 and 90 degrees. This means that the 0 degree fonts should be used with 0 and 180 degree rotations while the 90 degree fonts used with 90 and 270 degree rotations in order to achieve correct printing.

Standard Downloadable Font Set		
CGN VALUE	**POINT SIZE**	**FONT TYPE**
10	6	Swiss™721 Normal 0 degree
11	6	Swiss™721 Normal 90 degree
12	8	Swiss™721 Normal 0 degree
13	8	Swiss™721 Normal 90 degree
14	10	Swiss™721 Normal 0 degree
15	10	Swiss™721 Normal 90 degree

Standard Downloadable Font Set		
CGN VALUE	POINT SIZE	FONT TYPE
16	12	Swiss™721 Normal 0 degree
17	12	Swiss™721 Normal 90 degree
18	14	Swiss™721 Normal 0 degree
19	14	Swiss™721 Normal 90 degree
20	16	Swiss™721 Normal 0 degree
21	16	Swiss™721 Normal 90 degree
22	20	Swiss™721 Normal 0 degree
23	20	Swiss™721 Normal 90 degree
24	24	Swiss™721 Normal 0 degree
25	24	Swiss™721 Normal 90 degree
30	6	Swiss™721 Bold 0 degree
31	6	Swiss™721 Bold 90 degree
32	8	Swiss™721 Bold 0 degree
33	8	Swiss™721 Bold 90 degree
34	10	Swiss™721 Bold 0 degree
35	10	Swiss™721 Bold 90 degree
36	12	Swiss™721 Bold 0 degree
37	12	Swiss™721 Bold 90 degree
38	14	Swiss™721 Bold 0 degree
39	14	Swiss™721 Bold 90 degree
40	16	Swiss™721 Bold 0 degree
41	16	Swiss™721 Bold 90 degree
42	20	Swiss™721 Bold 0 degree
43	20	Swiss™721 Bold 90 degree
44	24	Swiss™721 Bold 0 degree
45	24	Swiss™721 Bold 90 degree
50	12	OCR-A Normal 0 degree
51	12	OCR-A Normal 90 degree
52	12	OCR-B Normal 0 degree
53	12	OCR-B Normal 90 degree
54	8	OCR-B Normal 0 degree
55	8	OCR-B Normal 90 degree

Table 4-5   CGN - Standard Downloadable Font Set

4.6.6.3   Embedded Bar Codes

Certain bar codes can be printed using various ratios and character spacing options. The following table illustrates these options. See Chapter 8 for more detailed information on designing label formats using bar code symbols. Some bar codes do not require a CGN value and should be omitted by entering the comma delimiter.

For Example: If a TCI of 40 is selected the CGN will be omitted by entering nothing for the CGN and surrounding the parameter with the comma delimiter.

<div align="center">

1,200,200,10,**40,,**0,0,100,1

</div>

Bar Code Symbologies					
SYMBOL	CGN VALUE	RATIO	HEIGHT	SPACING	FO **
Code 39	2 3 5 8	2:1 3:1 5:2 8:3	1 1 1 1	2 2 2 3	0123 0123 0123 0123
I 2 of 5	2 3 5 7 8	2:1 3:1 5:2 7:3 8:3	1 1 1 1 1	- - - - -	0123 0123 0123 0123 0123
UPC / EAN *	-	40 %	1	-	0123
UPC Readable *	-	40 %	1	-	0123
Code 128 & UCC / EAN 128 *	-	40 %	1	-	0123
Codabar	2 3 5	2:1 3:1 5:2	1 1 1	- - -	0123 0123 0123
Code 93	-	2:1	1	-	0123
AS-10	-	2:1	1	-	0123
Maxicode (CGN = Mode)	2 3 4 5 6	- - - - -	- - - - -	- - - - -	0123 0123 0123 0123 0123
MSI (Modified Plessey)	-	1:1	1	-	0123

<div align="center">

Table 4-6   CGN—Bar Code Symbologies

</div>

* These Symbols must use the CMX or CMY multipliers by 2 to produce an 80% ratio.

** The "FO" field represents the available Field Orientation or print rotation.

4.6.7   FO   (Field Orientation)

TSN, XB, YB, CC, TCI, CGN, **FO**, FJ, CMX, CMY, CS, TSP,,, AN

This parameter defines the rotation of the format field on the label. The point of rotation is determined from the Field Justification parameter.

0	0 degrees (normal rotation)
1	180 degrees (upside-down rotation)
2	90 degrees (left rotation)
3	270 degrees (right rotation)

4.6.8   FJ   (Field Justification)

TSN, XB, YB, CC, TCI, CGN, FO, **FJ**, CMX, CMY, CS, TSP,,, AN

This parameter defines the justification of the format field on the label.

0	Left Justified above the base-line
1	Right Justified above the base-line
2	Left Justified below the base-line
3	Right Justified below the base-line
4	Centered above the base-line
5	Centered below the base-line

Table 4- shows how to obtain the proper character placement or starting positions relative to the format field's orientations and justifications.

ROTATION	FIELD ORIENTATION and JUSTIFICATION
0 & 180 Degrees	0 – Left justified above the base-line 1 – Right justified above the base-line 2 – Left justified below the base-line 3 – Right justified below the base-line 4 – Centered above the base-line 5 – Centered below the base-line
90 & 270 Degrees	0 – Left justified above the base-line 1 – Right justified above the base-line 2 – Left justified below the base-line 3 – Right justified below the base-line 4 – Centered on the Y axis, right of X coordinate 5 – Centered on the Y axis, left of the X coordinate

Table 4-7   FO & FJ Character Starting Positions

4.6.9   CMX   (Character Multiplier X Direction)

TSN, XB, YB, CC, TCI, CGN, FO, FJ, **CMX**, CMY, CS, TSP,,, AN

The CMX parameter multiplies each character in the X direction. The valid range is 1 to 65536. For bar codes with a FO of 0 & 180 degree rotation, the CMX would be the multiplier while the CMY would be the actual height in thermal dots. For bar codes with a FO of 90 & 270 degree rotation, the CMX would be the actual height in thermal dots while the CMY parameter would be the multiplier.

4.6.10   CMY   (Character Multiplier Y Direction)
TSN, XB, YB, CC, TCI, CGN, FO, FJ, CMX, **CMY**, CS, TSP,,, AN

The CMY parameter multiplies each character in the Y direction. The valid range is 1 to 65536. For bar codes with a FO of 90 & 270 degree rotation, the CMY would be the multiplier while the CMX would be the actual height in thermal dots. For bar codes with a FO of 0 & 180 degree rotation, the CMY would be the actual height in thermal dots while the CMX parameter would be the multiplier.

4.6.11   CS   (Character Spacing)
TSN, XB, YB, CC, TCI, CGN, FO, FJ, CMX, CMY, **CS**, TSP,,, AN

This parameter adjusts the spacing between each character. If this parameter is omitted, then the default for the selected character generator (CGN) is used. The values (0-127) add dots while (128-255) subtract dots. For example, a value of 4 would insert 4 dots between the characters while a value of 131 would subtract 4 dots between the characters. Bar codes have default spacing according to the indicated multiplier. Multiplying a text string will not multiply the spacing between characters. This element may be used to properly space the characters to create the desired printed effect.

4.6.12   TSP   (Text Starting Position)
TSN, XB, YB, CC, TCI, CGN, FO, FJ, CMX, CMY, CS, **TSP**,,, AN

This parameter marks the starting position of the character in the text string to be used as data. This is useful for allowing several fields to use sections of the same text string, minimizing the amount of data transmitted. For example, for the text string 0123456789, a TSP of 5 and a CC (Character Count) of 2 would print 45.

4.6.13   ,,,   (Reserved Spaces)
TSN, XB, YB, CC, TCI, CGN, FO, FJ, CMX, CMY, CS, TSP**,,,** AN

These are spaces reserved for future use and nothing should be entered between the comma delimiters.

4.6.14   AN   (Attribute Number)
TSN, XB, YB, CC, TCI, CGN, FO, FJ, CMX, CMY, CS, TSP,,, **AN**

The AN parameter has four different effects. If set to a value of "0" the character spacing is proportional. Reverse Text (white on black) is created by setting the AN to a value of "1" and printing a black box on top of the text using the Line Draw function. (Special Note: The AN parameter of the line field should also be set to a "1" for proper reverse imaging.) If the AN parameter is set to a value of "2", the character spacing will be fixed / non-proportional. A setting of "3" will print both fixed/non-proportional character spacing and reversed text.

0	Proportional Character Spacing
1	Reverse Video
2	Fixed / Non-proportional Character Spacing
3	Fixed / Non-proportional Character Spacing and Reverse Video
8	Auto Reverse Video: Character cell = BLACK, Character = WHITE

4.7 Line Draw

It is possible to design lines into a label utilizing some of the elements of label format fields. Specifically, a TCI value of "6" enables the line draw function. XB and XY provide a starting position for a line draw. CMX and CMY provide length and thickness to a line. Other elements not necessary to draw a line such as CC, CGN, FO, FJ, CS, and AN are ignored by simply adding delimiters (commas) without values.

An example of two lines drawn on a label is shown in Figure 4-5. This 3 x 3" label was designed for a 428M printer with a 300 DPI print head.

```
^D57 <CR>
2,1280,900,19,38,7,0,1,385,0,0 <CR>
1,340,712,,6,,,,600,25,,,,,0 <CR>
1,286,127,,6,,,,25,600,,,,,0 <CR>
^D56 <CR>
^D2 <CR>
Line <CR>
^D3 <CR>
```
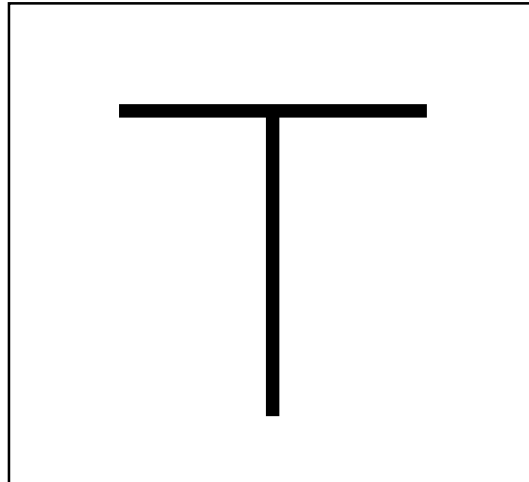

Figure 4-5   Line Draw Sample

This is a list of the first label format field element mnemonics for the sample label in Figure 4-5:

TSN, XB, YB, CC, TCI, CGN, FO, FJ, CMX, CMY, CS, TSP, , , AN
  1, 340, 712,   , 6,   ,   ,   , 600, 25,   ,   , , , 0

Feed Direction
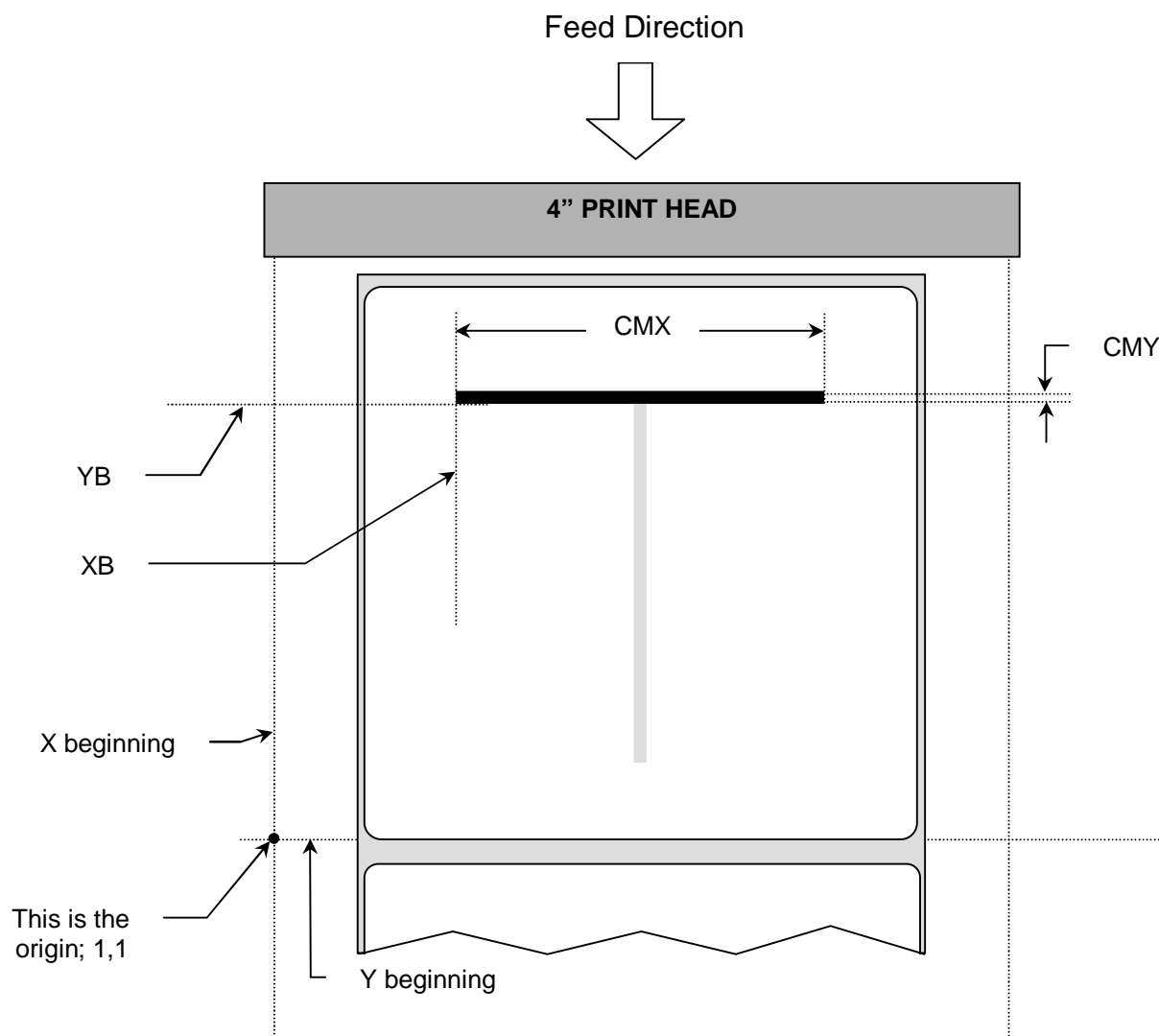
Figure 4-6   Label Format Line Draw

TSN (Text String Number) The TSN parameter may point to any valid text string but it is a good idea to always use "1" to make trouble-shooting formats easier. The text string that the TSN is referencing must contain at least one character in order for a line to print properly. "Line" was used in the example to clearly define the label format fields that contain line values. However, it could have simply been one character such as a period "."

XB (X Beginning Coordinate) The X and Y coordinates determine the start of the line draw.

YB (Y Beginning Coordinate) The X and Y coordinates determine the start of the line draw.

CC (Character Count) This element is not used in line draw. No value is necessary, however, a comma needs to be entered to acknowledge the position.

TCI (Text Conversion Identifier) The TCI is always set to a "6" for line draw.

CGN (Character Generator Number) This element is not used in line draw. No value is necessary, however, a comma needs to be entered to acknowledge the position.

FO (Field Orientation)   This element is not used in line draw. No value is necessary, however, a comma needs to be entered to acknowledge the position.

CMX (Character Multiplier X Direction) This element sets the length of a horizontal line or the thickness of a vertical line.

CMY (Character Multiplier Y Direction) This element sets the length of a vertical line or the thickness of a horizontal line.

CS (Character Spacing) This element is not used in line draw. No value is necessary, however, a comma needs to be entered to acknowledge the position.

TSP (Text Starting Position)   This element is not used in line draw. No value is necessary, however, a comma needs to be entered to acknowledge the position.

,,, (Reserved Spaces)   These are reserved for future use and no values should be added between the commas.

AN (Attribute Number) This element should be set to "0" for line draw.

4.8 Reverse Video

The printer has the ability to produce Reverse Video by printing white text over a black background. Two methods are used to produce this effect. The advantages and disadvantages are covered in greater detail in the following two sections.

4.8.1   Reverse Video

The first method (Reverse Video) is to place text over a black box created with line draw. When the label format defines print at the same coordinate twice the printer will not print creating a reverse print effect when the Attribute Number (AN) is set to "1" for the Label Format Fields defining the line draw and the text fields. The size of the box is not defined by the text. Adjustment to the size of the box must be made by adjusting the line draw coordinates.

```
^D57
6,1280,900,19,38,7,0,1,385,0,0
1,300,300,,6,,,,700,550,,,,,1
2,640,700,8,3,5,0,4,2,2,,,,,1
3,640,591,11,1,5,0,4,2,2,,,,,1
4,640,443,26,1,5,0,4,,,,,,,1
5,640,296,6,1,50,4,,,,,,,1
5,640,148,6,16,3,,4,3,75,,,,,0
^D56
^D2
Line
Microcom
Corporation
Thermal Printing Solutions
012345
^D3
```
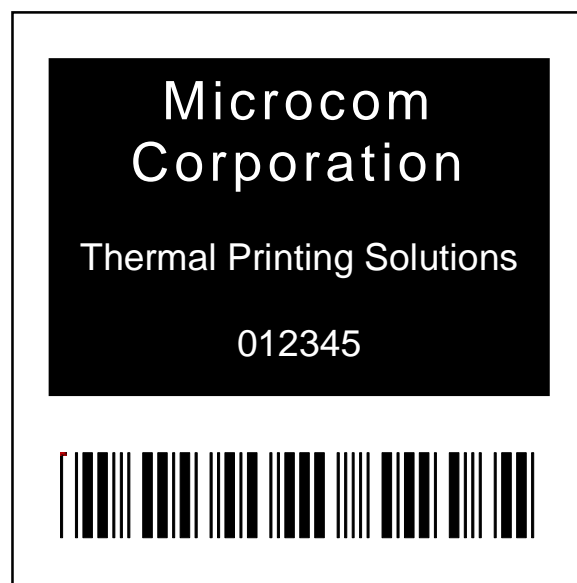
Figure 4-7   Reverse Video Sample

4.8.2   Auto Reverse Video

The second method (Auto Reverse Video) will create a white character in a black character cell. The size of the black box surrounding the character will be determined by the character cell. Adjusting the size of the box is surrounding text is limited using this method.

It is possible to create a reverse video effect with barcodes using this method.

```
^D57
5,1280,900,19,38,7,0,1,385,0,0
1,640,700,8,1,5,0,4,2,2,,,,,8
2,640,591,11,1,5,0,4,2,2,,,,,8
3,640,443,26,1,5,0,4,,,,,,,8
4,640,296,6,1,5,0,4,,,,,,,8
4,640,148,6,16,3,,4,3,75,,,,,0
^D56
^D2
Microcom
Corporation
Thermal Printing Solutions
012345
^D3
```
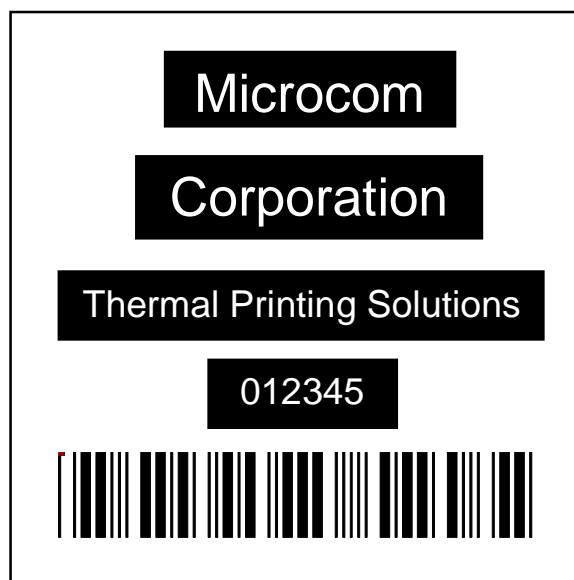
Figure 4-8   Auto Reverse Video Sample

Chapter 5 Printer Commands

The model 428M printer has a large and versatile collection of control commands to meet the special needs of the most demanding applications. Most of the commands use the "^D" control sequence, however the printer also recognizes a selected number of other control sequences.

For all commands listed in this manual, the printer will recognize the one character control code ("Ctrl+D") or the two-character caret plus alpha character ("^+D+<CR>") sequence. In other words, the same command may be generated by either holding the control (Ctrl) key down and pressing the alpha character or by entering the two characters – the ^ (caret, generated when the "Shift" key is pressed and then the "6" key) and then the appropriate alpha key (upper and/or lower case).

Unless specified otherwise, commands are entered by sending the ^Dxx command where xx is the command number. The ^D commands are terminated by either issuing a carriage return after the command or by issuing another command and/or control code. Some commands load data or control numbers and are preceded by the ^Axx command. The xx specifies the value and/or control number for the associating ^D command. The ^D commands should precede or follow the actual format layout. They should be placed before the ^D57 or just before the ^D3 print command unless otherwise mentioned.

To protect against errors, in situations where the two-character caret and alpha sequences are used exclusively as printer commands, the control character recognition may be disabled. This is accomplished by using the ^D93 command or by using the ^D21 command to setup Soft Switch #1 (^D21) Bit 3 (See 5.2.1.1).

Some mainframe and mini-computers cannot use the ASCII "^" character. In these cases, substitute the ASCII pipe symbol ("|") or use the one-character control code representation.

5.1   Special Printer Control Codes

To perform special functions, the printer uses the following control characters. All other control characters will be ignored. Some of these instructions are also accessible through a "^D" command sequence and will be noted as such.

^A   **Accumulator Mode:** Used to supply the parameters for the ^D commands. These parameters must be positive integers and are generally decimal numbers but may be entered as binary if the ASCII "B" precedes the value or parameter. For example, "^AB00000001^D21 <CR>" may also be entered as "^A1^D21 <CR>" as well.

^B   **Text Entry Mode:** Instructs the printer to enter printable text entry mode. This command (or the preferred "^D <CR>") must be sent before the text string information. This command is the equivalent of the "^D<CR>" sequence but does not require the carriage return (^B text string data). Because the "control B" is shorter, it is easier to use in direct terminal mode. In general it is better to use the ^D2 command sequence inside a file or program to assist in trouble-shooting the format.

^C   **Print:** Starts the print cycle or batch. This command is the equivalent of the "^D3<CR>" command sequence but does not require the carriage return. Because the "control C" is shorter than the ^D3 command sequence it is easier to use in direct terminal mode. In general the ^D3 sequence is better to use inside a format and/or program to assist in trouble-shooting the format.

^D   **Command Mode:** Used to issue commands to the printer. This command is normally preceded by the ^A sequence. The ^D commands must be terminated with a carriage return or another command sequence (^A9^D73^D3<CR> is the same as ^A9^D73<CR> and ^D3<CR>).

^E   **Printer Enquiry:** This command is used to attain the current status or operational state of the printer. The "^E" does not require a carriage return and is the equivalent to the "^D5<CR>" command sequence. If Binary Compression is enabled (default setting) the ^E command will not function. Five NULL characters (0x00) followed by a SOH (0x01) (00 00 00 00 00 01) are required to get the printer's immediate status when configured for binary compression use. The serialized ^D5 command will continue to function while in binary compression mode if the printer is idle or not in an error. It is recommended that the five NULL's method is used to request printer status as it functions with a printer in binary compression, binary compression disabled, or if the printer is in an error condition. See 5.1.1 for additional information regarding the Printer Enquiries.

^M   **Terminate Text or Data String:** This command is the equivalent of the carriage return character and is used to terminate commands and format lines.

^H   **Delete:** This control code is used to delete the last printable character when communicating to the printer through a keyboard via a terminal. The ^H is the equivalent of the "Backspace" key on the keyboard.

^K   **Print Test Pattern:** Used to generate a test pattern, which consists of a series of diagonal lines. The pattern is helpful in determining the condition of the thermal dots on the print head. The ^K code is the equivalent of the "^D11 <CR>" command sequence.

^L   **Form Feed:** Used to feed one blank form based on the previous format configuration parameters. This command is the equivalent of the "^D12 <CR>" command sequence.

^Q   **XON:** Instructs the printer to send data or resume sending data.

^S   **XOFF:** Instructs the printer to stop sending data.

5 NULLS + 01: The 5 NULL method commands are a way to pass commands to the printer even when the printer in configured in binary compression mode. The command is sent to the printer as HEX characters; 00 00 00 00 00 01 are sent to the printer in order to issue the command. This command is used to request the printer's status and is very similar to the ^E command. The biggest difference between this command and the ^E is that when printers are

configured for binary compression (D23 -SW3 bit 7), which is required if saving graphics, the ^E will not function. This means that if the printer is going to be using binary compression, the 5 NULL's method should be used to request status instead of the ^E command.

5 NULLS + 02: The 5 NULL method commands are a way to pass commands to the printer even when the printer in configured in binary compression mode. The command is sent to the printer as HEX characters; 00 00 00 00 00 02 are sent to the printer in order to issue the command. This command is used to cancel pending jobs/commands and to remotely clear errors returning the printer to an idle >READY< state. If the condition causing the original error condition still exists, sending new jobs will cause the printer to go back into an error condition. This command simply provides the ability to remotely clear error conditions and return the printer to a state that allows normal communication.

5.1.1   Enquiry Responses

It is important for the host computer to know the status of the printer as labels are being produced. This facilitates security in the system and flags electrical, mechanical, and functional error conditions. Enquiries also aid the system designer in adjusting the pace of the printer with that of the operator or host system.

The printer returns enquiry responses to the host in two different modes depending on how Software Switch#1 is configured. (See Section 5.2.1.1)

Text Mode: The response is sent to the host as text as shown in Table 5-2. The strings are sent out the active communication port with a CR LF (0x0D 0x0A) separating each one. The end of the response is terminated with an extra CR LF.

Byte Mode: The response is sent to the host as a hexadecimal number (byte) as shown in Table 5-2. Each string is represented by a single byte with nothing separating them. The end of the response is terminated with a 0xFF character.

5.1.1.1   STL Status Responses

If the STL Emulation (Switch Bank #6 bit 2; D26 command) is enabled, the printer will report STL type responses instead of the normal LDS status responses. The STL mode continues to follow the Text and/or Byte mode rule above but will only Display the Decimal codes.

Text Mode Response	Byte Mode Response	Definition
6	6	TICKET ACK
16	16	OUT OF TICKETS
25	25	ILLEGAL DATA
29	29	CUTTER JAM

Table 5-1   STL Status Responses

Text Mode Response	Byte Mode Response	Definition
>RESTARTED<	1A	Printer has been reset
>READY<	06	Normal condition
>CUTTER ERROR<	07	Cutter cannot rotate
>TAKE LABEL<	16	Printer is waiting for label to be taken
>LOW STOCK<	19	Media supply is low or out
>INPUT 1<	0E	Input sensor #1 active
>INPUT 2<	21	Input sensor #2 active
>TRAY FULL<	09	Printed label tray is full
>PRINTER PAUSED<	10	Printer is paused
>TOF ERROR<	1F	Top of Form is not sensed properly
>OVER VDD<	1E	VDD voltage is out of operational range
>UNDER VDD<	1C	VDD voltage is out of operational range
>OVER TEMP<	1D	Print Head is too hot
>DATA ERROR<	15	Communication error
>STOCK NOT LOADED<	22	Printer power on without media installed.
>BUTTON PRESSED<	C0	Print button configured to report message when pressed.
>CODE 12<	FF	CRC value does not match stored value.
>BROWNOUT RECOVERY<		Printer entered and recovered from a brownout power condition
>FAIL TIMEOUT<		Timeout failure occurred using the D149 Image Print Mode
>FAIL SIZE<		Incorrect size of the image was received using the D149 Image Print Mode

Table 5-2   Enquiry Responses

5.2   Printer Configuration Commands

The following commands are used to set up printer configuration. Most of these commands are non-volatile and, therefore, do not need to be resent unless changes are desired.
Note: When the printer is in the DEFAULT MODE, factory settings control printer operation. This provides a starting point for re-establishing communication with the printer so that user settings may be sent to the printer. The statistics label printed when the printer entered the DEFAULT MODE reflects current printer settings and not the factory default settings.

5.2.1   Software Switches

The Software Switch settings are non-volatile. The Switch commands may use either ^A (decimal) or ^AB (binary) values. Since each bit represents a setting for the printer, the soft switches are always reported as binary. Changes made with these commands will not take effect until the printer's power is cycled "OFF" and "ON", a "reboot" command (^A1^D143), or a "soft restart" command (^D32 command) is sent to the printer.

Example: ^AB10100001^D21<CR> configures serial port #1 for text equivalent enquiry responses, accept control codes, disables echo, and enables XON/XOFF flow control.

5.2.1.1   Software Switch #1

<u>^AB</u> <u>^D</u>   <u>COMMAND</u>
XX   21   Change SW1: Software Switch #1.

^AB12345678 (each bit is represented by a numeric position number)

> **<u>Position:</u>**
> **1,2   Enquiry Response:** This determines what the printer will send back in response to an enquiry command.
> > **00 = Control Codes**
> > **10 = Text Equivalent**
>
> **3   Control Codes:** This position sets how the printer handles incoming control codes.
> > **1 = Ignore Incoming Control Codes**
> > **0 = Accept Incoming Control Codes**
>
> **4   Port #1 Parity Selection:** Sets the printer port #1 parity for serial communication.
> > **1 = Odd Parity**
> > **0 = Even Parity**
>
> **5   Port #1 Parity Enable:** Turns printer port #1 parity ON or OFF for serial communication.
> > **1 = Disable Parity (NONE)**
> > **0 = Enable Parity**
>
> **6   Echo:** If this feature is enabled, the printer will echo all received characters to the serial port.
> > **1 = Enable**
> > **0 = Disable**
>
> **7   Number of Data Bits:** Sets the printer's serial port to use either 7 or 8 data bits.
> > **1 = 8 Data Bits**
> > **0 = 7 Data Bits**

8   **XON/XOFF Flow Control:** Sets software flow control handshaking. CTS/RTS hardware handshaking is always enabled.

         1 = Enable
         0 = Disable

5.2.1.2   Software Switch #2

^AB   **^D**   <u>**COMMAND**</u>
  XX   **22**   **Change SW2:** Software Switch #2.

^AB12345678   (each bit is represented by a numeric position number)

<u>**Position:**</u>

1   **Clear Text Function:** If enabled, all variable text strings will be erased when the ^D<CR> is processed.

         1= Enable
         0 = Disable

2   **>RESTARTED< Response:** If the printer has been reset and this switch has been enabled, the printer will respond with the >RESTARTED< message for the first enquiry ONLY, to denote the reset condition and then >READY< with following enquiries.

         1 = Enable   (>RESTARTED< on first inquiry then >READY<)
         0 = Disable   (Always responds with >READY<)

3   **Button Use:** If set to a "1", the printer will disable the Print Button.

         1 = Disable
         0 = Enable

4   **Print Repetition:** Defines the function of the Print Button. If set to a "0", the button can be used for feeding labels but the print function is disabled and blank forms will be issued.

         1 = Label PRINT
         0 = Label FEED only

5   **Power-ON Format Type:** Determines whether to use a saved format file or a standard ROM format. User downloaded Label FORMAT files are saved in non-volatile FLASH memory. Any of these FORMATs may be used for the Power-ON label. When SW2:5=1, the format is selected by SW2 switch positions 6, 7, and 8.

         1 = Power-ON label is selected by SW2: 6, 7, and 8
         0 = Power-ON label is standard format

6,7,8   **Power-up Format:** These switches work in conjunction with switch location 5 above. They determine which stored format is loaded at power-up. The printer can be instructed not to load a format at power-up by setting all three switches to 0.

         000 = No Power-up Format
         001 = ROM or Saved Format File 1
         010 = ROM or Saved Format File 2

011 = ROM or Saved Format File 3
100 = ROM or Saved Format File 4
101 = ROM or Saved Format File 5
110 = Rom or Saved Format File 6
111 = ROM of Saved Format File 7

5.2.1.3   Software Switch #3

^AB	**^D**	**COMMAND**
XX	23	**Change SW3:** Software Switch #3

^AB12345678 (each bit is represented by a numeric position number)

Position:

1   **Extended ASCII:** Controls whether characters over HEX 7F will be processed.
    1 = Don't process input characters greater than 7F
    0 = Process input characters greater than 7F

2   **INPUT 1 Active State:** This bit determines whether the INPUT 1 sensor must see an object or not to send back the >INPUT 1< response. A setting of 1 (active LOW) will report the >INPUT 1< message if no reflection is detected. A setting of 0 (active HIGH) will report the >INPUT 1< message if a reflection is detected.
    1 = Send >INPUT 1< active LOW
    0 = Send >INPUT 1< active HIGH

3   **Response After Print:** If enabled, an enquiry response will be sent through the communications after every print automatically.
    1 = Enable
    0 = Disable

4   **INPUT 2 Active State:** This bit determines whether the INPUT 2 sensor must see an object or not to send back the >INPUT 2< response. A setting of 1 (active LOW) will report the >INPUT 2< message if no reflection is detected. A setting of 0 (active HIGH) will report the >INPUT 2< message if a reflection is detected.

    1 = Send >INPUT 2< active LOW
    0 = Send >INPUT 2< active HIGH

5   **Accept "|" for Ctrl:** Sets whether the "pipe" character will be interpreted the same as the "Ctrl" key. The "pipe" character is the <SHIFT> + \ key.
    1 = Disable
    0 = Enable   (<|> key functions as <Ctrl> key)

6   **Accept "^" for Ctrl:** Sets whether the "caret" character will be interpreted the same as the "Ctrl" key. The "caret" character is the <SHIFT> + 6 key.

1 = Disable
0 = Enable   (^ key functions as <Ctrl> key)

7   Binary Compression: If enabled, the printer will accept downloaded
binary compressed font and/or graphic files. The ^E command will not
function. (See 5.1)
1 = Enable Binary Mode
0 = Disable Binary Mode

8   Detect Black Line on Power-up: If enabled, the printer automatically
feeds labels on Power-up to determine the proper ^D90 value.
1 = Enable
0 = Disable

5.2.1.4   Software Switch #4

^AB   ^D   COMMAND
  XX   24   Change SW4: Software Switch #4.

^AB12345678 (each bit is represented by a numeric position number)

Position:

1   Slashed Zeros: If enabled, the printer will print a slash through the
embedded zero ("0") characters.
1 = Enable
0 = Disable

2   External Print Request: (Call Microcom for more information.)
1 = Enable
0 = Disable

3   Stock Out function: Enable this function to get a >LOW STOCK<
message when the printer runs out of stock. When this is disabled, the
printer will not report stock out conditions.
1 = Disable
0 = Enable   (stock out detection reports >LOW STOCK<)

4   Auto-size on Power-up: When enabled, the printer automatically sizes
the label to determine the appropriate format header values on power-
up. The printer will then use these values on all subsequent label
formats. Refer to the ^D39 command for additional information.
1 = Enable
0 = Disable

5,6,7,8   Code Page Selection: Positions 5 through 8 are used to select from
the available code pages stored within the printer.
See Chapter 9 for more details

0000 = Not Decoded (Default)
0001 = Danish

> **0010 = 860**
> **0011 = Spanish**
> **0100 = 850**
> **0101 = German**
> **0110 = 865**
> **0111 = Swiss**
> **1000 = 852**
> **1001 = French**
> **1010 = 863**
> **1011 = Swedish**
> **1100 = 437**
> **1101 = Italian**
> **1110 = English - UK**
> **1111 = English – US**

5.2.1.5   Software Switch #5

^AB	**^D**	**COMMAND**
XX	25	**Change SW5:** Software Switch #5.

^AB12345678 (each bit is represented by a numeric position number)

Position:

1   **Single Button Press Error Clear:** If enabled, error conditions are cleared with a single press of the print button after reloading the printer with more media.
If this function is disabled, pressing the print button clears the error condition, prints the pending job, and reenters the previous halting error state. The button must be pressed and held during printing in order to exit the error routine. This is used to reprint the pending job until the print realigns before continuing.
> **1 = Enable (Single Button Error Clear)**
> **0 = Disable (Reprint and Align)**

2   **>BUTTON PRESSED< status enable.** When enabled, pressing the button will cause the printer to report the >BUTTON PRESSED< or 0xC0 depending on the printer's ^D21 response mode configuration. This is typically used on systems that preload a batch of jobs to the printer but wait on the >BUTTON PRESSED< message before sending the print command.
> **1 = Enable >BUTTON PRESSED<**
> **2 = Disabled**

3   **Type of Top-Of-Form Sensor:** The leading edge of the label stock can be sensed using either a reflective sensor or a transmissive sensor. The correct type of sensor is determined by the printer hardware configuration being used.
> **1 = TOF is TRANSMISSIVE**
> **0 = TOF is REFLECTIVE**

4 **Enable Power ON TOF:** This bit controls whether or not the printer will do an automatic Top Of Form (TOF) when it is turned ON.
> **1 = Enable Power-ON TOF**
> **0 = Disable**

5 **Enable Button TOF:** This bit determines whether the GREEN button functions as a Top-Of-Form or as defined by SW#2 bit 4. The button is always configured to clear error conditions.
> **1 = Button is TOF**
> **0 = Button is defined by SW#2 bit 4**

6 **Enable AutoLoad:** This bit determines whether the AutoLoad function is ON or OFF. When Autoload is enabled, and a no media to media transition is detected by the printer's internal transmissive sensor, the printer will step the pulled the media into the printer and perform either a TOF or a Form Feed depending on SW#5 bit 7 configuration.
> **1 = Enable AutoLoad**
> **0 = Disable AutoLoad**

7 **Type of AutoLoad:** This bit determines whether the AutoLoad function uses the Top-Of-Form sensor (TOF), or if it uses the Form Feed technique.
> **1 = AutoLoad + TOF**
> **0 = AutoLoad + FF**

8 **Status Byte Mode:** If enabled, the printer will enter a special mode that sends a status byte to the host. See D110 command
> **1 = Enable Status Byte Mode**
> **0 = Disable Status Byte Mode**

5.2.1.6 Software Switch #6

<u>^AB</u>	<u>^D</u>	<u>COMMAND</u>
XX	26	**Change SW6:** Software Switch #6.

^AB12345678 (each bit is represented by a numeric position number)

> <u>**Position:**</u>
> **1** **Enable >TRAY FULL< response:** This bit is used to define whether a test pattern will print, or if the printer will halt on a >TRAY FULL< error condition when the printer is used with the optional catch tray on the Model 424 printer. This bit will also determine the printer's response when pin 4 of P17 is active.
>
> **2** **Enable STL Emulation:** This bit determines whether the STL emulation is enabled or not. This command provides similar functionality of other printer manufacturers that specify exact placement and location of blackline media used for registration. The printer takes in STL commands and internally converts them to LDS command tables.

When enabled, the Stock Class (SW#7 bits 1-3) and Width (SW#7 bits 456) must be set properly in order for the STL Emulation to function properly.

> **1 = Enable STL Emulation**
> **0 = Disable STL Emulation**

3   **Enable Pre-Stock Out feature:** This command supports the PSO option and is used to detect stock out errors using an optional sensor before the media enters the printer. Once enabled, when the PSO (>INPUT 1<) sensor goes active the printer will finish printing the current label, not cut it (if using a cutter command), then feed he stock until it clears the dot row plus 1/2". At this point the normal stock out function will be active and the printer status will respond with: >LOW STOCK<>INPUT 1< (if the polarity of input one is set correctly).

> **1 = Enable AutoHeader**
> **0 = Disable AutoHeader**

4   **Enable >STOCK NOT LOADED< Response:** When enabled, the printer will return >STOCK NOT LOADED< or 0x22 (depending on the ^D21 response mode configuration) to status requests if media is not detected in the printer at powerup. The status message will continue to be reported until media is installed in the printer. This message will only be reported if media is not detected by the internal sensors following a power on, reboot command (^D143), and/or restart (^D32) commands.

> **1 = Enable >STOCK NOT LOADED< response**
> **0 = Disable >STOCK NOT LOADED< response**

5   **48-466 Compatibility Mode:** A special limited 466/48-466 LDS compatibility mode has been developed for the X24/X24M code base. The objective of this compatibility mode is to allow applications that use formats and/or commands developed for a Model 48-466 printer to be sent to a 203 dpi X24 or X24M Model printer with little or no changes required. This command allows the printer to enable a limited 48-466 emulation feature of the printer. When enabled, the printer will process a 48-466 data stream and convert the data stream for proper operation on an X24M printer. The emulation mode uses a lookup table for fonts stored in flash and does not use the TCI 1 embedded fonts while this mode is enabled. Please note that the X24 products store fonts in 0 /180 degree rotation and in 180/270 degree rotation. The odd memory slots denote 0 or 180 degree rotation fonts while the even memory slots denote 90/270 degree rotated fonts. The flash memory slot locations are shown below:

48-466 TCI = 1, CGN #	X24 Flash Memory Slot
1	1 and 2
2	3 and 4
3	5 and 6
4	7and 8
5	9 and 10
6	11 and 12
7	13 and 14
8	15 and 16

Table 5-2   48-466 Compatibility Fonts

The 48-466 emulation supports unique 48-466 command operations and will process the data in the same way when technically possible. These unique operations are briefly discussed below. Please consult the Model 48-466 Operators Manual for additional information regarding the command operation.

a) The printer supports the CGN lookup as defined above and in the 48-466 Operators manual when the emulation command is enabled.

b) The 48-466 graphic structure is used when the emulation command is enabled and discussed in greater detail the 48-466 Operators manual.

c) The ^D59 command allows format slots 121 to 128 to be overwritten to when the emulation command is enabled.

d) The ^Ax^D125 command controls the location of the euro character as provided in the model 48-466 printers. The euro character which by default is mapped to location 0xE3 (227 decimal) can be moved to another location specified by the x if x>0. If x=0 no remapping will take place and the euro will stay at location 0xE3. Also if the printer must be configured to use a code page other than the default (0000) code page.

The 48-466 and X24 code bases are not fully compatible, so the emulation does have some limitations. The known limitations are briefly mentioned below:

a) The 48-466 data stream should not use an Attribute Number of 2 (fixed/non-proportional) which is the seventeenth parameter. It is not technically possible to emulate this model 48-466 feature.

b) The CS value used in conjunction with the AN set to a 2 to produce a negative kerning effect should be removed and the field defaulted. This is the 11th field defined in the format lines.

    c) Fields that were using an AN of 2 and CS for negative kerning may require that their placement coordinates are adjusted to produce the same outputs.

Once these changes are made, the resulting data may be sent to a 48-466 and 424M printer to produce the same printed image in most cases.

        1 = Enable 48-466 Compatibility Mode
        0 = Disable 48-466 Compatibility Mode

6   **Select GP I/O Hardware Mode:** This command is used to select from the various General Purpose I/O modes the printer supports.

0 = Enable Custom General Purpose I/O Hardware. This mode is a custom solution developed for a specific customer and is not intended to be used by other users.

1 = Enable General Purpose I/O Hardware. When this command is enabled, the printer provides the ability to report the current status of 4 additional inputs accessed through the P17 connector on the PCB, report the status of 4 additional outputs accessed through the P21 connector on the PCB, to change the status of the outputs, and to configure the inputs to generate immediate errors.

GP INPUTS:
The P17 connector is used for the GP inputs. These inputs are active high (24VDC) and may be independently controlled.

The ^D150 command is used to report the current status of the inputs. When issued, the printer will send the host the current status of the 4 general inputs in the form of ">IO 0nH< where "n" is a hex number from 0 to F.

Example: A status of >IO 05H< would indicate that inputs 1 and 3 are active (24v) and that inputs 2 and 4 are inactive (0v); 05H = 0101(binary).

The ^D151 is a nonvolatile command used to set which GP inputs are configured to cause an immediate error when active. An immediate error will immediately stop printing and go into an error condition. Once the input is inactive, the "error" would need to be cleared before the printer will continue. The ^D29 statistical listing reports the GP inputs that are configured to generate error conditions when active and are listed under the "ERROR INPUT: 0nH" with the value for "n" equaling the HEX value of the inputs. The inputs equal a binary number with the inputs in the following order; 4321.

Command Syntax:
^D151<CR>0n<CR>

n = the hex value from 0 to F.

Example: If the application wanted to configure inputs 1 and 3 to generate error conditions when active, a ^D151<CR>05<CR> command (the <CR> indicates carriage return characters) would be issued. The printer ignores the LF characters, so a <CR+LF> is interpreted as a <CR> as well) would be sent to the printer.

GP OUTPUTS:
The P21 connector is used to provide 4 general purpose outputs. These outputs provide 24V and may be used to provide the voltage needed to power the GP INPUTS.

The ^D69 command is used to read and report the current status of the GP Outputs in the form of ">IO 0nH< where "n" is a hex number from 0 to F. The outputs equal a binary number with the values in the following order; 4321.

Example: A status of >IO 05H< would indicate that outputs 1 and 3 are active (24v) and that outputs 2 and 4 are inactive (0v); 05H = 0101(binary).

The ^D68 is a nonvolatile command used to enable which GP outputs are active. The outputs are entered in as a HEX value that is equal to a binary number with the outputs in the following order; 4321.

Command Syntax:
^D68<CR>0n<CR>

n = the hex value from 0 to F.

Example: If the application wanted to configure outputs 1 and 3 active, a ^D68<CR>05<CR> command (the <CR> indicates carriage return characters) would be issued. The printer ignores the LF characters, so a <CR+LF> is interpreted as a <CR> as well) would be sent to the printer.

NOTE: A status request (^E, ^D5, or 5 NULL's 01) will never show the status of the outputs while a status request will show the input status if:
1) GP I/O is enabled AND
2) One or more bits have been configured to generate errors when active AND
3) One or more of those halting bits have gone active and have produced an error that has not been cleared.

NOTE: If the printer is not in the general purpose I/O mode, the inputs status may still be read with the ^D150 command but the outputs cannot be read (or written to) with the ^D69 or ^D68 commands.

NOTE: If an input has caused an error to be generated, then goes inactive, and another print request received before the error is cleared, the printer will not print and will remain in the error state. A status request will show the active error inputs. This condition will remain until the error is cleared.

NOTE: Default power up will disable I/O mode.

The P17 and P21 connectors are 8 pin MTA50 AMP part number #1445350-8 and Microcom Corporation part number 510188-0008.

The pin out is as follows (the square pad denotes pin one on the PCB):

Connector P17 is the input port.
       1 = ground
       2 = g/p input 1
       3 = ground
       4 = g/p input 2
       5 = ground
       6 = g/p input 3
       7 = ground
       8 = g/p input 4
All inputs are active high. 24.0 VDC = high   0.0 VDC = low

Connector P21 is the output port.
       1 = ground
       2 = g/p output 1
       3 = ground
       4 = g/p output 2
       5 = ground
       6 = g/p output 3
       7 = ground
       8 = g/p output 4
All outputs are active high. 24.0 VDC = high   0.0 VDC = low
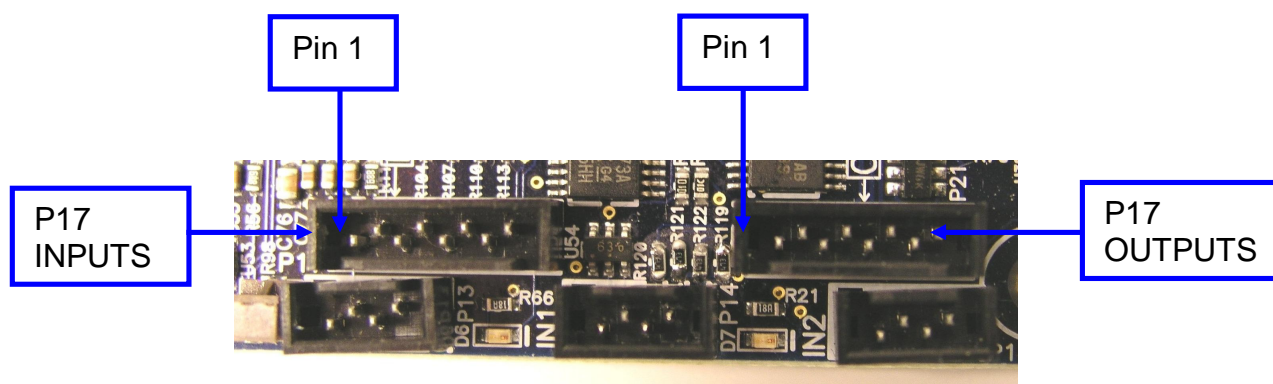
Figure 5-1   General Purpose Hardware Inputs and Outputs

7   **Select PIC Mode:** This command is used to select from the various PIC modes the printer supports. The PIC code is dedicated to the take-up motor or the cutter.

     0 = Select Cutter PIC mode of operation. When this mode is selected the printer will power and energize a cutter when the cutter enable command (^D99 or ^D111) is issued after a print job

     1 = Select Take-up PIC mode of operation. When this mode is selected the printer will energize a DC motor to be used in a rewind or take up capacity. Unless the printer is properly configured with a take-up motor and correct take-up motor specific PIC, this mode should not be enabled because it could potentially damage the cutter.

8   **Nonstick TOF Mode:** This feature was added to handle some applications where an unmanned system is left idle for long periods of time. The printer will periodically move the media to keep it from adhering to the platen roller in an effort to prevent media jams. Each time the value times out, the printer will advance 75 full steps at .5ips and then perform a TOF at normal speed. The timer is then reset and starts to count down once again. The default time interval is set to 4 hours or 144400 seconds. The interval may be adjusted by using the D156 command.

5.2.1.7   Software Switch #7

<u>**^AB**</u>   <u>**^D**</u>   <u>**COMMAND**</u>
  XX   27   **Change SW7:** Software Switch #7.

^AB12345678 (each bit is represented by a numeric position number)

<u>**Position**</u>**:**
123   **Select STL Stock Class:**
     These bits are used to select the class of the stock to be used according to the following bit pattern:
     100 – Standard
     010 – Cinema Ticket
     001 - Wristbands

456   **Select STL Stock Width:**
     These bits are used to select the width of the stock (in inches) to be used according to the following bit pattern:
     000 – 1.00
     100 – 1.328
     010 – 2
     110 – 2.125
     001 – 2.5
     101 – 2.75
     011 – 3.25
     111 – 4

7   **Disable System Parameter Saving:** When enabled, the printer will not save the non-volatile system parameters on power downs. The ^A1^D143 will continue to save system parameters.

<div style="text-align:center">

1 = Disable system parameter saving
0 = Enable system parameter saving

</div>

8   **Finish Mode:** When enabled, the printer will finish printing the current label as far as it can after a stock out error. The change will take place after a power cycle or after the restart command. When a stock out occurs the printer will finish printing the entire label if the LSY is less than the dot-to-gap distance. If greater, it will continue printing for a distance equal to the dot to gap distance OR until the label finishes; which ever comes first. The dot-to-gap value is configurable using the D158 command. The error will be acknowledged at the end of printing. This will work with all media (continuous, black line, and gap).

<div style="text-align:center">

1 = Enable Finish Mode
0 = Disable Finish Mode

</div>

5.2.2   Communication Port Configuration

These commands are used to configure the communication speed or Baud rate of the printer and to configure which port is the active port. A number of printer's are configured with more than one port, however only one is active at any given time.

5.2.2.1   Baud Rate

This non-volatile command changes the serial port communication speed.

Note: Unless otherwise noted, the factory default baud setting is 115,200. The baud rate will be temporarily set to 115,200 when the printer is in the Diagnostic Mode if the user setting is different. The user set baud rate will resume after a "soft reset" (^D32) or cycling the power to the printer.

^A	**^D**	**COMMAND**
X	**20**	**Set Bits Per Second:**

This command sets the serial/USB port communication speed or BAUD rate of the printer. Settings of 12 (230400) and higher are not intended to be used by normal serial operations. These settings are only intended to be used by the D149 USB image print mode.

0	110 bps
1	150 bps
2	300 bps
3	600 bps
4	1200 bps
5	2400 bps
6	4800 bps
7	9600 bps
8	19200 bps
9	38400 bps
10	57600 bps
11	115200 bps
12	230400 bps (only used for D149 Image Mode)

| **13** | 460800 bps (only used for D149 Image Mode) |
| **14** | 921600 bps (only used for D149 Image Mode) |

5.2.2.2 Set Serial Port Source Command (Non-volatile- ^D108)

This command sets which serial port will be used the next time the printer is turned ON. The 224/424 printer has three serial data ports on the rear panel: RS-232, USB, or Ethernet. Only 1 port can be active at any given time. The D108 command sets how the printer selects the active serial port the next time the printer is powered ON. Settings made with D108 are saved in the printer's system parameters and are used to select the serial port on power-up.

^A	**^D**	**Command**
X	**108**	**Serial Port Source (Non-volatile)**
0		**AutoSelect:** When the printer powers up, it scans the USB and RS-232 ports and selects the "Active" port. The USB port will be selected if the USB cable is connected between the printer and a PC that is powered "ON." The RS-232 port will be selected if the USB cable is not plugged in and a character comes in on the RS-232 port. The printer will continue to scan both ports until one or the other condition is satisfied.
1		**Ethernet:** This command tells the printer to use the Ethernet port the next time it powers up. The Ethernet port is generally a third party device that provides the printer with the connectivity of an Ethernet system. Internally, the signals go into a serial port. The Ethernet is setup and configured separated from the printer using the third party software and/or methods. By default, the printers are configured with an IP address of 192.168.200.3 on Port 9100 at the factory.

5.2.2.3 Set Serial Port Source Command (Volatile - ^D109)

This command is similar to the ^D108 command, except the ^D109 command immediately switches between the 3 serial ports without the need to cycle power. Settings made with ^D109 command are NOT saved on power-down. The printer returns to the original port setting on the next power-ON.

Note: The Auto Select option is not available with the ^D109 command.

^A	**^D**	**Command**
X	**109**	**Serial Port Source (volatile)**
0		RS-232
1		USB
2		Ethernet

5.2.3 Print Head Size Commands

The different printer models may be configured with a variety of different print head sizes and densities. The ^D78 and ^D79 commands (non-volatile) allow the printer to be setup through software to configure the different print head sizes and densities. Power cycle or ^D32 is required before command settings take affect.

Note: When using these commands, the ^D79 command MUST be sent prior to the ^D78

^A	**^D**	**COMMAND**
X	**79**	**Set print head dots/inch (dpi).** This command sets the dot density of the print head.
0		**203DPI:** This sets the printhead resolution to 203dpi. This requires that a 203dpi printhead is installed on the printer. If the setting is not set properly, the printed image could produce
1		**300DPI:** This command tells the printer to use the Ethernet port the next time it powers up. The Ethernet port is generally a third party device that provides the printer with the connectivity of an Ethernet system. Internally, the signals go into a serial port. The Ethernet is setup and configured separated from the printer using the third party software and/or methods. By default, the printers are configured with an IP address of 192.168.200.3 on Port 9100 at the factory.

The only valid entries are ^A0 for 203dpi and ^A1 for 300dpi.

XX	**78**	**Set print head number of dots.** This command sets # of dots in the print head. This command MUST be sent AFTER the dot density (dpi) is set with the ^D79 command. The only valid entries for XX are the numbers in the "# of Dots" column in the table above.

Printer Model	Dots/Inch	D79 value
224	203	448
224	300	640
324M	203	640
324M	300	960
424	203	832
424	300	1280
424M	203	832
424M	300	1280
X28	203	832
X28	300	1280

Table 5-3   Printhead sizes - D78

These are examples of how to use the ^D78 and ^D79 commands:

EXAMPLE #1: How to set the printer for a 640 dot, 300 dpi print head:
                        ^A1^D79<CR>   (Sets 300 dpi)
                        ^A640^D78<CR>   (Sets 640 dots)

EXAMPLE #2: How to set the printer for an 832 dot, 203 dpi print head:
                        ^A0^D79<CR>   (Sets 203 dpi)
                        ^A832^D78<CR>   (Sets 832 dots)

5.3 General Purpose I/O

When this command is enabled (Switch 6 bit 6; D26 command), the printer provides the ability to report the current status of 4 additional inputs accessed through the P17 connector on the PCB, report the status of 4 additional outputs accessed through the P21 connector on the PCB, to change the status of the outputs, and to configure the inputs to generate immediate errors.

^A	^D	Command
XX	**110**	**General Purpose Status Byte**

The printer has a special mode of communication for General Purpose control environments. Communication is over the Ethernet port and uses the following protocol.

The host sends a command byte to the Ethernet port every few milliseconds. The printer's Ethernet interface will pass the command byte on to the printer only when there is a change, i.e., when there is a new command.

The printer sends a byte of status data to its Ethernet interface using the same data format, and will only send the data when there is a change in status. The printer's Ethernet interface will send the printer status byte to the HOST every few milliseconds.

This is the command byte configuration:

Command Byte From Host to Printer:

Bit #	Function when = "1"	Function when = "0"
0	PRINT	DON'T PRINT
1	PRINT TEST PATTERN	DON'T PRINT TEST PATTERN
2	RESET	DON'T RESET
3	not used	
4	not used	
5	not used	
6	not used	
7	not used	

The HOST only sends the command byte to the printer. The printer's Ethernet interface receives this command byte from the HOST and tests it to see if it is different from the previous command byte. If there is a change, then the command byte is put into the "xx" of a ^Axx^D110 command and sent to the printer. Valid values for "xx" are determined from the "Host to Printer" table above.

The printer sends a status byte to the host every few milliseconds thru its Ethernet interface. This status byte is sent whether there is a change of status or not.

Status Byte From Printer to Host:

Bit #	Function when = "1"	Function when = "0"
0 (LSB)	IN RESET or PRINTING	NOT BUSY

1	ERROR	NO ERROR
2	DOWNLOADING A FORMAT	FINISHED DOWNLOAD
3	FORMAT LOADED	NO FORMAT LOADED
4	not used	
5	not used	
6	not used	
7 (MSB)	not used	

The General Purpose Status byte mode of operation is enabled by Soft Switch #5, Bit #8. These are the specific commands:

    ^ABxxxxxxx1^D25   Enable General Purpose Mode
    ^ABxxxxxxx0^D25   Disable General Purpose Mode

Note that the binary data entry mode is shown in these 2 commands. The user must set the "xxxxxxx" values to agree with current settings in order to avoid changing any of the other settings in Soft Switch #5.

Entering General Purpose Status Byte Mode
Sending the "Enable General Purpose Mode" command will set the printer up to go into General Purpose mode. The printer will NOT go into General Purpose Mode until a power cycle occurs to cause the data to be stored in FLASH memory. This command is nonvolatile, so once the General Purpose Mode is entered the printer will stay in General Purpose Mode thru subsequent power cycles.

Exiting General Purpose Status Byte Mode
A printer that is in General Purpose Mode will stay in General Purpose mode thru power cycles until the "Disable General Purpose Mode" command (^ABxxxxxxx0^D25) is issued. The next power-ON after a "Disable General Purpose Mode" command will cause the printer to leave General Purpose Mode.

Note: A default power-ON will also take the printer out of General Purpose Mode.

5.4 Synchronous Print Mode

This mode allows the printer to be synchronized to external equipment thru an external PRINT control line. A second input control line ABORT allows a pending print job to be terminated. Using this mode allows any label, no matter what size to begin printing IMMEDIATELY using the print input signal. Printing begins 11 microseconds after the rising edge of the PRINT control line.

    <u>Two control signals are required:</u>
        1) PRINT input line   (connector P17, Pin #2),
        2) ABORT input line   (connector P17, Pin #8)

    <u>Signal logic levels:</u>
        The signals are active high and must be between +15Vdc and +24Vdc to be "1".
        The signals must drop below +10Vdc to be "0".

To use this mode, follow these steps:

a) Download a label format to the printer. This format should not have the normal ^D3 (PRINT command) in the format. If the ^D3 is left in the format, an initial label will be printed regardless of the special input line settings.

a) Send the printer a ^D116<CR> command. This will force the printer to process the label to the point that the label bitmap is ready to be sent to the print head. After this command is sent no communications will be possible with the printer until the next step is completed.

b) To start the print, send a high-going pulse on the PRINT input line. To ABORT the job, whether printing or not, send a high-going pulse on the ABORT input line.

c) After the label prints or aborts, the printer will return to its normal non-sync mode of operation.

The PRINT pulse should go back to "0" before the print ends to avoid a second label being printed. A 10 millisecond pulse works fine.

Continuous sync mode is similar to single sync mode except after the label is printed the printer will immediately begin reprocessing the format to prepare another image for printing. If an external print signal is provided on the General Purpose print input, the printer will begin printing as soon as the image has completed reprocessing plus approximately 10 msecs. If sufficient time is allowed for the reprocessing to complete prior to the next General Purpose print input, the printer will begin printing almost immediately (~10 msecs).

The time between the completion of printing and when the next label is available to print is a function of the size of the image being generated. Larger labels will take longer.

The main difference between the two modes is single sync mode prints one label and exits sync mode. Continuous sync mode allows a user to print as many labels as they want using the print signal until the abort is received or a paper-out occurs.

^A	**^D**	**Command**
	116	**Synchronous Print Mode**
0		Exit all sync. modes.
1		Enter single sync. mode.
2		Enter continuous sync. mode.

WARNING! There is NO time-out on this command! Once the printer receives the ^D116 command and is waiting for the PRINT or ABORT pulse, it will wait forever!

5.4.1 Contrast Adjustment Commands

These commands are used to adjust the darkness of the label print. Print quality will vary not only with different label stocks, sometimes even in different batches of the same label stock. It is highly recommended that contrast adjustments be maintained at minimum settings to achieve desired print quality. Higher contrast settings will reduce the life of the print head.

5.4.1.1   Adjust Contrast Window (Volatile - ^D35)

This command is useful for adjusting contrast for specific label formats where different label media is used on a single printer. The command can be entered into specific label formats rather than affecting print contrast on all label formats.

^A	**^D**	**COMMAND**
XX	**35**	**Adjust Contrast Window:** This is a volatile command used to adjust the contrast window. The range is 1 to 9 of the base (^D36).

5.4.1.2   Adjust Contrast Base (Non-volatile - ^D36)

This command is used to adjust overall contrast on all formats.

^A	**^D**	**COMMAND**
XX	**36**	**Adjust Contrast Base:** This non-volatile command is used to skew the entire contrast window (^D35). Contrast settings above 150 reduce the overall life of the printer. This command has a ^A range of 10 to 200%.

5.4.2   Slice Buffer Size and Set Starting Slice Number Commands

XX	**92**	**Set Starting Slice Number:** This non-volatile command adjusts the number of slices (dot rows) generated before the printer starts moving the label stock. The default is set to 67% of the slice buffer size. Anytime the size of the slice buffer is changed (ref. ^D94 command), the Starting Slice # is also changed automatically to a value that is 67% of the new slice buffer size. The maximum number of slices (XX) is dependent on the size of the slice buffer (^D94) command.
X	**94**	**Set Slice Buffer Size:** This non-volatile command is used to set the size of the slice buffer that is used by the printer. If the slice buffer memory size is set to low, the printer may start printing and then stop to process additional slices before starting again. This typically happens on more dense formats were more memory is required so that the printer can build the image to be printed before actually printing the image. This command is used in conjunction with the ^D92 command to fully optimize the slice buffer memory.

2	88Kbytes
3	192Kbytes
4	256Kbytes (default size)
5	320KBytes
6	384KBytes

5.4.3   Printer Restart / Reboot Commands

	32	**Restart Printer (Soft Restart):** This command restarts the printer's internal software. The soft restart command is also used to start using certain non-volatile system parameters (head parameter and soft switch commands).
1	**143**	**Save and Reboot (Hard Reset):** This command instructs the printer to save statistics stored in RAM to non-volatile Flash memory and then actually resets the printer hardware. Issuing this command is the equivalent of turning the

printer off and back on. Even though the software attempts to maximize the number of writes, Flash memory does have a maximum number of writes so the D143 command should only be sent when it is imperative that the configuration is written to flash memory. The D32 command is typically recommended to set the non-volatile commands that require a restart. The printer will update and write the configuration to flash on normal power downs. This command may be used to start using certain non-volatile system parameters (head parameter and soft switch commands).

5.4.4   Registration Mark Threshold Commands

While the printer is designed to work with a wide variety of label media, it is sometimes necessary to adjust the printer's thresholds in order to obtain proper registration and operation. The numerical value in which the printer senses a registration mark is referred as the threshold value.

^A	^D	COMMAND
XX	90	**Reflective Detection Threshold:** This command is non-volatile and is used to set the reflective or blackline threshold value (0-255) at which the printer detects a blackline used for print registration. The default is set to a value of 100 and should work for most media types.
XX	91	**Transmissive Detection Sensitivity:** This non-volatile command is used to set the transmissive or GAP threshold value (0-255) at which the printer detects gap and/or blow-hole registration marks. The default is set to a value of 30 and should work for most media types.
XX	124	**Stock Out Threshold:** This command is non-volatile and is used to set the stock out threshold value (0-255) at which the printer detects an out of stock or >LOW STOCK< error condition. The threshold is typically set to a value that is 80 percent of the transmissive sensor reading when no media is detected by the transmissive sensor. This value is calibrated at the factory and should not require adjustment unless the transmissive sensor has been replaced.
X	129	**Auto Set Threshold:** This command will cause the printer to scroll 1350 dots, determine the proper threshold value, and set the nonvolatile threshold for proper registration. The ^Ax selects either reflective or transmissive detection.
0		Automatically sets the transmissive threshold value.
1		Automatically sets the reflective threshold value.

5.4.5   Auto-size Commands

The auto-size command attempts to automatically calculate important format values for the label header including LSY, GAP, AGD, SPG, ^D90, and the ^D91 values. The printer feeds a sample of labels through the GAP sensors and takes an average of the values it receives. The auto-size command uses the appropriate sensors to detect the registration marks set by the ^D47 command. Before issuing the auto-size command, verify that the ^D47 is set to the proper setting for the media being used.

When using media that contains a blackline for the registration mark, first execute the ^A1^D47<CR> command sequence before issuing the auto-size command or the results may be invalid.

When using media that contains a blow-hole, set software switch #4 (^D24 command) for blow-hole detection and then issue the desired auto-size command before issuing the auto-size command or the results may be invalid.

^A	^D	COMMAND
X	39	**Auto-size:**
0		Clears the use of auto-size values set by issuing the ^A1^D39<CR>.
1		Uses the values obtained for header variables instead of what is specified in the format file's header.
2		Automatically sizes the label and displays to the terminal screen the values for the format header.
3	39	Same as ^A2^D39<CR>, but the values will be printed on the media.
5		Diagnostic Mode that steps the motor while displaying the readings from the printers sensors to determine the media's proper ^D90 and ^D91 settings. This is also referred to as "tick-tick" mode.
6		Diagnostic Mode that does not step the motor while displaying the readings from the printers sensors to determine the media's proper ^D90 and ^D91 settings. When using this mode, the media is manually moved through the printer. This is also referred to as "silent tick-tick" mode.

5.4.6   AutoHeader Commands

X   147   Autoheader Command: The STL Autoheader command provides similar functionality of other printer manufacturers that specify exact placement and location of blackline media used for registration. This command is a specialty media handling command that works when the correct media is used. Please contact your Microcom Corporation representative if you have any questions regarding the use of this command. When enabled the printer will autoload and determine the correct header parameters for all subsequent formats based on the loaded media except for HFM which is the only parameter that must be included with the format header. The above values may be changed via the appropriate ^D command with the change being permanent until another Autoheader or another ^D command changes them.

After executing the Auto-header command, the values that the printer will use for the header may be observed using the ^D148 command.

When stock is initially loaded the printer will do an auto header to determine the correct header parameters. After this, when stock is loaded, the printer will just advance the stock to the correct printing position wasting the first label unless stock is loaded after a stock out condition. Then the printer will pull the stock in and print on the first label and clear the error.

<u>^A</u>	<u>^D</u>	<u>COMMAND</u>
0	**147**	Execute AutoHeader on power-up only.
1		Execute AutoHeader on the next media loading.
2		Execute AutoHeader immediately (after delay, assumes that media is loaded.
3		Execute AutoHeader every time media is loaded.
1	**148**	**Show Autoheader Values Command:** After the auto header has been executed, the values that the printer will use for the header may be seen using the command ^D148 which will be in the form:

HFM = 24
LSX = 832
LSY = 382
WEB = 0
GAP = 25
DPS = 6
LCB = 3
AGD = 1
SPG = 52
OFX = 0
OFY = 0
D91 = 125
 b = 594

The HFM parameter will show the value that is provided in the format that was last loaded in the printer which will initially be the power up format.

5.5   AutoLoad Media

The printer provides an easy way for new media to be loaded into the printer thru the use of the AutoLoad function. When this feature is turned ON, the printer will sense the presence of new media as the operator is pushing it into the printer, automatically feeding the media into the printer, and then registering the media using either a TOF sensor or a Form Feed.

There are two types of AutoLoad:
AutoLoad + Form Feed
AutoLoad + Top-of-Form.

Refer to Section 5.2.1.5 for details on how Soft Switch #5 (^D25) controls the AutoLoad function.

5.5.1   AutoLoad + Form Feed

This command is useful to load media without having to press the Print Button to start printing again. The operator must insert the label stock into the printer until it stops against the drive roller. The printer will automatically begin to turn the drive roller after the stock is sensed by the transmissive sensor. A delay (^D120) may be set from when the stock is first sensed and when the drive roller starts to turn (See Section 5.5.3). The printer will advance

a blank label, based on the current or last processed label, before starting to print properly registered labels.

These are the steps for AutoLoad + FF:
1. With the head mechanism latched in its normal print position, the user inserts new media until it stops at the drive roller.

2. The printer senses the new media and waits the programmable amount of time set by the ^D120 command (default is 1.5 seconds).

3. After the ^D120 time delay, the printer advances the media until the first registration mark is sensed based on the current or previously executed form size.

4. Label printing will resume if a job is pending.

Set ^D25 bit #6 to "1" to enable the use of AutoLoad + Form Feed.

The Autoload + FF may be used in conjunction with a saved format that acts as a template for the form size used by the autoload feature. This method assures that the correct form size used is loaded at power up enabling the autoload feature to be used when the printer is powered on before sending print jobs. The saved format or template is typically a format with the header configured for the media size/type being used and is configured to not print automatically. Below is an example of a format that is being saved into memory that is used as an autoload template and sent to the printer as part of the printer's configuration.

Autoload+FF power up format example:

^A1^D131<CR>	(Deletes data saved into memory slot 1)
^A1^D130<CR>	(Save format into slot 1)
^D57 <CR>	(A label format is coming.)
1,1280,900,19,38,7,0,1,385,0,0 <CR>	(Header Information.)
1,1,1,,6,,,,1,1,,,,,0 <CR>	(Field #1 format information (line draw).)
^D56 <CR>	(Signals the end of the label field definition.)
^D2 <CR>	(Text data is coming.)
. <CR>	(Text data string #1.)
^[<CR>	(Used to mark the end of save format)

This would example saves the format into Flash memory slot 1. This format stored in slot 1 may know be selected as a power-up format that will be processed every time the printer is power on. This is accomplished by using the ^D21 command bits 5-8; ^ABxxxx1001^D21. It should be noted that the format example does not contain a print command. This is done this way so that the saved template does not automatically execute when the printer is turned on. Basically, the printer powers up and processes the format and is awaiting a print request before executing the stored label. When using this as an autoload template, the format does not have to print; it simply needs to load the correct media size to be used as the alignment format.

5.5.2   AutoLoad + Top-Of-Form

This command is used on printers that are configured with a "Top-Of-Form" (TOF) sensor option used to detect the leading edge of the media. AutoLoad with a TOF sensor prevents the loss of the first label as in AutoLoad + FF.

Soft switch #5, bit #3 selects the type of TOF sensor. The TOF may a REFLECTIVE style, or it may use a TRANSMISSIVE sensor for more accurate sensing.

These are the steps for AutoLoad with TOF:
1. With the head mechanism latched in its normal print position, the operator inserts new media until it stops at the drive roller.

2. The printer waits a programmable amount of time as set by the ^D120 command (default is 1.5 seconds) after it senses the new media to make it easier for the operator to align the paper.

3. After the time delay, the printer feeds the paper forward until the leading edge of the media is seen by the TOF sensor.

4. The feed forward stops and then the printer retracts the media a programmable distance as set by the ^D123 command and stops.

Set ^D25, bits 6 and 7 to enable the AutoLoad+TOF feature.

Note: TOF Error—When the printer cannot complete a TOF, it will stop, the LED will turn "RED," and if the queried, the printer will report a ">TOF ERROR< or 0x1F depending on the response mode of the printer. To clear the error, press the print button. Another TOF may then be attempted.

5.5.3   AutoLoad Commands

<u>^A</u>	<u>^D</u>	<u>COMMAND</u>
XX	**120**	**AutoLoad Delay Selection.**

AutoLoad Delay = xx milliseconds (up to a maximum of 5000 milliseconds or 5 seconds.

The AutoLoad Delay is the amount of time that the printer waits after detecting that media has been put into the printer before it starts feeding it in. A small amount of delay makes it easier for the operator to get the paper fully inserted into the printer and properly oriented before paper motion begins.

The default value for AutoLoad delay is 1500 milliseconds (1.5 seconds). The operator may use this command to adjust the delay to suit individual preferences. ^A0 turns the delay OFF so that the driver roller is activated as soon as media is detected. Since this is a volatile command the default setting will be restored every time the printer's power is cycled "OFF" and "ON."

Example: Have the printer wait 1.25 seconds before feeding paper on AutoLoad.
                           ^A1250^D120

<u>**^A**</u>	<u>**^D**</u>	<u>**COMMAND**</u>
	121	**Top of Form Command.**

This command initiates a TOF operation:
  a) Media is advanced until the leading edge is detected by the reflective "Top Of Form" sensor,
  b) Media is retracted to place the leading edge of stock under the print head.

This command is useful when using the AutoLoad + Top of Form command.

XX   123   Set TOF Retract Distance: When a TOF operation is in process, the paper moves forward until its leading edge is seen by the TOF sensor. As soon as the sensor sees the paper, the printer stops the forward motion of the paper and begins to move the paper in reverse toward the print head. This command sets how far the media is moved back into the printer after the leading edge is seen by the TOF sensor. The valid range for the TOF retract distance is from 1 to 900.

5.6   Printing Commands

The following commands initiate printing, define the number of labels to be printed or control how the printer initiates printing.

5.6.1   Basic Printing Commands

<u>**.^A**</u>	<u>**^D**</u>	<u>**COMMAND**</u>
	3	**Print Command: (Equivalent ^C)** Informs the printer to print a single label or

start printing a batch of labels. Since commands are processed in the order they are received, this is typically the last command in the format file. This command is equivalent to the "^C" control code.

  11   Print Test Pattern: (Equivalent ^K) Prints a label with diagonal lines that is used in determining the condition of the thermal dots of the print head. This command is equivalent to the "^K" control code.

  12   Form Feed: (Equivalent ^L) Prints or scrolls a blank form based upon the previous format definitions. This command is equivalent to the "^L" control code.

  70   Clear Commands 73-76: Resets the ^D73 through ^D76 commands to their default values.

XX   73   Load Copies Count: Instructs the printer to print multiple copies without incrementing serial numbers. This command can be used in conjunction with the ^D75 (Load Label Count) to allow duplicate copies to be made within a batch of labels. For example, the following command string will print a total of 150 labels; three copies of each serial number for the 50 different labels. (^A3^D73^A50^D75^D3<CR>)

1   74   Infinity Print: Prints a batch of labels until the printer is turned off. This

command is most effective when used in conjunction with the Tag/Tear and Peel-n-Dispense modes. The "^A1" enables the Infinity Print while a "^A0" will disable this function.

XX 75 Load Label Count: Instructs the printer to print a batch of labels using the serial number function if enabled. If the serial number function is disabled, the ^D75 command will print the number of copies (the same label) specified by the "^Axx" sequence just like the ^D73 command. This command may also be used in conjunction with the ^D73 command. The batch of labels is printed once a ^D3 command is executed; therefore the ^D75 command must be issued before the ^D3 command. The only difference between this command and the ^D73 is the ability to increment and/or decrement sequential numbers in a batch.

XXX 76 Load Delay Time Between Printed Labels: Delays the printing between labels in a batch. The "^Axxx" specifies the delay time in tenths of a second with a maximum value of 650. For example, "^A10^D76<CR>" would introduce a one second delay between printed labels. This command is typically used in conjunction with the Peel-n-Dispense mode and applicators.

5.7 Label Header Parameter Override Commands

It is possible to override label header parameters by adding one or more of the following commands <u>after</u> the label format.

<u>^A</u>   <u>^D</u>   <u>COMMAND</u>
      40   Clears Commands 41 through 51

XX 41 Load Number of Fields in Layout (HFM): The ^Axx specifies the value.

XX 42 Load Label Width in dots (LSX): The ^Axx specifies the value.

XX 43 Load Label Height in dots (LSY): The ^Axx specifies the value.

XX 44 Load the Web Size in dots (WEB): The ^Axx specifies the value.

XX 45 Load the Gap Size in dots (GAP): The ^Axx specifies the value.

XX 46 Load Print Speed: The ^Axx specifies the value.

XX 47 Load the Label Control Byte (LCB): The ^Axx specifies the value.

XX 48 Load the Number of Steps to Activate Gap Detector (AGD): The ^Axx specifies the value in Dot Rows.

XX 49 Load the Number of Steps Past Gap (SPG): The ^Axx specifies the value in Dot Rows.

XX 50 Load X Direction Offset (OFX): The ^Axx specifies the value.

XX 51 Load Y Direction Offset (OFY): The ^Axx specifies the value.

5.7.1   Serial Number Commands

The following commands, ^D80 through ^D89, are used for the serial number function commands of the printer. The printer can increment or decrement any single serial number on the label by any amount. If the format contains more than one serial number, then all serial number fields can only increment or decrement by a value of one. Single and Multiple serial number commands cannot be used on the same format. Please note that the ^D57 command clears most of the serial number commands. Therefore, all serial number commands should be placed after the ^D56 command or just prior to the ^D3 command. Refer to Section 5.6.1 for additional information regarding the use of the ^D75 command and the serial number functions.

The following two commands are valid for both single and multiple serial number functions:

<u>^A</u>	<u>^D</u>	<u>COMMAND</u>
	80	**Clears Commands 86, 88, 89.**
	81	**Disable Serial Number Function:** This command disables both single and multiple serial number functions.

The next three commands deal with the single serial number functions:

<u>^A</u>	<u>^D</u>	<u>COMMAND</u>
XX	**84**	**Load Text String Number to Increment/Decrement:** Instructs the printer which text string number to increment or decrement. The ^Axx value determines which of the text strings will be used for incrementing or decrementing.
XX	**85**	**Load Increment/Decrement Step Value:** The single serial number functions increment or decrement by this value. ^Axx is the amount of increment or decrement. Fields that instructs the printer to decrement beyond 0 will be set to 0.
XX	**86**	**Single Serial Number Status:**
0		Disable increment and decrement
1		Enable increment: The serial number will be incremented by the step value specified by the ^D85 command.
2		Enable decrement: The serial number will be decremented by the step value specified by the ^D85 command.

The next three commands determine the status of multiple serial numbers:

<u>^A</u>	<u>^D</u>	<u>COMMAND</u>
XX	**87**	**Load Field Number to Clear Increment/Decrement:** This command is used to clear the status of one or more fields that are using the serial number increment/decrement function. Example: A "^A1^D87<CR>" instructs the printer to clear the increment/decrement function of text string number 1 or the first text string.
XX	**88**	**Load Field Number to Increment by 1:** The ^Axx specifies which field to increment by one.

XX   89   Load Field Number to Decrement by 1: The ^Axx specifies which text string field that will be decremented by one. The printer will not decrement fields beyond 0. Fields that instructs the printer to decrement beyond 0 will be set to 0.

A sample format using the single serial number function:

> ^D57 <CR>
> 1,575,609,,25,35,0,1,285,0,0 <CR>
> 1,280,300,2,1,5 <CR>
> ^D56 <CR>
> ^A2^D86 <CR>
> ^A1^D84 <CR>
> ^A5^D85 <CR>
> ^A3^D75 <CR>
> ^D2 <CR>
> 20 <CR>
> ^D3 <CR>

This format would enable the decrement function (^A2^D86). Select text string #1 to decrement (^A1^D84), load the step value of 5 (^A5^D85) and then print three serialized labels (^A3^D75). The printed result would be "20" for the first label, "15" for the second label, and "10" for the third or last label.

A sample format using the multiple serial number function:

> ^D57 <CR>
> 2,575,609,,25,35,0,1,285,0,0 <CR>
> 1,280,300,3,1,5 <CR>
> 2,280,100,3,1,5 <CR>
> ^D56 <CR>
> ^A1^D88 <CR>
> ^A2^D89 <CR>
> ^A3^D75 <CR>
> ^D2 <CR>
> 100 <CR>
> 200 <CR>
> ^D3 <CR>

This format would enable the multiple serial number function and select the first text string to increment by one (^A1^D88), the second field to decrement by one (^A2^D89), and print three serialized labels (^A3^D75). The first text string would be printed as "100", "101", and "102" while the second text string is printed as "200", "199", and then finally "198".

5.8   Text String Commands

These commands offer special functions pertaining to the text strings. Some of the special functions would include Pre-padded text and auto-print.

^A   **^D**   <u>**COMMAND**</u>
     60   **Clears Command ^D61**

XX   **61**   **Mark Text Starting Position:** The ^Axx specifies which text field to start entering new data. This is useful for creating variable text fields after a string of fixed text fields. If set to a value of 2, the first line of new text entered following the ^D2 will overwrite line two. If two new text strings are entered, the existing text lines two and three will be overwritten. This command is used when fixed data is used much like a template and only the variable data is to change.

     62   **Pre-padded Text:** This command is used to pre-pad text data. Any data already loaded into a field will be retained if the ^D62 command is sent. The following is an example of Pre=padded text:

               ^D57<CR>
               3,1280,900,,38,7,0,1,385,0,0 <CR>
               1,300,500,7,1,5<CR>
               2,300,400,7,1,5<CR>
               3,300,300,7,1,5<CR>
               ^D56 <CR>
               ^D2 <CR>
               A<CR>
               B<CR>
               C<CR>
               ^D62<CR>
               ^D2<CR>
               line 1<CR>
               line 2<CR>
               line 3<CR>
               ^D3<CR>

     This format would produce a label with "Aline 1", "Bline2", and "Cline 3" printed on the label.

^A   **^D**   <u>**COMMAND**</u>
X   **63**   **Text Control Mode:** Allows the entry of new text without the ^D2 command and/or clears all previous text when new text is added.

0   Disable modes 1 and 2.

1   Enable Auto-Print mode. If this mode is selected, the printer will accept new text strings without requiring the ^D2 command. The printer can also auto-print a label when the number of received text strings (carriage returns) equal the number specified by the ^D64 command. This mode is useful when interfacing to a scale, bar code wand of other limited host that is capable of generating and sending carriage return characters.

2   Clear Previous Text Upon Receiving New Data. When one of more characters

of new text is entered, the all-existing text data will be erased. The printer may be programmed to enter the mode automatically upon power-up by position 1 of software switch #2 (^D22 command).

3   Enable modes 1 and 2.

^A	**^D**	**COMMAND**
XX	**64**	**Auto-Print String Count:** This command is used in conjunction with the ^A1^D63 auto-print command. The ^Axx specifies the number of text strings (carriage returns) to accept before issuing the print command. When the printer is in the auto-print mode, it is not necessary to send the ^D2 command to enter text or the ^D3 command to initiate printing. The printer will accept incoming text strings and print the label as soon as the number of strings equal the amount specified by the ^D64 command.

The following is an example of the ^D61, ^D63, and ^D64 commands:

```
^A0^D64<CR>                  (Clears any old settings)
^D57<CR>
6,1280,900,,38,7,0,1,385,0,0 <CR>
1,300,300,20,1,4<CR>
2,300,250,20,1,4<CR>
3,300,200,20,1,4<CR>
4,300,150,20,1,4<CR>
5,300,100,20,1,4<CR>
6,300,50,20,1,4<CR>
^D56 <CR>
^D2 <CR>
Protected Field<CR>
Protected Field<CR>
Protected Field<CR>
Variable Field<CR>
Variable Field<CR>
Variable Field<CR>
^A3^D63<CR>          (Enables Auto-Print and Clears text)
^A3^D64<CR>          (Instructs printer to print after 3 <CR>)
^A3^D61<CR>          (Instructs printer to start text entry at line 3 instead
                       of line 1)
```

5.9   Cutter Configuration Commands

5.9.1   Cutter Type

The ^D115 is a non-volatile command that sets the proper type of cutter installed on the printer being used. This value is reported to the ^D29 statistics label. This command should be used prior to enabling the cutter with the ^D99 or ^D111 commands.

^A	**^D**	**Command**
X	**115**	**Set Cutter Type**
0		No Cutter
1		Guillotine
2		Rotary

5.9.2   Kiosk Cutter Commands

5.9.2.1   Kiosk Cutter Mode

This is a non-volatile command that enables cutter operation. When a printer is configured to use the ^D111, the printer prints a job, dispenses the advance distance (See ^D112), and then cuts the media. The media is not retract until the next format which helps to prevent paper jams going into the cutter or media wrapping around the platen roller.

XX	**111**	**Kiosk Cutter Mode**
0		Disable Kiosk Cutter Mode.
1		Enable Kiosk Cutter Mode.
2		Enable Partial Kiosk cut mode.

5.9.2.2   Kiosk Cutter Advance Distance Command

This command sets the advance/retract distance for the Kiosk Cutter (^D111) Mode. This is the distance that the printer will advance after printing to control the cut placement. The same distance will be used to retract the media to the print head for printing once the next job is sent.

XX	**112**	**Kiosk Cutter Advance/Retract Distance Command:** The valid range is from 0 to 1000 with the recommended distance of 150.

5.9.3   Volatile Cutter Operation

^A	**^D**	**COMMAND**
	8	**Cycle Cutter:** If a cutter is installed on the printer, this command will cause the cutter to be cycled. The cutter's operation will be determined by the D99 command. If the cutter is a rotary cutter, it will always cycle in the forward direction to make a full cut. If the cutter is a guillotine cutter, the cycle direction will be determined by the last setting given with a D99 command.
X	**99**	**Cutter Control:** This command enables full and/or partial cut operation. This command works in conjunction with the ^D102 and ^D103 Cut Interval commands. The ^D95 command is also used with the ^D99 command to adjust the advance distance to the cutter blades and then retract to the home position (dot row one). The ^D99 command will assume a default ^D95 value of 155.
		Note: When doing partial cuts with a LPD, the printer will not proceed until the LPD sees that the label has been taken. Then after a programmable delay, the printer will retract and print the next label.
0		Disable Cutter operation.
1		Enable Full Cut.

| **2** | Enable Partial Cut. |
| **3** | Enable Full and Partial Cut. |

<u>**^A**</u>	<u>**^D**</u>	<u>**COMMAND**</u>
XX	**102**	**Full Cut Interval:** Instructs the printer when to issue a Full Cut. The default value is 1. A value of "1" results in a full cut whenever the copies count is reached, or after each format if a copies count has not been specified. If this command is set higher than "1" (maximum of 65536), the printer will full cut when that quantity is reached. This command will not operate if the Cutter Control (^D99) command is set to partial cut.

XX   103   Partial Cut Interval: This command instructs the printer when to issue a Partial Cut. A partial cut requires the use of a Cutter that is capable of Partial cuts. A Partial Cut leaves a thin piece of media in the center after the cut cycle is finished. This small piece of uncut stock holds the media together and the printer waits until the media is removed before printing the next label. The default Partial Cut Interval is set to 1. The printer will issue a partial cut, if set to a 1, whenever the copies count is reached. If set to a value greater than 1, the printer will partial cut when that quantity is reached. This command only functions when the Cutter Control (^D99) command is set to allow partial cuts.

Note: A full cut will override a partial cut. The following examples assume that the ^D99 command has been set to 3.

Example #1: If the Full Cut Interval is set to a value of 5 and the Partial Cut Interval is also set to a value of 5, the printer will issue a Full Cut.

Example #2: If the Full Cut Interval is set to a value of 5 and the Partial Cut Interval is set to a value of 1, the printer will partial cut after labels 1 through 4 and full cut after label 5.

XX   95   Advance/Retract Distance: This command is used in conjunction with the tag/tear (^D97), peel-n-dispense (^D98), and cutter (^D99) commands. It is used to adjust the number of steps the printer will advance the media after printing has stopped and then retract the same distance so that media is not wasted. While the maximum value is 64,000 steps, it is not recommended that the printer advance further than one label size. This may create a paper jam when the label is retracted back into the printer.

XX   96   Load Advance Delay: The ^Axx specifies the amount time, in milliseconds, that the printer will delay the repositioning or retraction of the media. For Example, "^A1000^D96 <CR>" would delay for a period of one second.

118   Home Cutter: When this command is issued, the printer will cycle the cutter gear to determine the location of the gear and position it in the home position. This command is only available on the X28 series printer's.

5.9.4   Cutter Hold-off

This command is used to avoid cutting "air" or the leading edge of the first label when printing and cutting without advancing the label stock. This command is used with the Full or Partial Cut Mode (^D99), but not the Kiosk Cut Mode. This function will skip a pre-set number of cuts following a Top of Form. Count resets and begins count at TOF or following the point where the command is given.

Note: Advance distance must be set at "0" for this command to function.

XX   117   Cutter Hold-off: X represents the number of cuts to skip on the first X labels following a Top of Form.

5.10   Dispensing Commands

Dispensing commands are commands that advance the media for cutting, tear off, or presenting and then retract the media to a home position so that media is not wasted. These dispense commands include Peel-n-Dispense, Tag/Tear, Cutter commands, and optional media handling commands as well. The following commands define these types of operations. Most of the dispensing commands require that the printer is configured with an optional Label Present Detector.

5.10.1   Tag/Tear Operation

This command controls a method of dispensing the media so that the perforation between labels is positioned on the tear bar or peel edge. Once the label is taken, the label media retracts and allows proper registration of the next label print. Once the label is taken, the label media retracts and allows proper registration of the next label print.

^A	**^D**	**COMMAND**
X	97	**Tag/Tear Operation:**
0		Disable Tag/Tear operation.
1		Advance after every print.
2		Advance after copies count.
3		Advance when idle. (Does not use LPD - retracts stock at next sent label format.)

5.10.2   Peel-and-Dispense Operation

This command is used when the labels are to be peeled from the backing material. Once the label is taken, the label media retracts and allows proper registration of the next label print. This command requires that the printer is configured with the optional label peel assembly for proper operation. Not all models support the label peel option.

X	98	**Peel-and-Dispense Operation:**
0		Disable Peel-and-Dispense operation.
1		Enable Peel-and-Dispense operation.

5.10.3   Load Advance/Retract Distance and Load Advance Delay

XX   95   Advance/Retract Distance: This command is used in conjunction with the tag/tear (^D97), peel-n-dispense (^D98), and cutter (^D99) commands. It is used to adjust the number of steps the printer will advance the media after

printing has stopped and then retract the same distance so that media is not wasted. While the maximum value is 64,000 steps, it is not recommended that the printer advance further than one label size. This may create a paper jam when the label is retracted back into the printer.

XX   96   Load Advance Delay: The ^Axx specifies the amount time, in milliseconds, that the printer will delay the repositioning or retraction of the media. For Example, "^A1000^D96 <CR>" would delay for a period of one second.

5.11 View Printer Configuration and Statistics

These commands display or print configuration settings. The user may reset the Printed Labels and Inches if they wish to track label usage, print head life, etc. Total Labels and Inches cannot be reset by the user.

XX   29   Printer Statistics:
0   Print Statistics to the serial port
1   Print Statistics on a label
2   Clear the **Printed Labels** variable in the statistics
3   Clear the **Printed Inches** variable in the statistics

33   Display Model and Revision Number

5.12   Memory Commands

These commands offer special functions related to clearing, storing, and processing data in the RAM and FLASH memory.

The printer can store up to 128 FORMAT files into the printer's volatile RAM memory and another 128 files into non-volatile FLASH memory. Once stored, these files may be loaded from memory rather than having to be sent down thru the serial port. Formats are retained even after power has been cycled when stored in FLASH memory. Formats stored in RAM will be lost when the printer is turned "OFF."

The printer may be configured through software switch #2 (^D22 command) to automatically process a specific format from the FLASH memory (power up format) when the printer is turned "ON." The printer treats the stored formats as if they were sent through the serial port.

<u>^A</u>   <u>^D</u>   <u>COMMAND</u>
XX   54   Send Format from RAM to Port: The ^Axx specifies the slot number (1-128) where the format file is stored in RAM. This may be used to read what is stored in each memory slot.

XX   58   Process Format Saved in RAM: The ^Axx selects which stored format to process (1-128). This command is processed in the same was as if the format was sent directly to the port.

XX   59   Save Formats to RAM. (volatile)
The ^Axx selects the memory slot (1- 128) into which the format is to be saved. A format file must be terminated by an ESC (HEX 1B) or "["(left bracket) character to save the format.

Sample format saved to RAM slot #1:   ^A1^D59
^D57
5,1280,900,20,40,7,0,1,405,0,0
1,640,650,12,1,5,0,4,2,2,,,,,0
^D56
^D2
Saved Format
^D3
^[

XX   **66**   **Clear Single FORMAT Stored in RAM:** The ^Axx specifies which memory slot to clear (1-128). This command only functions with FORMAT files and not with downloadable fonts and/or graphics.

        100   **Clear User RAM:** This command clears all the downloaded fonts and graphics that have been stored in RAM. This command does not affect fonts and graphics that have been downloaded and stored into the FONT flash memory. Use the ^D17 to erase FONT flash memory.

        101   **Send User RAM Available:** The printer will send the number of free or available bytes to the serial port (i.e. >192480<).
Use the D119 command for more detailed reporting.

XX   **104**   **Save ASCII Fonts to RAM:** The ^Axx specifies which memory file # (CGN #) the FONT will use (1-255). This command should be used with an ASCII-HEX file that contains only printable characters less than 80 HEX. These FONTS are "extended non-compressed", meaning that they can be greater than 64KB in size. This command supports fonts greater than 64KB.

^A   **^D**   **COMMAND**
XX   **105**   **Delete Graphics from RAM**
            ^A0 deletes ALL graphics from RAM.
            ^Ax deletes the graphics in slot #x.

xxyy   **107**   **Save Compressed GRAPHICS to RAM.**
            (See Chapter 6, Downloadable Graphics)

        119   **Display Memory Allocation.**
            This command shows how all of the RAM and FLASH memory is being used

            Example display from the ^D119 command:

            Ram Based Fonts/Graphics(TCI=8) - [file number(CGN), size, type]
            [2,4625, Font set]   ← *Slot #2 in RAM has a FONT that is 4,625 bytes*.

            Ram Based Formats - [file number, size]
            [2,176] ← *Slot #2 in FORMAT RAM has a FORMAT that is 176 bytes.*
            Total Ram Memory Available - 258335 ← *There are 258,335 bytes of RAM available*.

            Flash Based Fonts/Graphics(TCI=7) - [file number(CGN), banks used, type]
            [1,1, Graphic]   ← *Slot #1 of FONT flash has a GRAPHIC that takes up 1 bank (64Kbyte)*
            Font/Graphic Flash Memory Banks Available - 119← *There are 119 banks of 64KB open.*

Flash Based Formats - [file number, size]
[1,176] ←*Slot #1 of FORMAT flash has a FORMAT file that is 176 bytes.*
Format Flash Memory Available - 65359 ←*There are 65,359bytes of FORMAT flash open.*

Label Memory - [size, available]
[43231,41618] ←*The difference is the amount of memory to process current format.*

NOTES: RAM GRAPHICS can extend beyond the starting slot # into sequential ones. RAM formats are numbered #1 to #128 (RAM FONTS are limited to 64K in size.)

122 Display Available FONT/GRAPHICS FLASH memory.
This command is used to display the amount of FONT/GRAPHICS FLASH memory available in bytes in the form >xxxxxxx< where xxxxxxx is the number of available bytes.

xxyy 127 Save FONTS to RAM.
(See Chapter 7, Downloadable Fonts)

XX 130 Save a FORMAT to FLASH. (non-volatile memory)
The ^Axx selects the memory slot (1- 128) into which the format is to be saved. A format file must be terminated by an ESC (HEX 1B) or "["(left bracket) character to save the format.

How to Save a Label FORMAT to FLASH:
1) Create the FORMAT file with ^Axx^D130 at the top to tell the printer to store into FLASH Slot #xx.

2) Send the file to the printer using a standard communications program.

Sample format saved to RAM slot #1:

```
^A1^D130
^D57
5,1280,900,19,38,7,0,1,385,0,0
1,640,650,12,1,5,0,4,2,2,,,,,0
^D56
^D2
Saved Format
^D3
^[
```

^A   ^D   COMMAND
XX   131 Delete a FORMAT from FLASH.
^A0 deletes all FORMAT files in FLASH ^Axx deletes the FORMAT file stored in FLASH slot (1 – 128)

This command deletes the Label FORMAT stored in Slot #xx of the FORMAT storage bank in FLASH memory. Use this command to clear a FORMAT Slot in FLASH before storing a new FORMAT into the Slot.

xxyy   133   Save Compressed GRAPHICS to FLASH.
(See Chapter 6, Downloadable Graphics)

XX   134   Delete a GRAPHIC from FLASH.
^A0 deletes all GRAPHIC files in FLASH
^Axx deletes the GRAPHIC stored in FLASH Slot #xx
Valid values for Axx are 1 to 255. The user selects the CGN #xx that will be cleared.

The ^D119 command may be used to verify what memory Slot #'s are available in FLASH for storage.

xxyy   135   Save FONTS to FLASH. (See Chapter 7)
This command is not normally seen by the user. It is put into a FONT file by the FONT converter program which generates a special ^Axxyy^D135 code which is placed at the beginning of the FONT download file. The ^Axxyy tells the printer the overall size of the file according to this format:

xx = the number of additional 64KB sectors in the FONT file set
yy = CGN # (1-255)

If xx = 00, then the FONT fits into one 64Kbyte sector of memory and there are no additional sectors required for the FONT.

If xx > 00, then the FONT is larger than one 64KB sector, and xx is the number of ADDITIONAL 64KB sectors needed for the FONT. The xx field > 00 signals the printer to get ready for a multi-sector FONT download. Each subsequent download contains a header with the xx field decremented by 1. The last download file has a header field xx = 00.

EXAMPLE: ^A0124^D135   This command tells the printer that an extended FONT download for FLASH memory is coming. The download will be 2 sectors long, and the printer will access the FONT in FLASH memory using CGN #24 and TCI #7. The ^A0124^D135 command will be right at the beginning of the file. So the ^D135 command is never sent by itself, it's always in a FONT download file, and the user never really sees it.

The FONT download file may be larger than 64Kbyte. The only limit on the file size is the amount of memory available to hold the file. When the FONT file is created, a specific reference number, called a CGN # is assigned to the file by the user. After the FONT file has been downloaded and stored in FLASH, the printer retrieves the FONT from FLASH by using its CGN # and TCI #7(for FLASH). The FONT may be stored anywhere in the printer's FLASH memory; it is NOT restricted to a specific FLASH memory location. The printer maintains a address table that tells where each FONT CGN # is stored in FLASH.

The CGN # is established by the user when the FONT download file is created using the font converter program. Since this is an arbitrary number picked by the user, it is possible to create two separate FONT files with the same CGN #. In fact, many FONT files could be created using the same CGN #. For the printer to function properly, each FONT in FLASH must have a unique CGN #. If a FONT is downloaded that has the same CGN # as a FONT that is already stored in FLASH, then an error message is sent back indicating a Duplicate CGN error.

The printer's FLASH is nonvolatile, so FONTS that are downloaded using the ^D135 will be stored in FLASH memory until specifically erased by the user. The following 3 parameters are included in the FONT file when it is created:
1. Memory destination: RAM or FLASH
2. Memory File #: 1→255 (this is the CGN #)
3. Rotation: 0°, 90°, 180°, or 270°

How to save a FONT to FLASH:
1. Create the special FONT download file with FLASH set as the memory destination,
2. Send the file to the printer using a standard communications program set for 8 data bits, no parity, 1 stop bit.

Hint: After the FONT file has been sent, the ^D119 command may be used to verify that the new FONT is now available in FLASH.

^A   **^D**   **COMMAND**
XX   **136**   **Delete a FONT from RAM.**
^A0 deletes all FONTS from RAM
^Axx deletes the FONT stored in RAM Slot #xx

Valid values for Axx are 1 to 255. The user selects the RAM memory Slot #xx that will be cleared.

Hint: After the FONT file has been deleted, the ^D119 command may be used to verify that Slot #xx is now available in RAM. The FONT may extend over several slots and the ^D119 will indicate how many slots are used.

XX   **137**   **Delete a FONT from FLASH.**
^A0 deletes all FONTS from FLASH
^Ax deletes the FONT stored in FLASH Slot #x

Valid values for Axx are 1 to 255. The user selects the FLASH memory Slot #xx that will be cleared.

Hint: After the FONT file has been deleted, the ^D119 command may be used to verify that Slot #xx is now available in FLASH. The FONT may extend over several slots and the ^D119 will indicate how many slots are used.

XX   **138**   **Process a FLASH FORMAT.**
^Axx references the FORMAT file stored in Slot #xx

Valid values for Axx are 1 to 128.

Label FORMATS are saved into FLASH Slots 1 to 128. Each of these FORMAT slots specifies how to build the dot rows that are used to print a label on the printer.

This command tells the printer to take the Label FORMAT file in Slot #xx and build up its image in the printer's slice buffer. After this command is finished, the label may be printed by sending the ^C print command.

NOTE: If the FORMAT file contains a print command, then the label will be printed at the end of this command.

XX   139   Send a FLASH FORMAT to the communications port.
^Axx references the FORMAT file stored in Slot #xx
Valid values for Axx are 1 to 128.

Label FORMATS are saved into FLASH Slots 1 to 128. This command causes the printer to send a previously loaded FORMAT file out the communications port to the HOST.

Use this command to view label Format's that have been saved in the printer's non-volatile FLASH memory.

^A   ^D   COMMAND
**   140   Clear all User GRAPHIC and FONT FLASH.**
This command erases the user FONTS and GRAPHICS in FLASH memory. This command is equivalent to sending:

          1)   ^A0^D134 (clears all GRAPHICS),
          2)   ^A0^D137 (clears all FONTS).

Label FORMATS stored in user FLASH memory are NOT erased by this command. Use the ^D131 command to erase label FORMATS stored in FLASH memory.

IMPORTANT NOTE!!! Embedded FONTS and label FORMATS are NOT erased. However, any custom FONTS and GRAPHICS loaded into user FLASH memory at the factory WILL be erased.

Hint: After the user FLASH has been deleted, the ^D119 command may be used to verify that Slots #1 thru #255 are now available in FLASH.

**   141   Clear User GRAPHIC and FONT FLASH & RAM memory.**
This command clears all user FONTS and GRAPHICS in FLASH memory, and all the downloaded FONTS and GRAPHICS in RAM. This command is the equivalent to sending:

    1) ^D100 (clears all downloaded FORMATS, FONTS and GRAPHICS in RAM.

2) ^A0^D140 (clears all user FONTS and GRAPHICS in FLASH).

Label FORMATS stored in user FLASH memory are NOT erased by this command. Use the ^D131 command to erase label FORMATS stored in FLASH memory.

Please note that this command may take some time (depending on how much is stored). During this time the printer will not respond to commands. The printer may appear to be locked up until the command finishes.

Hint: Use command ^D119 to confirm that FONTS and GRAPHICS were erased in user FLASH memory, and that all downloaded FORMATS, FONTS, and GRAPHICS were erased in RAM.

5.13   Printer Code Update

^A	**^D**	**COMMAND**
X	**7**	**Update Printer Code:**

This command is used to update the printer's flash memory in the event new or enhanced features exist in a different software version. Sending a ^A62519^D7 command will update the printer's bootloader, application, and embedded font set. This process requires some interactivity with the printer and failure to follow the proper process will cause the printer to become inoperable. Please contact your Microcom Corporation Representative for more information.

5.14   Miscellaneous Commands

^A	**^D**	**Command**
	5	**Send Printer Status: (Equivalent ^E)**
X	**93**	**Load Control Code Recognition Status:**
0		Enable control code recognition
1		Disable control code recognition
X	**113**	**Verbose Mode:**
0		Disable Verbose Mode
1		Enable Verbose Mode
X	**145**	**List Commands:**

This command is used to generate a list of commands containing a brief description of the LDSI code base that the printer uses. Issuing a ^D145 or ^A0^D145 causes the printer to generate a list of commands supported by the LDSI code base to communications port.

0	List LDS Commands
1	List current settings
2	List Soft-switch descriptions

^A	**^D**	**Command**
X	**146**	**Pre Stock-Out Distance:**

This command sets the distance in dots that the PSO option uses to feed the media when the >INPUT 1< sensor detects an out of media condition. If the length of the label happens to be larger than the distance from the pre stock out sensor to the dot row (^D146 command) the printer will not be able to completely finish printing the last label. Other than this, the operation of the printer will be the same as above. The printer's default distance is set to 1800 and issuing a "0" (^A0^D146) will cause the printer to reset to this value. The maximum setting is 7200 and values above this setting will be ignored.

| | **149** | **USB Image Print Mode:** |

This command controls an image print mode protocol that is used with the USB port to shift images to the printhead at fast baud rates. This mode requires that the bmp2mic rev 1.02 or later be used to convert the 1 bit monochrome bitmap image to be printed. This mode basically shifts data directly to the printhead and does not use the normal LDS command protocol. This mode also uses additional baud rates for higher speed image printing.

Protocol:
1. The HOST sends a format to the printer that identifies the media being used:

Example: ^D57[CR][LF]
              1,1280,940,,,3,0,1[CR][LF]
              ^D56[CR][LF]

This format only needs to be sent one time after the unit has powered on. The >RESTARTED< status message could be used to indicate when this needs to be sent or simply send it each time a print is desired.

2. The Host then sends the printer the ^D149 command followed by the raw image size that has been converted by the bmp2mic rev 1.02 or later. Please note that the size is only terminated with a [CR] and the [LF] is not included.

Example: ^D149[CR][LF]size[CR]

3. The printer will report back the image size back to the Host as an indication that the printer is ready to receive the image.

Example: size[CR][LF]

4. The host then sends the converted image to the printer.

This image print protocol has a 5 second inter-character timer that starts as soon as the printer sends back the size of the image. If the 5 second times out, the download will fail. The printer will report >FAIL TIMEOUT<, the status

light will turn RED, and the printer will not respond to any commands until receiving the Image mode clear command.

Image Mode Clear command:
ETBYKFNR
or in hex
45 54 42 59 4b 46 4e 52

The protocol will also fail if the image data is larger than the value entered after the ^D149 command. The printer will report >FAIL SIZE<, the status light will turn RED, and the printer will not respond to any commands until receiving the image mode clear command.

The graphic needs to be downloaded each time it is to be printed as reprints are not available in the D149 Image print mode. However, the format needs to be downloaded only once. The label will print based on the last format that was sent to the printer.

^A	**^D**	**COMMAND**
X	**153**	**Feed Forward Distance:**

This command will move the motor in the forward direction by the X amount (specified in dots) when issued. The maximum value is 65535. The feed speed is defined by the D155 command.

X	**154**	**Feed Reverse Distance:**

This command will move the motor in the reverse direction by the X amount (specified in dots) when issued. The maximum value is 65535. The feed speed is defined by the D155 command.

^A	**^D**	**COMMAND**
X	**155**	**Set Feed Speed:**

This command sets the feed speed that is used for the D153 and D154 commands.

0	8.0 ips (inches per second)
1	7.5 ips
2	7.0 ips
3	6.5 ips
4	6.0 ips
5	5.5 ips
6	5.0 ips
7	4.5 ips
8	4.0 ips
9	3.5 ips
10	3.0 ips
11	2.5 ips
12	2.0 ips
13	1.5 ips
14	1.0 ips
15	0.5 ips

X   156   Set Non-stick Time Interval:
This command is used to set the time interval for the Non-stick TOF mode (D26 position 8) used to help alleviate the media adhering to the platen roller. The value for X represents the number of seconds that the printer will execute the Non-stick TOF operation. The default setting is 14400 or 4 hours. The valid range is from 2 to 65536. This command is volatile and gets reset to the default setting after power cycles and/or command reset conditions. The ^A1^D145 command may be used to observe the current setting and the elapsed time counter.

X   157   Takeup Motor Run Time:
The D157 command is used with optional software that controls a DC Takeup motor instead of a cutter motor. The value for X represents how long the takeup motor will run, in milliseconds, after printing has stopped. This command is a volatile command with a default of 0. The ^A1^D145 command lists the current setting under the Post Takeup Time.

0	0	
1	25	25 msec
2	50	
3	75	
4	100	
5	125	
6	150	
7	175	
8	200	
9	225	
10	250	
11	275	
12	300	
13	325	
14	350	
15	375	
16	400	
17	425	
18	450	
19	475	
20	500	
21	525	
22	550	
23	575	
24	600	
25	625	

X   158   Set the Dot2Gap Value:
This is the distance of the transmissive sensor, that detects diecut and blow hole registration marks, to the dot row. This distance is set at the factory and is typically not needed to be changed. The Dot2gap distances represent the physical characteristics of the printer models. This command is used in

conjunction with the Finish Mode feature; see the D27 command bit position 8 for more information.

Printer Model Number	Dot2Gap value
203dpi 224/424	468
300dpi 224/424	720
203dpi x24m	284
300dpi x24m	438
203dpi x28	264
300dpi x28	380

Table 5-3   Dot2Gap Values

X   159   Brownout Reporting:
A brownout condition is a sag or drop in the supply voltage that dips below 16.4Vdc but does not continue to sag and perhaps goes back to the 24Vdc supply voltage. The printer will attempt to update its configuration and counters in this condition. Proper power sources should not normally have situations were Brownouts are a frequent occurrence. The printer provides the ability to monitor these types of conditions using the D159 command. The D159 command provides a volatile or running total of the brownouts and a non-volatile count that is saved.

0   After a power up, reports the "running" total of detected Brownouts.
1   Clears the "running" total or volatile brownout count
5   Reports the non-volatile brownout count stored in memory
255   Clears the non-volatile brownout count stored in memory

Chapter 6:   Downloadable Graphics

The 428M printer allows the user to download their own GRAPHICS and store the GRAPHICS in either non-volatile FLASH memory, or in volatile RAM memory.

6.1 FLASH Data Types

The printer's FLASH memory provides non-volatile storage for several types of data:

1) 120 FLASH memory banks are 64Kbyte sectors for storing downloadable FONTS and GRAPHICS.
2) 128 slots for label FORMATS.
3) 7 "embedded" FONTS. These FONTS are downloaded at the factory.

NOTE: The printer's FLASH memory retains data after power is turned OFF. So data that is downloaded to the printer's FLASH memory will be available until erased by the user. FONTS & GRAPHICS stored in FLASH memory are accessed using TCI #7 and the appropriate slot # (CGN #).

6.2 RAM Data Types

The printer's RAM memory provides volatile storage for several types of downloadable data:

1) RAM memory slots #1 thru #255 are used to store downloadable FONTS and GRAPHICS using TCI #8.
2) 128 slots for label FORMATS.

NOTE: The printer's RAM memory is NOT battery backed-up. So when the printer is turned OFF any data stored in the RAM memory is lost. The downloaded data that is stored in RAM is temporary.

6.3 Using the BMP2MIC.exe GRAPHIC Conversion Utility

Bitmap graphic image files (*.bmp) may be converted to a LDS compatible format by using the BMP2MIC.exe Graphic Conversion Utility. This and other conversion utilities may be downloaded at http://www.microcomcorp.com.

The conversion utility is a DOS-base program and will require access to a DOS prompt. Before starting the conversion utility, it would be helpful to gather the following information:

1) <u>In File</u>   This is the *.bmp file to be converted. (Limit the file name to 8 characters and locate file in the same directory as the conversion utility to simplify data entry into the program.)
2) <u>Out File</u>   Create a name for the converted GRAPHIC File. (Limit the file name to 8 characters. An extension is not necessary.)
3) <u>Out Type</u>   See Section 6.4.
4) <u>Slot Number</u>   Select an open slot number for storage. Use ^D119 to determine which slots are open.

5) <u>Limit</u>   The maximum print width (in dots). Use ^D29 to determine print head size.

6) <u>Destination</u>   Use "0" for FLASH and "1" for RAM.

6.3.1   BMP2MIC.exe GRAPHIC Conversion Utility Procedure

1. Execute the conversion utility from a DOS prompt.

```
Microsoft(R) Windows 98
   (C)Copyright Microsoft Corp 1981-1999.

C:\WINDOWS>cd\

C:\>BMP2MIC.exe
```

STEP 1
At the Command Prompt:
Type "BMP2MIC.exe"
Press [ENTER]

2. Type the conversion utility name and required information at the command prompt. Press [ENTER].

```
BMP2MIC - Convert BMP Graphic File to Microcom Printer Graphic
Rev. 2.01
Copyright 1998-2005 Microcom Corp., Westerville, Ohio

Use:
BMP2MIC <infile> <outfile> <outtype> <slotnum> <limit> <destination>
Where
 <infile> is a BMP file
 <outfile> is the name of the desired output file
 <outtype> is one of the output types listed below
 <slotnum> is the printer font slot number
 <limit> is the maximum image width (printhead width) of the printer
 <destination> is 0 for flash and 1 for ram


Output types are:
Type    Output
  1     Model 412 Standard ASCII (image 64K or less)
  2     Model 412 Binary (any size image)
  3     Model 412 Extended ASCII (any size image)
  4     Model 466 ASCII (any size image)
  5     Model 466 Binary (any size image)
  6     Model x24 Extended Binary (any size image)

C:\>BMP2MIC Jet.bmp Jet.mic 6 100 832 0C:\>BMP2MIC Jet.bmp Jet.mic 6 100 832 0
```

STEP 2
At the Command Prompt:
Type "BMP2MIC" *and follow with required information.*
Press (ENTER)

Note: Add a space between fields.

Note: Jet.bmp is used as an example for the <infile>. Enter your own GRAPHIC name in its place. You may name the <outfile> anything you wish as long it is less than 8 characters. An extension is not necessary.

3. Conversion is complete. Converted GRAPHIC file is ready to download to printer.

```
BMP format data:
Windows 3.X format.
dimensions: 74 wide, 31 high.
8 bits per pixel

Input file: Jet.bmp
Output file: Jet.mic
Output type: Model x24 Extended Binary (any size image) using font slot 100
Destination is ^D133 - for saving to flash (0)
Image width = 74 dots.  Image height = 31 rows.

Image occupies 332 bytes of space in printer memory.
Decompressed file contains 1 FFs and 295 00s.
```

6.4 Graphic Download Methods

The printer supports both compressed and uncompressed graphic downloads. The compressed format shortens the download time by reducing the number of bytes sent to the printer. Please note that the compressed format is only usable on 8-bit data connections and will **NOT** function on 7-bit data connections.

6.4.1   Uncompressed Graphic Downloads

The uncompressed converted GRAHIC file can be sent on either 7 or 8-bit connections, is more flexible, and encodes using ASCII-HEX, but this method results in a much larger file size than a compressed format.

The converted GRAPHIC file can be sent to the printer via any active printer port. A terminal emulation program such as Hyper Terminal, ProComm, Tera Term, etc is commonly used.
Note: It is highly recommended to use hardware flow control.

6.4.2   Compressed Binary GRAPHIC Downloads

The compressed format shortens the download time by reducing the number of bytes sent to the printer. Data compression is accomplished by converting strings of 0 HEX or FF HEX to shorter byte-plus-count sequences. These sequences are then expanded to the original number of bytes inside the printer. A compressed binary converted GRAPHIC file must be sent on a 8-bit data connection.

The printer must be setup to accept downloaded binary compressed files by setting Software Switch #3, position 7 to "1". Otherwise, the file may be sent to the printer through any active printer port.

6.5 Advanced GRAPHIC Format Conversion for Programmers

The following sections are provided to developers who wish to create usable GRAPHIC images within their own applications. Commands in the following section are not typically seen for users using Microcom GRAPHIC utilities.

6.5.1 Save Compressed Graphics to RAM (D107)

The following is the format of the ^D107 command when used to store a compressed GRAPHIC image file into RAM.

^A<*RAM Memory Slot Number*>^D107<CR>
<*Rotation*> <*Count*> <*Image Data*>

Where:
<*RAM Memory Slot Number*> is the memory slot location (1-255) where the GRAPHIC will be saved in the printer's RAM memory. The printer uses the same TCI of "8" to select downloadable fonts or graphics. Therefore a font and a graphic cannot have the same Slot Number or CGN number.

<*Rotation*> is an 8-bit integer, 0 for an upright GRAPHIC and 1 for a GRAPHIC rotated 90-degrees counter-clockwise.

<*Count*> is a 32-bit integer, least significant byte first. This is the number of uncompressed bytes that the GRAPHIC image uses, not the number of bytes that will actually be transmitted. Due to compression, the number of bytes transmitted will normally be less than this number.

<*Image Data*> is the compressed binary image.

6.5.2 Save Compressed Graphics to FLASH (D133)

The following is the format of the ^D133 command when used to store a compressed GRAPHIC image file into FLASH.

^A<*FLASH Memory Slot Number*>^D133<CR>
<*Rotation*> <*Count*> <*Image Data*>

Where:
<*FLASH Memory Slot Number*> is the memory slot location (1-120) where the GRAPHIC will be saved in the printer's FLASH memory. The printer uses the same TCI of "7" to select downloadable fonts or graphics. Therefore a font and a graphic cannot have the same Slot Number or CGN number.

<*Rotation*> is an 8-bit integer, 0 for an upright GRAPHIC and 1 for a GRAPHIC rotated 90-degrees counter-clockwise.

<*Count*> is a 32-bit integer, least significant byte first. This is the number of uncompressed bytes that the GRAPHIC uses, not the number of bytes that will actually be transmitted. Due to compression, the number of bytes transmitted will normally be less than this number.

<*Image Data*> is the compressed binary image.

6.5.3   Binary Compression Algorithm

The binary data that make up the image file is a run-length compressed version of the image data described in Section 7.2. Bytes with a value of "0" HEX or "FF" HEX are followed by another byte indicating the number of times that value is repeated.

For example: Suppose the original (uncompressed) image file has a sequence of bytes like: (All values are listed in Hexadecimal)

"00 01 02 03 04 00 00 00 00 00 00 FF FD FF FF FF FF FF 00 FF"

The encoded result would like this:
"00 00 01 02 03 04 00 05 FF 00 FD FF 04 00 00 FF 00"

Result interpretation:
00 - the first byte is 00
00 - count of 0 (the previous 00 byte is not repeated or repeated zero times)
01 - a 01 byte
02 - a 02 byte
03 - a 03 byte
04 - a 04 byte
00 - another "00" byte in the file
05 - the "00" byte is repeated 5 times for a total of 6 "00" bytes (00+05=6 "00" bytes)
FF - a "FF" byte
00 - count of 0 (the previous "FF" byte is not repeated or repeated zero times)
FD - a FD byte
FF - another FF byte
04 - the FF byte is repeated 4 times for a total of 5 "FF" bytes (FF+04 = 5 "FF" bytes)
00 - another 00 byte
00 - repeat count = 0
FF - another FF byte
00 - repeat count = 0

The compression scheme is slightly inefficient for single 00 HEX and FF HEX occurrences by entering two for each of these occurrences but most image bitmaps include large areas of either blank space (00 HEX) or black space (FF HEX).

If a string of more than 255 "00" HEX or "FF" HEX occurs, the byte-plus-count sequence may be repeated as often as necessary to incorporate all occurrences of the byte. For example, a string of 1132 "FF" HEX bytes in sequence may be encoded as:

"FF FF FF FF FF FF FF FF FF 6B"

The first four pairs of "FF" HEX each encode 256 bytes of "FF" HEX (one for the first "FF" byte and 255 copies) totaling 1024 bytes of "FF" HEX. The next "FF" HEX byte adds another and the 6B HEX adds 107 additional copies for a total of 1132 FF HEX bytes. (4 X 256)+1+107 = 1132

6.5.4   Uncompressed FONT to RAM (^D104)

This command allows graphic and/or font images (fonts must be less than 64KB uncompressed) to be transmitted in ASCII-HEX, thereby allowing all data to pass over 7 or

8-bit data connections. This command is usable on data connections that support either 7 or 8-bit data.

The following is the format of the ^D104 command when used for a graphic image file:

^A<*Slot Number*>^D104<CR>
<*Rotation*> <*Count*> <*Image Data*>

Where:
<*Memory Slot Number*> is the memory slot location (1-255) where the graphic will be saved in the printer's memory. The printer uses the same TCI of "8" to select downloadable fonts or graphics. Therefore a font and a graphic cannot have the same Slot Number or CGN number.

<*Rotation*> is an 8-bit integer, 0 for an upright font, and 1 for a 90-degree rotated image.

<*Count*> is a 32-bit integer, least significant byte first. This is the number of bytes that the image uses.

<*Image Data*> is the graphic image data that has been converted to ASCII-HEX.

ASCII-HEX Conversion
The ASCII-HEX conversion is performed by "ORing" the most significant and least significant nibbles of every byte with "30" HEX.

For Example: To convert the byte "6C" to ASCII-HEX, simply OR the first and second nibbles with "30" HEX. This results in the two bytes "36" HEX and "3C" HEX. This conversion results in a file size that is twice as big as the source, the data can now be transmitted over a 7-bit data connection.
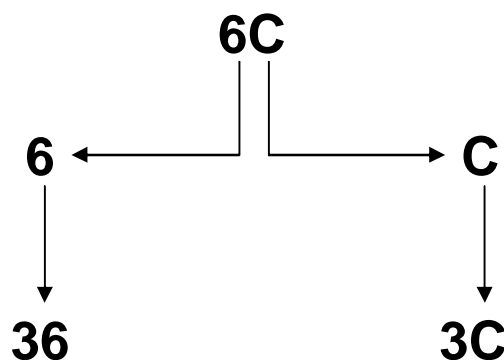
Figure 6-1   ASCII-HEX Conversions

6.6 Graphic Image Data Format

The image data consists of a set of data structures and location offsets to those structures. All data is stored in binary form. Multi-byte values are stored least-significant-byte first.

The method illustrated below allows graphic images to span 64KB memory segments. When using graphics over 64KB, the printer will determine the number of 64KB slots

required to store the entire graphic and will split the large file into the correct number of smaller files internally. The printer stores these smaller files sequentially in the slots following the one specified in the appropriate load or save graphic command. Therefore, before sending a graphic file that is 64KB or more (uncompressed size), make sure that the specified font slot has enough following empty slots to store the file properly.

Graphics that are stored in multiple slots in this way may still be printed as if they are one large graphic. In the label format, refer to the first slot (the one specified in the download command) regardless of how many slots that may be required for large graphics. The printer will automatically append the additional graphic files seamlessly without additional user intervention.

(Word is a 16-bit value, Byte is an 8-bit value, and Label is a location within the file)

Label start:	the beginning of the file
Word, Word, lookup_table_offset	distance in bytes from start to beginning of lookup_table (4 bytes)
Word tallest_char	height of graphic image in dots
Word widest_char	Width of graphic image in dots
Byte default_spacing	Default spacing, usually 0
Byte byte_width	Width of graphic image in bytes
Byte first_char	20 HEX
Byte last_char	20 HEX
Byte default_char	20 HEX
Label lookup_table	beginning of lookup table
Word char_offset [last_char-first_char]	an array of offsets, one for each character in font. Each offset is the distance, in bytes, from the start to the beginning of the corresponding character's data structure. The first word in this array is the offset to the first character's data; the last word is the offset to the last character's data.
Label first_char_data	the beginning of the graphic image data
Word char_height	height of this character's bitmap in dots
Word char_width	width of the graphic image in dots
Byte bitmap_data[char_height][byte_width]	bitmap of character, 2d array. The most significant bit of the first byte in each row, prints as the right most dot of the character, and the first row is the bottom row when printed.

6.7 Downloadable Graphics Commands

The following commands refer to the use of downloadable graphics:

^A	**^D**	**COMMAND**
	100	**Clear User RAM:** This command clears all downloadable fonts, graphics, and stored label formats.
	101	**List RAM Memory Bytes Available:** The printer will send the ">" character followed by the amount of available bytes and then finally a "<" character. (i.e. >192690<)
XX	**104**	**Save GRAPHICs or FONTs into RAM Memory without Compression:** The ^Axx specifies which memory slot to place the image/font (1-255). This command should be used with an ASCII-HEX file that contains only printable characters less than 80 HEX. This command supports graphics over 64KB.
XX	**105**	**Delete Graphics from RAM:**
0		Deletes ALL graphics from RAM
XX		Deletes the graphics in slot #XX
XX	**106**	**Save GRAPHICs or FONTs into RAM Memory without Compression:** This command is intended for legacy support only and Microcom Corporation recommends either the ^D104 or ^D107 commands. Fonts must be less than 64KB for this command to function.
XX	**107**	**Save GRAPHICs or FONTs into RAM Memory using Binary Compression:**
XX	**133**	**Save Compressed GRAPHIC to FLASH.**

Chapter 7:   Downloadable Fonts

The 428M printer allows the user to download their own fonts and store the fonts in either volatile RAM memory, or non-volatile FLASH memory.

7.1 FLASH Data Types

The printer's FLASH memory provides non-volatile storage for several types of data:

1) 120 FLASH memory banks are 64Kbyte sectors for storing downloadable FONTS and GRAPHICS, using TCI #7.

   These FONTS are downloaded using the ^D135 command.
   These GRAPHICS are downloaded using the ^D133 command.
   (See Chapter 6, Downloadable GRAPHICS.)

2) 128 slots for label FORMATS.

   These FORMATS are downloaded using the ^D130 command.

3) 7 "embedded" FONTS. These FONTS are downloaded at the factory.

NOTE: The printer's FLASH memory retains data after power is turned OFF. So data that is downloaded to the printer's FLASH memory will be available until erased by the user. FONTS & GRAPHICS stored in FLASH memory are accessed using TCI #7 and the appropriate slot # (CGN #).

7.2 RAM Data Types

The printer's RAM memory provides volatile storage for several types of downloadable data:

1) RAM memory slots #1 thru #255 are used to store downloadable FONTS and GRAPHICS using TCI #8.

   These FONTS are downloaded using the ^D127 command.
   These GRAPHICS are downloaded using the ^D107 command.
   (See Chapter 7, Downloadable GRAPHICS.)

2) 128 slots for label FORMATS.

   These FORMATS are downloaded using the ^D59 command.

NOTE: The printer's RAM memory is NOT battery backed-up. So when the printer is turned OFF any data stored in the RAM memory is lost. The downloaded data that is stored in RAM is temporary.

7.3 Using the Font Conversion Utilities

The printer treats downloadable fonts just like the standard bitmapped font mentioned in Chapter 5. Both LaserJet™ and TrueType® fonts can be converted using the "SFP2MIC.exe" or "TTF2MIC.exe" software utilities. Note: The "SFP2MIC.exe" program uses the Portrait or 0 degree source rotation for both normal and rotated fonts.

Downloadable font fields use the same structure as the bit mapped fields with the only difference being that the TCI must be set to an "8" for volatile downloadable fonts and the CGN refers to the memory slot location of the downloaded font. Nonvolatile fonts are accessed thru TCI "7".

The following section details the process required to convert and download fonts to the printer. The conversion utilities "SFP2MIC.exe" and "TTF2MIC.exe" may be downloaded at http://www.microcomcorp.com. These 16 bit DOS utilities convert LaserJet™ SFP or TrueType® TTF fonts into a format that is suitable for downloading to the printer.

7.3.1 SFP2MIC.exe Program

1. Run the SFP2MIC program from a DOS prompt.

2. Follow the on screen instructions and note the slot number where the image is saved. The Model 428M printer uses the same font structure as the Model 412 printer. Select the Model 412 printer when converting fonts for the 324/424M printer.

3. Make sure the destination memory slot is clear. The ^D100 command can be used to clear the printer's memory.

4. Download the resulting file (filename N12 (normal rotation) or R12 (rotated)) file to the printer.

7.3.2 TTF2MIC.exe Program

1. Run the TTF2MIC program from a DOS prompt.

2. Follow the on-screen instructions and note the slot number the image is saved. The 428M printer uses the same font structure as the Model 412 printer. Select the Model 412 printer when converting fonts for the 428M printer.

3. Make sure the destination memory slot is clear. The ^D100 command can be used to clear the printer's memory.

4. Download the resulting file (filename N12 (normal rotation) or R12 (rotated)) file to the printer.

7.4 Font Download Methods

The printer supports both compressed and uncompressed graphic and font downloads. The compressed format shortens the download time by reducing the number of bytes sent to the printer. Please note that the compressed format is only usable on 8-bit data connections and will not function on 7-bit data connections. The uncompressed (^D104) is usable on either 7 or 8-bit connections and is more flexible but encodes using ASCII-HEX. This results in a much larger file size. Microcom Corporation recommends the use of the compressed format when possible.

7.4.1   Compressed Binary Commands

These commands allow graphic images or fonts to be transmitted in binary, thereby reducing the number of bytes sent to the printer. Furthermore, the commands allow for data compression by converting strings of 0 HEX or FF HEX to shorter byte-plus-count sequences. These sequences are then expanded to the original number of bytes inside the printer. These commands are only usable on data connections that support 8-bit data. So the serial port MUST be configured for 8 Data Bits and no parity. These commands will NOT function correctly with a serial port configured to 7-bit data bits.

7.4.1.1 **Save Compressed FONT to RAM (D127)**

The following is the format of the ^D127 command when used to store a compressed FONT file into RAM.

^A<RAM Memory Slot Number>^D127<CR>
<Rotation> <Count> <Image Data>

Where:
<RAM Memory Slot Number> is the memory slot location (1-255) where the FONT will be saved in the printer's RAM memory. The printer uses the same TCI of "8" to select downloadable fonts or graphics for storage into RAM. Therefore a font and a graphic cannot have the same Slot Number or CGN number.

<Rotation> is an 8-bit integer, 0 for an upright FONT and 1 for a FONT rotated 90-degrees counter-clockwise.

<Count> is a 32-bit integer, least significant byte first. This is the number of uncompressed bytes that the FONT uses, not the number of bytes that will actually be transmitted. Due to compression, the number of bytes transmitted will normally be less than this number.

<Image Data> is the compressed binary image.

7.4.1.2 **Save Compressed FONT to FLASH (D135)**

The following is the format of the ^D135 command when used to store a compressed FONT file into FLASH.

^A<FLASH Memory Slot Number>^D135<CR>
<Rotation> <Count> <Image Data>

Where:
<FLASH Memory Slot Number> is the memory slot location (1-120) where the FONT will be saved in the printer's FLASH memory. The printer uses the same TCI of "7" to select downloadable fonts or graphics for storage into FLASH memory. Therefore a font and a graphic cannot have the same Slot Number or CGN number.

<Rotation> is an 8-bit integer, 0 for an upright FONT and 1 for a FONT rotated 90-degrees counter-clockwise.

<Count> is a 32-bit integer, least significant byte first. This is the number of uncompressed bytes that the FONT uses, not the number of bytes that will actually be transmitted. Due to compression, the number of bytes transmitted will normally be less than this number.

<Image Data> is the compressed binary image.

7.4.2 **Uncompressed FONT to RAM (^D104)**

This command allows graphic and/or font images (fonts must be less than 64KB uncompressed) to be transmitted in ASCII-HEX, thereby allowing all data to pass over 7 or 8-bit data connections. This command is usable on data connections that support either 7 or 8-bit data.

The following is the format of the ^D104 command when used for a GRAPHIC image file:

^A<*Slot Number*>^D104<CR>
<*Rotation*> <*Count*> <*Image Data*>

<u>*Where:*</u>
<*RAM Memory Slot Number*> is the memory slot location (1-255) where the GRAPHIC will be saved in the printer's volatile RAM memory. The printer uses the same TCI of "8" to select downloadable fonts or graphics. Therefore a font and a graphic cannot have the same Slot Number or CGN number.

<*Rotation*> is an 8-bit integer, 0 for an upright font and 1 for a 90-degree rotated image.

<*Count*> is a 32-bit integer, least significant byte first. This is the number of bytes that the image uses.

<*Image Data*> is the graphic image data that has been converted to ASCII-HEX.

ASCII-HEX Conversion
The ASCII-HEX conversion is performed by OR'ing the most significant and least significant nibbles of every byte with "30" HEX.

For Example: To convert the byte "6C" to ASCII-HEX, simply OR the first and second nibbles with "30" HEX. This results in the two bytes "36" HEX and "3C" HEX. This conversion results in a file size that is twice as big as the source but the data can now be transmitted over a 7-bit data connection. Refer to Figure 13.

7.4.3   Save FONTS to FLASH (^D135)

xxyy   135   Save FONTS to FLASH.
This command is not normally seen by the user. It is put into a FONT file by the FONT converter program which generates a special ^Axxyy^D135 code which is placed at the beginning of the FONT download file. The ^Axxyy tells the printer the overall size of the file according to this format:

xx = the number of additional 64KB sectors in the FONT file set
yy = CGN # (1-255)

If xx = 00, then the FONT fits into one 64Kbyte sector of memory and there are no additional sectors required for the FONT.

If xx > 00, then the FONT is larger than one 64KB sector, and xx is the number of ADDITIONAL 64KB sectors needed for the FONT. The xx field > 00 signals the printer to get ready for a multi-sector FONT download. Each subsequent download contains a header with the xx field decremented by 1. The last download file has a header field xx = 00.

EXAMPLE: ^A0124^D135   This command tells the printer that an extended FONT download for FLASH memory is coming. The download will be 2 sectors long, and the printer will access the FONT in FLASH memory using CGN #24 and TCI #7. The ^A0124^D135 command will be right at the

beginning of the file. So the ^D135 command is never sent by itself, it's always in a FONT download file, and the user never really sees it.

The FONT download file may be larger than 64Kbyte. The only limit on the file size is the amount of memory available to hold the file. When the FONT file is created, a specific reference number, called a CGN # is assigned to the file by the user. After the FONT file has been downloaded and stored in FLASH, the printer retrieves the FONT from FLASH by using its CGN # and TCI #7(for FLASH). The FONT may be stored anywhere in the printer's FLASH memory; it is NOT restricted to a specific FLASH memory location. The printer maintains a address table that tells where each FONT CGN # is stored in FLASH.

The CGN # is established by the user when the FONT download file is created using the font converter program. Since this is an arbitrary number picked by the user, it is possible to create two separate FONT files with the same CGN #. In fact, many FONT files could be created using the same CGN #. For the printer to function properly, each FONT in FLASH must have a unique CGN #. If a FONT is downloaded that has the same CGN # as a FONT that is already stored in FLASH, then an error message is sent back indicating a Duplicate CGN error.

The printer's FLASH is nonvolatile, so FONTS that are downloaded using the ^D135 will be stored in FLASH memory until specifically erased by the user. The following 4 parameters are included in the FONT file when it is created:

      1. Memory destination: RAM or FLASH
      2. Memory File #: (this is the CGN #)
      3. Rotation: 0°, 90°, 180°, or 270°
      4. Compressed or Non-compressed.

How to save a FONT to FLASH:

      1. Create the special FONT download file with FLASH set as the memory destination,
      2. Send the file to the printer using a standard communications program set for 8 data bits, no parity, 1 stop bit.

Hint: After the FONT file has been sent, the ^D119 command may be used to verify that the new FONT is now available in FLASH.

7.5 Font Structure

The following font structure is offered to programmers who wish to use their own programs to convert fonts. The font structure consists of a set of data structures and location offsets to those structures. All data is stored in binary form. Multi-byte values are stored "least significant byte" first. The printer can store a font of approximately 64KB or less in any one memory slot location.

(Word is a 16-bit value, Byte is an 8-bit value, and Label is a location within the file)

Label start:	the beginning of the file
Word, Word, lookup_table_offset	distance in bytes from start to beginning of lookup_table (4 bytes)
Word tallest_char	height of graphic image in dots
Word widest_char	Width of graphic image in dots
Byte default_spacing	Default spacing, usually 0
Byte byte_width	Width of graphic image in bytes
Byte first_char	20 HEX
Byte last_char	20 HEX
Byte default_char	20 HEX
Label lookup_table	beginning of lookup table
Word char_offset [last_char-first_char]	an array of offsets, one for each character in font. Each offset is the distance, in bytes, from the start to the beginning of the corresponding character's data structure. The first word in this array is the offset to the first character's data; the last word is the offset to the last character's data.
Label first_char_data	the beginning of the graphic image data
Word char_height	height of this character's bitmap in dots
Word char_width	width of the graphic image in dots
Byte bitmap_data[char_height][byte_width]	bitmap of character, 2d array. The most significant bit of the first byte in each row, prints as the right most dot of the character, and the first row is the bottom row when printed.

7.6 Downloadable Font Command Summary

The following commands refer to the use of downloadable fonts and graphics:

.

^A   ^D   COMMAND
       100   Clear User RAM:
                 This command clears all downloadable fonts, graphics, and stored label
       formats.
       101   List Memory Bytes Available:
       The printer will send the ">" character followed by the amount of available
       bytes and then finally a "<" character. (i.e. >192690<)

XX   104   Load GRAPHIC or FONT into RAM Memory without Compression:
       The ^Axx specifies which memory slot to place the image/font (1-255). This
       command should be used with an ASCII-HEX file that contains only printable
       characters less than 80 HEX. This command supports GRAPHICS over
       64KB.

XX   106   Load GRAPHIC or FONT into RAM Memory without Compression:
       This command is intended for legacy support only and Microcom Corporation
       recommends either the ^D104 or ^D107 commands. Fonts must be less than
       64KB for this command to function.

XX   127   Save FONTS to RAM.
       (See Section 7.4.1.1)

XX   135   Save a FONT to FLASH.
       (See Section 7.4.1.2)

Chapter 8:   Bar Codes

The purpose of this chapter is to provide information pertaining to the unique requirements of the individual symbologies that are resident in the printer. Bar codes are accessed by selecting the appropriate TCI number.

8.1 Types of Bar Codes

This section provides information regarding the different requirements of the available resident bar codes. Unless stated otherwise in the descriptions below, the printer will automatically generate the necessary check digits when required. The following symbols are described in numerical order based on the TCI number.

8.1.1   Universal Product Code – Version A (UPC-A), TCI 12

The Uniform Product Code version A or UPC-A symbology is used in the retail industry. It is capable of encoding numerical characters 0 through 9 and consists of eleven data digits followed by a check digit that the printer calculates. The first six data digits consist of a number system digit followed by manufacturer's identification digits that are assigned by the Uniform Code Council (UCC). The next five data digits are assigned by the manufacturers and typically represent product identification. The 12th digit is the checksum and should be omitted because the printer will automatically insert the correct value if a checksum is not included with the data. The printer will accept and print an invalid check digit if an incorrect check digit is provided. UPC-A bar codes do not use inter-character spacing and therefore the character spacing (CS) element must be defaulted. The UPC symbology defaults to an X dimension of 40% or 5.2 mils. To produce a symbology that is within the specification, a minimum multiplier of 2 should be entered in the appropriate multiplier parameters (CMX or CMY depending on the field orientation) to produce an 80% or 10.4 mils symbology.

8.1.2   Universal Product Code – Version E (UPC-E), TCI 13

The UPC-E symbology is used in the retail industry and is capable of encoding numerical characters 0 through 9 and consists of eleven data digits followed by a check digit that the printer calculates. The first six data digits consist of a number system digit followed by manufacturer's identification digits that are assigned by the Uniform Code Council (UCC). The next five data digits are assigned by the manufacturers and typically represent product identification. This bar code applies the "zero suppression" compression method to reduce certain 11 digit UPC-A bar codes to only 6 numeric digits and a conversion type numeric digit. Certain rules apply for this type of compression method to function properly. These rules may be obtained from the Uniform Code Counsel (UCC). The digits must be valid data for the proper bar code to print. Failure to use valid data may result in an incorrect bar code. The UPC symbology defaults to an X dimension of 40% or 5.2 mils. To produce a symbology that is within the specification, a minimum multiplier of 2 should be entered in the appropriate multiplier parameters (CMX or CMY depending on the field orientation) to produce an 80% or 10.4 mil symbology. When using the TCI 13 (UPC-E), the printer requires the unconverted 11 digits and the Manufacture's ID number must begin with "0" for proper use. UPC-E bar codes do not use inter-character spacing, therefore the character spacing (CS) element must be defaulted. The chart listed in Table 14 illustrates how the 11 digits are reduced to only 6 using the "zero suppression" compression.

SYMBOLOGY	DECODED NUMBER
X1 X2 X3 X4 X5 0	NS X1 X2 0 0 0 0 0 X3 X4 X5
X1 X2 X3 X4 X5 1	NS X1 X2 1 0 0 0 0 X3 X4 X5
X1 X2 X3 X4 X5 2	NS X1 X2 2 0 0 0 0 X3 X4 X5
X1 X2 X3 X4 X5 3	NS X1 X2 X3 0 0 0 0 0 X4 X5
X1 X2 X3 X4 X5 4	NS X1 X2 X3 X4 0 0 0 0 0 X5
X1 X2 X3 X4 X5 5	NS X1 X2 X3 X4 X5 0 0 0 0 5
X1 X2 X3 X4 X5 6	NS X1 X2 X3 X4 X5 0 0 0 0 6
X1 X2 X3 X4 X5 7	NS X1 X2 X3 X4 X5 0 0 0 0 7
X1 X2 X3 X4 X5 8	NS X1 X2 X3 X4 X5 0 0 0 0 8
X1 X2 X3 X4 X5 9	NS X1 X2 X3 X4 X5 0 0 0 0 9

Table 8-1   UPC-E Zero Reduction Format

8.1.3   Universal Product Code (UPC-E, send 6 digits), TCI 14
The UPC-E symbology is used in the retail industry and is capable of encoding numerical numbers 0 through 9 and consists of six digits followed by a check digit that the printer calculates. This symbology is the same as the UPC-E (TCI 13) with the only exception being that only the actual 7 numeric digits are used to produce the bar code. The digits must be valid data for the proper bar code to print. Failure to use valid data may result in an incorrect bar code. The UPC symbology defaults to an X dimension of 40% or 5.2 mils. To produce a symbology that is within the specification, a minimum multiplier of 2 should be entered in the appropriate multiplier parameters (CMX or CMY depending on the field orientation) to produce an 80% or 10.4 mils symbology.

8.1.4   Interleaved 2 of 5 (I2 of 5), TCI 15
The I2of 5 is a variable length, paired, numerical symbology that is typically used in the industrial and distribution industries. The I2 of 5 is a paired symbology, which means that the data string being sent must always be an even number amount. If the desired data to be sent is an odd amount, simply pad the beginning with "0" to achieve an even amount of digits. This symbology uses 2:1, 3:1, 4:2, 5:2, 7:3, and 8:3 ratios, which may be selected by the CGN parameter. The I2 of 5 symbology actually encodes characters in the spaces as well as the bars. Therefore, the character spacing (CS) parameter must be defaulted.

8.1.5   Code 3 of 9 (Code39), TCI 16
Code 39 is a variable length, alphanumeric symbology that is very popular and is extensively used in the non-retail, military, manufacturing and medical industries. Code 39 is capable of encoding numerical characters 0 through 9, the English Alphabet (uppercase only), characters -. *$/+% along with the "space" character. The Code 39 is framed with a start/stop character represented by the asterisk ("*") character, which is reserved for this purpose. This symbology uses 2:1, 3:1, 4:2, 5:2, and 8:3 ratios, which may be selected using the CGN parameter. Although most specifications require a specific inter-character

spacing, Code39 will allow custom inter-character spacing as long as the maximum does not exceed the timeout zone of the intended scanning equipment.

8.1.6   European Article Numbering System 13 (EAN-13), TCI 20

The European Article Numbering system (EAN) is a European version of the UPC symbology that is used in the retail industry. It is also referred to JAN or Japanese Article Numbering system in Japan. The EAN-13 is a fixed length symbology that encodes up to 13 numeric digits consisting of two country code digits, ten data digits, and one check digit that the printer will automatically calculate. The EAN symbology defaults to an X dimension of 40% or 5.2 mils. To produce a symbology that is within the specification, a minimum multiplier of 2 should be entered in the appropriate multiplier parameters (CMX or CMY depending on the field orientation) to produce an 80% or 10.4 mils symbology.

8.1.7   European Article Numbering System 8 (EAN-8), TCI 21

The European Article Numbering system (EAN) is a European version of the UPC symbology that is used in the retail industry. It is also referred to JAN or Japanese Article Numbering system in Japan. The EAN-8 encodes up to 8 numeric digits consisting of two country code digits, five data digits, and one check digit that the printer will automatically calculate. While very similar to the UPC-E symbology, the EAN-8 does not compress the data digits and is not a condensed version of the EAN-13 symbology. The EAN symbology defaults to an X dimension of 40% or 5.2 mils. To produce a symbology that is within the specification, a minimum multiplier of 2 should be entered in the appropriate multiplier parameters (CMX or CMY depending on the field orientation) to produce an 80% or 10.4 mils symbology.

8.1.8   Modified Plessey (MSI 1), TCI 24

The MSI is a modified version of the Plessey symbology, which is a variable length, numeric-only symbology used for retail shelf labeling. When using MSI 1, the user does not have to provide either check digit; the printer will calculate and insert the check digits automatically.

8.1.9   Modified Plessey (MSI 2), TCI 25

The MSI is a modified version of the Plessey symbology, which is a variable length, numeric-only symbology used for retail shelf labeling. When using the MSI 2 bar code, the user provides one check digit and the printer will calculate the second check digit.

8.1.10   Modified Plessey (MSI 3), TCI 26

The MSI is a modified version of the Plessey symbology, which is a variable length, numeric-only symbology used for retail shelf labeling. When using the MSI 3 bar code, the user provides both check digits.

8.1.11   Postnet (ZIP+4), TCI 36

Postnet is a numeric-only symbology that is commonly used in postal application to sort mail. The five-digit zip or five-digit zip plus four-digit extension may be used to generate this Postnet (TCI 36) bar code. Example: 12345 or 12345-1234.

8.1.12   Postnet (ZIP+6), TCI 37

Postnet is a numeric-only symbology that is commonly used in postal application to sort mail. The five-digit zip plus six-digit extension may be used to generate this Postnet (TCI 37) bar code. Example: 12345-123456.

8.1.13   MaxiCode, TCI 38

MaxiCode is a fixed-size, 2-D matrix symbology that is capable of encoding the entire ASCII character set (0 to 255) and up to 93 characters per symbology. Modes 2 through 6 of the AIM Internal MaxiCode specification are supported. Modes 0 and 1 are obsolete and are not supported. The CGN parameter is used to select the desired mode (2-6) of the symbology.

MaxiCode may encode non-printable characters, and Modes 2 and 3 require certain control characters for compatibility with transport industry standards. In order to properly specify a control character in a MaxiCode data string, use the pound symbol ("#") followed by the two digits Hexadecimal value of the control code. For example, "#01" specifies "Control-A" (ASCII SOH) and "#1D" specifies "Control-]" (ASCII GS). Enter "##" in order to include an actual pound symbol in the data string. Refer to Table 15 for the "#" equivalents that may be used.

The following is the command structure of the ^D71 which is used to load the data for Maxicode:

> ^D71<CR>
> Mode<CR>
> Symbol Number<CR>
> Total Number<CR>
> Country Code<CR>
> Service Code<CR>
> Zip Code<CR>

Mode - barcode mode (1 through 6).

Symbol Number - maxicode barcodes can be chained together. This one is the Nth barcode in a series.

Total Number - Total number of barcodes in the series.

Country Code - Three digits.

Service Code - Three digits.

Zip Code - 9 digits

The data string associated with a MaxiCode field shall be formatted according to the Mode selected (2-6).

Mode 2
Mode 2 may have either of the following formats:
Format 1

[)>#1e01#dYYPPPPPPPPP#1dCCC#1dSSS#1dA..A#1dB..B#1dC..C#1e#04

Where:
#1e is the ASCII RS character
#1d is the ASCII GS character
#04 is the ASCII EOT character
YY is the two digit numeric year
PPPPPPPPP is the 9-digit numeric US Postal Code. if using a 5-digit Postal Code, the last 4 digits must be 0.
CCC is the 3-digit numeric Country Code (840 in the US).
SSS is the 3-digit numeric Class of Service.
A..A, B..B, C..C, etc. are variable-length alphanumeric fields separated by #1d. These fields are optional according to the MaxiCode specification, but may be required by some applications.

Format 2
PPPPPPPPP#1dCCC#1dSSS#1dA..A#1dB..B#1dC..C#04

The individual fields are the same as previously described in Format 1.

Mode 3
Mode 3 may have either of the following formats:
Format 1
[)>#1e01#1dYYPPPPPP#1dCCC#1dA..A#1dB..B#1dC..C#1e#04
Format 2
PPPPPP#1dCCC#1dSSS#1dA..A#1dB..B#1dC..C#04
Where:
#1e is the ASCII RS character
#1d is the ASCII GS character
#04 is the ASCII EOT character
YY is the two digit numeric year
PPPPPP is the six character alphanumeric Postal Code.
CCC is the 3-digit numeric Country Code
SSS is the 3-digit numeric Class of Service
A..A, B..B, C..C, etc. are variable length alphanumeric field separated by the #1d. These fields are optional according to the MaxiCode specification, but may be required in certain application.

Mode 4
Mode 4 may encode any string of up to 93 characters. Control characters are specified in Table 15, and occupy only one character in the encoded string.

Mode 5
Mode 5 may encode any string of up to 77 characters. Control characters are specified in Table 15, and occupy only one character in the encoded string.

Mode 6
Mode 6 may encode any string up to 93 characters. Control characters are specified in Table 15 on the next page, and occupy only one character in the encoded string.

DATA STRING	CONTROL CODE	ASCII NAME	HEX VALUE
#00	Control @	NUL	00
#01	Control A	SOH	01
#02	Control B	STX	02
#03	Control C	ETX	03
#04	Control D	EOT	04
#05	Control E	ENQ	05
#06	Control F	ACK	06
#07	Control G	BEL	07
#08	Control H	BS	08
#09	Control I	HT	09
#0A	Control J	LF	0A
#0B	Control K	VT	0B
#0C	Control L	FF	0C
#0D	Control M	CR	0D
#0E	Control N	SO	0E
#0F	Control O	SI	0F
#10	Control P	DLE	10
#11	Control Q	DC1	11
#12	Control R	DC2	12
#13	Control S	DC3	13
#14	Control T	DC4	14
#15	Control U	NAK	15
#16	Control V	SYN	16
#17	Control W	ETB	17
#18	Control X	CAN	18
#19	Control Y	EM	19
#1A	Control Z	SUB	1A
#1B	Control [	ESC	1B
#1C	Control \	FS	1C
#1D	Control]	GS	1D
#1E	Control ^	RS	1E
#1F	Control_	US	1F
##	n/a	# (pound)	23

Table 8-2   MaxiCode Control Code Equivalents

8.1.14   Code 128 (Automatic Compression), TCI 40

The Code 128 bar code is a variable length, high density, alphanumeric symbology that is extensively used worldwide. This bar code uses three subsets (A, B, and C) which allows for the encoding of the full 128 ASCII character set along with special control codes. This bar code uses automatic compression. The printer will automatically choose the most efficient subset and insert the appropriate special function code listed in Table 16. It is possible to force a subset change by inserting the appropriate code while in automatic
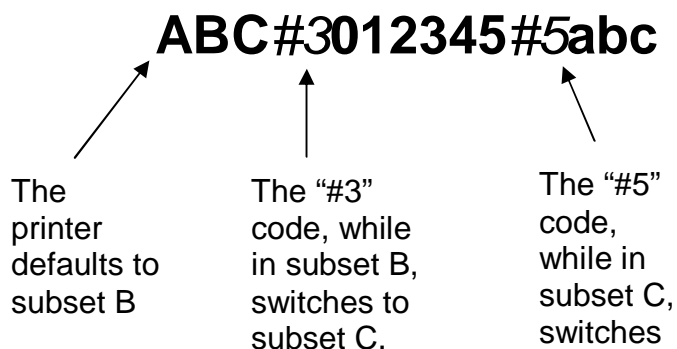
compression, however it is not recommended. Please note that if a subset is forced while using automatic compression the printer will automatically switch to subset C if 6 or more numeric characters are contained in the data string. Once the even number of characters has been processed, the printer will then switch to subset B. This could create problems if a user sent 6 numeric characters while forcing subset A ("#7123456"). The printer would automatically switch to subset C and then back to subset B resulting in an undesired bar code due to the extra function codes. If specific control of the subsets is a requirement, then the manual compression bar code should be used.

Code	SUBSET A	SUBSET B	SUBSET C
#0	FNC3	FNC3	N/A
#1	FNC2	FNC2	N/A
#2	SHIFT	SHIFT	N/A
#3	CODE C	CODE C	N/A
#4	CODE B	FNC4	CODE B
#5	FNC4	CODE A	CODE A
#6	FNC1	FNC1	FNC1
#7	START	N/A	N/A
#8	N/A	START	N/A
#9	N/A	N/A	START
##	#	#	N/A

Table 8-3   Code128 Special Function Access

8.1.15   Code 128 (Manual Compression), TCI 41

The Code 128 bar code is a variable length, high density, alphanumeric symbology that is extensively used worldwide. This bar code uses three subsets (A, B, and C) which allows for the encoding of the full 128 ASCII character set along with special control codes. This bar code uses manual compression, which provides full control by manually shifting between the available subsets using the special function access codes. The codes (#n) are placed within the data string to access the desired functions listed in the table below. When using manual compression the printer defaults to subset B if no start code is defined. The printer will also not attempt to compress the data unless subset C is used. Once in subset C the user must send the appropriate code (#n) to return to either subset A or B.

ABC#3012345#5abc

The printer defaults to subset B

The "#3" code, while in subset B, switches to subset C.

The "#5" code, while in subset C, switches

Figure 8-1   Code 128 Subset Switching

Subset A

This subset contains 106 unique characters, which includes numbers 0 through 9, the English alphabet (uppercase only), punctuation marks, ASCII control codes, and the special function codes listed in table 16.

Subset B

This subset contains 106 unique characters, which includes numbers 0 through 9, the English alphabet (both uppercase and lower case), punctuation marks, and the special function codes listed in table 16. This is the default if a subset is not defined when using manual compression.

Subset C

This subset contains 106 unique characters, which includes matched pair numbers 00 through 99 and the special function codes listed in table 16. Subset C requires that an even amount of digits to be sent because the matched pairs are encoded as a single character. This allows for a greater amount of compression than subsets A and B. If an odd amount of digits and/or non-numeric characters were sent while using subset C, the resulting bar code produced would be invalid.

8.1.16   Codabar (Rationalized), TCI 42

Codabar is a variable length linear symbology that is commonly used in libraries, blood banks, and in the air parcel business. Codabar is capable of encoding the 16 following characters: 0123456789-$:/. + and the four start/stop characters ABCD. This symbology uses 2:1, 3:1, 4:2, 5:2, and 8:3 ratios, which may be selected using the CGN parameter.

8.1.17   Code 93, TCI 43

Code 93 is a variable length, alphanumeric symbology that is capable of encoding 48 different characters and through the use of control characters can encode the full 128 ASCII character set. The 48 characters include the "space", numerical characters 0 through 9, the English alphabet (uppercase only), characters $%+-. / along with five special characters including the start/stop character.

8.1.18   PDF-417, TCI 46

The Portable Data File 417 or PDF-417 is a two-dimensional stacked symbology that is capable of encoding the entire ASCII character set, 2710 digits, and up to 1108 bytes in a single bar code. The requirements for generating a PDF-417 symbology are the text data, placement information, size configuration, rotation, aspect ratio, and Error Correcting Code or ECC. The character count (CC) parameter only has to be set to one character that will be used as a placeholder and not printed. The PDF-417 format command (^D77) is used to load the data as well as formatting instructions for the bar code and is placed on the first line of the format.

The following format is used to generate a PDF-417 bar code:

```
^D77<CR>
:Text Data^\
Number_of_Rows<CR>
Number_of_Columns<CR>
Rotation<CR>
ECC_Percent<CR>
```

ECC_Level<CR>
Aspect_Ratio<CR>

This format is then followed by the placement instructions and text placeholder.

:Text Data^
This parameter is where the desired data is placed and must be terminated with the "^\\[" or 0x1C control code. The text data may include carriage returns and other control codes.

Number_of_Rows<CR>
This parameter specifies the number of rows used for rendering the PDF-417 symbology. The PDF-417 symbology may have as few as 3 or as many as 90 rows with a default setting of 90. A carriage return character must be used to terminate this field.

Number_of_Columns<CR>
This parameter specifies the number of columns used for rendering the PDF-417 symbology. The PDF-417 symbology may have 1 to 30 columns with a default setting of 30. A carriage return character must be used to terminate this field.

Rotation<CR>
This parameter controls the rotation of the rendered PDF-417 symbology in 90-degree increments. The valid arguments for this parameter would be 0, 90, 180 or 270 with the default being set to 0. A carriage return character must be used to terminate this field.

ECC_Percent<CR>
The ECC_Percent parameter is used to set the percentage of overall data dedicated to the Error Correction Control (ECC) of the PDF-417 symbology. This parameter has to be set to 0 if the ECC# method is desired. The default ECC% is set to 0. A carriage return character must be used to terminate this field.

ECC_Level<CR>
The ECC_Level parameter is used to set the level of error correction of the PDF-417 symbology with a default value set to 0. This parameter can only be used if the ECC% parameter is set to 0. Refer to Table 17 for the valid ECC_Level values and their equivalent correction code words. A carriage return character must be used to terminate this field.

Aspect_Ratio<CR>
This parameter is used to adjust the aspect ratio of the PDF-417 symbology. The value is entered in ratio format (height: width) and has a default value of 2:1. A carriage return character must be used to terminate this field.

ECC#	Number of Error Correction Codewords
0	2
1	4
2	8
3	16
4	32
5	64
6	128
7	256
8	512

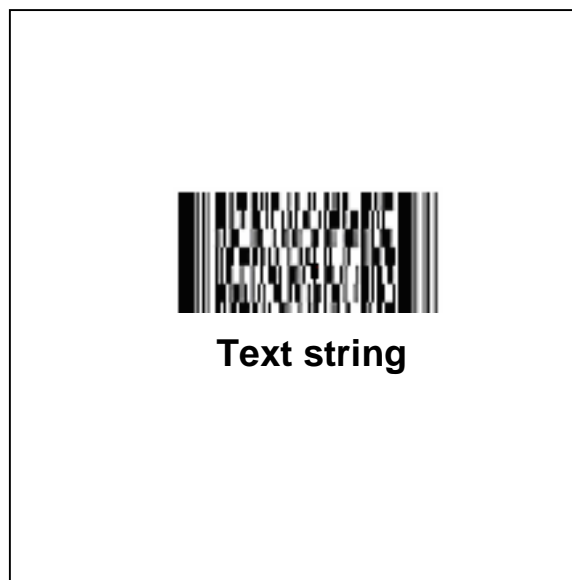**Table 8-4   PDF-417 Error Correction Level**

The following format samples show how to generate a PDF-417 bar code:

Sample Format #1:

^D77<CR>
:PDF-417 bar code data^[
3<CR>
30<CR>
0<CR>
0<CR>
0<CR>
2:1<CR>
^D57<CR>
2,575,609,,25,35,0,1,285<CR>
1,190,300,1,46<CR>
2,190,200,11,1,5<CR>
^D56<CR>
^D2<CR>
P<CR>
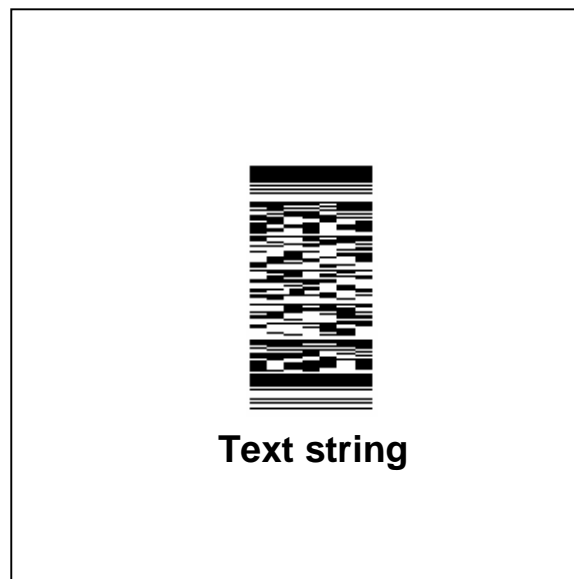Text string<CR>
^D3<CR>

Figure 8-2   PDF-417 Sample Format #1

Sample Format #2:

^D77<CR>
:PDF-417 bar code data<CR>
entered on two separate lines^[
3<CR>
30<CR>
90<CR>
0<CR>
0<CR>
2:1<CR>
^D57<CR>
2,575,609,,25,35,0,1,285<CR>
1,190,300,1,46<CR>
2,190,200,11,1,5<CR>
^D56<CR>
^D2<CR>
placeholder<CR>
Text string<CR>
^D3<CR>

Text string

Figure 8-3   PDF-417 Sample Format #2

8.1.19   UCC/EAN 128, TCI 50

UCC/EAN 128 symbologies are actually code 128 bar codes that have specific data format guidelines for multiple data subfields. The subfields are identified by application identifiers that are specified in the "UCC/EAN Application Identifier Standard" available from the Uniform Code Council, Inc.®.

Data strings can contain one or more substrings appended onto one line. Each substring can consist of a 2, 3 or 4 digit Application Identifier immediately followed by a data string meeting the formatting requirements for that specific Application Identifier.

The following table is a list of the supported Application Identifiers and their specific data format requirements.

Use the legend below when interpreting the data format requirements listed in the table below:

a	alphabetic character
n	numeric number
an	alphanumeric character
a3	3 alphabetic characters (fixed length)
n3	3 numeric characters (fixed length)
an3	3 alphanumeric characters (fixed length)
a..3	3 alphabetic characters (variable length)
n..3	3 numeric characters (variable length)
an..3	3 alphanumeric characters (variable length)
(*)	Indicates only year and month, DD must be filled with "00"
(**)	Plus one digit for length indication
(***)	Plus one digit for decimal point indication

AI	Content	Format
00	SCC-18	n2+n18
01	SCC-14	n2+n14
10	Batch or Lot Number	n2+an..20
11(*)	Production Date (YYMMDD)	n2+n6
13(*)	Packaging Date (YYMMDD)	n2+n6
15(*)	Sell By Date (Quality) (YYMMDD)	n2+n6
17(*)	Expiration Date (Safety) (YYMMDD)	n2+n6
20	Product Variant	n2+n2
21	Serial Number	n2+an..20
22	HIBCC – Quantity, Date, Batch, and Link	n2+an..29
23(**)	Lot Number (Transitional Use)	n3+n..19
240	Additional Product Identification assigned by the Manufacturer	n3+an..30
250	Secondary Serial Number	n3+an..30
30	Quantity	n2+n..8
310(***)	Net Weight, Kilograms	n4+n6
311(***)	Length or 1st Dimension, Meters	n4+n6
312(***)	Width Diameter, or 2nd Dimension, Meters	n4+n6
313(***)	Depth Thickness, Height or 3rd Dimension, Meters	n4+n6
314(***)	Area, Square Meters	n4+n6
315(***)	Volume, Liters	n4+n6
316(***)	Volume, Cubic Meters	n4+n6
320(***)	Net Weight, Pounds	n4+n6
321(***)	Length or 1st Dimension, Inches	n4+n6
324(***)	Length or 1st Dimension, Feet	n4+n6
323(***)	Length or 1st Dimension, Yards	n4+n6
324(***)	Width Diameter, or 2nd Dimension, Inches	n4+n6
325(***)	Width, Diameter, or 2nd Dimension, Feet	n4+n6
326(***)	Width, Diameter, or 2nd Dimension, Yards	n4+n6
327(***)	Depth Thickness, Height or 3rd Dimension, Inches	n4+n6
328(***)	Depth Thickness, Height or 3rd Dimension, Feet	n4+n6
329(***)	Depth Thickness, Height or 3rd Dimension, Yards	n4+n6
330(***)	Gross Weight, Kilograms	n4+n6
331(***)	Length or 1st Dimension, Meters, Logistics	n4+n6
332(***)	Width Diameter, or 2nd Dimension, Meters, Logistics	n4+n6

AI	Content	Format
333(***)	Depth Thickness, Height or 3rd Dimension, Meters, Logistics	n4+n6
334(***)	Area, Square Meters, Logistics	n4+n6
335(***)	Gross Volume, Liters	n4+n6
336(***)	Gross Volume, Cubic Meters	n4+n6
340(***)	Gross Weight, Pounds	n4+n6
341(***)	Length or 1st Dimension, Inches, Logistics	n4+n6
342(***)	Length or 1st Dimension, Feet, Logistics	n4+n6
343(***)	Length or 1st Dimension, Yards, Logistics	n4+n6
344(***)	Width Diameter, or 2nd Dimension, Inches, Logistics	n4+n6
345(***)	Width Diameter, or 2nd Dimension, Feet, Logistics	n4+n6
346(***)	Width Diameter, or 2nd Dimension, Yards, Logistics	n4+n6
347(***)	Depth Thickness, Height or 3rd Dimension, Inches, Logistics	n4+n6
348(***)	Depth Thickness, Height or 3rd Dimension, Feet, Logistics	n4+n6
349(***)	Depth Thickness, Height or 3rd Dimension, Yards, Logistics	n4+n6
350(***)	Area, Square Inches	n4+n6
351(***)	Area, Square Feet	n4+n6
352(***)	Area, Square Yards	n4+n6
353(***)	Area, Square Inches, Logistics	n4+n6
354(***)	Area, Square Feet, Logistics	n4+n6
355(***)	Area, Square Yards, Logistics	n4+n6
356(***)	Net Weight, Troy Ounce	n4+n6
360(***)	Volume, Quarts	n4+n6
361(***)	Volume, Gallons	n4+n6
362(***)	Gross Volume, Quarts	n4+n6
363(***)	Gross Volume, Gallons	n4+n6
364(***)	Volume, Cubic Inches	n4+n6
365(***)	Volume, Cubic Feet	n4+n6
366(***)	Volume, Cubic Yards	n4+n6
367(***)	Gross Volume, Cubic Inches	n4+n6
368(***)	Gross Volume, Cubic Feet	n4+n6
369(***)	Gross Volume, Cubic Yards	n4+n6
400	Customer's Purchase Order Number	n3+an..30

AI	Content	Format
410	Ship To (Deliver To) Location Code Using EAN-13	n3+n13
411	Bill To (Invoice To) Location Code Using EAN-13	n3+n13
412	Purchase From (Location Code of Party from Whom Goods are Purchased)	n3+n13
414	EAN Location Code for Physical Identification	n3+n13
420	Ship To (Deliver To) Postal Code Within a Single Postal Authority	n3+an..9
421	Ship To (Deliver To) Postal Code with 3 Digit ISO Country Code Prefix	n3+n3+an..9
8001	Roll Products – Width Length, Core Diameter, Direction, and Splices	n4+n14
8002	Electronic Serial Number for Cellular Mobile Telephones	n4+an..20
8003	UPC/EAN Number and Serial Number of Returnable Asset	n4+n14+an..16
8100	Coupon Extended Code – Number System Character and Offer	n4+n1+n5
8101	Coupon Extended Code – Number System Character , Offer, and End of Offer	n4+n1+n5+n4
8102	Coupon Extended Code – Number System Character preceded by zero	n4+n1+n1
90	Mutually Agreed, Between Trading Partners or FACT Dis	n2+an..30
91	Intra-Company (Internal)	n2+an..30
92	Intra-Company (Internal)	n2+an..30
93	Intra-Company (Internal)	n2+an..30
94	Intra-Company (Internal)	n2+an..30
95	Internal-Carriers	n2+an..30
96	Internal-Carriers	n2+an..30
97	Intra-Company (Internal)	n2+an..30
98	Intra-Company (Internal)	n2+an..30
99	Internal	n2+an..30

Table 8-5 UCC/EAN Application Identifiers

Each subfield's format is expressed as the format of the Application Identifier number + the format of the associated data. Each subfield must adhere to the format specified or else the printer will be unable to locate following subfields, causing errors generating the bar code.

Any variable length subfield, unless it is the last subfield in the field, must be terminated by the two characters "#6" (pound+6). These characters are translated as the Code 128 "FNC1" character, which is specified by the UCC/EAN 128 symbologies variable-length field terminator. The characters "#6" are only used internally and are not printed.

Several Application Identifiers (00, 01, 22, and 8003) specify fields that will have a check digit as part of their data. A character must be included in the check digit place (although it need not be the correct check digit). This character is used as a placeholder and will not be printed. The printer will calculate the correct check digit and replace the character already there.

8.1.20   UCC/EAN Text Information, TCI 51

The TCI 51 generates the UCC/EAN information as text. This TCI uses the same criteria for formatting as the TCI 50 bar code. The CGN selects the desired resident font that will be used to generate this string. The printer will automatically surround each application identifier with parentheses and add a space character in front of the data when using a TCI of 51. Do not use the parentheses or spaces when entering the data for an application identifier field.

8.1.21   RSS-14, TCI 35

RSS-14 Reduced Space Symbologies are the latest barcode types for space-constrained identification from EAN International and the Uniform Code Council, Inc. (UCC). RSS barcodes have been identified to solve problems in the grocery industry and in healthcare, where items are too small to allow for older barcode symbologies.

All six different RSS-14 symbologies:

1) RSS-14
2) RSS-14 Truncated
3) RSS-14 Stacked
4) RSS-14 Stacked Omni-directional
5) RSS-14 Limited
6) RSS-14 Expanded.

8.1.21.1   RSS-14 Standard

RSS-14 is capable of encoding up to 20 trillion values. There are actually 15 characters that make up the barcode, but only 13 data characters and 1 check are encoded. The first character is a flag, which determines if there is a Composite 2D barcode associated with the barcode. This is the first character encoded and it should not be included in the "Data To Encode" field.

The next 14 characters are the 13 data characters plus an implied check digit. The check digit is not actually encoded in the barcode, but should be included as part of the "Data To Encode" field.

If less than 14 characters are entered in the "Data To Encode" field, zeroes are padded to the front after the linkage flag. Non-numeric characters are stripped from the "Data To Encode" field.
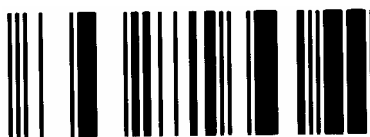

Figure 8-4   RSS-14 Standard Sample

8.1.21.2   RSS-14 Truncated
RSS-14 Truncated has the exact same data characteristics as the RSS-14 Standard
barcode, except the bar height is set to the RSS standard of 13 times the X dimension. This
symbology may be scanned omni-directionally.

The sample below is encoding this data string: 00012345678905

Figure 8-5   RSS-14 Truncated Sample

8.1.21.3   RSS-14 Stacked
RSS-14 Stacked has the exact same data characteristics as the Standard RSS-14 barcode.
The data to encode is split in half and encoded as a split level barcode. This format is used
if the width of the barcode will be an issue. The height of the top row of the RSS-14
Stacked barcode is 5 time the X dimension and height of the bottom row is 7 times the X
dimension. The barcode contains a separator pattern, containing no data, which has a
height equal to one X dimension. This symbology can not be scanned omni-directionally.
This symbology does not allow for human readable test with the barcode.

Figure 8-6   RSS-14 Stacked Sample

8.1.21.4   RSS-14 Stacked Omni-directional
RSS-14 Stacked Omni-directional has the exact same data characteristics as the Standard
RSS-14 barcode. The data to encode is separated to create a split level barcode. The
height of each row is ascertained from the bar height property of the control. The barcode
contains a separator pattern, containing no data, which has a height equal to 3 times the X
dimension. This symbology may be scanned omni-directionally. This symbology does not
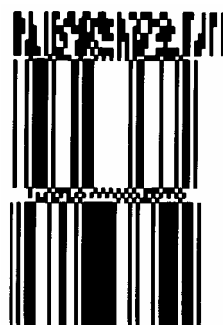allow for human readable text with the barcode.

Figure 8-7   RSS-14 Stacked Omni-directional Sample

8.1.21.5　　RSS-14 Limited

RSS-14 Limited has the same data characteristics as the Standard RSS-14 barcode, except that it may only include values up to 4 trillion. This symbology is specifically designed to be read by wands and handheld laser scanners. Omni-directional scanners can not read it efficiently.

Figure 8-8　　RSS-14 Limited Sample

8.1.21.6　　RSS-14 Expanded

RSS-14 Expanded is a variable length symbology capable of encoding up to 74 numeric or 41 alphabetic characters. This symbology does allow for the linkage flag, which determines if there is a 2D composite barcode associated with the linear barcode. Despite the possible length of the symbol, it can still be omni directionally read by suitably programmed laser point-of-sale scanners because the symbol can be decode in up to 22 segments and then reconstructed.

Figure 8-9　　RSS-12 Expanded Sample

8.1.21.7　　How to Print an RSS-14 Barcode

There are two steps to printing an RSS-14 barcode:
　　　　1) Send the ^D114 command and the 7 setup parameters
　　　　2) Send a label format that calls the RSS-14 barcode TCI #35.

These are the 7 RSS-14 parameters that MUST follow the ^D114 command:
　　　　1) Type of RSS-14 barcode
　　　　2) Multiplier
　　　　3) Segments per row
　　　　4) X undercut
　　　　5) Y undercut
　　　　6) Separator Height
　　　　7) Data to be encoded

Valid values for parameters
Type of RSS-14 barcode:
　　　1) 0 = RSS-14 (this is the Standard RSS-14 barcode)
　　　2) 1 = RSS-14 Truncated
　　　3) 2 = RSS-14 Stacked
　　　4) 3 = RSS-14 Stacked Omni-directional
　　　5) 4 = RSS-14 Limited
　　　6) 5 = RSS-14 Expanded

Multiplier:
> 1 to 100. This specifies how big to make the symbol. Multiplies both X & Y.

Segments per ROW:
> 2 to 22. EVEN number ONLY!

X Undercut:
> 0 to (MULTIPLIER-1)

Y Undercut:
> 0 to (MULTIPLIER-1)

Separator Height:
> MULTIPLIER < = Separator Height < = 2 * MULTIPLIER.
> Specifies the vertical separation between the linear data and the 2D data.

Data:
> Always 13 digits for the linear data unless using RSS Expanded which can be up to 74 numeric or 41 alphabetic characters.
> The "pipe" character (|) is used to separate the linear data from the 2D data.

Sample RSS-14 FORMAT: This sample uses the standard RSS-14 symbology

```
^D114<CR>   ← Here comes RSS-14 data
0<CR>       ← Use standard RSS-14 symbol
5<CR>       ← Multiply size by 5
22<CR>      ← Use 22 segments/row
0<CR>       ← X undercut = 0
0<CR>       ← Y undercut = 0
5<CR>       ← Set vertical separator = 5
0012345612345  ← 13 digits of data
^D57<CR>    ← START of Label FORMAT
2,575,609,,25,35,0,1,285<CR>  ← TCI=35 calls for a RSS-14 barcode
1,190,300,1,46<CR>
2,190,200,11,1,5<CR>
^D56<CR>    ← END of Label FORMAT
^D2<CR>     ← START of Text String
x           ← any character will do… this is just a placeholder
^D3<CR>     ← PRINT command
```

Figure 8-10 RSS-14 Sample Label FORMAT

8.2 Bar Code Rotation

When 0 and 180 degree bar codes are X multiplied (CMX), the space between characters is also multiplied by the printer internally to maintain the correct ratio. When multiplying bar codes use the default value for the spacing element (SP) in the field format parameters. On

some bar codes that allow spacing to be adjusted, spacing may be increased from the default and not reduced to a smaller spacing.

When 0 and 180 degree bar codes are Y multiplied (CMY), the result is the actual height of the bar code in thermal dots.   If the Y multiplier (CMY) is not multiplied, a bar code with a vertical length of one dot would be produced. For example: If a one inch high bar code is desired using a 300 dpi print head, 300 should be inserted for the CMY value.

When 90 and 270 degree, ladder or vertical, bar codes are X multiplied (CMX), the result is the actual width of the bar code in thermal dots. If the X multiplier (CMX) is not multiplied, a bar code with a horizontal length of one dot would be produced. For example: If a one inch wide bar code is desired using a 300 dpi print head, 300 should be inserted for the CMX value.

When 90° and 270° degree bar codes are Y multiplied (CMY), the space between characters is also multiplied by the printer internally to maintain the correct ratio. When multiplying bar codes use the default value for the spacing element (SP) in the field format parameters. On some bar codes that allow spacing to be adjusted, spacing may be increased from the default and not reduced to a smaller spacing.

Rotated Bar Code Program Sample, see Figure 26:

```
^D57<CR>
5,575,609,,25,35,0,1,285,0,0 <CR>
1,300,500,5,16,2,0,,2,100<CR>
1,300,400,5,16,2,1,,2,100<CR>
1,300,300,5,16,2,2,,100,2<CR>
1,300,300,5,16,2,3,,100,100<CR>
2,288,300,9,1,5,0,4<CR>
^D56 <CR>
^D2 <CR>
12345<CR>
ROTATIONS<CR>
^D3<CR>
```
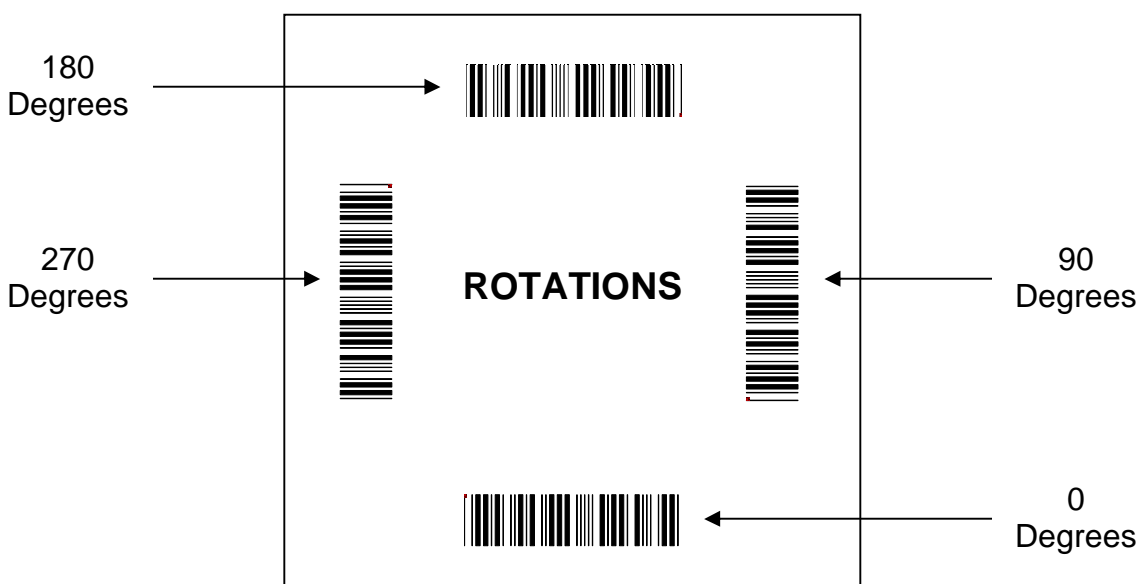
Figure 8-11 Bar Code Rotations

8.3 Bar Code Human Readable Text

Certain bar codes require human readable text and/or extended bars to conform to specifications. This is accomplished by using specially created TCI's, which add the human readable text and extended bars. This section will provide the necessary information to successfully add these items. This should not be confused with simply making all bar codes human readable. For bar codes that do not require extended bars, simply access the data that the bar code is using with a second field that generates a text representation of the data and insert in the desired position.

TCI VALUE	TCI DESCRIPTION
3	Text with UPC-A/UPC-E Checksum Digit added.
17	Text with UPC-E Checksum and Extended Bars added
22	Text with EAN-13 Checksum and Extended Bars added
23	Text with EAN-8 Checksum and Extended Bars added
28	Text with MSI 1 Checksum added
29	Text with MSI 2 Checksum added
32	Text with UPC-A Checksum and Extended Bars added
33	Text with UPC-A with Extended Bars added
51	EAN128

Table 8-6   Human Readable/Extended Bars TCI's

The Text/Extended Bar TCI's generate the human readable text and extended bars that are aligned with the original bar code to create the complete bar code, see Figure 19.

Figure 8-12 UPC-A Text/Extended Bars

The TCI 32 text/extended symbol, shown in Figure 27, is positioned with the TCI 12 code so that there is no space between the two. This creates one bar code. TCI's (17, 22, 23, 32, and 33) that add the extended bars should default the CGN parameter or enter a value of "1". The fields may then be multiplied using the CMX and CMY parameters to generate the proper size to match the bar code that the human readable code is intended. The data used to generate the human readable code should be the same data used to generate the bar code.

TCI's (3, 28, and 29) that only add the human readable portion may select any CGN for the font size and multiply it normally. The main purpose of these codes is to add the automatically calculated check digit character to the human readable code.   The data used to generate the human readable code should be the same data used to generate the bar code.

The following is a sample format is used to illustrate the proper use of the human readable code. This format contains the data used in Figure 27 and will print out two bar codes. The first bar code is a complete version while the second bar code illustrates the text/extended code before aligning to the original bar code.

Sample Format:

```
^D57<CR>
4,575,609,,25,35,0,1,285,0,0<CR>
1,200,418,11,12,,,,2,50<CR>
1,178,400,11,32,,,,2,2<CR>
1,200,150,11,12,,,,2,50<CR>
1,178,125,11,32,,,,2,2<CR>
^D56<CR>
^D2<CR>
01234567890<CR>
^D3<CR>
```

Chapter 9   Code Page Switching

9.1 What is Code Page Switching?

There are 256 numeric codes used on the PC to represent letters, symbols, and numbers. Up to 256 codes are available to represent lower and upper case letters, numbers, punctuation marks, and all the mathematical symbols on a PC's keyboard. This may seem like more than enough, but it is not possible to represent all the letters and characters used in every language using one character set of 256 codes.

For example:
- Some languages have a much larger alphabet than others and include many accented characters.
- Many graphics characters are used.

9.2 Character Sets

To accommodate the use of different languages, the printer provides a number of character sets. The numeric Hex codes are sent by the PC to the printer represent different characters depending on which character set is being used by the printer.

Code page 437 is the famous original IBM PC character set. It is the most common and is used for several languages, including English, German, and French. Character sets 865 and 860 contain the characters needed for Danish and Portuguese, respectively. In these character sets, some symbols available in 437 have been removed to make room for the extra letters needed. For example, the code for (franc) has been used for Ó in 860.

These character sets are stored in the printer's FLASH memory as tables called code pages. The printer allows you to change the code page that is being used by changing the settings in Soft Switch #4, using the ^D24 command.

9.3 Code Pages

The printer provides 15 standard code pages. Please note that the printer implements the codes from 32 up. Code numbers below 32 are reserved for operational control codes. These are the Code Pages that are implemented in the printer:

1. Code Page 437
2. Code Page 850
3. Code Page 852
4. Code Page 860
5. Code Page 863
6. Code Page 865
7. USA
8. British
9. German
10. French
11. Italian
12. Danish
13. Spanish
14. Swedish
15. Swiss

9.3.1 Code Pages

The Default Code Page is selected when SW4:(5-8) = 0000.

Microcom M1 Base Font Set
wjm 2005-12-13 rev 2007-04-03

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1 / 16	0x0105 ą	0x0104 Ą	0x0107 ć	0x0106 Ć	0x0119 ę	0x0118 Ę	0x0144 ń	0x0143 Ń	0x015b ś	0x015a Ś	0x017c ż	0x017b Ż	0x017a ź	0x0179 Ź	0x0020	0x0020
2 / 32	0x0020	0x0021 !	0x0022 "	0x0023 #	0x0024 $	0x0025 %	0x0026 &	0x0027 '	0x0028 (	0x0029)	0x002a *	0x002b +	0x002c ,	0x002d -	0x002e .	0x002f /
3 / 48	0x0030 0	0x0031 1	0x0032 2	0x0033 3	0x0034 4	0x0035 5	0x0036 6	0x0037 7	0x0038 8	0x0039 9	0x003a :	0x003b ;	0x003c <	0x003d =	0x003e >	0x003f ?
4 / 64	0x0040 @	0x0041 A	0x0042 B	0x0043 C	0x0044 D	0x0045 E	0x0046 F	0x0047 G	0x0048 H	0x0049 I	0x004a J	0x004b K	0x004c L	0x004d M	0x004e N	0x004f O
5 / 80	0x0050 P	0x0051 Q	0x0052 R	0x0053 S	0x0054 T	0x0055 U	0x0056 V	0x0057 W	0x0058 X	0x0059 Y	0x005a Z	0x005b [	0x005c \	0x005d]	0x005e ^	0x005f _
6 / 96	0x0060 `	0x0061 a	0x0062 b	0x0063 c	0x0064 d	0x0065 e	0x0066 f	0x0067 g	0x0068 h	0x0069 i	0x006a j	0x006b k	0x006c l	0x006d m	0x006e n	0x006f o
7 / 112	0x0070 p	0x0071 q	0x0072 r	0x0073 s	0x0074 t	0x0075 u	0x0076 v	0x0077 w	0x0078 x	0x0079 y	0x007a z	0x007b {	0x007c |	0x007d }	0x007e ~	0x2022 •
8 / 128	0x2215 ∕	0xf001 fi	0xf002 fl	0x0141 Ł	0x0142 ł	0x00d0 Đ	0x0111 đ	0x00de Þ	0x00fe þ	0x00b5 µ	0x00b1 ±	0x00bd ½	0x00a8 ¨	0x2019 '	0x2219 ·	0x02dc ˜
9 / 144	0x02c6 ˆ	0x2013 —	0x00b4 ´	0x02c9 ¯	0x2018 '	0x2018 '	0x02da °	0x02d9 ·	0x02ba □	0x00b8	0x02db	0x02c7 ˇ	0x2215 ∕	0x02d8 ˇ	0x0131 ı	0x0030 0
0A / 160	0x201e „	0x00c0 À	0x00c2 Â	0x00c8 È	0x00ca Ê	0x00cb Ë	0x00ce Î	0x00cf Ï	0x00a9 ©	0x00ae ®	0x2122 ™	0x2039 ‹	0x203a ›	0x00d9 Ù	0x00db Û	0x21b5 ↵
0B / 176	0x2030 ‰	0x201c "	0x201d "	0x00b0 °	0x00c7 Ç	0x00e7 ç	0x00d1 Ñ	0x00f1 ñ	0x00a1 ¡	0x00bf ¿	0x00a4 ¤	0x00a3 £	0x00a5 ¥	0x00a7 §	0x0192 ƒ	0x00a2 ¢
0C / 192	0x00e2 â	0x00ea ê	0x00f4 ô	0x00fb û	0x00e1 á	0x00e9 é	0x00f3 ó	0x00fa ú	0x00e0 à	0x00e8 è	0x00f2 ò	0x00f9 ù	0x00e4 ä	0x00eb ë	0x00f6 ö	0x00fc ü
0D / 208	0x00c5 Å	0x00ee î	0x00d8 Ø	0x00c6 Æ	0x00e5 å	0x00ed í	0x00f8 ø	0x00e6 æ	0x00c4 Ä	0x00ec ì	0x00d6 Ö	0x00dc Ü	0x00c9 É	0x00ef ï	0x00df ß	0x00d4 Ô
0E / 224	0x00c1 Á	0x00c3 Ã	0x00e3 ã	0x20ac €	0xf150 □	0x00cd Í	0x00cc Ì	0x00d3 Ó	0x00d2 Ò	0x00d5 Õ	0x00f5 õ	0x0160 Š	0x0161 š	0x00da Ú	0x0178 Ÿ	0x00ff ÿ
0F / 240	0x0152 Œ	0x0153 œ	0x00b6 ¶	0x2020 †	0x2021 ‡	0x2014 —	0x2013 –	0x002d -	0xeffc □	0x00aa ª	0x00ba º	0x00ab «	0x2022 •	0x00bb »	0x00b6 ¶	0x2026 …

Figure 9-1   Code Page - Default

9.3.2 Danish Code Page

The Danish Code Page is selected when SW4:(5-8) = 0001.

Refer to Section 5.1.2.4 for more details on SW4 settings.

Danish

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
1					0x2021	0x00a7	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
16					244	189	32	32	32	32	32	32	32	32	32	32
					‡	§										
2	0x0020	0x0021	0x0022	0x0023	0x0024	0x0025	0x0026	0x0027	0x0028	0x0029	0x002a	0x002b	0x002c	0x002d	0x002e	0x002f
32	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
		!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
3	0x0030	0x0031	0x0032	0x0033	0x0034	0x0035	0x0036	0x0037	0x0038	0x0039	0x003a	0x003b	0x003c	0x003d	0x003e	0x003f
48	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4	0x0040	0x0041	0x0042	0x0043	0x0044	0x0045	0x0046	0x0047	0x0048	0x0049	0x004a	0x004b	0x004c	0x004d	0x004e	0x004f
64	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	0x0050	0x0051	0x0052	0x0053	0x0054	0x0055	0x0056	0x0057	0x0058	0x0059	0x005a	0x00c6	0x00d8	0x00c5	0x00dc	0x005f
80	80	81	82	83	84	85	86	87	88	89	90	211	210	208	219	95
	P	Q	R	S	T	U	V	W	X	Y	Z	Æ	Ø	Å	Ü	_
6	0x0060	0x0061	0x0062	0x0063	0x0064	0x0065	0x0066	0x0067	0x0068	0x0069	0x006a	0x006b	0x006c	0x006d	0x006e	0x006f
96	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7	0x0070	0x0071	0x0072	0x0073	0x0074	0x0075	0x0076	0x0077	0x0078	0x0079	0x007a	0x00e6	0x00f8	0x00e5	0x00fc	0x2022
112	112	113	114	115	116	117	118	119	120	121	122	215	214	212	207	127
	p	q	r	s	t	u	v	w	x	y	z	æ	ø	å	ü	•

Figure 9-2   Code Page - Danish

9.3.3   860 Code Page

The 860 Code Page is selected when SW4:(5-8) = 0010

This code page is also known as DOS Portuguese.

860 Code Page

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1 / 16					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 / 32	0x0020 32	0x0021 33 !	0x0020 32	0x0023 35 #	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (	0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 / 48	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 / 64	0x0040 64 @	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 / 80	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x005b 91 [	0x005c 92 \	0x005d 93]	0x005e 94 ^	0x005f 95 _
6 / 96	0x0060 96 `	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 / 112	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x007b 123 {	0x007c 124		0x007d 125 }	0x007e 126 ~	0x2022 127 •
8 / 128	0x00c7 180 Ç	0x00fc 207 ü	0x00e9 197 é	0x00e2 192 â	0x00e3 226 ã	0x00e0 200 à	0x00c1 224 Á	0x00e7 181 ç	0x00ea 193 ê	0x00ca 164 Ê	0x00e8 201 è	0x00cc 230 Ì	0x00d4 223 Ô	0x00ec 217 ì	0x00c3 225 Ã	0x00c2 162 Â
9 / 144	0x00c9 220 É	0x00c0 161 À	0x00c8 163 È	0x00f4 194 ô	0x00f5 234 õ	0x00f2 202 ò	0x00da 237 Ú	0x00f9 203 ù	0x00cc 230 Ì	0x00d5 233 Õ	0x00dc 219 Ü	0x00a2 191 ¢	0x00a3 187 £	0x00d9 173 Ù	0x0020 32	0x00d3 231 Ó
0A / 160	0x00e1 196 á	0x00ed 213 í	0x00f3 198 ó	0x00fa 199 ú	0x00f1 183 ñ	0x00d1 182 Ñ	0x00aa 249 ª	0x00ba 250 º	0x00bf 185 ¿	0x00d2 232 Ò	0x0020 32	0xeffc 248 □	0x002d 247 -	0x0020 32	0x0020 32	0x0020 32
0B / 176	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0C / 192	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0D / 208	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0E / 224	0x0020 32	0x00df 222 ß	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x2020 243 †	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0F / 240	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x00b0 179 °	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32

Figure 9-3   Code Page - 860

9.3.4   Spanish Code Page
The Spanish Code Page is selected when SW4:(5-8) = 0011.

Spanish

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
1 **16**					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 **32**	0x0020 32	0x0021 33 !	0x0022 34 "	0x0021 33 !	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (	0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 **48**	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 **64**	0x00a1 184 ¡	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 **80**	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x00d1 182 Ñ	0x00f1 183 ñ	0x00bf 185 ¿	0x00fc 207 ü	0x005f 95 _
6 **96**	0x00e1 196 á	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 **112**	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x00e9 197 é	0x00ed 213 í	0x00f3 198 ó	0x00fa 199 ú	0x2022 127 •

Figure 9-4   Code Page - Spanish

9.3.5   850 Code Page
The 850 Code Page is selected when SW4:(5-8) = 0100.

To simplify the exchange of computerized documents between countries, the International Standards Organization (ISO) defined a new code page called 850, for use across national boundaries. This 850 code page can be used instead of local code pages and reduces the need for code page switching because the sender and the recipient always use the same code page.

This code page is also known as DOSLatin1 (Western Europe). Latin1 covers most West European languages such as French, Spanish, Catalan, Basque, Portuguese, Italian, Albanian, Rhaeto-Romanic, Dutch, German, Danish, Swedish, Norwegian, Finnish, Faroese, Icelandic, Irish, Scottish, and English. It covers the entire North American continent, Australia, and much of Africa.

Refer to Section 5.1.2.4 for more details on SW4 settings.

850 Code Page

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1 **16**					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 **32**	0x0020 32	0x0021 33 !	0x0022 34 "	0x0023 35 #	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (	0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 **48**	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 **64**	0x0040 64 @	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 **80**	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x005b 91 [	0x005c 92 \	0x005d 93]	0x005e 94 ^	0x005f 95 _
6 **96**	0x0060 96 `	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 **112**	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x007b 123 {	0x007c 124 |	0x007d 125 }	0x007e 126 ~	0x2022 127 •
8 **128**	0x00c7 180 Ç	0x00fc 207 ü	0x00e9 197 é	0x00e2 192 â	0x00e4 204 ä	0x00e0 200 à	0x00e5 212 å	0x00e7 181 ç	0x00ea 193 ê	0x00eb 205 ë	0x00e8 201 è	0x00ef 221 ï	0x00ee 209 î	0x00ec 217 ì	0x00c4 216 Ä	0x00c5 208 Å
9 **144**	0x00c9 220 É	0x00e6 215 æ	0x00c6 211 Æ	0x00f4 194 ô	0x00f6 206 ö	0x00f2 202 ò	0x00fb 195 û	0x00f9 203 ù	0x00ff 239 ÿ	0x00d6 218 Ö	0x00dc 219 Ü	0x00f8 214 ø	0x00a3 187 £	0x00d8 210 Ø	0x0020 32	0x0192 190 ƒ
0A **160**	0x00e1 196 á	0x00ed 213 í	0x00f3 198 ó	0x00fa 199 ú	0x00f1 183 ñ	0x00d1 182 Ñ	0x00aa 249 ª	0x00ba 250 º	0x00bf 185 ¿	0x0020 32	0x0020 32	0xeffc 248 □	0x002d 247 -	0x00a1 184 ¡	0x0020 32	0x0020 32
0B **176**	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x00c1 224 Á	0x00c5 208 Å	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0C **192**	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x00e3 226 ã	0x00c3 225 Ã	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0D **208**	0x0020 32	0x0020 32	0x00ca 164 Ê	0x00cb 165 Ë	0x0020 32	0x00cd 229 Í	0x00ce 166 Î	0x00cf 167 Ï	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x00cc 230 Ì	0x0020 32
0E **224**	0x00d3 231 Ó	0x00df 222 ß	0x00d4 223 Ô	0x00d2 232 Ò	0x00f5 234 õ	0x00d5 233 Õ	0x2020 243 †	0x0020 32	0x0020 32	0x00da 237 Ú	0x0020 32	0x00d9 173 Ù	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0F **240**	0x0020 32	0x0020 32	0x003d 61 =	0x2014 245 —	0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x00b0 179 °	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32

Figure 9-5   Code Page - 850

9.3.6   German Code Page

The German Code Page is selected when SW4:(5-8) = 0101.

Refer to Section 5.1.2.4 for more details on SW4 settings.

German															
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**0A**	**0B**	**0C**	**0D**	**0E**	**0F**
1					0x2021	0x00a7	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
16					244	189	32	32	32	32	32	32	32	32	32	32
					‡	§										
2	0x0020	0x0021	0x0022	0x0023	0x0024	0x0025	0x0026	0x0027	0x0028	0x0029	0x002a	0x002b	0x002c	0x002d	0x002e	0x002f
32	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
		!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
3	0x0030	0x0031	0x0032	0x0033	0x0034	0x0035	0x0036	0x0037	0x0038	0x0039	0x003a	0x003b	0x003c	0x003d	0x003e	0x003f
48	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4	0x00a7	0x0041	0x0042	0x0043	0x0044	0x0045	0x0046	0x0047	0x0048	0x0049	0x004a	0x004b	0x004c	0x004d	0x004e	0x004f
64	189	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
	§	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	0x0050	0x0051	0x0052	0x0053	0x0054	0x0055	0x0056	0x0057	0x0058	0x0059	0x005a	0x00c4	0x00d6	0x00dc	0x005e	0x005f
80	80	81	82	83	84	85	86	87	88	89	90	216	218	219	94	95
	P	Q	R	S	T	U	V	W	X	Y	Z	Ä	Ö	Ü	^	_
6	0x0060	0x0061	0x0062	0x0063	0x0064	0x0065	0x0066	0x0067	0x0068	0x0069	0x006a	0x006b	0x006c	0x006d	0x006e	0x006f
96	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7	0x0070	0x0071	0x0072	0x0073	0x0074	0x0075	0x0076	0x0077	0x0078	0x0079	0x007a	0x00e4	0x00f6	0x00fc	0x00df	0x2022
112	112	113	114	115	116	117	118	119	120	121	122	204	206	207	222	127
	p	q	r	s	t	u	v	w	x	y	z	ä	ö	ü	ß	•

Figure 9-6   Code Page - German

9.3.7 865 Code Page

The 865 Code Page is selected when SW4:(5-8) = 0110

This code page is also known as DOS Nordic.

865 Code Page

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1 / 16					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 / 32	0x0020 32	0x0021 33 !	0x0020 32	0x0023 35 #	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (	0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 / 48	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 / 64	0x0040 64 @	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 / 80	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x005b 91 [	0x005c 92 \	0x005d 93]	0x005e 94 ^	0x005f 95 _
6 / 96	0x0060 96 `	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 / 112	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x007b 123 {	0x007c 124		0x007d 125 }	0x007e 126 ~	0x2022 127 •
8 / 128	0x00c7 180 Ç	0x00fc 207 ü	0x00e9 197 é	0x00e2 192 â	0x00e4 204 ä	0x00e0 200 à	0x00e5 212 å	0x00e7 181 ç	0x00ea 193 ê	0x00eb 205 ë	0x00e8 201 è	0x00ef 221 ï	0x00d4 223 Ô	0x00ec 217 ì	0x00c4 216 Ä	0x00c5 208 Å
9 / 144	0x00c9 220 É	0x00e6 215 æ	0x00c6 211 Æ	0x00f4 194 ô	0x00f6 206 ö	0x00f2 202 ò	0x00fb 195 û	0x00fa 199 ú	0x00ff 239 ÿ	0x00d4 223 Ô	0x00f6 206 ö	0x00f8 214 ø	0x00a3 187 £	0x00d8 210 Ø	0x0020 32	0x0192 190 ƒ
0A / 160	0x00e1 196 á	0x00ed 213 í	0x00f3 198 ó	0x00fa 199 ú	0x00f1 183 ñ	0x00d1 182 Ñ	0x00aa 249 ª	0x00ba 250 º	0x00bf 185 ¿	0x0020 32	0x0020 32	0xeffc 248 □	0x002d 247 -	0x0020 32	0x0020 32	0x0020 32
0B / 176	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0C / 192	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0D / 208	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0E / 224	0x0020 32	0x00df 222 ß	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x2020 243 †	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0F / 240	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x00b0 179 °	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32

Figure 9-7   Code Page - 865

9.3.8   Swiss Code Page

The Swiss Code Page is selected when SW4:(5-8) = 0111.

Refer to Section 5.1.2.4 for more details on SW4 settings.

Swiss

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
1 / **16**					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 / **32**	0x0020 32	0x0021 33 !	0x0020 32	0x0023 35 #	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (	0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 / **48**	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 / **64**	0x00c9 220 É	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 / **80**	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x00c4 216 Ä	0x00d6 218 Ö	0x00c3 225 Ã	0x00dc 219 Ü	0x005f 95 _
6 / **96**	0x00e9 197 é	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 / **112**	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x00e4 204 ä	0x00f6 206 ö	0x00e3 226 ã	0x00fc 207 ü	0x2022 127 •

Figure 9-8   Code Page - Swiss

9.3.9   852 Code Page

The 852 Code Page is selected when SW4:(5-8) = 1000.

This code page is also known as DOSLatin2 (Eastern Europe). Latin2 covers the languages of Central and Eastern Europe: Czech, Hungarian, Polish, Romanian, Croatian, Slovak, Slovenian, and Sorbian.

852 Code Page

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1 **16**					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 **32**	0x0020 32	0x0021 33 !	0x0022 34 "	0x0023 35 #	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (	0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 **48**	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 **64**	0x0040 64 @	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 **80**	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x005b 91 [	0x005c 92 \	0x005d 93]	0x005e 94 ^	0x005f 95 _
6 **96**	0x0060 96 `	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 **112**	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x007b 123 {	0x007c 124 |	0x007d 125 }	0x007e 126 ~	0x2022 127 •
8 **128**	0x00c7 180 Ç	0x00fc 207 ü	0x00e9 197 é	0x00e2 192 â	0x00e4 204 ä	0x00e0 200 à	0x00e5 212 å	0x00e7 181 ç	0x00ea 193 ê	0x00eb 205 ë	0x0020 32	0x0020 32	0x00ee 209 î	0x0179 29 Ź	0x00c4 216 Ä	0x0106 19 Ć
9 **144**	0x00c9 220 É	0x0020 32	0x0020 32	0x00f4 194 ô	0x00f6 206 ö	0x0020 32	0x0020 32	0x015a 25 Ś	0x015b 24 ś	0x00d6 218 Ö	0x00dc 219 Ü	0x0020 32	0x0020 32	0x0141 131 Ł	0x0020 32	0x0020 32
0A **160**	0x00e1 196 á	0x00ed 213 í	0x00f3 198 ó	0x00fa 199 ú	0x0104 17 Ą	0x0105 16 ą	0x0020 32	0x0020 32	0x0118 21 Ę	0x0119 20 ę	0x0020 32	0x017a 28 ź	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0B **176**	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x00c1 224 Á	0x00c5 208 Å	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x017b 27 Ż	0x017c 26 ż	0x0020 32
0C **192**	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0D **208**	0x0020 32	0x0020 32	0x0020 32	0x00cb 165 Ë	0x0020 32	0x00cd 229 Í	0x00ce 166 Î	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0E **224**	0x00d3 231 Ó	0x00df 222 ß	0x00d4 223 Ô	0x0143 23 Ń	0x0144 22 ń	0x00b6 242 ¶	0x0020 32	0x0020 32	0x0020 32	0x00da 237 Ú	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0F **240**	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x00b0 179 °	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32

Figure 9-9   Code Page - 852

9.3.10 French Code Page

The French Code Page is selected when SW4:(5-8) = 1001.

Refer to Section 5.1.2.4 for more details on SW4 settings.

French

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
1 / **16**					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 / **32**	0x0020 32	0x0021 33 !	0x0022 34 "	0x00a3 187 £	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (	0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 / **48**	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 / **64**	0x00e0 200 à	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 / **80**	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x00b0 179 °	0x00a7 189 §	0x00e7 181 ç	0x005e 94 ^	0x005f 95 _
6 / **96**	0x0060 96 `	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 / **112**	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x00e9 197 é	0x00f9 203 ù	0x00e8 201 è	0x0022 34 "	0x2022 127 •

Figure 9-10 Code Page - French

9.3.11   863 Code Page

The 863 Code Page is selected when SW4:(5-8) = 1010

This code page is also known as DOS CanadaF.

863 Code Page

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1 16					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 32	0x0020 32	0x0021 33 !	0x0020 32	0x0023 35 #	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (	0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 48	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 64	0x0040 64 @	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 80	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x005b 91 [	0x005c 92 \	0x005d 93]	0x005e 94 ^	0x005f 95 _
6 96	0x0060 96 `	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 112	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x007b 123 {	0x007c 124 |	0x007d 125 }	0x007e 126 ~	0x2022 127 •
8 128	0x00c7 180 Ç	0x00fc 207 ü	0x00e9 197 é	0x00e2 192 â	0x00c2 162 Â	0x00e0 200 à	0x2021 244 ‡	0x00e7 181 ç	0x00ea 193 ê	0x00eb 205 ë	0x00e8 201 è	0x00ef 221 ï	0x00d4 223 Ô	0x003d 61 =	0x00c0 161 À	0x00a7 189 §
9 144	0x00c9 220 É	0x00c8 163 È	0x00ca 164 Ê	0x00f4 194 ô	0x00cb 165 Ë	0x00cf 167 Ï	0x00fb 195 û	0x00fa 199 ú	0x0020 32	0x00d4 223 Ô	0x00dc 219 Ü	0x00a2 191 ¢	0x00a3 187 £	0x00d9 173 Ù	0x0020 32	0x0192 190 ƒ
0A 160	0x0020 32	0x0020 32	0x00f3 198 ó	0x00fa 199 ú	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x00ce 166 Î	0x0020 32	0x0020 32	0xeffc 248 □	0x002d 247 -	0x0020 32	0x0020 32	0x0020 32
0B 176	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0C 192	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0D 208	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0E 224	0x0020 32	0x00df 222 ß	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x2020 243 †	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0F 240	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x00b0 179 °	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32

Figure 9-11   Code Page - 863

9.3.12 Swedish Code Page

The Swedish Code Page is selected when SW4:(5-8) = 1011.

Refer to Section 5.1.2.4 for more details on SW4 settings.

Swedish																
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**0A**	**0B**	**0C**	**0D**	**0E**	**0F**
1 **16**					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 **32**	0x0020 32	0x0021 33 !	0x0020 32	0x0057 87 W	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (	0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 **48**	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 **64**	0x00a7 189 §	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 **80**	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x00e0 200 à	0x00e7 181 ç	0x00e8 201 è	0x005e 94 ^	0x005f 95 _
6 **96**	0x00e1 196 á	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 **112**	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x00e4 204 ä	0x00f6 206 ö	0x00fc 207 ü	0x00e9 197 é	0x2022 127 •

Figure 9-12 Code Page - Swedish

9.3.13 437 Code Page

Code Page 437 is the famous code page used in the original IBM PC. This code page contains lot of box drawing characters and a few foreign letters. The 437 Code Page is selected when SW4:(5-8) = 1100.

This code page is also known as DOS LatinUS.

437 Code Page

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1 / **16**					0x2021 / 244 / ‡	0x00a7 / 189 / §	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32
2 / **32**	0x0020 / 32	0x0021 / 33 / !	0x0022 / 34 / "	0x0023 / 35 / #	0x0024 / 36 / $	0x0025 / 37 / %	0x0026 / 38 / &	0x0027 / 39 / '	0x0028 / 40 / (	0x0029 / 41 /)	0x002a / 42 / *	0x002b / 43 / +	0x002c / 44 / ,	0x002d / 45 / -	0x002e / 46 / .	0x002f / 47 / /
3 / **48**	0x0030 / 48 / 0	0x0031 / 49 / 1	0x0032 / 50 / 2	0x0033 / 51 / 3	0x0034 / 52 / 4	0x0035 / 53 / 5	0x0036 / 54 / 6	0x0037 / 55 / 7	0x0038 / 56 / 8	0x0039 / 57 / 9	0x003a / 58 / :	0x003b / 59 / ;	0x003c / 60 / <	0x003d / 61 / =	0x003e / 62 / >	0x003f / 63 / ?
4 / **64**	0x0040 / 64 / @	0x0041 / 65 / A	0x0042 / 66 / B	0x0043 / 67 / C	0x0044 / 68 / D	0x0045 / 69 / E	0x0046 / 70 / F	0x0047 / 71 / G	0x0048 / 72 / H	0x0049 / 73 / I	0x004a / 74 / J	0x004b / 75 / K	0x004c / 76 / L	0x004d / 77 / M	0x004e / 78 / N	0x004f / 79 / O
5 / **80**	0x0050 / 80 / P	0x0051 / 81 / Q	0x0052 / 82 / R	0x0053 / 83 / S	0x0054 / 84 / T	0x0055 / 85 / U	0x0056 / 86 / V	0x0057 / 87 / W	0x0058 / 88 / X	0x0059 / 89 / Y	0x005a / 90 / Z	0x005b / 91 / [	0x005c / 92 / \	0x005d / 93 /]	0x005e / 94 / ^	0x005f / 95 / _
6 / **96**	0x0060 / 96 / `	0x0061 / 97 / a	0x0062 / 98 / b	0x0063 / 99 / c	0x0064 / 100 / d	0x0065 / 101 / e	0x0066 / 102 / f	0x0067 / 103 / g	0x0068 / 104 / h	0x0069 / 105 / i	0x006a / 106 / j	0x006b / 107 / k	0x006c / 108 / l	0x006d / 109 / m	0x006e / 110 / n	0x006f / 111 / o
7 / **112**	0x0070 / 112 / p	0x0071 / 113 / q	0x0072 / 114 / r	0x0073 / 115 / s	0x0074 / 116 / t	0x0075 / 117 / u	0x0076 / 118 / v	0x0077 / 119 / w	0x0078 / 120 / x	0x0079 / 121 / y	0x007a / 122 / z	0x007b / 123 / {	0x007c / 124 / |	0x007d / 125 / }	0x007e / 126 / ~	0x2022 / 127 / •
8 / **128**	0x00c7 / 180 / Ç	0x00fc / 207 / ü	0x00e9 / 197 / é	0x00e2 / 192 / â	0x00e4 / 204 / ä	0x00e0 / 200 / à	0x00e5 / 212 / å	0x00e7 / 181 / ç	0x00ea / 193 / ê	0x00eb / 205 / ë	0x00e8 / 201 / è	0x00ef / 221 / ï	0x00ee / 209 / î	0x00ec / 217 / ì	0x00c4 / 216 / Ä	0x00c5 / 208 / Å
9 / **144**	0x00c9 / 220 / É	0x00e6 / 215 / æ	0x00c6 / 211 / Æ	0x00f4 / 194 / ô	0x00f6 / 206 / ö	0x00f2 / 202 / ò	0x00fb / 195 / û	0x00f9 / 203 / ù	0x00ff / 239 / ÿ	0x00d6 / 218 / Ö	0x00dc / 219 / Ü	0x00a2 / 191 / ¢	0x00a3 / 187 / £	0x0020 / 32	0x0020 / 32	0x0192 / 190 / ƒ
0A / **160**	0x00e1 / 196 / á	0x00ed / 213 / í	0x00f3 / 198 / ó	0x00fa / 199 / ú	0x00f1 / 183 / ñ	0x00d1 / 182 / Ñ	0x00aa / 249 / ª	0x00ba / 250 / º	0x00bf / 185 / ¿	0x0020 / 32	0x0020 / 32	0xeffc / 248 / □	0x002d / 247 / -	0x00a1 / 184 / ¡	0x0020 / 32	0x0020 / 32
0B / **176**	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32
0C / **192**	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32
0D / **208**	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32
0E / **224**	0x0020 / 32	0x00df / 222 / ß	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x2020 / 243 / †	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32
0F / **240**	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x00b0 / 179 / °	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32	0x0020 / 32

Figure 9-13   Code Page - 437

9.3.14 Italian Code Page

The Italian Code Page is selected when SW4:(5-8) = 1101

Refer to Section 5.1.2.4 for more details on SW4 settings.

Italian																
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**0A**	**0B**	**0C**	**0D**	**0E**	**0F**
1 **16**					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 **32**	0x0020 32	0x0021 33 !	0x0022 34 "	0x00a3 187 £	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (	0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 **48**	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 **64**	0x00a7 189 §	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 **80**	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x00b0 179 °	0x00a7 189 §	0x00e9 197 é	0x005e 94 ^	0x005f 95 _
6 **96**	0x00f9 203 ù	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 **112**	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x00e0 200 à	0x00f2 202 ò	0x00e8 201 è	0x00ec 217 ì	0x2022 127 •

Figure 9-14 Code Page - Italian

9.3.15   British Code Page

The British Code Page is selected when SW4:(5-8) = 1110.

Refer to Section 5.1.2.4 for more details on SW4 settings.

British	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
1 **16**					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 **32**	0x0020 32	0x0021 33 !	0x0022 34 "	0x00a3 187 £	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (	0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 **48**	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 **64**	0x0040 64 @	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 **80**	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x005b 91 [	0x005c 92 \	0x005d 93]	0x005e 94 ^	0x005f 95 _
6 **96**	0x0060 96 `	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 **112**	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x007b 123 {	0x007c 124		0x007d 125 }	0x007e 126 ~	0x2022 127 •

Figure 9-15   Code Page - British

9.3.16 USA Code Page

The USA Code Page is selected when SW4:(5-8) = 1111.

Refer to Section 5.1.2.4 for more details on SW4 settings.

USA

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
1 **16**					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 **32**	0x0020 32	0x0021 33 !	0x0022 34 "	0x0023 35 #	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (	0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 **48**	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 **64**	0x0040 64 @	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 **80**	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x005b 91 [	0x005c 92 \	0x005d 93]	0x005e 94 ^	0x005f 95 _
6 **96**	0x0060 96 `	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 **112**	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x007b 123 {	0x007c 124		0x007d 125 }	0x007e 126 ~	0x2022 127 •

Figure 9-16 Code Page – USA

Chapter 10   Printer Maintenance

10.1   Maintenance Schedule

It is important to note that the optimum print quality and print head life is achieved by maintaining a clean printer and print head. A Microcom Corporation approved cleaning kit (*part # 040005-0000*) is available; contact your sales representative for purchasing information.

AREA	METHOD	INTERVAL
Print Head	Foam tipped swab, cotton tipped swab, or thermal printer cleaning card dampened with Isopropyl Alcohol.	After every roll of media or every 512 feet of tag stock or fanfold media.
Drive Roller	Foam tipped swab, cotton tipped swab, thermal printer cleaning card, or lint-free cloth dampened with Isopropyl Alcohol	After every roll of media or every 512 feet of tag stock or fanfold media.
Peel Edge	Foam tipped swab, cotton tipped swab, thermal printer cleaning card, or lint-free cloth dampened with Isopropyl Alcohol	As Needed.
Interior Cleaning	Compressed air, static protected vacuum cleaner, soft-bristle brush, and/or lint-free cloth dampened with Isopropyl Alcohol.	As Needed.
Exterior Cleaning	Lint-free cloth dampened with a mild, non-abrasive general purpose cleaner.	As Needed.

Table 10-1   Recommended Maintenance Schedule

CAUTION: Microcom Corporation will not be held responsible for damage caused by any non-approved solvent, cleaning material and/or method. The use of such non-approved materials and/or methods may void appropriate expressed or implied warranties.

10.2   Thermal Printer Cleaning Card

Any decline in print quality, voids or dropout areas in bar codes and/or graphics may indicate that the print head is dirty and needs to be cleaned. The necessary cleaning materials can be purchased through Microcom Corporation by contacting your sales representative and ordering the *Cleaning Kit, part # 040005-0000*. The print head should be cleaned after every roll of media or after every 512 feet of fanfold media (a typical stack of tag or fanfold media is approximately 3,200 tags).

A thermal printer card is the quickest and easiest way to clean the print head, drive roller, and peel edge all at the same time. Follow the steps below for the proper cleaning procedure.

1. Remove any installed media.

2. Dampen both sides, on one end, of the cleaning card with isopropyl alcohol.

3. Press Print Head Assembly down to insert the cleaning card into the printer.
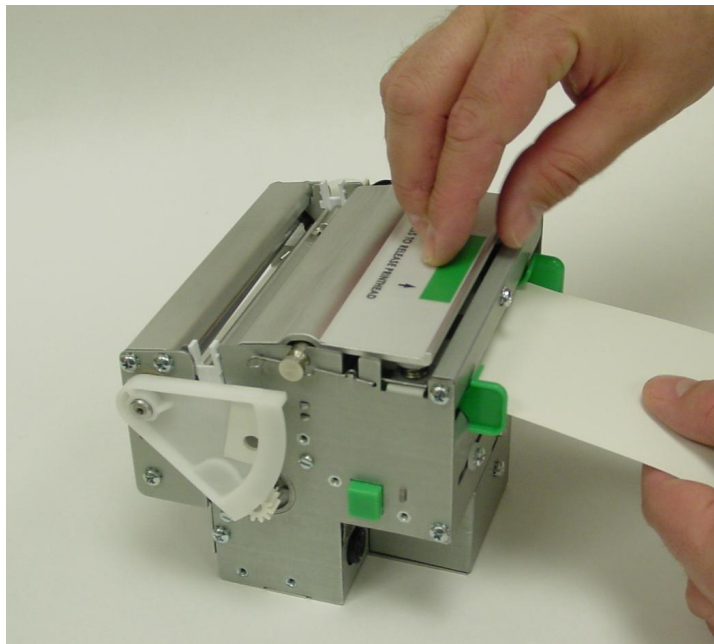
Figure 10-1   Inserting Cleaning Card

4. Release the print head assembly, hold the printer, and slowly pull the cleaning card (you will feel resistance) out of the printer.

5. Reinstall the media and check print quality.

6. Repeat cleaning steps if necessary.

Thermal cleaning cards should not be used more than three times each. Extremely dirty cards should be disposed of immediately.

10.3   Internal Cleaning

The overall internal cleaning of the printer is important to help reduce the dust and other contaminates residing in the printer that may attach to the print head or drive roller and affect the printer's performance. Refer to Figure 40 for common areas needing cleaning.

1. Remove any installed media.

2. Turn the printer power "OFF."

3. Press the Retainer Spring to allow the Head Pivot Shaft to pressed "IN" to allow the release of the Print Head Assembly.

4. Carefully pull the Print Head Assembly up and away from the printer without straining the Print Head cables.

5. The exposed Drive Roller can now be cleaned using a cotton swab or lint-free wiping rag dampened with isopropyl alcohol.
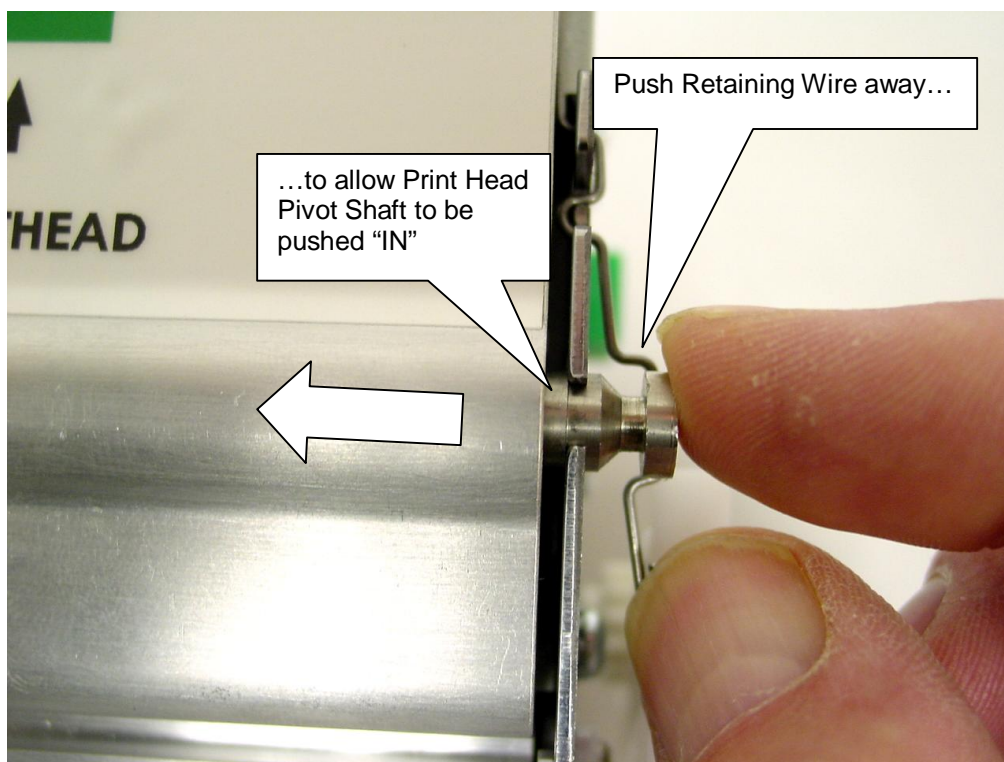
Figure 10-2 Print Head Assembly Removal

Blow dust out with compressed air or vacuum with anti-static vacuum cleaner.

Clean Peel Edge with lint-free cloth or swabs dampened with isopropyl alcohol.

Clean Drive Roller with lint-free cloth or swabs dampened with isopropyl alcohol. (Drive Roller can be rotated by hand.)
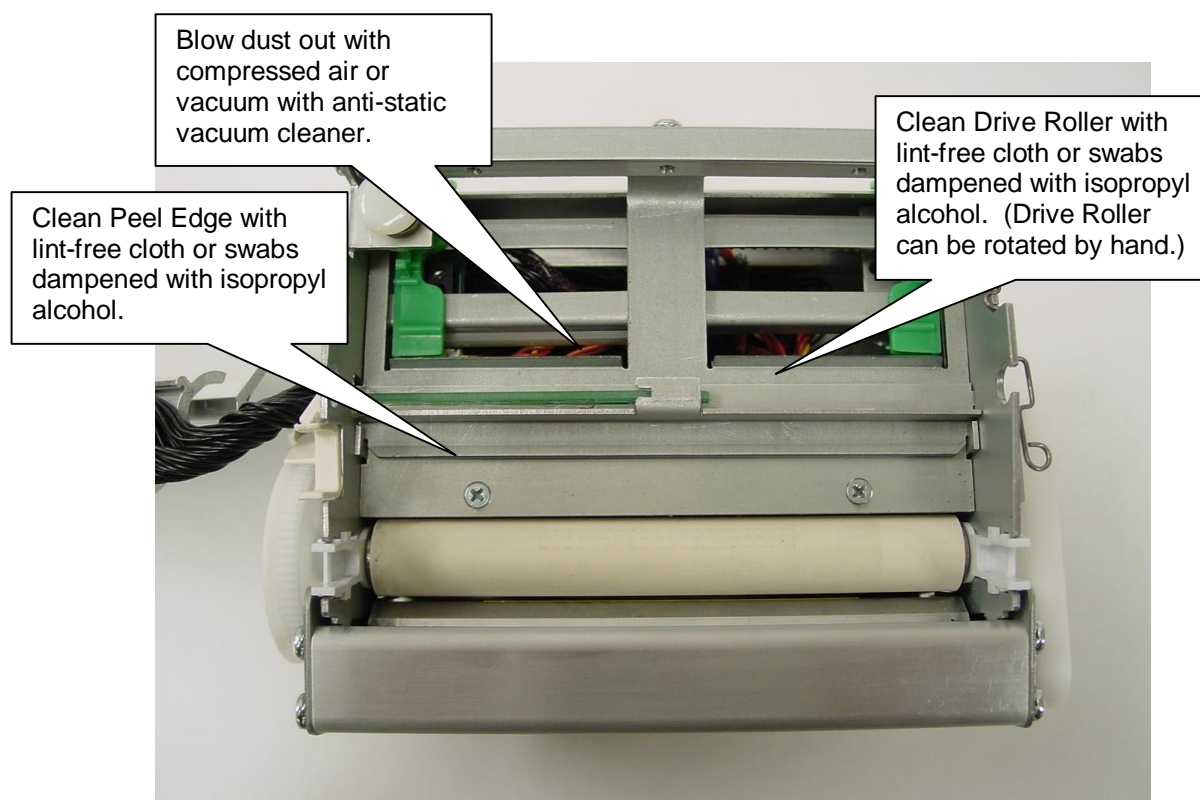
Figure 10-3 Internal Cleaning

10.4   Print Head Maintenance

If print quality has not improved after using a thermal cleaning card, or if one is not available, foam or cotton tipped swabs or a clean lint-free cloth dampened with isopropyl alcohol may be used. Follow the steps below to clean the print head.

1. Follow the steps to remove the Print Head Assembly in Internal Cleaning (See Section 10.3)

2. With a foam or cotton tipped swab or soft, lint-free cloth dampened with isopropyl alcohol, clean the thermal elements by gently rubbing the swab down the length of the print head dot row. Allow for the alcohol to evaporate, then repeat if necessary (See Figure 10-4).

3. Reinstall media and run labels to check print quality.

4. If poor print quality persists, print head or other parts may be damaged.

Gently clean the Print Head dot row with a foam or cotton-tipped swab or lint-free rag moistened with Isopropyl alcohol.
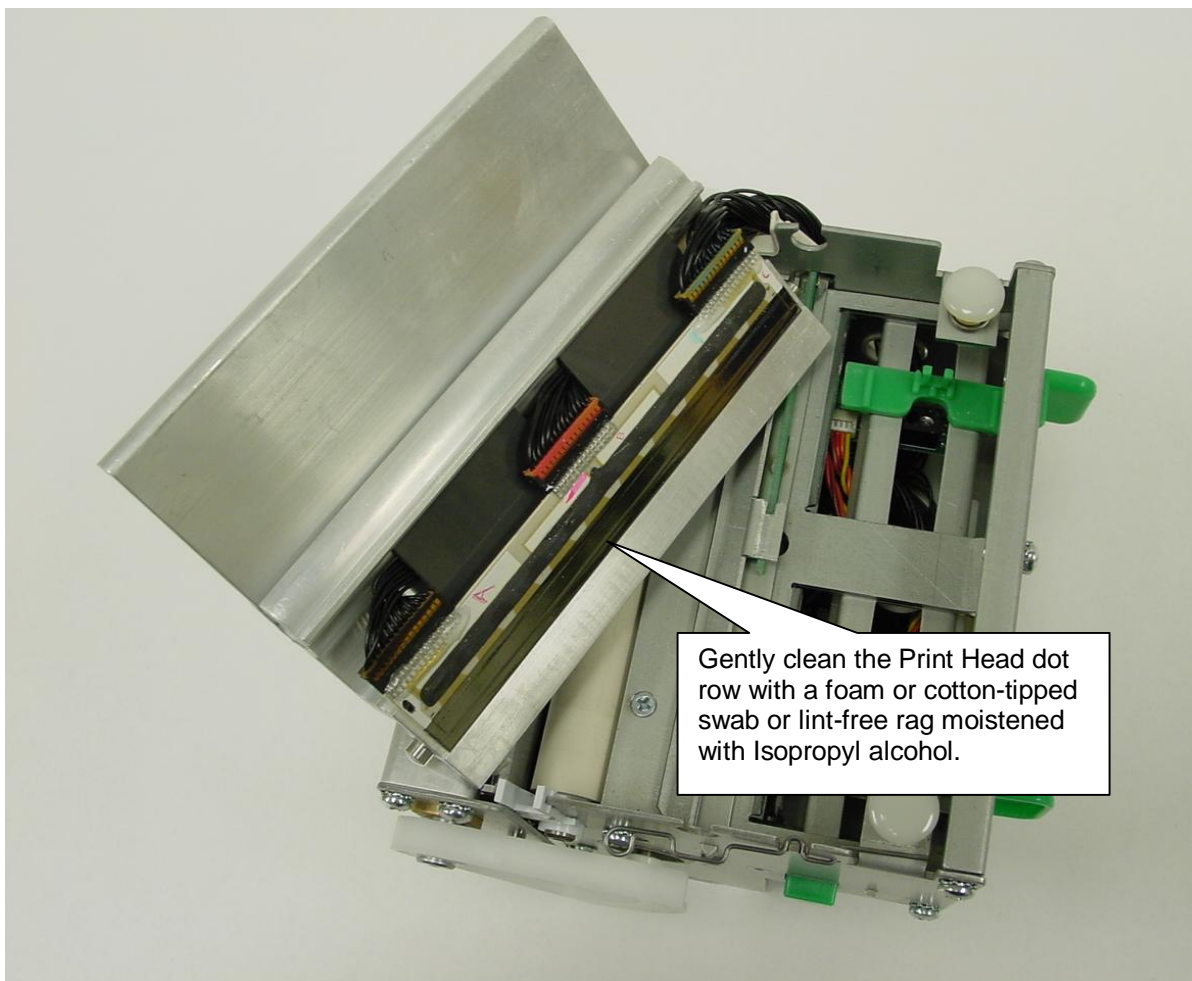
Figure 10-4 Cleaning the Print Head

CAUTION: Isopropyl Alcohol should be used to clean the drive roller. The use of other cleaning solvents or materials is not recommended and may degrade the performance of the drive roller.

Chapter 11: Troubleshooting

11.1   Troubleshooting Tips

The printer fails to turn "ON" and the status indicator light fails to light:

   ✓ Verify that the power cord is connected to the printer, as well as the AC outlet.

   ✓ Verify that the printer power switch is in the "ON" position.

   ✓ Verify that the AC outlet is functioning properly.

   ✓ Contact your Service Representative.

The printer has no communication:

   ✓ Verify that the communication cable is properly connected to the printer and to an available communication port on the host computer.

   ✓ Verify that the host communication port is functioning properly.

   ✓ Verify that the printer and the host serial parameters are set exactly the same.

   ✓ Verify that nothing else is configured on the same port.

   ✓ Contact your Service Representative.

Vertical blank or light lines appear on printed areas:

   ✓ Clean the print head.

   ✓ Print head may need to be replaced.

   ✓ Contact your Service Representative.

The status indicator light is solid amber in color:

   ✓ Indicates that the printer has been paused or a tag/tear mode is being used.

   ✓ Press the print button; light should turn green and resume printing if the printer has been paused.

   ✓ Remove the tag, the light should turn green if a tag/tear mode is enabled

   ✓ Contact your Service Representative.

The status indicator light is solid red in color:

- ✓ The printer has an error and requires service before printing will continue.

- ✓ Verify that media has been loaded in the printer properly.

- ✓ Press the print button to attempt to clear the error.

- ✓ Refer to Chapter 5 for information regarding the Enquiry Command to help identify the error condition.

- ✓ Cycle power to reset the printer.

The status indicator light is flashing red in color:

- ✓ Generally due to a power fail error.

- ✓ Verify that the AC line-voltage is present at the AC outlet.

- ✓ Cycle power.

During download the status indicator light flashes red in color:

- ✓ The file contains an illegal operation / command.

- ✓ The graphic or font is not valid or has errors.

- ✓ The intended memory slot is already occupied.

- ✓ Verify that the printer is properly configured for the type of download being sent.

- ✓ Clear memory and attempt download again.

- ✓ Verify that the format has been created properly.

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Appendix

Appendix A: Limited Warranty

Microcom Corporation printers, excluding thermal print heads, which are warranted separately below, are warranted against defects in material and workmanship for twelve (12) months from the date of original shipment by Microcom Corporation. This warranty does not cover normal wear and tear and shall be null and void if the printer is modified, improperly installed or used, damaged by accident or neglect, or in the event any parts are improperly installed or replaced by the user.

The thermal print head is covered by a limited warranty of three (3) months or 500,000 linear inches to be free from defects in material and workmanship. The length of media run through the printer may be verified using the printer's internal statistical counter. Although the user is not required to purchase Microcom Corporation brand supplies, to the extent it is determined that the use of other supplies (such as non-approved label stock, ribbons, and cleaning solutions) shall have caused any defects in the thermal print head for which the warranty claim has been made, the user shall be responsible for Microcom Corporation's customary charges for labor and materials to repair such defects.

MICROCOM CORPORATION'S SOLE OBLIGATION UNDER THIS WARRANTY SHALL BE TO FURNISH PARTS AND LABOR FOR THE REPAIR OR REPLACEMENT OF PRODUCTS FOUND TO BE DEFECTIVE IN MATERIAL OR WORKMANSHIP DURING THE WARRANTY PERIOD.

Except for the express warranties stated, Microcom Corporation disclaims all warranties on products, including all implied warranties of merchantability and fitness for a particular purpose. The stated warranties and remedies are in lieu of all other warranties, obligations or liabilities on the part of Microcom Corporation for any damages, including, but not limited to, special, indirect, or consequential damages arising out of or in conjunction with the sale, use, or performance of these products.

MICROCOM CORPORATION SHALL NOT, UNDER ANY CIRCUMSTANCES WHATSOEVER, BE LIABLE TO THE BUYER OR ANY OTHER PARTY FOR LOST PROFITS, DIMINUTION OF GOODWILL OR ANY OTHER SPECIAL OR CONSEQUENTIAL DAMAGES WHATSOEVER WITH RESPECT TO ANY CLAIM HEREUNDER. IN ADDITION, MICROCOM CORPORATION'S LIABILITY FOR WARRANTY CLAIMS SHALL NOT, IN ANY EVENT, EXCEED THE INVOICE PRICE OF THE PRODUCT CLAIMED TO BE DEFECTIVE. NOR SHALL MICROCOM CORPORATION BE LIABLE FOR DELAYS IN THE REPLACEMENT OR REPAIR OF PRODUCTS.

Appendix B: RMA Procedure

Return Material Authorization (RMA) Procedure

A Return Material Authorization (RMA) number must be obtained prior to the return of printers and/or materials to Microcom Corporation's Service Department. The purpose of the RMA number is to provide effective tracking and control of returned printers and/or materials. Microcom Corporation will not be responsible or held accountable for printers and/or materials returned without proper authorization.

Shipping Charges:

The return of printers and/or materials to Microcom Corporation for repair should be returned freight and insurance prepaid. Microcom Corporation will pay the return shipping charges (standard ground service) on all warranty repairs; expedited services will be paid at the customer's expense. The return of non-warranty repairs to printers and/or materials will be shipped by a shipping carrier and service determined by the customer.

Receiving a Return Material Authorization (RMA) number:

1.   To receive an RMA number, either complete the online RMA request form located at Microcom's website (www.microcomcorp.com) or contact the Microcom Corporation Service Department and provide the representative with the following information:
         - Company name.
         - Contact name and phone number.
         - Model number.
         - Printer serial number.
         - A detailed description of the problem.
         - Service option requested (1 Day, 3 Day, 5 Day, or Standard turnaround).
         - Purchase Order Number.

2.   The shipping label should contain the following information:
         Microcom Corporation
         Attn: Service Dept. RMA# <place RMA number here>
         8220 Green Meadows Dr. N.
         Lewis Center, OH 43035 USA

3.   Return the defective item(s) for repair to the address listed above, freight and insurance prepaid.

4.   Upon receipt of an RMA number, the customer contact will be notified by a Microcom Corporation representative regarding repair charges, at which time the ship method will be determined. Items returned for repair with inadequate packaging material will be returned to the customer in Microcom Corporation approved packaging at the customer's expense.

Appendix C: ^D Command Summary

5 NULLS + 01:   The 5 NULL method commands are a way to pass commands to the printer even when the printer in configured in binary compression mode. The command is sent to the printer as HEX characters; 00 00 00 00 00 01 are sent to the printer in order to issue the command. This command is used to request the printer's status and is very similar to the ^E command. The biggest difference between this command and the ^E is that when printers are configured for binary compression (D23 -SW3 bit 7), which is required if saving graphics, the ^E will not function. This means that if the printer is going to be using binary compression, the 5 NULL's method should be used to request status instead of the ^E command.

5 NULLS + 02:   The 5 NULL method commands are a way to pass commands to the printer even when the printer in configured in binary compression mode. The command is sent to the printer as HEX characters; 00 00 00 00 00 02 are sent to the printer in order to issue the command. This command is used to cancel pending jobs/commands and to remotely clear errors returning the printer to an idle >READY< state. If the condition causing the original error condition still exists, sending new jobs will cause the printer to go back into an error condition. This command simply provides the ability to remotely clear error conditions and return the printer to a state that allows normal communication.

5 NULLS + 0F: The 5 NULL method commands are a way to pass commands to the printer even when the printer in configured in binary compression mode. The command is sent to the printer as HEX characters; 00 00 00 00 00 0F are sent to the printer in order to issue the command. This command instructs the printer to exit the temporary binary mode switch. If a printer has been configured to use binary compression mode using the soft switch command (D23 - SW3 bit 7), the NULL's + 0F method will be ignored when issued.

0F + 5 NULLS: The 5 NULL method commands are a way to pass commands to the printer even when the printer in configured in binary compression mode. The command is sent to the printer as HEX characters; 0F 00 00 00 00 00 are sent to the printer in order to issue the command. This command provides a temporary switch into binary compression mode without having to have the printer configured for binary compression (D23 - SW3 bit 7) mode. This is helpful when placed just before a graphic file. The printer will continue processing the data as binary data until instructed to exit the temporary binary mode (5 NULL's +0F).

The following is the list of ^D commands in numeric order:

^A   **^D**   <u>COMMAND</u>

    2   **Text String Entry Mode**: Precedes the text strings that are supplied to the various fields in the format (Equivalent to ^B).

    3   **Print Command**: Prints a single label or starts the printing of a batch of labels (Equivalent to ^C).

    5   **Send Printer Status**: (Equivalent to ^E).

    7   **Update printer flash**: This command is used to update the printer's software which includes the application, the bootloader, and the embedded fonts.

    8   **Cycle the cutter**: This command makes the cutter cycle once.

    11   **Print Test Pattern**: (Equivalent to ^K).

    12   **Print Blank Label**: (Equivalent to ^L).

X   **20**   **Set Bits Per Second:**
0   110 bps
1   150 bps
2   300 bps
3   600 bps
4   1200 bps
5   2400 bps
6   4800 bps
7   9600 bps
8   19200 bps
9   38400 bps
10   57600 bps
11   115200 bps
12   230400 bps (only used for D149 Image Mode)
13   460800 bps (only used for D149 Image Mode)
14   921600 bps (only used for D149 Image Mode)

^AB	**^D**	**COMMAND**

21   **Software Bank Switch #1:** A non-volatile command used to set the various functions identified below.

^AB12345678

Position:

12	**Enquiry Responses:**
	00 = Control Codes
	10 = Text Equivalent
3	**1 = Ignore Control Codes; 0 = Accept**
4	**1 = Odd Parity; 0 = Even Parity**
5	**1 = Disable Parity (NONE); 0 = Enable Parity**
6	**1 = Enable Echo; 0 = Disable**
7	**1 = 8 Data Bits; 0 = 7 Data Bits**
8	**1 = Enable XON/XOFF; 0 = Disable**

22   **Software Bank Switch #2:** A non-volatile command used to set the various functions identified below.

^AB12345678

Position:

1	**1 = Enable Clear Text; 0 = Disable**
2	**1 = Enable >RESTARTED< Response; 0 = Disable**
3	**1 = Disable Button; 0 = Enable**
4	**1 = Enable Print Repetition; 0 = Enable Form Feed**
5	**1 = Use Saved Format File; 0 = ROM Format**
678	**Power-up / ROM Format Selection:**
	000 = No Power-up Format
	001 = ROM or Saved Format File 1
	010 = ROM or Saved Format File 2
	011 = ROM or Saved Format File 3
	100 = ROM or Saved Format File 4
	101 = ROM or Saved Format File 5
	110 = ROM or Saved Format File 6
	111 = ROM or Saved Format File 7

23   **Software Bank Switch #3:** A non-volatile command used to set the various functions identified below.

^AB12345678

Position:

1	**1 = Disable Extended ASCII; 0 = Enable**
2	**1 = Active LOW for >INPUT1<; 0 = Active HIGH**
3	**1 = Send Enquiry Response after Print; 0 = Disable**
4	**1 = Active LOW for >INPUT2<; 0 = Active HIGH**
5	**1 = Disable use of | for control; 0 = Enable**
6	**1 = Disable use of ^ for control; 0 = Enable**
7	**1 = Enable Binary Compression; 0 = Disable**
8	**1 = Enable Detect Blackline on Power-up; 0 = Disable**

^AB	**^D**	**COMMAND**

24   **Software Bank Switch #4:** A non-volatile command used to set the various functions identified below.

^AB12345678

Position:

1	**1 = Enable Slashed Zeros; 0 = Disable**
2	**1 = External Print Request; 0 = Disable**
3	**1 = Disable Stock Out Sensing; 0 = Enable**
4	**1 = Enable Auto-size on Power-up; 0 = Disable**
5678	**Code Pages:**

                0000 = Not decoded (8 bit)
                0001 = Danish (7 bit)
                0010 = 860 (8 bit)
                0011 = Spanish (7 bit)
                0100 = 850 (8 bit)
                0101 = German (7 bit)
                0110 = 865 (8 bit)
                0111 = Swiss (7 bit)
                1000 = 852 (8 bit)
                1001 = French (7 bit)
                1010 = 863 (8 bit)
                1011 = Swedish (7 bit)
                1100 = 437 (8 bit)
                1101 = Italian (7 bit)
                1110 = British (7 bit)
                1111 = US English (7 bit)

25   **Software Bank Switch #5:** A non-volatile command used to set the various functions identified below.

^AB12345678

Position:

1	**1 = Enable Single Button Error Clear; 0 = Disable**
2	**1 = Display >BUTTON PRESSED<; 0 = Disable**
3	**1 = TOF sensor is transmissive; 0 = TOF is reflective**
4	**1 = Enable TOF on Power-up; 0 = Disable**
5	**1 = Button is TOF; 0 = Button is Defined by SW#2 bit4**
6	**1 = Enable AutoLoad; 0 = Disable**
7	**1 = AutoLoad+TOF; Autoload+FF**
8	**1 = Enable Status Byte Mode; 0 = Disable**

^AB	**^D**	**COMMAND**
	26	**Software Bank Switch #6:** A non-volatile command used to set the various functions identified below. **^AB12345678**

Position:

1	**1 = Enable >TRAY FULL< response; 0 = Enable Test Pattern**
2	**1 = Enable STL Emulation; 0 = Disable**
3	**1 = Enable Pre-Stock Out Feature; 0 = Disable**
4	**1 = Enable >STOCK NOT LOADED< response; 0 = Disable**
5	**1 = Enable 48-466 Compatibility mode; 0 = Disable**
6	**1 = General Purpose I/O Enable; 0 = Custom I/O Enable**
7	**1 = Enable Takeup Control; 0 = Enable Cutter Control**
8	**1 = Enable Nonstick TOF Mode; 0 = Disable**

27	**Software Bank Switch #7:** A non-volatile command used to set the various functions identified below. **^AB12345678**

Position:

123	**Select STL Stock Class:**		
		100	Standard Ticket
		010	Cinema Ticket
		001	Wristbands
456	**Select STL Stock Width (Inches):**		
		000	1.00
		100	1.328
		010	2.00
		110	2.125
		001	2.50
		101	2.75
		011	3.25
		111	4.00
7	**1 = Disable System Parameter Saving; 0 = Enable**		
8	**1 = Enable Finish Mode; 0 = Disable**		

^A	**^D**	**COMMAND**
X	29	**Printer Statistics:**
0		Print Statistics to the serial port.
1		Print Statistics on a label.
2		Clear the Printed Labels variable in the statistics.
3		Clear the Printed Inches variable in the statistics.
	32	**Restart Printer:** Restores the printer to power-up settings. Also used to set the non-volatile fields in memory.
	33	**Display Model and Revision Number**
X	35	**Adjust Contrast Window:** This is the temporary contrast adjustment. The

^Axx range is from 1 to 9 and is an small adjustment to the contrast base (^D36 command)

^A	^D	COMMAND
XX	36	**Adjust Contrast Base:** This is a non-volatile command that adjusts the contrast base value. The ^Axx specifies a value from 10% to 200%.

X	39	**Auto-Size Label:**
0		Clears the auto-size values determined by the ^A1^D39 command.
1		Uses values obtained for the variables instead of what the user supplies in the header of the format file.
2		Automatically sizes the label and displays on the screen the values for the header variables.
3		Same as ^A2^D39, but prints the values on a label, instead of on the screen.
5		Diagnostic Mode (Tick-Tick)
6		Diagnostic Silent Mode (Tick-Tick)

	40	**Clears Commands 41 through 51**
XX	41	**Load Number of Fields in Layout (HFM):** The ^Axx specifies the value.
XX	42	**Load Label Width in dots (LSX):** The ^Axx specifies the value.
XX	43	**Load Label Height in dots (LSY):** The ^Axx specifies the value.
XX	44	**Load the Web Size in dots (WEB):** The ^Axx specifies the value.
XX	45	**Load the Gap Size in dots (GAP):** The ^Axx specifies the value.
XX	46	**Load Print Speed:** The ^Axx specifies the value.
XX	47	**Load the Label Control Byte (LCB):** The ^Axx specifies the value.
XX	48	**Load the Number of Steps to Activate Gap Detector (AGD):** The ^Axx specifies the value in Dot Rows.
XX	49	**Load the Number of Steps Past Gap (SPG):** The ^Axx specifies the value in Dot Rows.
XX	50	**Load X Direction Offset (OFX):** The ^Axx specifies the value.
XX	51	**Load Y Direction Offset (OFY):** The ^Axx specifies the value.
XX	54	**Send Format from RAM to the Port:** The ^Axx specifies the slot number where the format file is stored in RAM. Valid values for Axx are A1 to A128.
XX	55	**Select Default Power-up Format:** Selects the ROM power-up format. The ^Axx selects from the available formats 1 through 8.
	56	**Select User Defined Layout:** Signals the end of the label field definition.

^A	**^D**	**COMMAND**
	57	**Enter Label Format Mode:** Instructs the printer that information for a format is following the command.
XX	**58**	**Process Format Saved in RAM:** The ^Axx selects which stored format to process (1-128). This command takes the selected format in RAM and makes it into a label.
XX	**59**	**Save Formats to RAM. (1 - 128)**
	60	**Clears Command 61**
XX	**61**	**Mark Text Starting Position:** The ^Axx designates which text field to start entering new data.
	62	**Pre-Padded Text:** This command is sent after the text that is to appear at the beginning of each field.
X	**63**	**Text Mode Control:** Allows the entry of new text without the ^D2 command and/or clears all previous text when new text is added.
0		Disable 1 and 2
1		Enable Auto-Print Mode
2		Clear all previous text upon receiving new data.
3		Enable 1 and 2
XX	**64**	**Auto-Print String Count:** The ^Axx instructs the printer how many text strings to accept before printing.
XX	**66**	**Clear Single FORMAT Stored in RAM:** The ^Axx specifies which memory slot to clear (1-128).
	70	**Clear Commands 73 through 76**
	71	**Load MaxiCode Bar Code Data**
XX	**73**	**Load Copies Count:** Instructs the printer to print a group of labels. This command will not increment/decrement serial numbers.
X	**74**	**Infinity Print:** Continues to print copies of a format until the power is shut off. The valid ^Ax values are "1" to enable and "0" to disable this command.
XX	**75**	**Load Label Count:** Instructs the printer to print a batch of labels using the serial number functions if enabled.
XX	**76**	**Load Delay Time Between Labels:** The ^Axx specifies the delay time in 1/10ths of a second. Maximum value is 650.
	77	**Load PDF-417 Bar Code Data**

^A	^D	COMMAND
X	**78**	**Set print head number of dots.**
448		203dpi 224 (448 dots)
640		300dpi 224 (640 dots)
640		203dpi 324M (640 dots)
960		300dpi 324M (960 dots)
832		203dpi 424 (832 dots)
1280		300dpi 424 (1280 dots)
832		203dpi 424M (832 dots)
1280		300dpi 424M (1280 dots)
832		203dpi X28 (832 dots)
1280		300dpi X28 (1280 dots)

X   79   Set print head dots/inch (dpi). This command sets the dot density of the print head. This command MUST be sent BEFORE the # of Dots is set with the ^D78 command.
0   203 DPI
1   300 DPI

80   Clears Command 86, 88, and 89

81   Disable Serial Number Function: This command disables the serial number function for either single or multiple serial numbers.

XX   84   Load Text String Number to Increment/Decrement: Instructs the printer which text string to increment/decrement. Only used in conjunction with single serial numbers.

XX   85   Load Increment/Decrement Step Value: The ^Axx specifies the value that the serial number will be incremented or decremented.

X   86   Single Serial Number Status:
0   Disable Increment/Decrement
1   Enable Increment. The serial number will be increased by the ^D85 value.

2   86   Enable Decrement. The serial number will be decreased by the ^D85 value.

XX   87   Load Field Number to Clear Increment/Decrement Status: Clears the status of one or more serial numbers.

XX   88   Load Field Number to Increment by 1: The ^Axx specifies which field to increment when using the multiple serial number function.

XX   89   Load Field Number to Decrement by 1: The ^Axx specifies which field to decrement when using the multiple serial number function.

XX   90   Reflective Detection Sensitivity: The ^Axx value sets the point (0-255) at which the printer detects a blackline registration mark using the reflective sensor. The printer's threshold default is a value of 100 for the reflective

sensor. If this value is not set correctly the printer may false sense a registration mark or report an invalid >LOW STOCK< error.

^A	^D	COMMAND
XX	**91**	**Transmissive Detection Sensitivity:** The ^Axx value sets the point (0-255) at which the printer detects a diecut registration mark (gap) and/or blow-hole using the transmissive sensor. The printer's threshold default is a value of 30 for the transmissive sensor. If this value is not set correctly the printer may false sense a registration mark or report an invalid >LOW STOCK< error.
XX	**92**	**Set Starting Slice Number:** This command adjusts the number of dot rows that the printer will generate before the printer starts to print.
X	**93**	**Load Control Code Recognition Status:**
0		Enable control code recognition
1		Disable control code recognition
X	**94**	**Set Slice Buffer Size:** Sets the size of the slice buffer memory that is used by the printer to generate images to be printed. If the slice buffer memory size is set to low, the printer may start printing and then stop to process additional slices before starting again.
2		88Kbytes
3		192Kbytes
4		256Kbytes
5		320KBytes
6		384KBytes
XX	**95**	**Load Advance/Retract Distance:** Used in conjunction with cutter and dispense command. The ^Axx specifies the amount to advance after printing and then retract to dot row. The count is given in dot increments.
XX	**96**	**Load Advance Delay:** The ^Axx specifies the amount of delay, in Milliseconds, the printer waits before retracting to dot row in cutter and dispense modes.
X	**97**	**Tag/Tear Dispense Mode:**
0		Disables Tag/Tear Mode
1		Advance after every label.
2		Advance after copies count.
3		Advance when idle.
X	**98**	**Peel-n-Dispense Mode:**
0		Disable Peel-n-Dispense
1		Enable Peel-n-Dispense

^A	^D	COMMAND
X	**99**	**Cutter Control:** This command enables the volatile full and/or partial cut operation. This command works in conjunction with the ^D102 and ^D103 Cut Interval commands. The ^D95 command is also used with the ^D99 command to adjust the advance distance to the cutter blades and then retract to the home position (dot row one).

0   Disable Cutter operation.
1   Enable Full Cut.
2   Enable Partial Cut.
3   Enable Full and Partial Cut.

       100   **Clear User RAM:** This command clears all the downloaded fonts and graphics that have been stored in RAM.

       101   **Send User RAM Available:** The printer will send the number of free or available bytes to the serial port (i.e. >192480<). Use the D119 command for additional reporting.

XX   **102**   **Full Cut Interval:** Instructs the printer when to issue a Full Cut. The default value is 1. If it is set to a value of "1" the printer will full cut whenever the copies count has been reached or after each format if a copies count has not been specified. If this command is set higher than "1" (maximum of 65536), the printer will full cut when that quantity has been reached. This command will not operate if the Cutter Control (^D99) command is set to partial cut.

XX   **103**   **Partial Cut Interval:** This command instructs the printer when to issue a Partial Cut. A partial cut requires the use of a Cutter that is capable of Partial cuts. Partial Cut is when a thin piece of the media, in the center, holds the media together and the printer waits until the media is removed before printing the next label. The default Partial Cut Interval is set to 1. The printer will issue a partial cut, if set to a 1, whenever the copies count is reached. If set to a value greater than 1, the printer will partial cut when that quantity has been reached. This command only functions when the Cutter Control (^D99) command is set to allow partial cuts.

XX   **104**   **Save ASCII Fonts to RAM:**
                 The ^Axx specifies which memory file # (CGN #) the FONT will use (1-255). This command should be used with an ASCII-HEX file that contains only printable characters less than 0x80. These FONTS are "extended non-compressed", meaning that they can be greater than 64KB. This command supports fonts greater than 64KB.

XX   **105**   **Delete Graphics from RAM:**
0   deletes ALL graphics from RAM
1-255   Value of X deletes the graphics in slot #X

XX   **106**   **Save ASCII Graphics to RAM:**
                 This command is intended for legacy support only. Microcom Corporation recommends using the ^D107 command instead of the ^D106.

^A	^D	COMMAND
xxyy	**107**	**Save Compressed GRAPHICS to RAM:**

The special ^Axxyy^D107 code is put at the beginning of the GRAPHIC download file by the bit map converter program. The ^Axxyy tells the printer the overall size of the file according to this format:

xx   The number of additional 64KB sectors needed to save the graphic file.

yy   The memory slot location of the graphic being saved; CGN # (1-255)

X	**108**	**Serial Port Source (Non-volatile)**
0		AutoSelect
1		Ethernet

X	**109**	**Serial Port Source (volatile)**
0		RS-232
1		USB
2		Ethernet

X	**110**	**General Purpose Status Byte**

XX **111** **Kiosk Cutter Mode:** This command enables the non-volatile full and/or partial cut operation. The ^D112 command is also used with the ^D111 command to adjust the advance distance to the cutter blades and then retract to the home position (dot row one).

0   Disable Kiosk Cutter Mode.
1   Enable Kiosk Cutter Mode.
2   Enable partial Kiosk Cutter Mode.

XX **112** **Kiosk Cutter Advance Distance Command:** The valid range is from 0 to 1000 with the recommended distance of 150.

XX	**113**	**Verbose Mode:**
0		Disable Verbose Mode.
1		Enable Verbose Mode.

	114	**RSS-14 Data Entry Command:** The Reduced Space Symbology (RSS-14) barcode is fully supported by the 324M and 424M printers. There are 6 different types of RSS-14 that are supported by the printer:

X	**115**	**Set Cutter Type:** Selects the type of cutter installed on the printer.
0		No cutter
1		Guillotine
2		Rotary

X	**116**	**Synchronous Print Mode**
0		Exit all sync. modes.
1		Enter single sync. mode.
2		Enter continuous sync. mode.

X	**117**	**Cutter Hold-off:** X represents the number of cuts to skip on the first X labels

following a TOF.

^A	^D	COMMAND

X   **118**   **Home Cutter:** This command will return the cutter gear to the home or open position when issued. Only available of the X28 Series of printer's.

XX   **119**   **Display Memory Allocation:** This command shows how all of the RAM and flash memory is being used.

XX   **120**   **AutoLoad Delay Selection:** The AutoLoad Delay is the amount of time, in Milliseconds, that the printer waits after detecting that media has been put into the printer before it starts feeding it in.

121   **Top Of Form Command:** This command causes the printer to perform a Top-of-Form. This command requires a LPD sensor to be installed on the printer.

122   **Display Available FLASH memory:** This command is used to display the amount of available flash memory for file storage.

XX   **123**   **Set TOF Retract Distance:** Sets the distance that the printer will retract when performing a TOF operation. The retraction distance range is from 1 to 900 with the units being in dots or pixels.

XX   **124**   **Stock Out Threshold:** Sets the stock out threshold

xxyy   **127**   **Save FONTS to RAM:** This command is used to load or save fonts to the volatile RAM memory. Refer to Chapter 7 for more detail.

X   **129**   **Auto Set Threshold:** This command automatically determines and sets the nonvolatile threshold for proper registration.
0   Automatically sets the transmissive threshold value.
1   Automatically sets the reflective threshold value.

XX   **130**   **Save a FORMAT to FLASH:** This command is used to save an LDS format to non-volatile flash memory. The ^A value is used to indicate the memory slot location into which the format will be saved. Formats are saved in a separate area of flash than the fonts and graphics so the memory slots for the formats are independent from the fonts and graphic memory slots. The valid range of memory slots is from 1 to 128.

XX   **131**   **Delete a FORMAT from FLASH:** Used to delete a format that has been stored in flash memory. The ^A value is used to specify the memory slot of the stored format that will be deleted.

xxyy   **133**   **Save Compressed GRAPHICS to FLASH:** This command is used to save graphic's into non-volatile flash memory. The ^Axxyy^D133 command is placed at the beginning of a graphic download and instructs the printer to save the following data as a graphic file. The <ESC> (^[or 0x1B) instructs the printer the end of file download and acts as the command terminator.

| **xx** | The number of additional 64KB sectors needed to save the graphic file. |
| **yy** | The memory slot location of the graphic being saved; CGN # (1-255) |

^A	**^D**	**COMMAND**
XX	**134**	**Delete a GRAPHIC from FLASH:** Instructs the to delete a graphics from flash memory. Issuing a "0" for the ^A value causing the printer to delete all flash graphics. The ^A value is used to select the memory slot or CGN # that will be deleted. The valid values for Axx are 0 to 255.
xxyy	**135**	**Save FONTS to FLASH:** This command is used to save font's into the printer's non-volatile flash memory. The ^Axxyy^D135 command is placed at the beginning of a font file download and instructs the printer to save the following data as a font file. The <ESC> (^[or 0x1B) instructs the printer the end of file download and acts as the command terminator.
xx		The number of additional 64KB sectors needed to save the graphic file.
yy		The memory slot location of the graphic being saved; CGN # (1-255)
XX	**136**	**Delete a FONT from RAM:** Instructs the printer to delete a graphics from RAM. Issuing a "0" for the ^A value causing the printer to delete all RAM fonts. The ^A value is used to select the memory slot or CGN # that will be deleted. The valid values for Axx are 0 to 255.
XX	**137**	**Delete a FONT from FLASH:** Instructs the to delete a font stored in flash memory. Issuing a "0" for the ^A value causing the printer to delete all flash fonts. The ^A value is used to select the memory slot or CGN # that will be deleted. The valid values for Axx are 0 to 255.
XX	**138**	**Process a FLASH FORMAT:** This commands instructs the printer to process or run a saved format from flash memory as if it was sent to the printer.
XX	**139**	**Send a FLASH FORMAT to the Communication Port:** This command instructs the printer to send the contents of a stored format to the printer's active communications port without processing the stored format.
	140	**Clear all User FLASH:** Instructs the printer to delete all fonts and graphics stored in non-volatile flash memory. Format files stored in flash are not deleted by this command. This command is equivalent to sending a ^A0^D134 and a ^A0^D137 to the printer.
	141	**Clear User FLASH & RAM memory:** This command instructs the printer to delete all fonts and graphics stored in both RAM and flash memory. This command is the equivalent to sending the ^D100 and ^A0^D140 commands to the printer.
1	**143**	**Save and Reboot Printer:** This command instructs the printer to save statistics stored in RAM to non-volatile Flash memory and then actually resets the printer hardware. Issuing this command is the equivalent of turning the printer off and back on. This command may be used to start using certain

non-volatile system parameters (head parameter and soft switch commands). It is recommended that this command is sent before updating the printer's software to ensure that the printer's configuration and statistics are saved before the update starts.

^A	**^D**	**COMMAND**
	145	**List Commands:** This command is used to generate a list of commands containing a brief description of the LDSI code base that the printer uses. Issuing a ^D145 or ^A0^D145 causes the printer to generate a list of commands supported by the LDSI code base to communications port.
XX	**146**	**Pre Stock-Out Distance:** This command sets the distance in dots that the PSO option uses to feed the media when the >INPUT 1< sensor detects an out of media condition. If the length of the label happens to be larger than the distance from the pre stock out sensor to the dot row (^D146 command) the printer will not be able to completely finish printing the last label. Other than this, the operation of the printer will be the same as above. The printer's default distance is set to 1800 and issuing a "0" (^A0^D146) will cause the printer to reset to this value. The maximum setting is 7200 and values above this setting will be ignored.
X	**147**	**Autoheader Command:** The Autoheader command provides similar functionality of other printer manufacturers that specify exact placement and location of blackline media used for registration. This command is a specialty media handling command that works when the correct media is used.
0		Execute AutoHeader on power-up only.
1		Execute AutoHeader on the next media loading.
2		Execute AutoHeader immediately (after delay, assumes that media is loaded.
3		Execute AutoHeader every time media is loaded.
1	**148**	**Show Autoheader Values Command:** After the auto header (^D147) has been executed, the values that the printer will use for the header may be seen using this command.
	149	**USB Image Print Mode:** This is a special Image print mode protocol used with the USB Port at higher Baud rates.
X	**153**	**Feed Forward Distance:** Moves motor in the forward direction by the X amount specified in dots.
X	**154**	**Feed Reverse Distance:** This command will move the motor in the reverse direction by the X amount, specified in dots.
X	**155**	**Set Feed Speed:** Sets the feed speed used with the D153 and D154 commands.
0		8.0 ips (inches per second)
1		7.5 ips
2		7.0 ips
3		6.5 ips
4		6.0 ips

5	5.5 ips
6	5.0 ips
7	4.5 ips
8	4.0 ips
9	3.5 ips
10	3.0 ips
11	2.5 ips
12	2.0 ips
13	1.5 ips
14	1.0 ips
15	0.5 ips

^A	**^D**	**COMMAND**
X	**156**	**Set Non-stick Time Interval:** Sets the time interval for the Non-stick TOF mode (D26 position 8). The value for X represents the number of seconds that the printer will execute the Non-stick TOF operation. The default setting is 14400 or 4 hours. The valid range is from 2 to 65536.
X	**157**	**Takeup Motor Run Time:** Only used with custom Takeup PIC code. The value for X represents how long the takeup motor will run, in milliseconds, after printing has stopped.
0	0	
1	25	25 msec
2	50	
3	75	
4	100	
5	125	
6	150	
7	175	
8	200	
9	225	
10	250	
11	275	
12	300	
13	325	
14	350	
15	375	
16	400	
17	425	
18	450	
19	475	
20	500	
21	525	
22	550	
23	575	
24	600	
25	625	

^A	^D	COMMAND
X	158	**Set the Dot2Gap Value:** This is the distance of the transmissive sensor, that detects diecut and blow hole registration marks, to the dot row.
264		203dpi x28
284		203dpi x24m
380		300dpi x28
438		300dpi x24m
468		203dpi 224/424
720		300dpi 224/424
X	159	**Brownout Reporting:** Reports the number of recorded brownout conditions.
0		After a power up, reports the "running" total of detected Brownouts.
1		Clears the "running" total or volatile brownout count
5		Reports the non-volatile brownout count stored in memory
255		Clears the non-volatile brownout count stored in memory

Glossary

Alphanumeric - A term used to identify characters consisting of letters, numbers, and other symbols (such as punctuation marks and mathematical symbols).

Bar code - Alphanumeric characters that are represented using a system of printed lines and can be read by a computer.

Black-line - A registration mark, typically a black line on the underside of certain media used to identify the starting position of a label.

Blow-hole - A registration mark, typically a notched or cutout in certain media used to identify the starting position of a label.

Continuous media - Media that contains no gap and continues as one piece of media.

CTS (Clear to Send) - A status signal from the printer to the host PC indicating when it is OK to send data to the printer. This signal is used in conjunction with RTS (Ready To Send). The PC (DTE) will only transmit to the printer (DCE) when it sees CTS up. CTS leaves the printer on pin #8 of the RS-232 connector.

Cutter - An optional device, mounted on the printer, which is used to cut media into custom sized labels after printing

DCD (Data Carrier Detect) - A status signal from the printer to the host PC that tells the PC (DTE) that the printer is powered up. This signal is +5Vdc when the printer is turned ON. DCD leaves the printer on pin #1 of the RS-232 connector.

DCE (Data-Circuit-terminating Equipment - The modem or printer end of an RS-232 serial communication link. Modem serial ports and other peripherals are typically configured as DCE.

Die-cut media - Media that is cut using a die to form individual labels that have a start and stop point. Typically the excess material surrounding the label is removed from the backing material.

Direct thermal - Method of printing with a special heat-sensitive media that directly contacts heat elements of a thermal print head. (See *Thermal print head*)

DPI (Dots Per Inch) - A unit of measure term used to identify the print resolution capability.

Drive roller - Platen roller that is located below the print head that is used to drive media through the printer.

DSR (Data Set Ready) - A status signal from the printer (DCE) to the host PC (DTE) telling the PC that the printer is powered up. Used in conjunction with DTR. Microcom Corporation does not use this signal.

DTE (Data Terminal Equipment) - The terminal or computer end of an RS-232 serial communication link. Serial ports on computers are typically configured as DTE.

DTR (Data Terminal Ready) *)* - A status signal used to provide information about the status of the communication line connected to the DCE end of an RS-232 link. Used in conjunction with DSR. Microcom Corporation does not use this signal.

Ethernet - A fast and capable serial interface used by many networks for connecting host computers to various peripherals.

Fanfold media - Die-cut or tag media that is folded into stacks.

Flash memory - Memory that is used to store font, graphics and label formats for faster access. This is a non-volatile type of memory, which means that the information stored in the memory chip is retained even when the printer power is turned off. The 428M printers use two FLASH memory chips: a CODE flash (256K x 16), and a FONT flash (4M x 16)

GND (Signal Ground) - The ground terminal of a power supply's output, and all points that connect to it. This is an essential signal in an RS-232 communication link that is used to reduce noise spikes that can cause a receiver to misread logic levels. Signal also known as SG and SGND.

Guillotine Cutter – A cutter that has a blade that cuts perpendicular to the media path. This type of cutter can be setup to make "partial cuts" which leave a small piece of label uncut in the center of the label. Not all Guillotine cutters can make partial cuts; a special blade is required. Cuts paper weights in the range of 60 – 100 gm/m^2.

LDS (Label Design Software) - This is the resident control software language that is used to develop label formats and controls the full function of the printer.

LPD (Label Present Detector) - This sensor, when enabled, detects when media is present. This sensor is also referred to as a LTS (Label Taken Sensor). This sensor is typically a reflective type sensor that is normally mounted above the paper stock looking down at the paper just past the print head.

Platen - Roller that is located below the print head, which the media rests upon. (See *Drive roller*)

RI (Ring Indicator) – An RS-232 handshaking signal that is NOT used on the 428M printers. RI would leave the printer on pin #9 of the RS-232 connector if it were used.

Rolled media - Media that has been rolled onto a core, typically cardboard in nature.

Rotary Cutter – A cutter that has multiple angled blades mounted to a shaft that cut media by rotating the shaft. This cutter only cuts in one direction, and cannot make "partial cuts". The rotary cutter is typically used when heavy label stock must be cut because it has higher cutting force than the Guillotine cutter. Cuts paper weights in the range of 60 – 200g/m^2.

RS-232 - A popular and inexpensive asynchronous serial interface used for connecting host computers to various peripherals.

RTS (Request To Send) - A status signal from the host PC (DTE) to the printer (DCE) indicating when the PC has data to send to the printer. The printer (DCE) will only transmit data to the PC (DTE) when it sees RTS up. RTS comes into the printer on pin #7 of the RS-232 connector.

RXD (Receive Data) - An essential signal that carries data from the printer (DCE) to the host PC (DTE) for 2-way RS-232 serial communication. Signal is also known as RX and RD. RXD leaves the printer on pin #2 of the RS-232 connector.

SDRAM (Synchronous Dynamic Random Access Memory) – High density random access memory that is commonly used to store application code. The 324M & 424M printers do NOT use this type of memory.

SRAM (Static Random Access Memory) – High speed random access memory that is used to store label formats, graphics, and fonts temporarily. The slice buffer and serial buffer (10Kbyte) are also in SRAM. This is volatile memory, which means that the information is lost when the printer powers down. The 428M printers use a 512Kbyte SRAM configured as 256K x 16.

Tag stock - Media that typically has no adhesive backing, thicker in nature, and generally is a fanfold type media.

Thermal print head - A print head that uses thermal technology, to heat individual elements or dots to produce images. Also referred to as print head in this manual.

TXD (Transmit Data) - An essential signal that carries data from the host PC (DTE) to the printer (DCE) for 2-way RS-232 serial communication. Also known as TX and TD. This signal comes into the printer on pin #3 of the RS-232 connector.

USB (Universal Serial Bus) - A high-speed asynchronous serial interface that connects a PC to a peripheral, such as a printer. There are 3 versions of USB:
      1) USB 1.0   transfers at 1M bits/second. (Hardly used at all anymore).
      2) USB 1.1   transfers at 12M bits/second. (The 324 & 424 printers use this).
      3) USB 2.0   transfers at 480M bits/second. (All newer PC's use this).

Appendix D: User Notes

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