MODEL 238B

DIRECT THERMAL PRINTER

OPERATOR'S MANUAL

PART NUMBER 880053-0101

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Product Enhancements

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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 238B printer is a battery powered thermal ticketing printer that is designed to provide worry free printing of up to 4000 tickets on a single charge. The printer features on internal ticket tray that is capable of holding a 2" high 2-up stack of credit card sized media (approx. 350 tickets) or a 2" stack of single fold standard entertainment tickets (approx. 175 tickets).

The Model 238B is configured with a 300dpi resolution printhead, a heavy duty rotary cutter that can slice through ticket stock up to 13 mils thick and high-speed USB connectivity.

The printer incorporates the latest features of the proven LDS software found in earlier Microcom Corporation printers and also is capable of using the STL (Standard Ticketing Language) found in a number of existing Ticket systems.

Figure 1-1 238B Printer Model

Chapter 1: Printer Specifications

1.1 General Specifications

	238B
Width	6” (152mm)
Height	5” (127mm)
Depth	12” (305mm)
Weight	7.1 lbs (3.2 kg)
Electrical (internal battery)	Lithium-Ion Battery, 22.2 VDC 5400mAh/115.44Wh Battery is not user-replaceable. See Section 1.4 for additional battery information.
Electrical (external charger)	Charger Input: 100-240 VAC, 50/60Hz, 1.5A Charger Output: 25.2 VDC, 1.8A
Shipping Requirements	Contains lithium-ion battery. Before shipping, consult your freight carrier to determine if special packaging and handling is required. See Section 1.4 for additional battery information.
Operating Temperature	40 – 104° F (5 – 40° C), operating
Humidity	10 – 85%, non-condensing
RAM Memory	Up to 8Mb
Flash Memory	Up to 20Mb
Agency Approvals	RoHS, FCC Class A, cTUVus
Interface Communications	Mini-USB TYPE B - 2.0 Compatible

Table 1-1 General Specifications

1.2 Printing Specifications

Print Type	Direct Thermal
Print Resolution	300 DPI (12 dots/mm = 0.0032” per dot)
Maximum Print Speed	8”/sec. (203mm/sec.)
Maximum Print Width	2.24” (57mm)
Maximum Print Length	20” (508mm)

Table 1-2 Printing Specifications

1.3 Media Specifications

Media Types	Continuous, die-cut, preprinted and fanfold tag stock
Maximum Media Thickness	Up to 13 Mils depending on media pliability
Paper Guides	24.5mm, 44mm, 57.15mm, and adjustable guides available

Table 1-3 Media Specifications

1.4 Internal Battery

The 238B uses an internal lithium-ion battery, 22.2 VDC 5400mAh/115.44Wh. The internal battery is not user replaceable, and the battery should only be serviced by Microcom-approved service providers.

CAUTION: Contains Lithium-Ion Battery.
To reduce the risk of fire or explosion, do not disassemble or dispose of in fire, water or a place over 60 degrees C (140 degrees F).
Please recycle or dispose of the waste battery according to local regulations.

ATTENTION: Contient Batterie Lithium-Ion.
Pour réduire les risque d'incendie ou d'explosion, ne pas démonter ou la jeter dans le feu, l'eau ou un endroit plus de 60C (140F).
Veuiller recycler ou jeter la batterie usagée en accord avec les régles locales.

1.5 Battery Charger

Use only a Microcom-approved battery charger.

1.6 Shipping Specifications

The 238B contains an internal lithium-ion battery (see Section 1.4). The printer may require special packaging and handling for shipping due to the battery. Contact your freight carrier before shipping this unit to determine if special packaging and handling are required.

Chapter 2: Features and Options

2.1 Fonts

- Standard fonts sets available.
- Downloadable font support.
- All bitmapped fonts expandable in height and width.
- 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
  - Modified Plessey
  - UPC-A
  - UPC-E
  - EAN 8
  - EAN 13
  - GS1 128
  - Postnet
  - Planet
  - Intelligent Mail (4-State)

- ***Two-dimensional***
  - GS1 Databar
    - Omni-directional
    - Truncated
    - Stacked
    - Stacked
    - Omni directional
    - Limited
    - Expanded
  - PDF-417
  - Maxicode
  - QR
  - Aztec
  - DataMatrix
  - GS1 DataMatrix (ECC200)

2.4 Special Features

- Mini-USB Type B - 2.0 compatible
- Rotating head mechanism for easy print head cleaning
- Adjustable media guides for easy label centering or custom fixed guide brackets
- 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
- Automatic paper loading
- Automatic stock eject on paper-out
- Field replaceable drive rollers and printheads
- Heavy duty rotary cutter
- STL (FGL Emulation)

2.5 Options

- Adjustable media guides for easy label centering or custom fixed guide brackets
- Mobile cart mounting tray
- External reflective sensor
- USB Type A to Mini-USB Type B interface cable
- 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 printer, system CD, and battery charger. 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 Connecting the Printer

The printer's may be interfaced to PC's, mini-computers, main frames, and special purpose machines using the Mini-USB Type B connection.

3.2.1 Printer Power

The 238B is powered by an internal lithium-ion battery pack that is rated at 22.2V 5.2Ah 115.44Wh. The long life battery provides the ability to print up to 4000 standard sized tickets per battery charge. Turn the printer ON by setting the power switch to the ON position and wait for printer initialization to finish (<30 seconds). Turn the printer OFF by setting the power switch to the CHARGE (OFF) position. Remember to turn OFF the printer during idle times to extend the time between battery charges.

The internal battery is not user replaceable. The internal battery should only be serviced by approved service providers.

CAUTION: Contains Lithium-Ion Battery.
To reduce the risk of fire or explosion, do not disassemble or dispose of in fire, water or a place over 60 degrees C (140 degrees F).
Please recycle or dispose of the waste battery according to local regulations.

ATTENTION: Contient Batterie Lithium-Ion.
Pour réduire les risque d'incendie ou d'explosion, ne pas démonter ou la jeter dans le feu, l'eau ou un endroit plus de 60C (140F).
Veuiller recycler ou jeter la batterie usagée en accord avec les régles locales.

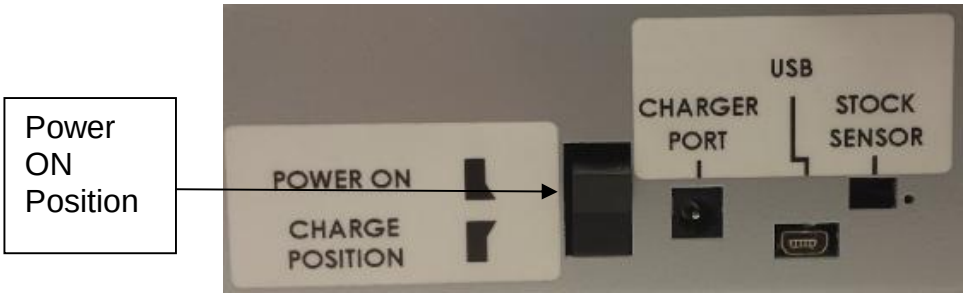


Figure 3-2 Power Switch

3.2.2 Battery Charger

Use only a Microcom-approved battery charger. Battery charging time is typically less than 6 hours. To charge the battery, set the printer power switch to the CHARGE (OFF) position, plug the charger output cord into the CHARGE PORT of the printer, then plug the charger AC power cord into a suitable AC outlet. The CHARGE PORT is located next to the printer power switch. If the power switch is not in the CHARGE (OFF) position when the charger is connected to the printer, the printer will power down but the battery will not be charged. If this occurs, set the power switch to the CHARGE (OFF) position to begin charging the battery.
The solid green light indicates the level charge in the battery. The flashing light means the battery is charging.

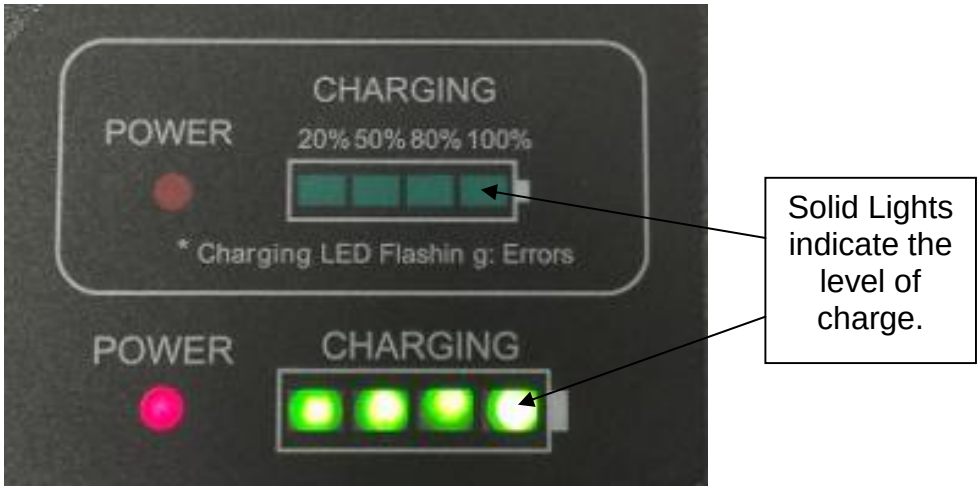


Figure 3-4 Charger Lights

3.2.3 USB Communication Interface

A Mini USB 2.0 compatible connector is provided on the printer. The USB port operates as a virtual serial communications port and requires the installation of the Microcom Corporation supplied USB driver for proper operation. The USB cable must be connected to a host PC that is already powered on before the printer is turned on.

3.3 Loading Media

The printer is equipped with an Auto-Load 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, Auto-Load Commands.

If the printer is configured with adjustable media guides, they should be adjusted so they contact the edge of the media as it is feed into the machine.

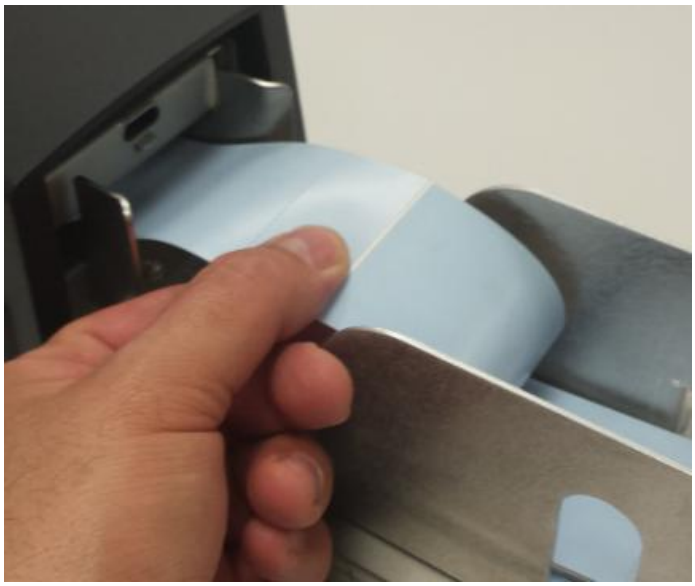


Figure 3-3 Loading Media

3.4 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.

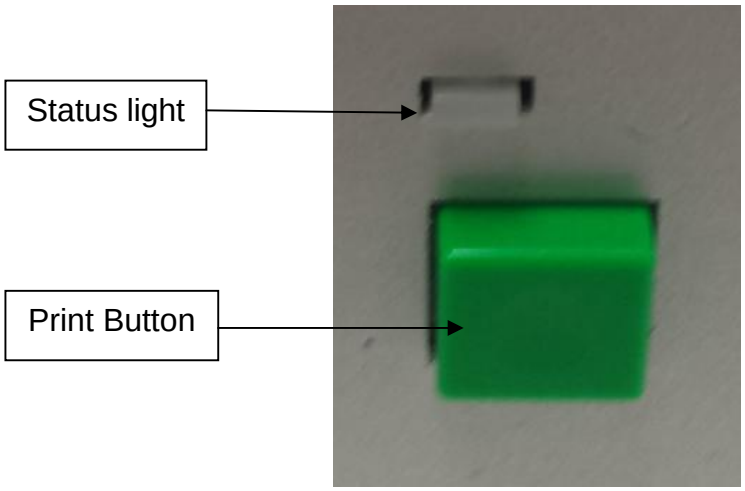


Figure 3-4 Print Button and Status Indicator Light

Operation	**Description**
Printing a label	Press the Print Button while the printer is IDLE to reprint the last label. A power up label will print after a power ON cycle when the Print Button is pressed.
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 3-1 Print Button Description

Light Color	Description
Solid Green	Indicates that the power is on and the printer is in a ready state.
Flashing Green	Indicates that data is being detected on the active printer port.
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 Amber	Indicates that the printer registration sensors are not detecting paper; >LOW STOCK< paper out condition.
Flashing Red	A printer error has occurred. Please note that the >LOW STOCK< error reported with Flashing Red would be different than the Flashing Amber error and would indicate that the machine is jammed.

Table 3-2 Status Indicator Light Description

3.5 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.

3.5.1 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.

Solid GREEN Printer is ready to receive commands/formats.

Flashing GREEN Active printer port is detecting data.

3.5.2 Error Mode: Flashing RED

The printer is in the Error Mode when it has stopped due to an error condition. The Status Indicator Light will be flashing solid red in color when the printer has entered the Error 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.

3.5.2.1 Clear >LOW STOCK< (paper jam) 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.

3.5.2.2 Clear 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.

3.5.2.3 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.

3.5.3 Attention 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 Printer registration sensors are not detecting paper; >LOW STOCK< (Paper out)

3.5.4 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.

3.5.4.1 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.

3.5.4.2 Statistics Label

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

Figure 3-5 Status Label (Examples)

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 OD).

Note: Control codes are ignored when the printer is configured to accept binary compressed files (^D23).

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 at least one unused USB Port.
- A USB cable and driver installed on host PC.
- A VT-100 terminal emulation program such as HyperTerminal™.
- A text editor that does not add formatting characters such as Microsoft® Notepad.

4.2.1 PC Connection (USB)

The printer is shipped with serial communication parameters set to 115200 bits per second, no parity, 8 data bits, and 1 stop bit (115200-N-8-1). This means that for proper communication, the PC's communication port must be set to these parameters. If a terminal program is not available, it is possible to send files to the printer using the DOS COPY (for example: C:\>COPY FILENAME COM1) command. When using DOS, it is a good idea to set the communications port up using the DOS MODE (for example: C:\>MODE COM1:9600,n,8,1,p) command before copying the files to the port. Create a text file, enter "^D3" <CR> (carriage return) and save it as "D3.txt". Send the file to the printer by either using the DOS COPY (C:\>copy d3.txt com1) command or by using a terminal program.

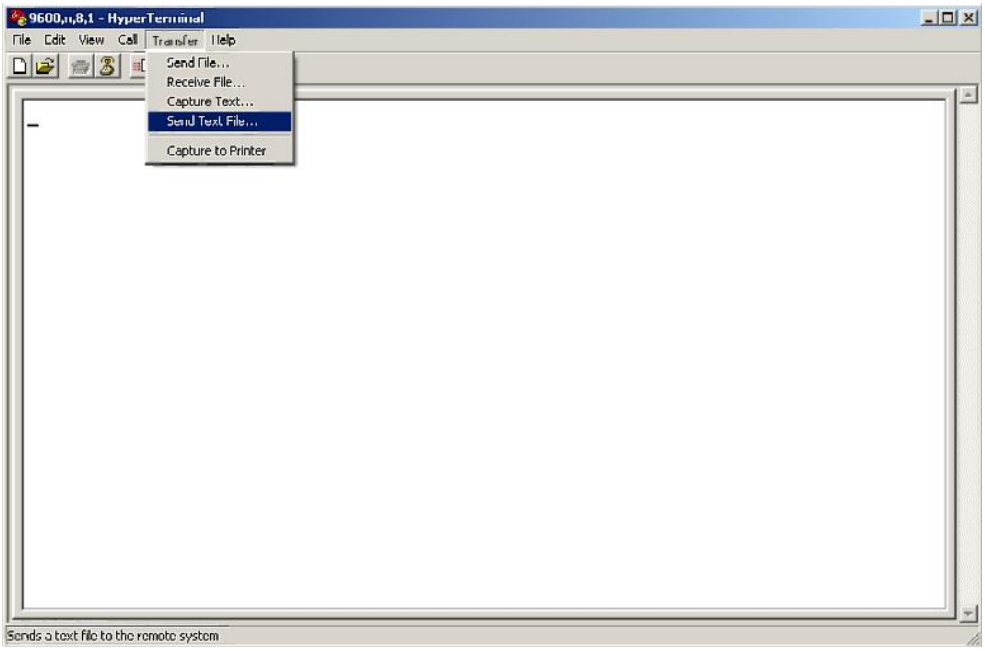


Figure 4-1 HyperTerminal™ Window Example

4.2.2 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 224 and 424 printers may be fitted with either a standard density 203dpi head, or a higher density 300dpi print head.

These are the conversion values for each print head:

Print head	*Dots/mm*	*Dots/inch*	*Inch/Dot*
203	8	203	0.0049
300	12	300	0.0033

EXAMPLE: To enter the width of a label that is 2” wide when using a 203dpi head, the value entered would be 406 (2” x 203 dots/in. = 406).

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 + 01 (HEX 00 00 00 00 00 01) 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 basic 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 238B configured with a 300 DPI printhead. 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	A label format is coming.
5,672,300,20,38,4,0,1,272,0,0	Header Information.
1,336,215,8,1,5,0,4,2,2,,,,,0	Field #1 format information.
2,336,155,11,1,5,0,4,2,2,,,,,0	Field #2 format information.
3,336,110,26,1,5,0,4	Field #3 format information.
4,336,65,6,1,5,0,4	Field #4 format information.
4,336,10,6,16,3,,4,3,50	Field #4 format information.
^D56	Signals the end of the label field definition.
^D2	Text data is coming.
Microcom	Text data string #1
Corporation	Text data string #2
Thermal Printing Solutions	Text data string #3
012345	Text data string #4
^D3	Print label

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 1x2 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. Two print resolutions are currently available for the 238 (203 DPI and 300 DPI). The dot size of a 203 dots per inch head (8 dots/mm) is 0.0049". 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 203 DPI print head would be 812 (4 X 203) dots in the horizontal or "X" direction, and 1218 (6 X 203) 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
5 672 300 20 38 4 0 1 272 0 0

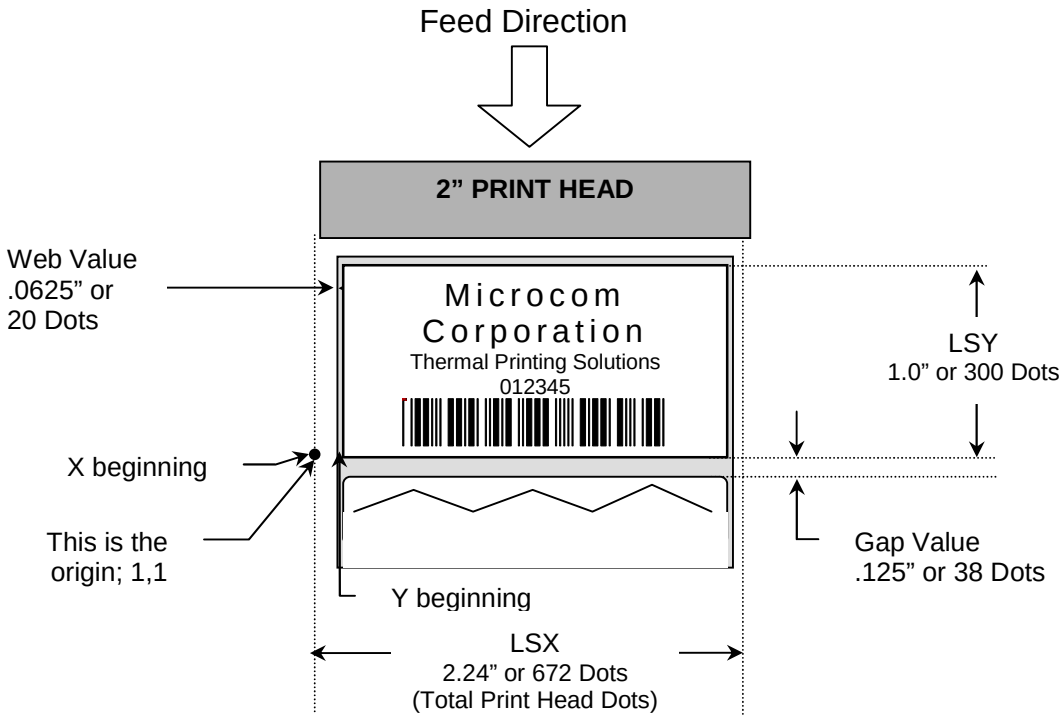


Figure 4-3 Header Elements

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.

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. These are the LSX values that should be used for proper print registration with various print heads:

Print Width	Dots/Inch	# of Dots (LSX Value)
2.21" (56.13 mm)	203	448
2.24" (56.91 mm)	300	672

Table 4-1 Valid LSX Values

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 1" or 300 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 20 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 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 4-2 for the list of print speeds, DPS values, and corresponding inches per second values. To print at greater speeds, change the DPS value to a lower setting as shown on Table 4-2. 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:

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

PRINT SPEED			
DPS VALUE	MM PER SECOND	INCHES PER SECOND	INCHES PER MINUTE
00	203.2	8.0	480
02	177.8	7.0	420
04	152.4	6.0	360
06	127.0	5.0	300
08	101.6	4.0	240
10	76.2	3.0	180
12	50.8	2.0	120

Table 4-2 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. The Model 238 has both upper or lower reflective and a transmissive sensor for registration detection. 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 that 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 609 (3" x 203 = 609), an SPG value of 285, 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 285 dots. Regardless of the format fields, if the LSY is set to 609 and the SPG is set to 285 the printer will advance a total of 881 dots (609+285=881).

4.4.7.3 Black Line Media (Reflective) (setting = 3)

The Reflective Black Line method is used when media using a black line for a registration mark and reflective detection is desired; a "3" should be entered in the LCB parameter. This setting will detect the leading edge of the black line by using the lower sensor only. The light from the emitter in the lower sensor is reflected down to the detector in the lower sensor. This method is the preferred method for detecting media containing a black line and should be used whenever possible.

Note: The detector in the upper sensor is still used to detect a "paper out" condition.

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 should skip before gap 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 gap 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 parameter value.

Model/Print Head DPI	D2G Value
238 – 203 DPI	184
238 – 300 DPI	272

Table 4-3 Dot to Gap Parameters

For media that has a LSY value less than the parameter value in table 4-3, 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 sensors to the print head's dot row, and is a specific value for each model.

LSY = This is the actual height of the media 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 being used with 2" x 1" media containing a .125" die-cut gap. The SPG would be calculated as follows:

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

SPG = (184 + 203 - 203) mod (203 + 25)

SPG = 184 mod 228

SPG = 184

D2G (184) = The Dot to Gap distance for a 203 DPI printer (Table 4-3).

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 can be fine adjusted by temporarily adding a line at dot row #1 using Line Draw and adjusting the SPG number up and down to get desirable registration.

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.

5,672,300,20,38,4,0,1,272,0,0<CR>

5	=	5 format fields are following the header.
672	=	LSX (total print head dots) is 672 dots.
300	=	LSY (label height) measures 1” or 300 dots.
20	=	WEB measures 0.0625” or 20 dots.
38	=	GAP measures 0.125” or 38 dots.
4	=	Print speed (DPS) of 4 = 6 inches per second.
0	=	LCB of 0 for die-cut labels.
1	=	AGD of 1 step.
272	=	SPG of 272 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, 336, 215, 8, 1, 5, 0, 4, 2, 2, , , , , 0

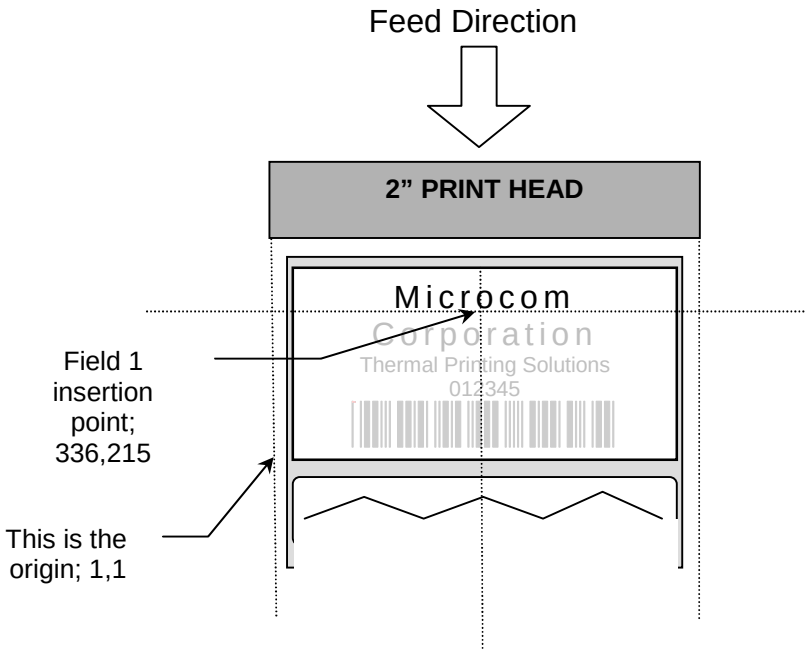


Figure 4-4 Label Format Field Elements

4.6.1 TSN (Text String Number)

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 the “.” period character. The maximum value for a TSN is 65536.

4.6.2 XB (X Beginning Coordinate)

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)

The Y coordinate of the field is measured in thermal dots. A YB 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)

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)

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 238 printer are listed in Table 4-4 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
0	Regular Text (standard embedded fonts, no barcode)
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

TCI VALUE	TCI DESCRIPTION
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	GS1 Databar Barcode
36	Postnet Symbol (Zip+4)
37	Postnet Symbol (Zip+6)
38	MaxiCode Symbol
40	Code 128 Symbol (Automatic Compression)
41	Code 128 Symbol (Full Implementation)
42	Codabar Symbol
43	Code 93 Symbol
44	AS-10 Symbol
46	PDF-417 Symbol
47	Data matrix
48	Intelligent Mail Barcode
49	Planet Code
50	UCC/EAN 128 Symbol
51*	Text with EAN 128 Information
52	Aztec
53	QR Code

* Human Readable - Refer to Chapter 8

Table 4-4 TCI Values

4.6.6 CGN (Character Generator Number)

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 Standard Fonts

The Model 238 printers provide Helvetica style fonts that may be selected using the CGN when text is selected by the appropriate TCI value.

CGN VALUE	POINT SIZE	FONT TYPE
1	6	Swiss™721 Bold
2	8	Swiss™721 Normal
3	10	Swiss™721 Normal
4	12	Swiss™721 Normal

CGN VALUE	POINT SIZE	FONT TYPE
5	14	Swiss™721 Normal
7	12	OCR-A
8	12	OCR-B
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
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

CGN VALUE	POINT SIZE	FONT TYPE
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—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. Graphics must point to a "." period character in the field. 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".

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.

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

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	2:1 3:1 5:2	1 1 1	- - -	0123 0123 0123
UPC / EAN *	-	40 %	1	-	0123
UPC Readable *	-	40 %	1	-	0123
Code 128 & UCC / EAN 128 *	-	40 %	1	-	0123
Codabar	2 3	2:1 3:1	1 1	- -	0123 0123

	5	5:2	1	-	0123
Code 93	-	2:1	1	-	0123
AS-10	-	2:1	1	-	0123
MSI (Modified Plessey)	-	1:1	1	-	0123

Table 4-6 CGN—Bar Code Symbologies

* 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)

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)
2 270 degrees (right rotation)
3 90 degrees (left rotation)

4.6.8 FJ (Field Justification)

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 4-8 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)

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)

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)

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)

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)

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

4.6.14 AN (Attribute Number)

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	True 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 YB 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 424 printer with a 300 DPI print head.

```
^D57 <CR>
2,1280,900,19,38,7,0,1,385,0,0 <CR>
1,340,750,,6,,,,600,25,,,,,0 <CR>
1,627,150,,6,,,,25,600,,,,,0 <CR>
^D56 <CR>
^D2 <CR>
Line <CR>
^D3 <CR>
```

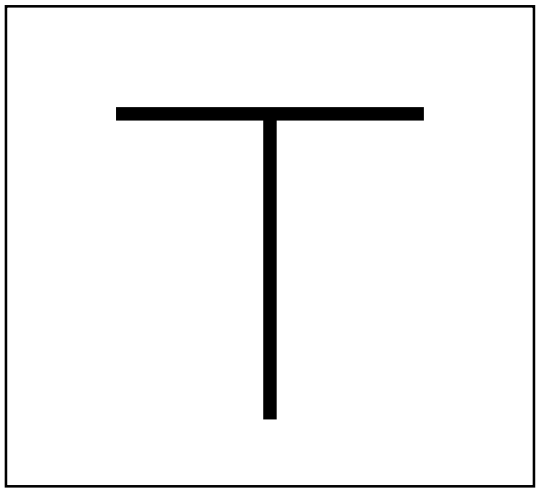


Figure 4-5 Line Draw Sample

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

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.

FJ (Field Justification) 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
6,1280,900,20,40,7,0,1,405,0,0
1,280,300,,6,,,,720,520,,,,,1
2,640,700,8,3,5,0,4,2,2,,,,,1
3,640,591,11,1,5,0,4,2,2,,,,,1
4,640,465,26,1,3,0,4,2,2,,,,,1
5,640,350,6,1,3,0,4,2,2,,,,,1
5,640,50,6,16,3,,4,5,150,,,,,0
^D56
^D2
Line
Microcom
Corporation
Thermal Printing Solutions
012345
^D3
```

Figure 4-6 Reverse Video Sample

4.8.2 True Reverse Video

The second method (True 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 that is surrounding the text is not possible using this method.

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

```
^D57
5,1280,900,0,0,7,2,0,1,0,0
1,640,700,8,1,5,0,4,2,2,,,,,8
2,640,591,11,1,5,0,4,2,2,,,,,8
3,640,465,26,1,3,0,4,2,2,,,,,8
4,640,350,6,1,3,0,4,2,2,,,,,8
4,640,50,6,16,3,,4,5,150,,,,,1
^D56
^D2
Microcom
Corporation
Thermal Printing Solutions
012345
^D3
```

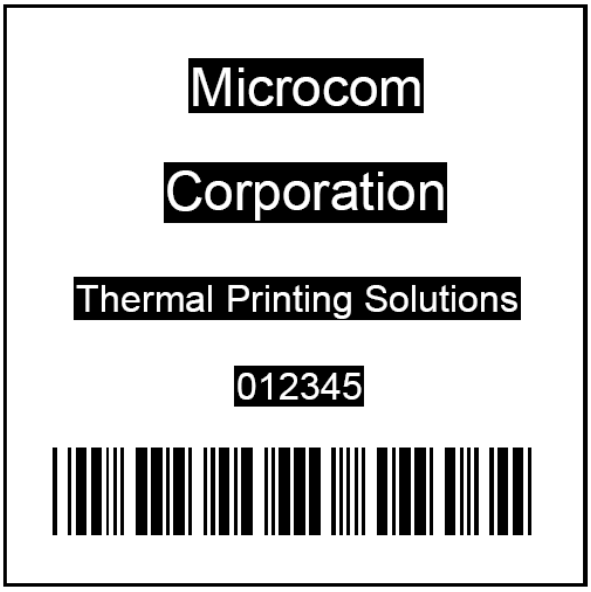


Figure 4-7 Auto Reverse Video Sample

Chapter 5 Printer Commands

The 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 NULLS + 04: 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 04 are sent to the printer in order to issue the command. This command is used to cancel and exit an LTS Dispense Mode (^D97, ^D98) and to return the printer to an idle >READY< state.

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 . 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 . 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.
>LPD STOCK JAM<	11	Reports when jams are detected. Switch 8 position 8 enables this feature
>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

>NO FLASH DATA FOUND<		The printer was unable to locate a valid configuration and is forcing the default configuration or “birth” pattern.
>CHECKSUM VERIFICATION FAILED<		Configuration checksum does not match printer will attempt to restore configuration.
>FLASH READBACK FAILED<		The printer failed to read and verify the configuration parameters are present.
>ERASE FAILED FOR SENSOR n<		The flash was unable to erase

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

^AB ^D COMMAND
XX 21 Change SW1: Software Switch #1.

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

Position:

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 **Reserved**

5.2.1.2 Software Switch #2

^AB	^D	COMMAND
XX	22	**Change SW2:** Software Switch #2.

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

Position:

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 **Reserved**

5.2.1.6 Software Switch #6

^AB	^D	COMMAND
XX	26	**Change SW6:** Software Switch #6.

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

Position:

1 **Reserved**

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 **Reserved**

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 **Reserved**

6 **Reserved**

7 **Reserved**

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

^AB	^D	COMMAND
XX	27	**Change SW7:** Software Switch #7.

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

Position:

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
011 – Magnetic Card (fixed length = 3.375 inch, width = 2.116 inch)
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.

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

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).

1 = Enable Finish Mode
0 = Disable Finish Mode

5.2.1.8 Software Switch #8

^AB	^D	COMMAND
XX	28	**Change SW8:** Software Switch #8.

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

Position:

1 **Custom Test Ticket:** When this feature is enabled, the printer will process the saved power up format specified by the D22 command every time the printer button on the printer is pressed.

1 = Enable Custom Test Ticket
0 = Disable Custom Test Ticket

2 **Reserved**

3 **Line Feed:** This feature is used to control the line feed. When enabled, the printer will line feed while the button is pressed and held. When this feature is disabled, pressing and holding the button will be ignored.

1 = Disable Line Feed
0 = Enable Line Feed

4, 5 **STL Autoheader Mode:**
STL Autoheader (^D147) may be configured to execute using three different methods or modes.

00 Standard Autoheader mode
10 Autoheader Table mode
11 Autoheader User mode

Standard Autoheader Mode
This is the default mode used to automatically detect the proper values for a format header. The printer uses the reflective sensor to determine stock sizes within the Ticketing Industry.

Autoheader Table Mode
The table mode takes the calculated blsy value that the standard autosize measures and replaces it with the Norm value based on a 203 dpi table or the 300 dpi table.

If the measured value is >= the 1st value and <= the 3rd value, then blsy is forced to the middle normalized value.

If the measured blsy value falls outside of the table, the value is not changed. Example – Stock is autosized and found to be 1362 dots long (203 dpi). This value will then be changed to 1320. It is this changed value that will be reported (^D148) and used as blsy.

The tables are based on ticketing industry stock sizes off:
2” 2½” 3” 3¼” 3½” 4” 4½” 5” 5½” 5 5/8” 6” 6½” 7” 11

203 dpi		
low	norm	hi
355	406	457
458	508	558
559	609	634
635	660	685
686	711	761
762	812	863
864	914	964
965	1015	1066
1067	1117	1129
1130	1142	1180
1181	1218	1269
1270	1320	1370
1371	1421	1827
1828	2233	2300

300 dpi		
low	norm	hi
525	600	675
676	750	825
826	900	938
939	975	1013
1014	1050	1125
1126	1200	1275
1276	1350	1425
1426	1500	1575
1576	1650	1669
1670	1688	1744
1745	1800	1875
1876	1950	2025
2026	2100	2700
2701	3300	3400

Autoheader User Mode

The Autoheader User Mode operates in a similar fashion to the Table Mode, but uses a table that the user creates. The user can have up to three stock ranges within the table (3, 6, or 9 values).

To enter stock ranges use the ^D170 command as follows.

The 1st range is entered like this:
^A1^D170[CR]Range1LowThreshold[CR]
^A2^D170[CR]Range1Target[CR]
^A3^D170[CR]Range1UpperThreshold[CR]

The 2nd range is entered like this:
^A4^D170[CR]Range2LowThreshold[CR]
^A5^D170[CR]Range2Target[CR]
^A6^D170[CR]Range2UpperThreshold[CR]

The 3rd range is entered like this:
^A7^D170[CR]Range3LowThreshold[CR]
^A8^D170[CR]Range3Target[CR]
^A9^D170[CR]Range3UpperThreshold[CR]]

Value1 is the lower boundary, value3 is the upper boundary, and value2 is the blsy value for this range. Up to 9 values can be entered for a total of 3 ranges. All values are non volatile and are stored with the other non volatile parameters. Like the table, if the measured blsy doesn't fall into any of the ranges the value won't change and will be used as is.
To see all of the table and user values enter
^A0^D170 [CR]
Using one of these smart autosize modes gives the user single dot accuracy in using Boca autosize to find blsy.

6 Reserved

7 **Reflective Stock Out Detection:** When this feature is enabled, the printer will use reflective sensor to detect stock out conditions. This should only be used if a Transmissive sensor is not available.

1 = Enable Reflective Stock Out Detection
0 = Disable Reflective Stock Out Detection

8 **LTS Jam Detection:** This feature uses the printer's Label Present or Label Taken sensor to identify a jam condition after sending a print job to the printer. When enabled, the printer will report the >LPD STOCK JAM< message if the printer was sent a print job and the LTS did not detect the media exiting the printer.

1 = Enable LTS Jam Detection
0 = Disable LTS Jam Detection

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 238 printer has one optional serial data port. 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.
4		**USB:** When the active port is set to a 4, the printer will ignore other ports being plugged into the machine and will only be active on the USB port.

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 the printhead resolution to 300dpi. This requires that a 300dpi printhead is installed on the printer. If the setting is not set properly, the printed image could produce

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
238	203	448
238	300	672
438	203	832
438	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)

5.2.4 USB Image Print Mode

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.

5.2.5 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.

5.2.5.1 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%.
X	161	**Contrast Limit:** This command is used to set the contrast limit of the printer. The command uses the same contrast values of the D36 command. When this command is set, the printer will ignore all contrast settings that are above the limit command.

5.2.6 Printer Restart / Reboot Commands

^A	^D	COMMAND
	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).
2	143	**Save Backup 1 and Reboot (Hard Reset):** This command operates just like option 1 above and also saves a second set of configuration parameters into the first backup position. If the printer powers on and does not detect a configuration, it will first search the first backup position and restore the configuration stored in this location. The command may be sent along with the ^A1^D143 command and is typically only sent when the configuration actually changes.
3	143	**Save Backup 2 and Reboot (Hard Reset):** This command operates just like option 1 above and also saves a third set of configuration parameters into the second backup position. If the printer powers on and does not detect a configuration, it will first search the first backup position. If it does not find a configuration in the first backup, it will then search the second backup location and restore the configuration stored in this location. The command may be sent along with the ^A1^D143 and ^A2^D143 commands and is typically only sent when the configuration actually changes.

5.2.7 Registration 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.

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.

^A	^D	COMMAND
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.
X	158	**Set the Transmissive Dot2Gap Value:** This is the distance of the transmissive sensor, which 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 transmissive 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	Transmissive Dot2Gap
203dpi 438	468
300dpi 438	720
203dpi 238	
300dpi 238	
203dpi x24m	284
300dpi x24m	438
203dpi x28	264
300dpi x28	380

Table 5-4 Transmissive Dot2Gap Values

^A	^D	COMMAND
X	165	**Set the Reflective Dot2Gap Value:** This is the distance of the reflective sensor, which detects blackline registration marks, to the dot row. This distance is set at the factory and is typically not needed to be changed. The reflective Dot2gap distances represent the physical characteristics of the printer models.

Printer Model Number	Reflective Dot2Gap
203dpi 438	468
300dpi 438	720
203dpi 238	
300dpi 238	
203dpi x24m	284
300dpi x24m	438
203dpi x28	487
300dpi x28	730

Table 5-5 Reflective Dot2Gap Values

5.2.8 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.

5.2.9 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.

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.

^A **^D** **COMMAND**

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.

5.3 AutoLoad Media Commands

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.

5.3.1 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. 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.

5.3.2 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.

^A ^D COMMAND

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

121 Top of Form Command.

This command initiates a TOF operation:

a) Media is advanced until the leading edge is detected by the "Top Of Form" sensor,
b) Media is then retracted to position the leading edge of stock to the correct starting location.

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

^A ^D 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.

5.4 Printing Commands

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

5.4.1 Basic Printing Commands

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.

^A	^D	COMMAND
	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.

5.5 Label Header Parameter Override Commands

It is possible to override label header parameters by adding one or more of the following commands after the ^D2 and before the print command.

	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.

^A	^D	COMMAND
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.

5.5.1 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 5.4.1 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:

^A	^D	COMMAND
	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:

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.

^A	**^D**	**COMMAND**
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:

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”.

5.6 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	COMMAND
	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**	**COMMAND**
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.
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)

5.7 Cutter Configuration Commands

5.7.1 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

5.7.2 Kiosk Cutter Commands

5.7.2.1 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. Modes 2 and 4 use the optional LTS sensor. When using these modes, a second form will not print until the label is taken. The printer will report the >TAKE LABEL< message when the LTS detects media and then only >READY< when the form is taken.

^A	^D	COMMAND
XX	**111**	**Kiosk Cutter Mode**
0		Disable Kiosk Cutter Mode.
1		Enable Kiosk Cutter Mode.
2		Enable Partial Kiosk cut mode.
4		Enable Full kiosk cut mode.

5.7.2.2 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.

5.7.3 Volatile Cutter Operation

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.

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.

^A **^D** **COMMAND**

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.

X 162 Advance/Retract Speed: This command is used to set the advance/retract speed that is used in conjunction with the different dispense modes. The valid arguments for the X value are the DPS speed values for the printer. Please refer to the DPS and ^D49 sections for valid speed values.

5.7.4 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.

5.8 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.

5.8.1 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.)

5.8.2 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.

5.8.3 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.

5.9 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

^A	^D	COMMAND
	33	**Display Model and Revision Number**

5.10 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.

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.

^A ^D COMMAND

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.

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)

^A ^D COMMAND
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
^[
```

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.

^A	^D	COMMAND
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.

5.11 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.

5.12 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

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.

^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.

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	**157**	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 **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

163 **Sensor Status Byte:** This command is used to report the real time sensor status of all the printer sensors. When the ^D163 command is issued, the printer returns a byte status that is defined below.

Bit Position (12345678)	Definition	Operation
1	Reserved	NA
2	Reserved	NA
3	PSO (Pre Stock Out)	1 = Stock Detected 0 = No Stock Detected
4	Input 2	See Sw3-4 (D23)
5	Input 1	See SW3-2 (D23)
6	LTS / TOF	1 = Stock Detected 0 = No Stock Detected
7	Transmissive Registration Sensor	1 = No Stock Detected 0 = Stock Detected
8	Reflective Registration Sensor	1 = No Stock Detected 0 = Stock Detected

Table 5-6 Sensor Status Byte Definitions

5.13 STL (FGL Emulation)

This section is intended to define the STL emulation mode resident in the printer. The STL (Standard Ticket Language) mode is a label design language which allows the user or host system to specify text and barcode fields on a label, as well as providing rudimentary printer operating mode control (e.g. cutter operation). STL emulation is intended to support

interoperability with applications developed using FGL 21 as described in Boca Systems Inc. ***Programming Guide FRIENDLY GHOST LANGUAGE - FGL41 / FGL21, January 16, 1999 Revision C***.

FGL Command - Not Supported
Diagnostic Mode <DM>
Paper Mode
New Style Barcode Rotation
Printing Length <PL#> <pl#>
Permanent Ticket Length <tl#>
Delete Permanent Length <dpl>
Delayed Status Request <S3><s3>
No Status <S5><s5>
ASCII Status <S6><s6>
Download Space Available <S7>
Partial ASCII Status <S8><s8>
Clear Permanent Status <cs>
Print Downloadable Font <SF#>
Print Resident Logo <LO#>
CRT Messages Enable/Disable <ME><MD>
Multiple Ticket Mode Enable/Disable <me><md>
Purge Printer <PP>
Parking Ticket <PT><pt>
Delete Parking Ticket <dpt>
Single Buffer Mode <sb>
Multiple Buffer Mode <mb>

FGL Command - Not Supported
Expanded Character Mode Enable/Disable <xe><xd>
Translation Table <TT#><tt#>
Test Button Enable/Disable <te><td>
Print on Ticket Path 1,2 <P1><P2>
Dual Printer Mode <pb>
Single/Dual Supply Mode <pb1><pb2>
Test Ticket Ack Enable/Disable<ta><dta>
Scale Down <SD#>
Shade Pattern <PAF><PAB><PA#>
Enable/Disable Shading <ES><DS>
Print Cut Hold Ticket <h>
Print No Cut Hold Ticket <r>

Table 5-7 FGL21 Features Not Supported by STL Emulation

5.13.1 STL Configuration

STL emulation is selected and configured through standard soft switches. Once the printer is placed into the STL emulation mode, it will process LDS commands wrapped in STL delimiters (e.g. <^D119> will execute the LDS1 file directory command).

The STL emulation mode is configured using software switches 2, 3, 6, and 7 as described in the following sections. Configuration is performed using LDS1 commands. For example, to set the stock class to standard, with a width of 2 inches and enabling finishing the current label when stock out is detected, the following commands would be issued:

<^AB10001001^D27> - set the configuration dipswitches
<^A1^D143> - reset the printer so the new configuration takes effect.

5.13.2 STL Stock Selection

Normally, the stock type is configured by the factory. However, the stock class and width may be changed using configuration dipswitches. For the Standard and Cinema stock classes, the printer performs automatic length calculation on power-up. Wristband and Magnetic tickets are fixed length and require no automatic sizing.

Software Switch #7
These bits are used to select the class of the stock to be used

^AB	**^D**	**COMMAND**
XX	**27**	**Change SW7:** Software Switch #7.

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

Position:

123 **Select 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
011 – Magnetic Card (fixed length = 3.375 inch, width = 2.116 inch, with 0.118 blackline at leading edge on top side.

456 **Select 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 UNUSED

8 When set to 1 (default for STL), finish printing the current label when out of stock is detected.

5.13.3 STL Test Label Selection

Once the automatic stock length calculation has been executed, the printer is setup to print a standard test label whenever the front panel pushbutton is pressed. This test label contains fields identifying the printer model, the print density (in dots per inch), the firmware version, cutter type, and communications setup as well as examples of each font type. The ticket will be indexed and cut to the proper size to ensure proper alignment after the test label is printed.

Software Switch #3

^AB	**^D**	**COMMAND**
XX	**22**	**Change SW2:** Software Switch #2.

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

5 **Power-ON Format Type:**
1 = Power-ON label is selected by SW2: 6, 7, and 8

6,7,8 **Power-up Format:**.
001 = STL custom status label saved in File 1

5.13.4 STL Serial Status Selection

Software Switch #3

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

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

Position:

3 **Select STL Serial Status:**
The printer will transmit status information back to the host via pin 2 of the RS232 interface if STL emulation is enabled by the D26 command. The status codes are as follows:

CODE		DESCRIPTION
(HEX)	*(DEC)*	
06H	6	TICKET ACK
10H	16	OUT OF TICKETS
19H	25	ILLEGAL DATA
1DH	29	CUTTER JAM

5.13.5 STL Emulation Selection

Software Switch #6

^AB	^D	COMMAND
XX	**26**	**Change SW6:** Software Switch #6.

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

Position:

2 **Select STL Emulation:**
Setting this bit to 1 enables STL emulation mode.

5.13.6 STL TOF Operation

Software Switch #5

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

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

Set switch 5 to 10010110 – This enables proper TOF processing during autoload.

5.13.7 STL Label Layout

The label coordinate system used for STL emulation is shown in the figure below. This figure shows the label coordinate systems for both STL emulation and standard LDS.

The STL RMAX and CMAX values are calculated by multiplying the stock width and length in inches by the DPI value (203 for a 203 DPI printer and 300 for a 300 DPI printer).

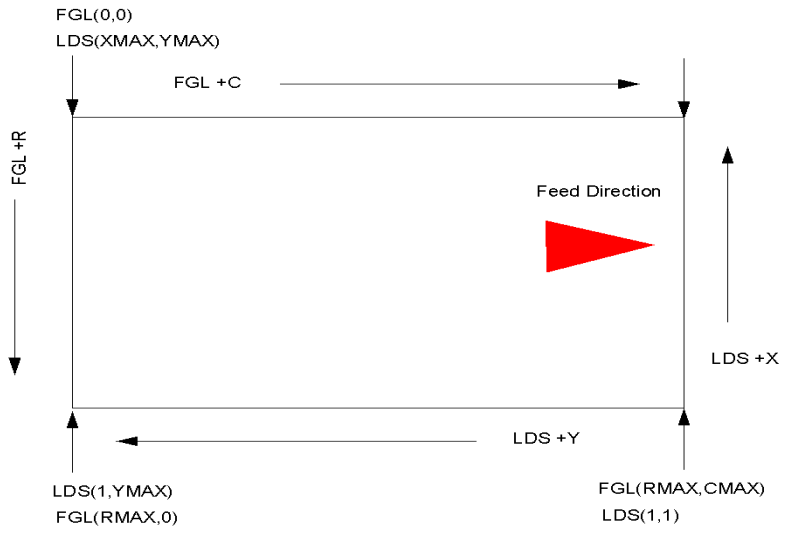


Figure 5-1 STL Coordinate Example

5.14 STL Commands

A command is distinguished from text by the < > characters. Any data sent between these markers is interpreted as command data. The field data (to be printed on the ticket) is sent with no markers. Every command sequence must be bracketed with the < > characters, (ex. <HW2,2><RC10,30>).

5.14.1 LDS Mode - <*LDS1>

This commands forces the system into the LDS1 printer mode when operating in the STL mode. After a power cycle or reset, the printer will return to the STL mode.

5.14.2 LDS Mode Stats - <*D29>

This command displays the printer's LDS ^D29 configuration and statistical information out the current port to the host. The printer remains in the STL mode and does not require a power cycle or reset.

5.14.3 ROW/COLUMN COMMAND - <RC10,330>

This command positions the character at the row (R) and column (C) sent. There must be a comma sent between the row and column values. In the above example, the row is 10 and the column 330. The character will start there and build according to its rotation. NOTE: The values are ASCII characters. This means that the 10 is sent as an ASCII 1 followed by an ASCII 0 not as a byte with a value of 10.

5.14.4 ROTATION COMMAND

This command sets the rotation mode for all the following text until a new direction is sent. Facing in the direction of rotation, all characters build down and to the right of their starting points.

<NR> No rotation
<RR> Rotate right (+90)
<RU> Rotate upside down (+180)
<RL> Rotate left (+270 or - 90)

5.14.5 HEIGHT/WIDTH COMMAND - <HW2,3>

This command sets up the height and width of the character. In the above example, the height will be 2 and the width 3. This means that for a 7x8 dot size character it will be 21 dots wide and 16 dots high. Characters are limited in their expansion only by the size of the ticket. Be careful not to build characters into the ones below them. Once the height and width have been changed from normal, you must send a <HW1,1> to return to normal size. NOTE: HW is capped at a maximum of 4 when using soft fonts.

5.14.6 FONT SIZE COMMAND

This command sets the font size of the characters to be printed. The printer defaults to the font3 size on 200 dpi printers. Alternate font sizes will be available on certain models. See the font size supplement for actual font size samples and further information.

<F1> Font1 characters (5x7)
<F2> Font2 characters (8x16)
<F3> OCRB (17x31)
<F4> OCRA (5x9)
<F6> large OCRB (30x52)
<F7> OCRA (15x29)
<F8> Courier (20x40)(20x33)
<F9> small OCRB (13x20)
<F10> Prestige (25x41)
<F11> Script (25x49)
<F12> Orator (46x91)
<F13> Courier (20x40)(20x42)

5.14.7 BOXSIZE COMMAND - <BS21,34>

This command changes the box size to the values sent. The first value is the box width and the second is the box height. The character printed sits in this box. The font3 box size is 20x33 so in this example the character will sit in a box that is one dot higher (34) and one dot wider (21) than normal. This means that there will be an extra dot space between characters and between lines of characters. This command is used to get compressed or expanded spacing of characters. Note: when printing in inverted mode, the entire boxsize will be printed in the negative image. If a character only takes up a small fraction of the box size, it will have a large black border around it. This border can be trimmed by sending a box size that is smaller than the font size.

5.14.8 CLEAR BUFFER COMMAND - <CB>

This command will clear the ticket buffer and be sent before any other commands. In most instances, this command is not needed as the printer clears itself automatically. The <CB> command restores all font definitions back to their normal states. *This command should be avoided as it degrades printer throughput.*

5.14.9 GRAPHICS COMMAND

This command can be sent with or without a number. The number tells the printer how many graphics bytes are coming next. If no number is sent, the printer uses the default value of 7. Therefore, exactly 7 graphics bytes must follow a command of just <G>. The bytes are sent one after the other without any intervening commas!

Using Graphics mode, you can individually turn on or off any dot on a ticket. In this manner, you can create your own images, shapes or logos. A Graphic character is made up of one byte of data. Graphic characters can be positioned like normal characters with row, column commands. The first Graphics character will be printed at the row/column position selected. Each succeeding Graphics character will be printed in the next dot column. Following transmission of the graphics select command <G> or <G#>, the user is to send the printer bytes of dot data for each column of data to be printed. Each byte will represent one column of 8 dots (the MSB being the top dot) with the leftmost column being transmitted first. A one will print as a black dot and a zero will be a blank dot. If the command <G> is sent without a number, the bytes must be transmitted in multiples of seven. If the <G#> command is used, then the number of bytes sent over is equal to #. In either case, the graphics mode must be re-selected after each group of bytes is sent over. If not, the Ghostwriter will be unable to distinguish the graphics bytes from command sequences.

Command Syntax:
<G>byte1,byte2,byte3,byte4,byte5,byte6,byte7 or <G#>byte1,byte2...byte#

5.14.10 ASCII GRAPHICS COMMAND -

This command uses ASCII characters instead of straight decimal representations of the data. For example, a byte value of 3F hex would be sent as an ASCII byte of 3 (33H) and an ASCII byte of F (46H). This command should only be used with computers that cannot send non-ASCII characters to the printer as the number of bytes sent in ASCII graphics mode is twice that sent in normal mode. (Please note that the # following the small g command must be an even number equal to all the following bytes.)

Command Syntax:
<g#>ASCII high byte1,ASCII low byte1 ... byte#

5.14.11 BAR CODE INTERPRETATION COMMAND - <BI>

This command will cause the bar code interpretation (human readable code) to be printed underneath the bar code. The <BI> command is only active for the bar code immediately following it. The interpretation is printed in font1 and is automatically adjusted depending on the size of the bar code. The different bar code command sequences are listed under the particular bar code supplement desired.

5.14.12 BAR CODE SELECT COMMAND - <AB#>string or <aB#>string

Old style - rotation commands have no effect on bar codes.

A= U (for upc and ean8)
A= E (for ean-13)
A= N (for three of nine)
A= F (for interleaved two of five)
A= C (for uss-codabar)
A= O (for code 128)

B= P (for picket-fence)
B= L (for ladder)

and string vary as detailed below

The above example is a symbolic representation of a bar code select command. The letter A represents the type of bar code selected. The letter B represents the orientation of the bar code (either picket fence or ladder). The # represents the size (in units) of the bar code. This is an optional parameter and if it is not sent then the default size of 4 will be used. Each unit represents an 8 dot high bar so a default bar code will be 32 dots high.

5.14.13 BAR CODE EXPANDED COMMAND - <X2>

This command allows you to expand the width of a bar code bar (normally based on a one dot unit). The number following the X will be the new dot unit bar size. In the above example, the new width of a bar is 2 dots. These will double the length of the bar code. An <X3> command would triple the bar code length. Normally, a setting of 2 dot wide bars is all that is needed for clear, readable bar codes.

Note: 9 (nine) is the largest expansion number allowed.

5.14.14 BAR CODE RATIO ADJUST COMMAND

<AXB#>string or <aXB#>string , future commands: <AYB#>string or <aYB#>string

A= N (for three of nine)
A= F (for interleaved two of five)

a= n (for three of nine)
a= f (for interleaved two of five)

All bar codes naturally default to a 2:1 ratio between wide and narrow spaces. However, certain bar codes (I2of5, 3of9) can be printed in a 3:1 (5:2) wide to narrow ratio. This is accomplished by adding an X (Y) to the normal command structure as shown above. For example, to print a 3:1 (5:2) ratio ladder 3of9 bar code you would use a <NXL> (<NYL>) string command. Do not use the X (Y) with bar codes that can't be printed in that format. NOTE: The 5:2 ratio has not yet been implemented and will not be available until sometime in the future.

5.14.15 REPEAT COMMAND - <RE#>

The REPEAT command allows the user to print multiple copies without retransmitting the ticket. The number used in the repeat command represents the number of tickets to be printed in addition to the first ticket. The repeat command can be sent anywhere in the data stream prior to the print command.

5.14.16 TRANSPARENT MODE ON COMMAND - <t>

All data sent after receipt of this command will be ignored without being processed by the printer. This mode will continue until receipt of the transparent mode off <n> command.

5.14.17 TRANSPARENT MODE OFF COMMAND - <n>

This command terminates the printer's transparent mode and returns it to normal operation.

5.14.18 STATUS COMMANDS

The status enabled function must be set to activate these commands.

NOTE: Because of the new command buffering structure, the printer will no longer respond to status commands immediately. The printer must first process all of the data received prior to the status command. In other words, there is a potential response delay of a few seconds if the status request is received in the middle of printing a ticket. If the status request is sent by itself, the response will still be immediate.

5.14.18.1 STATUS REQUEST - <S1>

The printer will respond with a one byte status message following the receipt of this command.

5.14.18.2 PROM TYPE AND TICKET COUNT STATUS REQUEST - <S2>

The printer will respond with a seven digit ticket count followed by the software level of the printer. A typical response will be as indicated below:

0003273 PROM=1.01.73

5.14.19 PRINT DOWNLOADABLE LOGO COMMAND - <LD#>

Frs customer downloaded logos on the ticket. This command is explained in greater detail in the logo supplement. (NOTE: This command must be preceded by a starting point, <SP#,#>, command.)

5.14.20 STARTING POINT COMMAND - <SP#,#>

This command is used only when printing logos. It is used to assign the starting location of the logo in the same way that the <RC#,#> command is used to assign the starting position of normal alphanumeric characters.

5.14.21 DRAW BOX COMMAND - <BXr,c>

This command tells the printer to draw a box "r" dot rows tall and "c" dot columns wide. We recommend that a row/column command is used immediately following this command to prevent any confusion regarding the location of the cursor following this command.

5.14.22 DRAW VERTICAL LINE COMMAND - <VXr>

This command draws a vertical line (one dot wide) "r" dots long. We recommend that a row/column command is used immediately following this command to prevent any confusion regarding the location of the cursor following this command.

5.14.23 DRAW HORIZONTAL LINE COMMAND - <HXc>

This command draws horizontal line (one dot wide) “c” dots long. We recommend that a row/column command is used immediately following this command to prevent any confusion regarding the location of the cursor following this command.

5.14.24 LINE THICKNESS COMMAND - <LT#>

This command is used in conjunction with the line and box drawing commands. It allows the user to change the thickness of the lines being drawn from their normal default thickness of one dot. The # in the command represents the number of dots in the thickness of the line. This command must be sent immediately preceding the line or box command it is to work with. The following sequence <LT4><BX10,10> would produce a box 10 dots long by 10 dots wide with a line thickness of 4 dots. Note that the thickness of a box grows

towards the center of the box. A vertical line grows towards the right and a horizontal line grows towards the bottom of a ticket. The only restriction on the thickness of a box drawing line is that it may not be more than 1/2 the size of smallest box dimension. For example, a 10 x 15 box can have a maximum line thickness of 5 (note: this would produce a solid black box).

5.14.25 PRINT TICKET COUNT COMMAND - <PC>

The printer keeps track of each ticket that it prints. This seven digit number is kept in the printer as a ticket count. Up to two ticket counts (both the same count) can be printed in any font size, in any rotation, anywhere on the ticket. To have this number printed on the ticket, you must send the printer a <PC> command. This command can be placed anywhere in the ticket data. However, it will use the location of the ticket pointer when the command is sent in determining where to place the count. Therefore, it is recommended to send a normal row/column command before the <PC> command. The reason for being able to print two counts is to print a count on the main ticket and the same count on a stub. To change the count, see the load ticket count instruction below. A separate <PC> command must be sent for each count you want printed. For example, to print two rotated-right font3 counts, 100 columns apart, you might send the following:

<F3><RR><RC10,100><PC>
<F3><RR><RC10,200><PC>

5.14.26 LOAD TICKET COUNT COMMAND - <TC1234567>

This command allows the user to preload the printer's seven digit ticket count. It must contain all seven digits - a count of 5 would be sent as <TC0000005>. This number will be the count for the ticket presently being sent. The next ticket will be one higher. When using this command with a repeat command and a print count command you can print many tickets at full speed with the only difference being the ticket count.

5.14.27 ENABLE INVERTED PRINT MODE COMMAND - <EI>

This command enables inverted print mode (white on black printing).

5.14.28 DISABLE INVERTED PRINT MODE COMMAND - <DI>

This command disables inverted print mode.

5.14.29 PCX FILE BEING SENT COMMAND - <pcx>

This command notifies the printer that a PCX image file is being sent to the printer. This command must be sent as part of a command sequence like <SP#,#><pcx><G#>pcx bytes.

5.14.30 BMP FILE BEING SENT COMMAND - <bmp>

This command notifies the printer that a BMP image file is being sent to the printer. This command must be sent as part of a command sequence like <SP#,#><bmp><G#>pcx bytes.

5.14.31 CASH DRAW A COMMAND - <DA>

This command generates a 50 ms pulse to open the A cash draw.

5.14.32 CASH DRAW B COMMAND - <DB>

This command generates a 50 ms pulse to open the B cash draw.

5.14.33 PRINT INTENSITY - <lve#>

This command adjusts the print intensity at a given speed setting. <lve0> is the default setting. The # value may range from –5 to +5. Positive #'s increase the print intensity while negative numbers decrease the intensity. .

5.14.34 FILE ID COMMAND - <ID#>

The printer automatically assigns a sequential ID# to all permanent and temporary files unless the files are preceded with a valid <ID#> command. The <ID#> command is used to assign an ID number to files. To preset the next logo to logo 3, send <ID3> prior to the logo information. To replace logo 3, send <ID3> before downloading the next logo.

Notes:

- The printer keeps track of the file ID's as they are deleted. The ID assigned to the next file downloaded will always be one greater than the highest remaining ID left in the printer. If all files are deleted, then the ID number starts back at one.

5.14.35 PERMANENT FILE COMMAND - <PF> <pf>

Permanent files are stored in FLASH. The upper case commands modify the printer's file storage mode until modified by the next storage mode command. The lower case <pf> sets the default mode. The printer will return to its default mode on power up.

5.14.36 TEMPORARY FILE COMMAND - <TF> <tf>

Temporary files are stored in RAM. The upper case commands modify the printer's file storage mode until modified by the next storage mode command. The lower case <pf> sets the default mode. The printer will return to its default mode on power up.

5.14.37 DELETE FILE COMMAND - <DF#>

The delete file command <DF#> is used to delete permanent and temporary files.
<DF#> command format.

1 - delete all permanent and temporary files.
2 - delete all temporary files.
5 - delete all permanent and temporary logo files.
6 - delete all temporary logo files.
8 - delete individual logo file.

Notes:

- The <ID#> command must precede the <DF8> command in order to delete an individual file.

5.14.38 PRINT / CUT TICKET - <p>

This is the normal print command. The printer will cut the ticket after printing if it has a cutter.

5.14.39 PRINT / NO CUT TICKET - <q>

This is the normal print/no cut command. The printer will not cut the ticket after printing even if it has a cutter.

5.14.40 SPECIAL COMMANDS

The following commands are to be transmitted independently (without the < or > characters).

5.14.40.1 NORMAL PRINT / CUT COMMAND - 0CH (FF)

This command prints and cuts the ticket.

5.14.40.2 PRINT / NO CUT - 1DH

This command causes the printer to print a ticket without cutting.

5.14.40.3 LOAD DOWNLOADABLE LOGO - ESC<RC0,0><G#> (BYTE1 - BYTE#)<RC#,#><G#>(BYTES)...ESC

This command allows the user to store up to 128K bytes of logos in the memory. Once stored, the logos can be accessed via a simple command. This will be discussed in detail in the LOGO SUPPLEMENT SECTION.

5.14.40.4 CLEAR DOWNLOADABLE STORAGE AREA - ESC c

Note: this is a character 27 followed by small c (character 99).

The printer has a separate memory area that it reserves for downloaded logos and fonts. Normally, all information sent is stored sequentially in memory starting at the beginning. When the memory is full or if you want to change the information in memory, you must clear out the old information before sending the new information. You can do this by turning off the printer or sending this command. Note: if the printer has flash memory, the information is not lost after power off so you must send this command if you want to reuse the download space. This command clears the download logo and font pointers so that new information can be downloaded to the printer at the beginning of memory.

5.14.41 UPC SUPPLEMENT

UPC (version A) is a numeric only code which contains a left hand border character, 6 left hand characters, a center character, 6 right hand characters and a right border character. The letter U is used to select UPC bar code. The border and center characters are defined as follows:

Left Border	J
Center	K
Right Border	L

A typical data stream for printing UPC ladder bar code is as follows:

"<RC0,70><X2><UL5>J501234K567890L"

The following data will generate a 5 unit wide (40 dots) expanded bar code. The bar code will represent the numbers 501234 and 567890 separated by the guard markers. It will start in row 0 and column 70 and build down and towards the left. There will be no interpretation printed.

A typical data stream for printing UPC picket fence bar code with interpretation is as follows

"<RC0,70><X2><BI><UP5>J501234K567890L"

EAN8 - This code is really an 8 digit UPC code. A typical EAN8 ladder code follows:

"<RC0,70><X2><UL5>J1234K5678L"

The same bar code printed in the opposite direction would be as follows:

"<RL><RC200,70><X2><uL5>J1234K5678L"

5.14.42 I 2 OF 5 SUPPLEMENT

Interleaved 2 of 5 bar code is a numeric only bar code. All I 2 of 5 bar codes must contain an even number of characters and are bracketed by a stop and start character. The character is the colon (:). The letter F is used to select interleaved two of five bar code. Note: this bar code can be printed in either a 2:1 or 3:1 wide to narrow ratio. The following are 2:1 ratio commands (the default value).

A typical picket fence bar code would be sent as follows:

"<RC0,10><X2><FP3>:123456:"

The above prints a 3 unit high (24 dots) bar code starting at row 0 column 10. The bar code will extend down and to the right from the initial row and column position.

A typical ladder orientation bar code with interpretation and a default width of 4 would be sent as follows.

"<RC0,70><FL>:123456:"

An expanded (doubled) version of the above bar code would be as follows:

"<RC0,70><FL><X2>:123456:"

A 3:1 ratio of the above expanded (doubled) version would be as follows:

"<RC0,70><FXL><X2>:123456:"

5.14.43 EAN13 SUPPLEMENT

EAN13 is a numeric only bar code. All EAN13 codes must contain a variable parity bit followed by a front guard character (J), 6 left-hand characters, a center pattern (K), 6 right-hand characters and an ending guard pattern (L). The parity of the left-hand characters is determined by the first (parity) bit. The last bit in the right-hand side is the check-digit. The firmware automatically recalculates this value after transmission. The letter E is used to select EAN13 bar code.

A typical EAN13 ladder bar code sequence would look like the following:

"<RC0,70><EL5><BI>9J014561K780128L"

The above command line would generate a 5 unit wide bar code starting on row 0 ,column 70. The BI command causes the interpretation to be printed with the bar code.

A typical expanded EAN13 picket fence bar code with no interpretation would be as follows:

"<RC0,10><X2><EP3>9J014561K780128L"

5.14.44 CODE 39 SUPPLEMENT

Code 39 is an alphanumeric bar code. All code 39 data must be bracketed by an asterisk (*) on both sides. The letter N is used to select the three of nine bar code. Note: this bar code can be printed in either a 2:1 or 3:1 wide to narrow ratio. The following are 2:1 ratio commands (the default value).

A typical ladder code 39 bar code would be sent as follows:
"<RC0,70><NL3>*CODE39*"

This would result in a 3 unit wide bar code starting on row 0, column 70. No interpretation is printed.

A typical picket fence code 39 would be as follows:
"<RC0,10><NP5><BI>*CODE39*"

This code starts at row 0, column 10. The interpretation is included.

To print the above bar code in a 3:1 ratio you would send the following:
"<RC0,10><NXP5><BI>*CODE39*"

5.14.45 USS-CODABAR SUPPLEMENT

USS-CODABAR is a numeric bar code with 6 special characters (-$:/.+) and 4 start/stop characters (A,B,C,D). The data sent must be bracketed by a start and stop character. The letter C is used to select USS-CODABAR bar code.

A typical data stream for a picket fence codabar bar code with interpretation starting at row 0,column 110 is as follows:
"<RC0,110><CP><BI>A123456B"

A expanded ladder version of the above would be as follows:
"<RC0,110><X2><CL><BI>A123456B"

5.14.46 CODE 128 SUPPLEMENT

Code 128 is an alphanumeric bar code. All code 128 data must be bracketed by a caret (^) on both sides. The letter O is used to select one twenty eight bar code. Shift characters and check digits are automatically calculated by the Ghostwriter.

A typical ladder code 128 bar code would be sent as follows:
"<RC0,70><OL3>^CODE128^"

This would result in a 3 unit wide bar code starting on row 0, column 70. No interpretation is printed.

A typical expanded picket fence code 128 would be as follows:
"<RC0,10><X2><OP5><BI>^CODE128^"

This code starts at row 0, column 10. The interpretation is included.

Chapter 6: Downloadable Graphics

The printers allow 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.

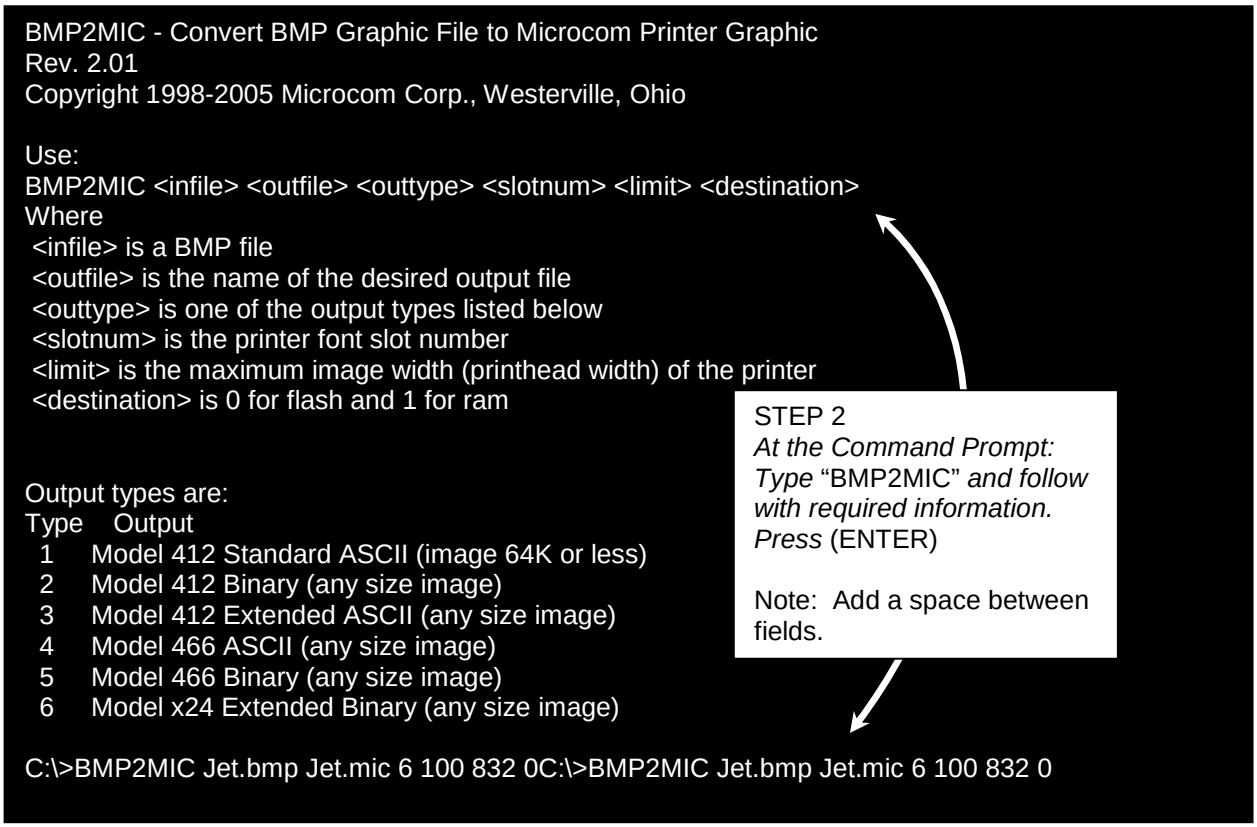
The conversion utility is a DOS-base program and will require access to a DOS prompt. Before starting the conversion utility, it would be helpful to gather the following information:

1) In File 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) Out File Create a name for the converted GRAPHIC File. (Limit the file name to 8 characters. An extension is not necessary.)
3) Out Type
4) Slot Number Select an open slot number for storage. Use ^D119 to determine which slots are open.
5) Limit The maximum print width (in dots). Use ^D29 to determine print head size.
6) Destination 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.

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



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.

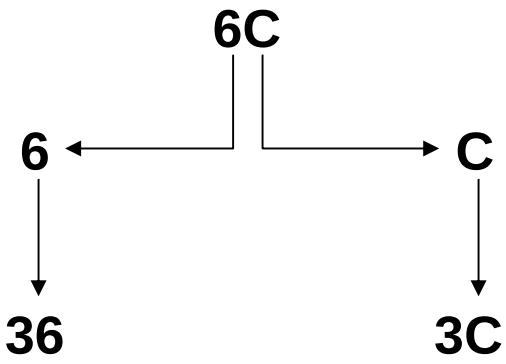


Figure 6-1 ASCII-HEX Conversions

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.**

**Note: These are commands are for Programmers use only.*

Chapter 7: Downloadable Fonts

The printers allow 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.
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.
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. TrueType® fonts can be converted using "FONTCV16.exe" software utility.

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 utility "FONTCV16.exe" may be downloaded at http://www.microcomcorp.com.

7.3.1 FONTCV16.exe Program

1. Run the FONTCV16 program from a DOS prompt.

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

Where:
<*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 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 but the data can now be transmitted over a 7-bit data connection.

7.4.3 Save FONTS to FLASH (^D135)

^A	^D	COMMAND
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 (>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.

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 GS1 Databar, TCI 35

GS1 Databar, formerly known as RSS-14, is a barcode type for space-constrained identification from EAN International and the Uniform Code Council, Inc. (UCC). GS1 Databar has been identified to solve problems in the grocery industry and in healthcare, where items are too small to allow for older barcode symbology.

The printer should have binary compression disabled before using GS1 Databar.

8.1.11.1 GS1 Databar Omni-Directional

The GS1 Databar Omni-Directional is used to encode numeric characters 0 -9 and does not support alpha or special characters. The code can encode up to 14 characters, including 13 data characters and 1 check digit.

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.

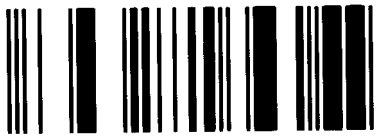


Figure 8-1 GS1 Databar Omni-Directional

8.1.11.2 GS1 Databar Truncated

GS1 Databar Truncated has the exact same data characteristics as the GS1 Databar Omni-Directional, except the bar height is set to the standard of 13 times the X dimension. This symbology may be scanned omni-directionally.

The sample below is encoding this data string: 00012345678905

Figure 8-2 GS1 Databar Truncated Sample

8.1.11.3 GS1 Databar Stacked

GS1 Databar Stacked has the exact same data characteristics as the GS1 Databar Omni-directional 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 barcode is 5 times 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 text with the barcode.

Figure 8-3 GS1 Databar Stacked Sample

8.1.11.4 GS1 Databar Stacked Omni-directional

GS1 Databar Stacked Omni-directional has the exact same data characteristics as the GS1 Databar Omni-directional 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.

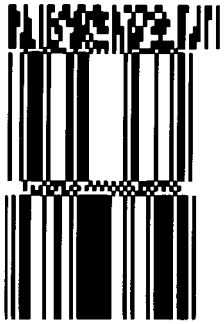


Figure 8-4 GS1 Databar Stacked Omni-directional Sample

8.1.11.5 GS1 Databar Limited

GS1 Databar Limited has the same data characteristics as the GS1 Databar Omni-directional 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 8-5 GS1 Databar Limited Sample

8.1.11.6 GS1 Databar Expanded

GS1 Databar 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 8-6 GS1 Databar Expanded Sample

8.1.11.7 How to Print an GS1 Databar Barcode

There are two steps to printing an GS1 Databar barcode:

1) Send the ^D114 command and the 7 setup parameters
2) Send a label format that calls the GS1 Databar barcode TCI #35.

These are the 7 parameters that MUST follow the ^D114 command:

1) Type of GS1 Databar barcode
2) Height
3) *reserved*
4) *reserved*
5) *reserved*
6) Separator Height
7) Data to be encoded

Valid values for parameters

Type of GS1 Databar barcode:

0 = Omni-directional
1 = Truncated
2 = Stacked
3 = Stacked Omni-directional
4 = Limited
5 = Expanded

Height:

Specifies the height of the desired barcode in dots. A good starting point is 50.

reserved:

reserved:

reserved:

Separator Height:

MULTIPLIER < = Separator Height < = 2 * MULTIPLIER.
Specifies the vertical separation between the linear data and the 2D data. The separator height is subtracted from the overall Height listed in the 1st element.

Data:

Always 13 digits for the linear data unless using GS1 Databar 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.

```
^D114<CR>  ← Here comes GS1 Databar data
0<CR>      ← Use –Omni-directional symbol
50<CR>     ← Height equals 50 dots
0<CR>      ← Reserved
0<CR>      ← Reserved
0<CR>      ← Reserved
3<CR>      ← Set vertical separator = 3
0012345612345  ← 13 digits of data
^D57<CR>   ← START of Label FORMAT
2,1280,609,,25,35,0,1,285<CR>
1,190,300,1,35<CR> ← TCI=35 (GS1 Databar barcode)
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 8-7 GS1 Databar Sample Label FORMAT

8.1.12 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.

8.1.13 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.

8.1.14 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

8.1.15 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

8.1.16 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.

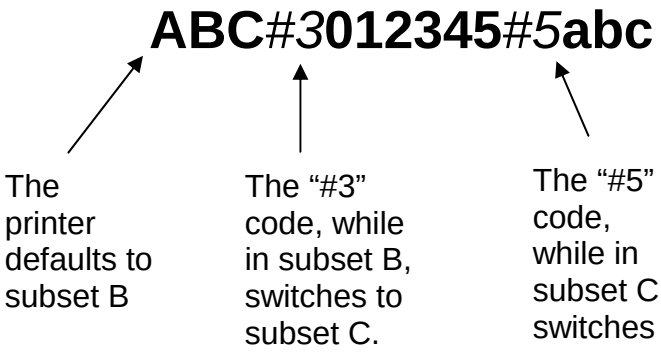


Figure 8-8 Code 128 Subset Switching

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 tables above.

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 tables above. 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.

8.1.17 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.

8.1.18 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.

8.1.19 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>
```

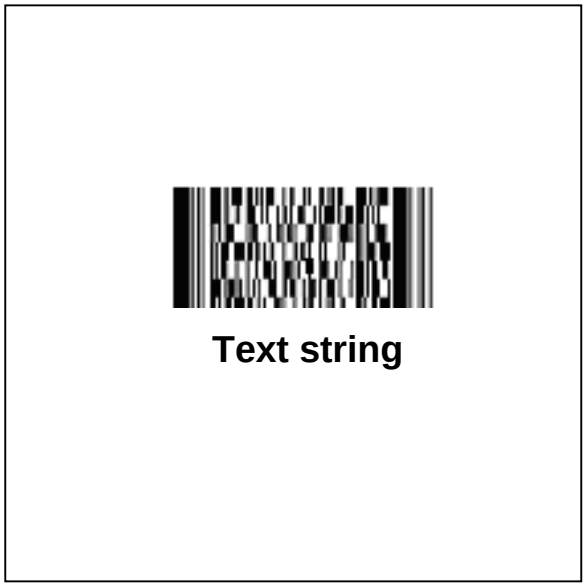


Figure 8-9 PDF-417 Sample Format #1

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>

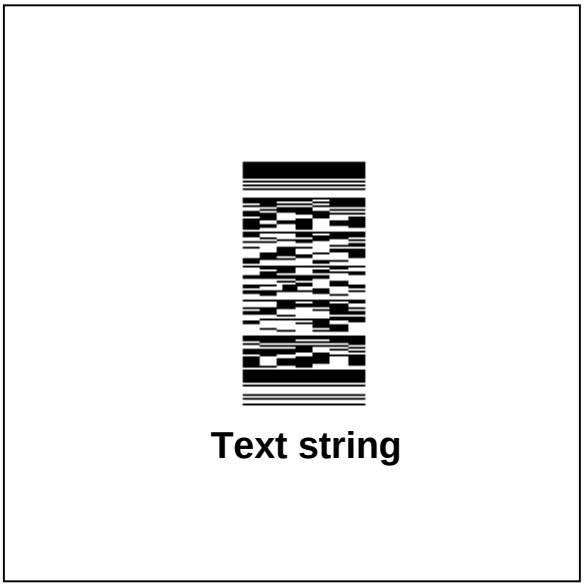


Figure 8-10 PDF-417 Sample Format #2

8.1.20 Datamatrix, TCI 47

A Data Matrix code is a two-dimensional matrix barcode consisting of black and white "cells" or modules arranged in either a square or rectangular pattern. The information to be encoded can be text or numeric data. The version implemented in the printer supports ECC 200 and uses Reed-Solomon error correction. The maximum number of characters supported in the printer is 1000 characters.

The D164 command is used to receive and process the Datamatrix barcode with the elements discussed below.

Once the Datamatrix barcode data is entered and processed, the barcode image may be placed using the normal format field by using a TCI of 47.

The sample below shows how to generate a data matrix symbol:

^D164 <----------Start of Datamatrix Data
0 <----------Datamatrix Type
0 <----------Do not force square Datamatrix
0 <----------Width
0 <----------Height
1 <----------Rotation
A <----------Encoding
0 <----------Barcode ID
:0123456789^\<---------- Data to encode
^D57
2,1280,900,,,10,0,1,250
1,300,300,1,47,0,,,10,10 <---------- Multiplier (10, 10); TCI 47; Barcode ID = 0
2,300,230,11,1,5
^D56
^D2
A
Data Matrix
^D3

NOTE: MULTIPLYING THE BARCODE GENERATED.
The barcode generated is based on a single dot width. For the barcode to be visible and to scan properly, a reasonable multiplier must be used. Typical values for a multiplier are 8-10. This is accomplished in the LDS1 format above on the line: 1,300,300,1,47,,,,10,10

Datamatrix Type- 0
This parameter is used to set the type of Datamatrix to be generated. A value of “0” will generate a standard Datamatrix while a value of “1” will generate a GS1 Datamatrix.

Force Square- 0
This parameter is used to force the resulting Datamatrix to be a square regardless of the row column settings. A value of “0” is standard while a value of “100” will force the resulting Datamatrix to be square.

Width Parameter- 0
This parameter is used to set the width or row size of the Data Matrix symbol. Zero entry will invoke auto sizing.

Height Parameter- 0
This parameter is used to set the height or column size of the Data Matrix symbol. Zero entry will invoke auto sizing.

Rotation - 1
0 = 0 degree rotation
1 = 180 degree counter clockwise rotation.
2 = 90 degree counter clockwise rotation.
3 = 270 degree counter clockwise rotation.

Symbol Size	Numeric Capacity	Alphanumeric Capacity	Binary Byte Capacity
Auto	---	---	---
10 x 10	6	3	1
12 x 12	10	6	3
14 x 14	16	10	6
16 x 16	24	16	10
18 x 18	36	25	16
20 x 20	44	31	20
22 x 22	60	43	28
24 x 24	72	52	34
26 x 26	88	64	42
32 x 32	124	91	60
36 x 36	172	127	84
40 x 40	228	169	112
44 x 44	288	214	142
48 x 48	348	259	172
52 x 52	408	304	202
64 x 64	560	418	278
72 x 72	736	550	366
80 x 80	912	682	454
88 x 88	1152	862	574
96 x 96	1392	1042	694
104 x 104	1632	1222	814
120 x 120	2100	1573	1048
132 x 132	2608	1954	1302
144 x 144	3116	2335	1556
8 x 18	10	6	3
8 x 32	20	13	8
12 x 26	32	22	14
12 x 36	44	31	20
16 x 36	64	46	30
16 x 48	98	72	47

Table 8-5 Data Matrix Configuration Parameters

Encoding Schemes - A
See below for entire list. Values may be entered as upper or lower case.

Encoding
The Encoding parameter is used to set the encoding scheme that will be used for the supplied data. The printer default is set to “Auto”, which will automatically switch to the most efficient encoding scheme for the data provided. Consult the Aim International Technical Specification for Data Matrix ECC 200 requirements for additional information.

Encoding Scheme	Characters	Bits per Character
A- ASCII	Double digit numeric ACSII values 0 – 127 Extended ASCII values 128-255	4 8 16
C- C40	Primarily Uppercase Alphanumeric	5.33
T- Text	Primarily Lowercase Alphanumeric	5.33
B- Base256	All byte values 0 – 255	8
X- X12	Similar to C40	5.33
E- Edifact	63 ASCII plus un-latch char	6

Table 8-6 Data Matrix Encoding Schemes

ACSII Encoding Scheme

ASCII encoding is the basic scheme that encodes ASCII data, double density numeric data and symbology control characters. Which means it encodes one alphabetic or two numeric characters per byte. All other encoding schemes are invoked from ASCII and will then return to this scheme through the use of code words.

C40 Encoding Scheme

C40 encoding scheme is used to encode uppercase alphabetic, numerical and space characters. C40 encodes three alphanumeric data characters into two bytes.

Text Encoding Scheme

Text encoding is primarily used to encode lowercase alphabetic and numerical characters. Text encodes three alphanumeric data characters into two bytes.

Base 256 Encoding Scheme

The Base 256 encoding scheme is used to encode any 8-bit byte data, including extended channel interpretations (ECI's) and binary data.

X12 Encoding Scheme

X12 encoding scheme is use to encode the standard ANSI X12 electronic data interchange characters, which are compacted three data characters to two codewords in a manner similar to C40 encoding.

Edifact Encoding Scheme

X12 encoding scheme includes 63 ASCII values (values from 32 to 94) plus an Unlatch character (binary 011111) to return to ASCII encoding. Edifact encoding encodes four data characters in three codewords.

Codeword	Data and/or Function
1 - 128	ASCII data (ASCII value +1)
129	Pad Character
130 - 229	2 digit data 00 – 99 (Numeric Value + 130)
230	Latch to C40 Encoding Scheme
231	Latch to Base256 Encoding Scheme
232	FNC1
233	Structured Append
234	Reader Programming
235	Upper Shift (shift to Extended ASCII)
236	05 Macro
237	06 Macro
239	Latch to Text Encoding Scheme
241	ECI Character

Table 8-7 ASCII Codeword Values

Barcode ID

The printer is able to print two different unique Data Matrix barcodes per format and this parameter is used to select which formatting data is being used. The valid parameters are a 0 or a 1. To printer the proper barcode, the CGN field must also reflect a 0 or 1 to match the Barcode ID field. The CGN default is a 0 so if only one barcode is present and the Barcode ID is a 0, nothing has to be entered as the CGN.

The sample below shows how to generate two data matrix symbols:

```
^D164 <----------------------------------Start of Datamatrix Data
0 <---------------------------------------Datamatrix Type
0 <---------------------------------------Do not force square Datamatrix
0 <---------------------------------------Width
0 <---------------------------------------Height
1 <---------------------------------------Rotation
A <---------------------------------------Encoding
0 <---------------------------------------Barcode ID
:0123456789^\<---------------------- Data to encode
^D164 <----------------------------------Start of Datamatrix Data
0 <---------------------------------------Datamatrix Type
0 <---------------------------------------Do not force square Datamatrix
0 <---------------------------------------Width
0 <---------------------------------------Height
1 <---------------------------------------Rotation
A <---------------------------------------Encoding
1 <---------------------------------------Barcode ID
:This is the second datamatrix
being printer in this format.^\<---------------------- Data to encode (from the : to ^\)
^D57
3,1280,900,,,10,0,1,250
1,300,300,1,47,0,,,10,10 <---------- Multiplier (10, 10); TCI 47; Barcode ID = 0
1,600,300,1,47,1,,,10,10 <---------- Multiplier (10, 10); TCI 47; Barcode ID = 1
2,300,230,11,1,5
^D56
^D2
.
Data Matrix
^D3
```

Data
Data to be converted to 2D Data Matrix Barcode, maximum number of characters supported in the printer implementation is 1000.

8.1.21 Intelligent Mail Barcode, TCI 48

The Intelligent Mail barcode (also referred to as the 4-State or OneCode) is the term coined by the United Stated Postal Service (USPS) for the new barcode symbology used to track and sort letters and flat packages. The Intelligent Mail barcode is a height-modulated barcode that encodes up to 31 decimal digits of mail-piece data into 65 vertical bars.

The code is made up of four distinct symbols, which is why this barcode was once referred to as the 4-State Customer Barcode. Each bar contains the central "tracker" portion, and may contain an ascender, descender, neither, or both (a "full bar").

The D166 command is used to receive and process the Intelligent Mail barcode.

After The ^D166<CR> is issued, it must be followed by a set of ASCII digits that define a valid string with a <CR> as a terminator. The '-' (dash) may be included only to separate the

tracking code from the routing code. A maximum of 32 characters including the dash is allowed.

Once the Intelligent Mail barcode data is entered and processed, the barcode image may be placed using the normal format field by using a TCI of 48.

EXAMPLE:
^D166
01234567094987654321-01234567891<---- Intelligent Mail Barcode data
^D57
1,832,2000,0,0,08,2,1,,0,0
1,400,400,1,48 <---------- Placement information
^D56
^D2
.
^D3

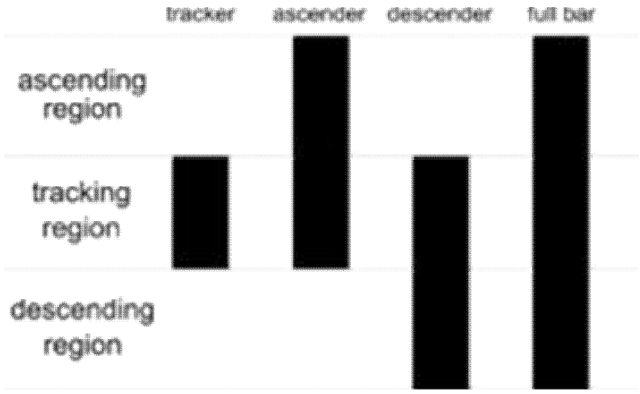


Figure 8-11 Intelligent Mail Barcode bars

TYPE	FIELD	DIGITS	EXAMPLE
Tracking Code	Barcode Identifier	2 (2nd digit must be 0-4)	01
	Special Services	3	234
	Customer Identifier	6	567094
	Sequence Number	9	987654321
Routing Code	Delivery Point ZIP Code	0, 5, 9, or 11	01234567891

Table 8-8 Intelligent Mail Barcode Structure

Complete data string from above:

01234567094987654321012345678910
or
01234567094987654321-01234567891

Barcode Identifier
The Barcode Identifier field is a 2-digit field reserved for future use to encode the presort identification that is currently printed in human-readable form on the optional endorsement line.

Special Services
The Special Services field is a 3-digit field that identifies the type of service.

Customer Identifier
The Customer Identifier field is a 6-digit number identifying the mailer.

Sequence Number
The Sequence Number is a 9-digit field. For Destination Confirm, this field holds the existing Mailing ID field, which is a 4- or 6-digit field. The Mailing ID field can be expanded to 9 digits if so desired. Otherwise, leading zeros should be used to fill the field completely. When using Origin Confirm, the Customer Identifier field and the Sequence Number field may be combined into a 15-digit field to hold the existing 9- or 11- digit Customer field plus additional digits. If these fields are not expanded to 15 digits, leading zeros should be used to fill the field completely.

Routing ZIP Code
The Routing ZIP Code field will accommodate 0, 5, 9 or 11 digit ZIP Code information. Confirm requires a 9- or 11-digit Routing ZIP to serves as "Subscriber ID" for Origin Confirm users. The routing ZIP Code inserted into the 4CB must be registered in the Confirm account.

8.1.22 Planet Code, TCI 49

The Planet (Postal Alpha Numeric Encoding Technique) Code is designed to track both inbound and outbound letter mail for the United States Postal Service. The Planet barcode was required by the USPS to use their Confirm service but has since been replaced by the Intelligent Mail Barcode.

The Confirm is a 12 digit barcode with the following structure:

- The first two digits represent the service (21 = Origin Confirm or 22 = Destination Confirm)
- The next nine digits identify the mail
- The 12th digit is a check sum that helps USPS detect errors.

The D176 command is used to receive and process the USPS planet code. After the ^D176<CR> is issued, it must be followed by a 2 sets of ASCII digits terminated by <CR><LF>. The first set consists of a single digit field used to select barcode rotation with the following values:
0 = 0 degree rotation
1 = 180 degree counter clockwise rotation.
2 = 90 degree counter clockwise rotation.
3 = 270 degree counter clockwise rotation.

The second set of ASCII digits contains a valid planet code string with a <CR> as a

terminator.

The PLANET Code is a 12 -or 14- digit barcode. All PLANET Codes include a check-sum digit or correction character. This digit must always be the single-digit number (i.e., 0–9) which, when added to the sum of the other digits in the barcode, results in a whole number that is a multiple of 10.

Once the planet code barcode data is entered and processed, the barcode image can be placed using the normal format field by using a TCI of 49.

Command Syntax:
^D176
Rotation
Planet Code String

EXAMPLE:
^D176
3 <---------- Rotation parameter
1234567890123 <---------- Planet Code data
^D57
1,832,2000,0,0,08,2,1,,0,0
1,400,400,1,49,,,4,12,3 <------- Placement information
^D56
^D2
.
^D3

8.1.23 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

AI	Content	Format
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
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

AI	Content	Format
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
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 8-9 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.

8.1.24 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.

8.1.25 Aztec, TCI 52

Aztec is a high density 2 dimensional barcode that can encode up to 3750 characters from the entire 256 byte ASCii character set. Aztec also has the potential to use less space than other matrix style barcodes because it does not require quiet zones.

The D193 command is used to receive and process the Aztec barcode with the elements discussed below.

Once the Aztec barcode data is entered and processed, the barcode image may be placed using the normal format field by using a TCI of 52.

The sample below shows how to generate a data matrix symbol:

```
^D193 <---------------------------------Start of Aztec Data
0 <---------------------------------------Size
0 <---------------------------------------Minimum error correction
0 <---------------------------------------Mode
:0123456789^\<---------------------- Data to encode
^D57
2,672,300,19,38,7,0,1,287,0,0
1,336,100,10,52,,0,4,10,10 <---------- Multiplier (10, 10); TCI 52
1,336,25,11,7,10,0,4,2,2,,,,,0
^D56
^D2
Aztec
^D3
```

NOTE: MULTIPLYING THE BARCODE GENERATED.

The barcode generated is based on a single dot width. For the barcode to be visible and to scan properly, a reasonable multiplier must be used. Typical values for a multiplier are 8-10. This is accomplished in the LDS1 format above on the line: 1,300,300,1,52,,,,10,10

Size - 0
This parameter is used to set the size the Aztec code to be generated. A value of "0" will generate an automatically scaled Aztec. The overall size of the barcode is controlled by the Size and by the formats X and Y multiplier values.

Size Value	
0	Auto
1	15x15 Compact
2	19x19 Compact
3	23x23 Compact
4	27x27 Compact
5	19x19
6	23x23
7	27x27
8	31x31
9	37x37
10	41x41
11	45x45
12	49x49
13	53x53
14	57x57
15	61x61
16	67x67
17	71x71
18	75x75
19	79x79
20	83x83
21	87x87
22	91x91
23	95x95
24	101x101
25	105x105
26	109x109
27	113x113
28	117x117
29	121x121
30	125x125
31	131x131
32	135x135
33	139x139

Table 8-10 Aztec Size Values

Minimum Error Correction- 0
This parameter is used to set the Minimum Error Correction level. This parameter must be set to 0 for Auto if a non-Auto is selected for the size parameter.

Minimum Err Correction	
0	Auto
1	10% + 3 words
2	23% + 3 words
3	36% + 3 words
4	50% + 3 words

Table 8-11 Aztec Minimum Error Correction

Mode - 0
This parameter is used to set the mode to be used in generating the Aztec barcode. A value of 0 generates a standard Aztec while a setting of 2 would use the GS1 specification. Please note that if the GS1 is used, the application identifiers should be entered with brackets, Example: [21]123

Modes	
0	Standard
1	Reserved
2	GS1*

Table 8-12 Aztec Modes

8.1.26 QR Code, TCI 53

QR Code is a high density 2 dimensional barcode that can encode up to 7089 characters. QR Code was designed for high-speed component scanning

The D194 command is used to receive and process the QR Code barcode with the elements discussed below.

Once the QR Code barcode data is entered and processed, the barcode image may be placed using the normal format field by using a TCI of 53.

The sample below shows how to generate a data matrix symbol:

^D194 <----------Start of QR Code Data
0 <----------Size
0 <----------Minimum error correction
0 <----------Mode
:0123456789^\<---------- Data to encode
^D57
2,672,300,19,38,7,0,1,287,0,0
1,336,75,10,53,,0,4,10,10 <---------- Multiplier (10, 10); TCI 53
1,336,25,11,7,10,0,4,2,2,,,,,0
^D56
^D2
QR CODE
^D3

NOTE: MULTIPLYING THE BARCODE GENERATED.
The barcode generated is based on a single dot width. For the barcode to be visible and to scan properly, a reasonable multiplier must be used. Typical values for a multiplier are 8-10. This is accomplished in the LDS1 format above on the line: 1,300,300,1,52,,,,10,10

Size - 0
This parameter is used to set the size the Aztec code to be generated. A value of “0” will generate an automatically scaled Aztec. The overall size of the barcode is controlled by the Size and by the formats X and Y multiplier values.

Size Value	
0	Auto
1	21x21
2	25x25
3	29x29
4	33x33
5	37x37
6	41x41
7	45x45
8	49x49
9	53x53
10	57x57
11	61x61
12	65x65
13	69x69
14	73x73
15	77x77
16	81x81
17	85x85
18	89x89
19	93x93
20	97x97

21	101x101
22	105x105
23	109x109
24	113x113
25	117x117
26	121x121
27	125x125
28	129x129
29	133x133
30	137x137
31	141x141
0	Auto
1	21x21

Table 8-13 Aztec Size Values

Minimum Error Correction- 0
This parameter is used to set the Minimum Error Correction level. This parameter must be set to 0 for Auto if a non-Auto is selected for the size parameter.

Minimum Err Correction	
0	Auto
1	20%
2	37%
3	55%
4	65%

Table 8-14 QR Code Minimum Error Correction

Mode - 0
This parameter is used to set the mode to be used in generating the Aztec barcode. A value of 0 generates a standard Aztec while a setting of 2 would use the GS1 specification. Please note that if the GS1 is used, the application identifiers should be entered with brackets, Example: [21]123.

Modes	
0	Standard
1	Reserved
2	GS1*

Table 8-15 QR Code Modes

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>
```

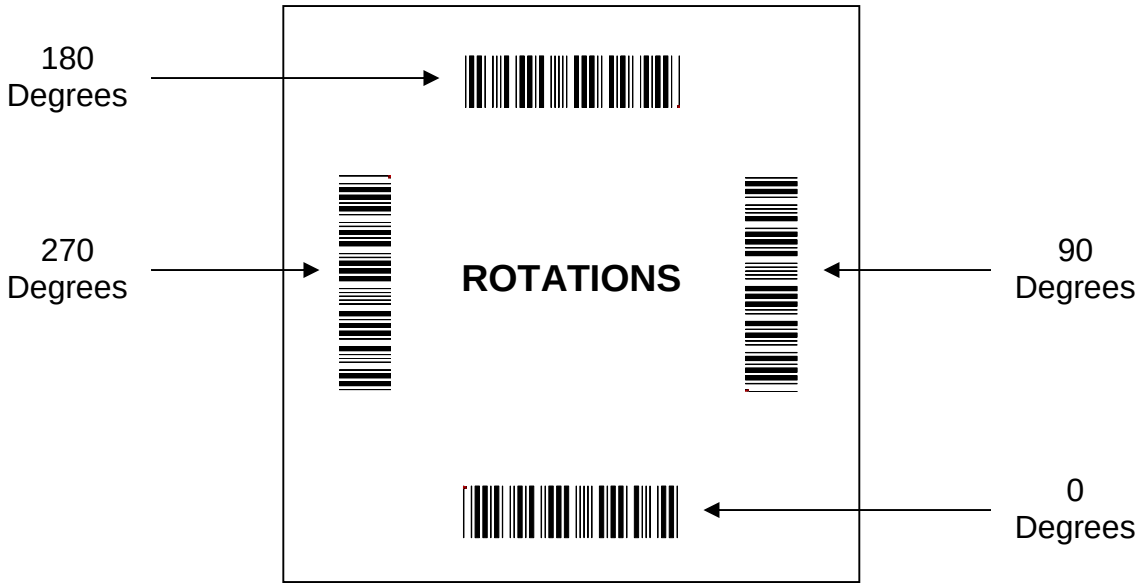


Figure 8-12 Bar Code Rotations

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 8-16 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 8-13 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 printers provide a number of character sets. The numeric codes 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 printers provide 15 standard code pages. Please note that the printer implements the codes from 32 up. Code numbers below 32 are printed using the 238 standard font set. 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.

Refer to Chapter 5 for more details on SW4 settings.

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	0x0105	0x0104	0x0107	0x0106	0x0119	0x0118	0x0144	0x0143	0x015b	0x015a	0x017c	0x017b	0x017a	0x0179	0x0020	0x0020
16	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	ą	Ą	ć	Ć	ę	Ę	ń	Ń	ś	Ś	ż	Ż	ź	Ź		
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	0x005b	0x005c	0x005d	0x005e	0x005f
80	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
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	0x007b	0x007c	0x007d	0x007e	0x2022
112	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	•
8	0x2215	0xf001	0xf002	0x0141	0x0142	0x00d0	0x0111	0x00de	0x00fe	0x00b5	0x00b1	0x00bd	0x00a8	0x2019	0x2219	0x02dc
128	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
	⁄	fi	fl	Ł	ł	Đ	đ	Þ	þ	µ	±	½	¨	'	·	˜
9	0x02c6	0x2013	0x00b4	0x02c9	0x2018	0x2018	0x02da	0x02d9	0x02ba	0x00b8	0x02db	0x02c7	0x2215	0x02d8	0x0131	0x0030
144	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
	ˆ	–	´	-	‘	‘	°	·	□	¸	˛	ˇ	⁄	˘	ı	0
0A	0x201e	0x00c0	0x00c2	0x00c8	0x00ca	0x00cb	0x00ce	0x00cf	0x00a9	0x00ae	0x2122	0x2039	0x203a	0x00d9	0x00db	0x21b5
160	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
	„	À	Â	È	Ê	Ë	Î	Ï	©	®	™	‹	›	Ù	Û	↵
0B	0x2030	0x201c	0x201d	0x00b0	0x00c7	0x00e7	0x00d1	0x00f1	0x00a1	0x00bf	0x00a4	0x00a3	0x00a5	0x00a7	0x0192	0x00a2
176	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
	‰	“	”	°	Ç	ç	Ñ	ñ	¡	¿	¤	£	¥	§	ƒ	¢
0C	0x00e2	0x00ea	0x00f4	0x00fb	0x00e1	0x00e9	0x00f3	0x00fa	0x00e0	0x00e8	0x00f2	0x00f9	0x00e4	0x00eb	0x00f6	0x00fc
192	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
	â	ê	ô	û	á	é	ó	ú	à	è	ò	ù	ä	ë	ö	ü
0D	0x00c5	0x00ee	0x00d8	0x00c6	0x00e5	0x00ed	0x00f8	0x00e6	0x00c4	0x00ec	0x00d6	0x00dc	0x00c9	0x00ef	0x00df	0x00d4
208	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
	Å	î	Ø	Æ	å	í	ø	æ	Ä	ì	Ö	Ü	É	ï	ß	Ô
0E	0x00c1	0x00c3	0x00e3	0x20ac	0xf150	0x00cd	0x00cc	0x00d3	0x00d2	0x00d5	0x00f5	0x0160	0x0161	0x00da	0x0178	0x00ff
224	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
	Á	Ã	ã	€	□	Í	Ì	Ó	Ò	Õ	õ	Š	š	Ú	Ÿ	ÿ
0F	0x0152	0x0153	0x00b6	0x2020	0x2021	0x2014	0x2013	0x002d	0xeffc	0x00aa	0x00ba	0x00ab	0x2022	0x00bb	0x00b6	0x2026
240	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255
	Œ	œ	¶	†	‡	—	–	-	□	ª	º	«	•	»	¶	…

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 Chapter 5 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 DOSPortuguese.

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					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	0x0020	0x0023	0x0024	0x0025	0x0026	0x0027	0x0028	0x0029	0x002a	0x002b	0x002c	0x002d	0x002e	0x002f
32	32	33	32	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	0x005b	0x005c	0x005d	0x005e	0x005f
80	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
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	0x007b	0x007c	0x007d	0x007e	0x2022
112	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	•
8	0x00c7	0x00fc	0x00e9	0x00e2	0x00e3	0x00e0	0x00c1	0x00e7	0x00ea	0x00ca	0x00e8	0x00cc	0x00d4	0x00ec	0x00c3	0x00c2
128	180	207	197	192	226	200	224	181	193	164	201	230	223	217	225	162
	Ç	ü	é	â	ã	à	Á	ç	ê	Ê	è	Ì	Ô	ì	Ã	Â
9	0x00c9	0x00c0	0x00c8	0x00f4	0x00f5	0x00f2	0x00da	0x00f9	0x00cc	0x00d5	0x00dc	0x00a2	0x00a3	0x00d9	0x0020	0x00d3
144	220	161	163	194	234	202	237	203	230	233	219	191	187	173	32	231
	É	À	È	ô	õ	ò	Ú	ù	Ì	Õ	Ü	¢	£	Ù		Ó
0A	0x00e1	0x00ed	0x00f3	0x00fa	0x00f1	0x00d1	0x00aa	0x00ba	0x00bf	0x00d2	0x0020	0xeffc	0x002d	0x0020	0x0020	0x0020
160	196	213	198	199	183	182	249	250	185	232	32	248	247	32	32	32
	á	í	ó	ú	ñ	Ñ	ª	º	¿	Ò		□	-			
0B	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
176	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
0C	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
192	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
0D	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
208	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
0E	0x0020	0x00df	0x0020	0x0020	0x0020	0x0020	0x2020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
224	32	222	32	32	32	32	243	32	32	32	32	32	32	32	32	32
		ß					†									
0F	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x00b0	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
240	32	32	32	32	32	32	32	32	32	179	32	32	32	32	32	32
										°						

Figure 9-3 Code Page - 860

9.3.4 Spanish Code Page

The Spanish Code Page is selected when SW4 :(5-8) = 0011.

Refer to Chapter 5 for more details on SW4 settings.

Spanish

	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	0x0021	0x0024	0x0025	0x0026	0x0027	0x0028	0x0029	0x002a	0x002b	0x002c	0x002d	0x002e	0x002f
32	32	33	34	33	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	0x00a1	0x0041	0x0042	0x0043	0x0044	0x0045	0x0046	0x0047	0x0048	0x0049	0x004a	0x004b	0x004c	0x004d	0x004e	0x004f
64	184	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	0x00d1	0x00f1	0x00bf	0x00fc	0x005f
80	80	81	82	83	84	85	86	87	88	89	90	182	183	185	207	95
	P	Q	R	S	T	U	V	W	X	Y	Z	Ñ	ñ	¿	ü	_
6	0x00e1	0x0061	0x0062	0x0063	0x0064	0x0065	0x0066	0x0067	0x0068	0x0069	0x006a	0x006b	0x006c	0x006d	0x006e	0x006f
96	196	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
	á	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	0x00e9	0x00ed	0x00f3	0x00fa	0x2022
112	112	113	114	115	116	117	118	119	120	121	122	197	213	198	199	127
	p	q	r	s	t	u	v	w	x	y	z	é	í	ó	ú	•

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 Chapter 5 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					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	0x005b	0x005c	0x005d	0x005e	0x005f
80	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
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	0x007b	0x007c	0x007d	0x007e	0x2022
112	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	•
8	0x00c7	0x00fc	0x00e9	0x00e2	0x00e4	0x00e0	0x00e5	0x00e7	0x00ea	0x00eb	0x00e8	0x00ef	0x00ee	0x00ec	0x00c4	0x00c5
128	180	207	197	192	204	200	212	181	193	205	201	221	209	217	216	208
	Ç	ü	é	â	ä	à	å	ç	ê	ë	è	ï	î	ì	Ä	Å
9	0x00c9	0x00e6	0x00c6	0x00f4	0x00f6	0x00f2	0x00fb	0x00f9	0x00ff	0x00d6	0x00dc	0x00f8	0x00a3	0x00d8	0x0020	0x0192
144	220	215	211	194	206	202	195	203	239	218	219	214	187	210	32	190
	É	æ	Æ	ô	ö	ò	û	ù	ÿ	Ö	Ü	ø	£	Ø		ƒ
0A	0x00e1	0x00ed	0x00f3	0x00fa	0x00f1	0x00d1	0x00aa	0x00ba	0x00bf	0x0020	0x0020	0xeffc	0x002d	0x00a1	0x0020	0x0020
160	196	213	198	199	183	182	249	250	185	32	32	248	247	184	32	32
	á	í	ó	ú	ñ	Ñ	ª	º	¿			□	-	¡		
0B	0x0020	0x0020	0x0020	0x0020	0x0020	0x00c1	0x00c5	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
176	32	32	32	32	32	224	208	32	32	32	32	32	32	32	32	32
						Á	Å									
0C	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x00e3	0x00c3	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
192	32	32	32	32	32	32	226	225	32	32	32	32	32	32	32	32
							ã	Ã								
0D	0x0020	0x0020	0x00ca	0x00cb	0x0020	0x00cd	0x00ce	0x00cf	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x00cc	0x0020
208	32	32	164	165	32	229	166	167	32	32	32	32	32	32	230	32
			Ê	Ë		Í	Î	Ï							Ì	
0E	0x00d3	0x00df	0x00d4	0x00d2	0x00f5	0x00d5	0x2020	0x0020	0x0020	0x00da	0x0020	0x00d9	0x0020	0x0020	0x0020	0x0020
224	231	222	223	232	234	233	243	32	32	237	32	173	32	32	32	32
	Ó	ß	Ô	Ò	õ	Õ	†			Ú		Ù				
0F	0x0020	0x0020	0x003d	0x2014	0x2021	0x00a7	0x0020	0x0020	0x0020	0x00b0	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
240	32	32	61	245	244	189	32	32	32	179	32	32	32	32	32	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 Chapter 5 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 DOSNordic.

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					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	0x0020	0x0023	0x0024	0x0025	0x0026	0x0027	0x0028	0x0029	0x002a	0x002b	0x002c	0x002d	0x002e	0x002f
32	32	33	32	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	0x005b	0x005c	0x005d	0x005e	0x005f
80	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
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	0x007b	0x007c	0x007d	0x007e	0x2022
112	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	•
8	0x00c7	0x00fc	0x00e9	0x00e2	0x00e4	0x00e0	0x00e5	0x00e7	0x00ea	0x00eb	0x00e8	0x00ef	0x00d4	0x00ec	0x00c4	0x00c5
128	180	207	197	192	204	200	212	181	193	205	201	221	223	217	216	208
	Ç	ü	é	â	ä	à	å	ç	ê	ë	è	ï	Ô	ì	Ä	Å
9	0x00c9	0x00e6	0x00c6	0x00f4	0x00f6	0x00f2	0x00fb	0x00fa	0x00ff	0x00d4	0x00f6	0x00f8	0x00a3	0x00d8	0x0020	0x0192
144	220	215	211	194	206	202	195	199	239	223	206	214	187	210	32	190
	É	æ	Æ	ô	ö	ò	û	ú	ÿ	Ô	ö	ø	£	Ø		ƒ
0A	0x00e1	0x00ed	0x00f3	0x00fa	0x00f1	0x00d1	0x00aa	0x00ba	0x00bf	0x0020	0x0020	0xeffc	0x002d	0x0020	0x0020	0x0020
160	196	213	198	199	183	182	249	250	185	32	32	248	247	32	32	32
	á	í	ó	ú	ñ	Ñ	ª	º	¿			□	-			
0B	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
176	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
0C	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
192	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
0D	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
208	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
0E	0x0020	0x00df	0x0020	0x0020	0x0020	0x0020	0x2020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
224	32	222	32	32	32	32	243	32	32	32	32	32	32	32	32	32
		ß					†									
0F	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x00b0	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
240	32	32	32	32	32	32	32	32	32	179	32	32	32	32	32	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 Chapter 5 for more details on SW4 settings.

Swiss

	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	0x0020	0x0023	0x0024	0x0025	0x0026	0x0027	0x0028	0x0029	0x002a	0x002b	0x002c	0x002d	0x002e	0x002f
32	32	33	32	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	0x00c9	0x0041	0x0042	0x0043	0x0044	0x0045	0x0046	0x0047	0x0048	0x0049	0x004a	0x004b	0x004c	0x004d	0x004e	0x004f
64	220	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
	É	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	0x00c3	0x00dc	0x005f
80	80	81	82	83	84	85	86	87	88	89	90	216	218	225	219	95
	P	Q	R	S	T	U	V	W	X	Y	Z	Ä	Ö	Ã	Ü	_
6	0x00e9	0x0061	0x0062	0x0063	0x0064	0x0065	0x0066	0x0067	0x0068	0x0069	0x006a	0x006b	0x006c	0x006d	0x006e	0x006f
96	197	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
	é	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	0x00e3	0x00fc	0x2022
112	112	113	114	115	116	117	118	119	120	121	122	204	206	226	207	127
	p	q	r	s	t	u	v	w	x	y	z	ä	ö	ã	ü	•

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.

Refer to Chapter 5 for more details on SW4 settings.

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					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	0x005b	0x005c	0x005d	0x005e	0x005f
80	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
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	0x007b	0x007c	0x007d	0x007e	0x2022
112	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	•
8	0x00c7	0x00fc	0x00e9	0x00e2	0x00e4	0x00e0	0x00e5	0x00e7	0x00ea	0x00eb	0x0020	0x0020	0x00ee	0x0179	0x00c4	0x0106
128	180	207	197	192	204	200	212	181	193	205	32	32	209	29	216	19
	Ç	ü	é	â	ä	à	å	ç	ê	ë			î	Ź	Ä	Ć
9	0x00c9	0x0020	0x0020	0x00f4	0x00f6	0x0020	0x0020	0x015a	0x015b	0x00d6	0x00dc	0x0020	0x0020	0x0141	0x0020	0x0020
144	220	32	32	194	206	32	32	25	24	218	219	32	32	131	32	32
	É			ô	ö			Ś	ś	Ö	Ü			Ł		
0A	0x00e1	0x00ed	0x00f3	0x00fa	0x0104	0x0105	0x0020	0x0020	0x0118	0x0119	0x0020	0x017a	0x0020	0x0020	0x0020	0x0020
160	196	213	198	199	17	16	32	32	21	20	32	28	32	32	32	32
	á	í	ó	ú	Ą	ą			Ę	ę		ź				
0B	0x0020	0x0020	0x0020	0x0020	0x0020	0x00c1	0x00c5	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x017b	0x017c	0x0020
176	32	32	32	32	32	224	208	32	32	32	32	32	32	27	26	32
						Á	Å							Ż	ż	
0C	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
192	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
0D	0x0020	0x0020	0x0020	0x00cb	0x0020	0x00cd	0x00ce	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
208	32	32	32	165	32	229	166	32	32	32	32	32	32	32	32	32
				Ë		Í	Î									
0E	0x00d3	0x00df	0x00d4	0x0143	0x0144	0x00b6	0x0020	0x0020	0x0020	0x00da	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
224	231	222	223	23	22	242	32	32	32	237	32	32	32	32	32	32
	Ó	ß	Ô	Ń	ń	¶				Ú						
0F	0x0020	0x0020	0x0020	0x0020	0x0020	0x00a7	0x0020	0x0020	0x0020	0x00b0	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
240	32	32	32	32	32	189	32	32	32	179	32	32	32	32	32	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 Chapter 5 for more details on SW4 settings.

French

	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	0x00a3	0x0024	0x0025	0x0026	0x0027	0x0028	0x0029	0x002a	0x002b	0x002c	0x002d	0x002e	0x002f
32	32	33	34	187	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	0x00e0	0x0041	0x0042	0x0043	0x0044	0x0045	0x0046	0x0047	0x0048	0x0049	0x004a	0x004b	0x004c	0x004d	0x004e	0x004f
64	200	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
	à	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	0x00b0	0x00a7	0x00e7	0x005e	0x005f
80	80	81	82	83	84	85	86	87	88	89	90	179	189	181	94	95
	P	Q	R	S	T	U	V	W	X	Y	Z	°	§	ç	^	_
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	0x00e9	0x00f9	0x00e8	0x0022	0x2022
112	112	113	114	115	116	117	118	119	120	121	122	197	203	201	34	127
	p	q	r	s	t	u	v	w	x	y	z	é	ù	è	"	•

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 DOSCanadaF.

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					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	0x0020	0x0023	0x0024	0x0025	0x0026	0x0027	0x0028	0x0029	0x002a	0x002b	0x002c	0x002d	0x002e	0x002f
32	32	33	32	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	0x005b	0x005c	0x005d	0x005e	0x005f
80	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
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	0x007b	0x007c	0x007d	0x007e	0x2022
112	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	•
8	0x00c7	0x00fc	0x00e9	0x00e2	0x00c2	0x00e0	0x2021	0x00e7	0x00ea	0x00eb	0x00e8	0x00ef	0x00d4	0x003d	0x00c0	0x00a7
128	180	207	197	192	162	200	244	181	193	205	201	221	223	61	161	189
	Ç	ü	é	â	Â	à	‡	ç	ê	ë	è	ï	Ô	=	À	§
9	0x00c9	0x00c8	0x00ca	0x00f4	0x00cb	0x00cf	0x00fb	0x00fa	0x0020	0x00d4	0x00dc	0x00a2	0x00a3	0x00d9	0x0020	0x0192
144	220	163	164	194	165	167	195	199	32	223	219	191	187	173	32	190
	É	È	Ê	ô	Ë	Ï	û	ú		Ô	Ü	¢	£	Ù		ƒ
0A	0x0020	0x0020	0x00f3	0x00fa	0x0020	0x0020	0x0020	0x0020	0x00ce	0x0020	0x0020	0xeffc	0x002d	0x0020	0x0020	0x0020
160	32	32	198	199	32	32	32	32	166	32	32	248	247	32	32	32
			ó	ú					Î			□	-			
0B	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
176	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
0C	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
192	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
0D	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
208	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
0E	0x0020	0x00df	0x0020	0x0020	0x0020	0x0020	0x2020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
224	32	222	32	32	32	32	243	32	32	32	32	32	32	32	32	32
		ß					†									
0F	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x00b0	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
240	32	32	32	32	32	32	32	32	32	179	32	32	32	32	32	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 Chapter 5 for more details on SW4 settings.

Swedish

	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	0x0020	0x0057	0x0024	0x0025	0x0026	0x0027	0x0028	0x0029	0x002a	0x002b	0x002c	0x002d	0x002e	0x002f
32	32	33	32	87	36	37	38	39	40	41	42	43	44	45	46	47
		!		W	$	%	&	'	(	)	*	+	,	-	.	/
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	0x00e0	0x00e7	0x00e8	0x005e	0x005f
80	80	81	82	83	84	85	86	87	88	89	90	200	181	201	94	95
	P	Q	R	S	T	U	V	W	X	Y	Z	à	ç	è	^	_
6	0x00e1	0x0061	0x0062	0x0063	0x0064	0x0065	0x0066	0x0067	0x0068	0x0069	0x006a	0x006b	0x006c	0x006d	0x006e	0x006f
96	196	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
	á	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	0x00e9	0x2022
112	112	113	114	115	116	117	118	119	120	121	122	204	206	207	197	127
	p	q	r	s	t	u	v	w	x	y	z	ä	ö	ü	é	•

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 DOSLatinUS.

Refer to Chapter 5 for more details on SW4 settings.

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					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	0x005b	0x005c	0x005d	0x005e	0x005f
80	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
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	0x007b	0x007c	0x007d	0x007e	0x2022
112	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	•
8	0x00c7	0x00fc	0x00e9	0x00e2	0x00e4	0x00e0	0x00e5	0x00e7	0x00ea	0x00eb	0x00e8	0x00ef	0x00ee	0x00ec	0x00c4	0x00c5
128	180	207	197	192	204	200	212	181	193	205	201	221	209	217	216	208
	Ç	ü	é	â	ä	à	å	ç	ê	ë	è	ï	î	ì	Ä	Å
9	0x00c9	0x00e6	0x00c6	0x00f4	0x00f6	0x00f2	0x00fb	0x00f9	0x00ff	0x00d6	0x00dc	0x00a2	0x00a3	0x0020	0x0020	0x0192
144	220	215	211	194	206	202	195	203	239	218	219	191	187	32	32	190
	É	æ	Æ	ô	ö	ò	û	ù	ÿ	Ö	Ü	¢	£			ƒ
0A	0x00e1	0x00ed	0x00f3	0x00fa	0x00f1	0x00d1	0x00aa	0x00ba	0x00bf	0x0020	0x0020	0xeffc	0x002d	0x00a1	0x0020	0x0020
160	196	213	198	199	183	182	249	250	185	32	32	248	247	184	32	32
	á	í	ó	ú	ñ	Ñ	ª	º	¿			□	-	¡		
0B	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
176	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
0C	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
192	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
0D	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
208	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
0E	0x0020	0x00df	0x0020	0x0020	0x0020	0x0020	0x2020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
224	32	222	32	32	32	32	243	32	32	32	32	32	32	32	32	32
		ß					†									
0F	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020	0x00b0	0x0020	0x0020	0x0020	0x0020	0x0020	0x0020
240	32	32	32	32	32	32	32	32	32	179	32	32	32	32	32	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 Chapter 5 for more details on SW4 settings.

Italian

	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	0x00a3	0x0024	0x0025	0x0026	0x0027	0x0028	0x0029	0x002a	0x002b	0x002c	0x002d	0x002e	0x002f
32	32	33	34	187	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	0x00b0	0x00a7	0x00e9	0x005e	0x005f
80	80	81	82	83	84	85	86	87	88	89	90	179	189	197	94	95
	P	Q	R	S	T	U	V	W	X	Y	Z	°	§	é	^	_
6	0x00f9	0x0061	0x0062	0x0063	0x0064	0x0065	0x0066	0x0067	0x0068	0x0069	0x006a	0x006b	0x006c	0x006d	0x006e	0x006f
96	203	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
	ù	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	0x00e0	0x00f2	0x00e8	0x00ec	0x2022
112	112	113	114	115	116	117	118	119	120	121	122	200	202	201	217	127
	p	q	r	s	t	u	v	w	x	y	z	à	ò	è	ì	•

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 Chapter 5 for more details on SW4 settings.

British

	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	0x00a3	0x0024	0x0025	0x0026	0x0027	0x0028	0x0029	0x002a	0x002b	0x002c	0x002d	0x002e	0x002f
32	32	33	34	187	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	0x005b	0x005c	0x005d	0x005e	0x005f
80	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
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	0x007b	0x007c	0x007d	0x007e	0x2022
112	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	•

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 Chapter 5 for more details on SW4 settings.

USA

	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	0x005b	0x005c	0x005d	0x005e	0x005f
80	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
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	0x007b	0x007c	0x007d	0x007e	0x2022
112	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	•

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 Removing the Top Cover

The top cover needs to be removed to perform some of the maintenance tasks. To remove the cover, grasp the side of the cover and pull outwards and up to remove the cover from the mounting rail.

Simply reverse the process to re install the cover once finished with the maintenance.

.

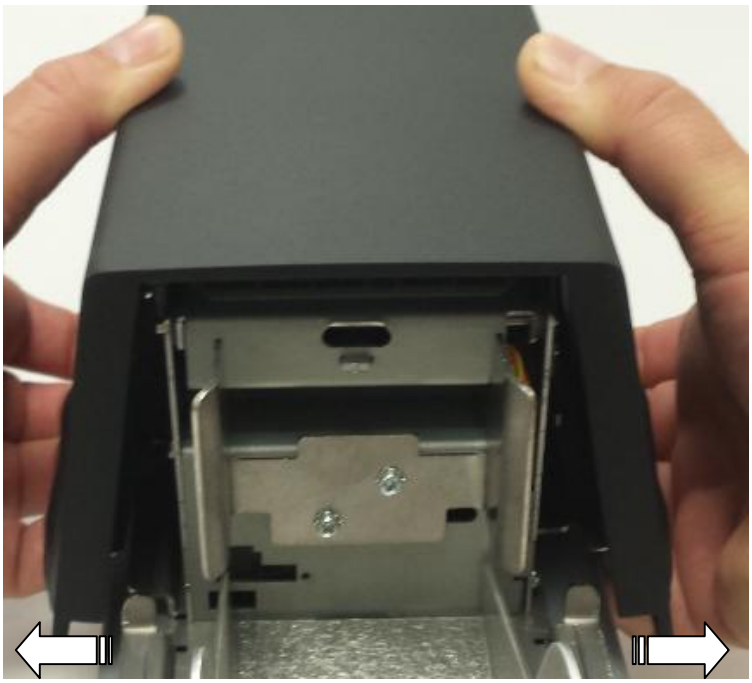


Figure 10-1 Removing the Top Cover

10.3 Thermal Printer Card

Decline in print quality, voids or drop out 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 (3200 tag which is a typical stack of tag or fanfold media).
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. Cut cleaning card so that it fits into the printer.

3. Dampen both sides, of one end, of the cleaning card with isopropyl alcohol.

4. Slide the printhead release forward and insert the cleaning card so that it reside under the printhead and exits the printer.

5. Slowly pull the card out of the printer.

6. Repeat as necessary.

7. Reinstall media.

Thermal cleaning cards should not be used more than three times each, and extremely dirty cards should be disposed of immediately.

CAUTION: Never touch or clean the print head with any abrasive solvents and/or with metal or sharp objects.

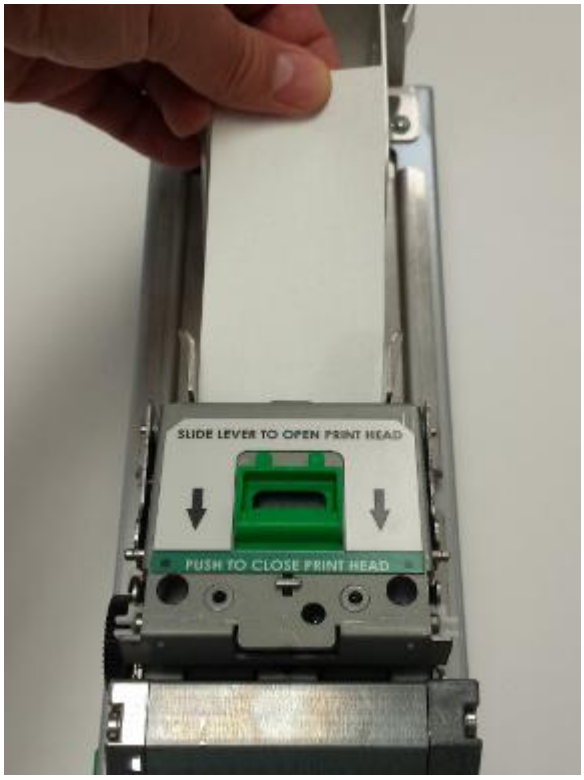


Figure 10-2 Inserting the Thermal Cleaning Card

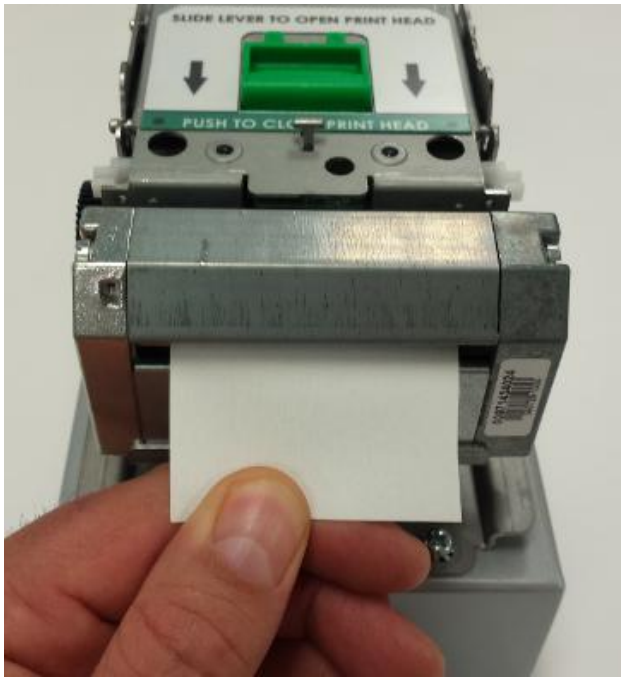


Figure 10-3 Thermal Card Removal

10.4 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 10-4 for common areas needing cleaned.

1. Remove any installed media.

2. Turn the printer power "OFF."

3. Remove the top cover.

4. Using the Head Release Levers, unlatch and raise the Print Head.

5. Basic internal cleaning can be done using a combination of compressed air, soft-bristle brushes; foam/cotton tipped swabs and/or lint-free cloths dampened in alcohol. Using any combination of these materials, remove dust or other contaminants from the printer.

6. When finished, latch the Print Head completely and reinstall the Top Cover and media.

7. Turn the printer power "ON."

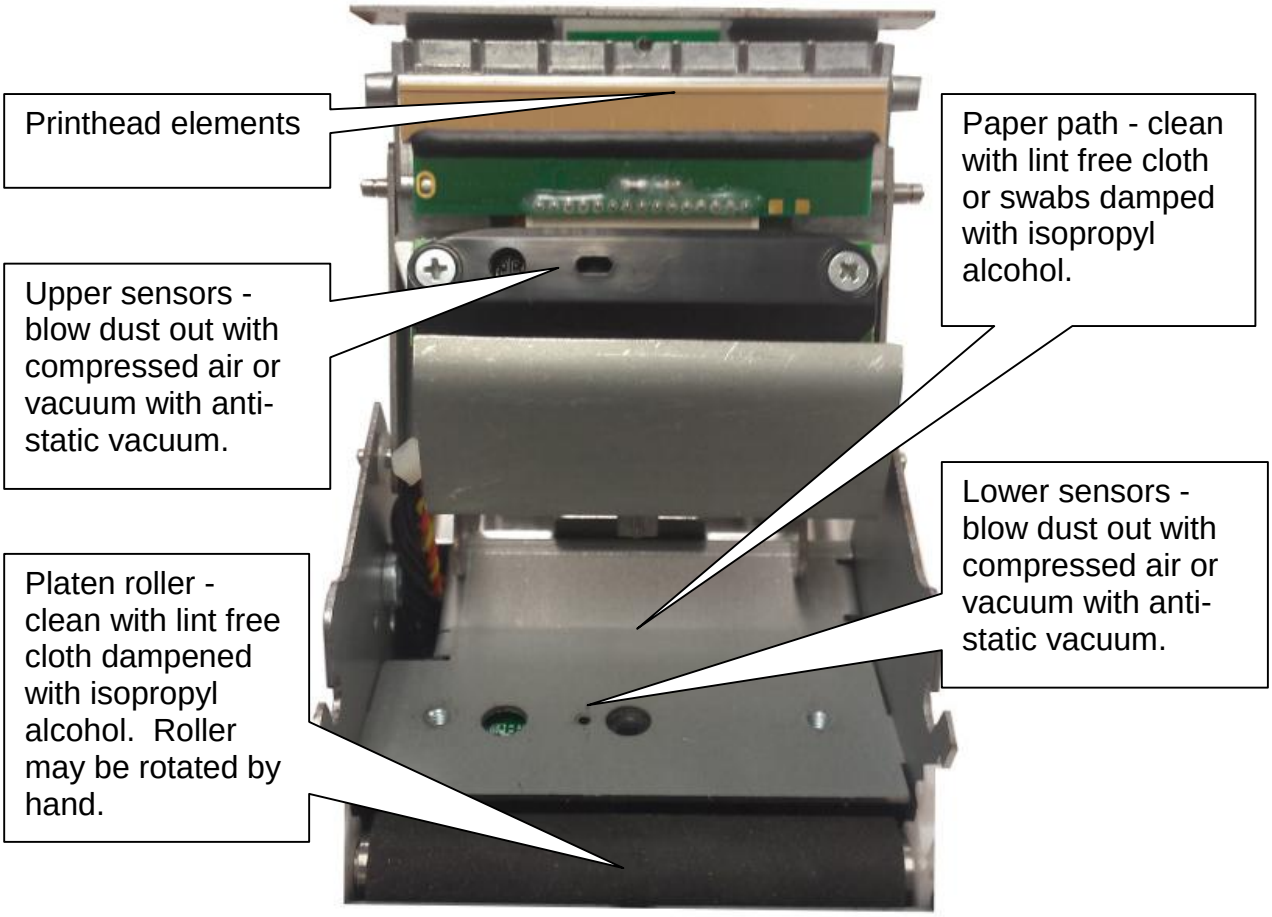


Figure 10-4 Internal Cleaning

10.5 Print head Maintenance

If print quality has not improved after cleaning using a thermal cleaning card or if one is not available, foam or cotton tipped swabs dampened in isopropyl alcohol may be used. Follow the steps below for the proper cleaning procedure:

1. Remove any installed media.

2. Turn the power to the printer “OFF.”

3. Remove the Top Cover from the printer.

4. Unlatch and raise the Print Head.

5. With a foam or cotton tipped swab dampened in isopropyl alcohol, clean the thermal elements by gently rubbing the swab down the length of the Print Head. Allow for the alcohol to evaporate then repeat if necessary.

6. The Drive Roller, Peel Edge, and other basic internal cleaning may also be performed at this time, see the appropriate sections for more information.

7. Latch the Print Head completely and reinstall the Top Cover and media.

8. Turn the power to the printer “ON.”

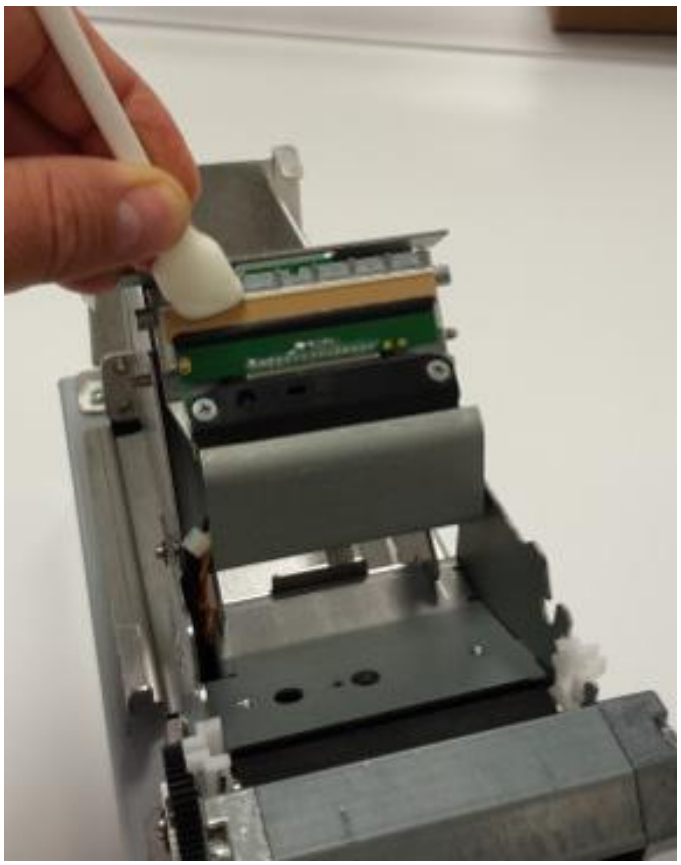


Figure 10-5 Print head Thermal Elements

CAUTION: When performing maintenance inside the printer, always make sure that the print head is latched completely before installing the top cover. Failure to do so may result in damage to the print head.

10.6 Cleaning the Drive Roller

Maintaining a clean Drive Roller not only helps to extend the life of the roller but also helps to reduce print quality issues and media slips that may occur due to dust, label adhesive and other forms of contamination. The Drive Roller should be cleaned after every roll or 512 feet of media:

1. Remove any installed media.

2. Turn the printer power “OFF.”

3. Remove the Top Cover from the printer.

4. Unlatch and raise the Print Head.

5. With a lint-free cloth dampened in alcohol, clean the drive roller. Manually rotate the Drive Roller by the Drive Roller Gear located to the left (from the front of the printer) or by manually rotating the Drive Roller itself to clean the entire Drive Roller surface.

6. Print Head and internal cleaning may also be performed at this time, see the appropriate sections for more information.

7. Latch the Print Head completely and reinstall the Top Cover and media.

8. Turn the printer power “ON.”

10.7 Exterior Cleaning

Although cleaning the exterior surfaces has no effect on the printer’s performance, it will help the overall appearance of the printer. The use of any mild, non-abrasive general purpose cleaner with a lint-free cloth may be used to clean the exterior surfaces. This cleaning should be performed on an as needed basis.

Chapter 11: Troubleshooting

11.1 Troubleshooting Tips

The printer fails to turn "ON" and the status indicator light fails to light:

- ✓ Verify that the printer power switch is in the "ON" position.
- ✓ Verify that the battery is charged enough for printing.
- ✓ Contact your Service Representative.

The printer has no communication:

- ✓ Verify that the communications cable is properly connected to the printer and to an available port on the host computer.
- ✓ Verify that the host port is functioning properly.
- ✓ Verify that the printer proper USB driver has been installed.
- ✓ 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 is in the Bootloader or a tag/tear mode is being used.
- ✓ Remove the tag, the light should turn green if a tag/tear mode is enabled
- ✓ If you were updated code when this occurred, try to load code in a second time.
- ✓ 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 amber in color:

- ✓ This occurs when the printer detects that it is out or paper.
- ✓ Install paper and try again.
- ✓ 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. This printer contains a Lithium-Ion battery. Refer to Section 1.6 for special shipping requirements.

4. Return the defective item(s) for repair to the address listed above, freight and insurance prepaid.

5. 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 + 04: This command is sent to the printer as HEX characters; 00 00 00 00 00 04 to clear the >TAKE LABEL< condition. The >TAKE LABEL< status message is issued when the printer is being used with a ^D97 or ^D98 dispense mode and LTS sensor is detecting media. The communication channel is disabled until the media is taken under normal circumstances so this command is provided to bypass the communication and clear the status. After issuing this command, the media will retract the ^D95 distance and the printers normal communication will return.

The following is the list of ^D commands in numeric order:

^A	^D	COMMAND
	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:** The 238B uses a parallel based USB device so setting the serial baud rate does not have any effect. The machine will run as fast as possible.
	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 = Reserved**

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; 0 = 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**	

^AB	^D	COMMAND
	28	**Software Bank Switch #8:** A non-volatile command used to set the various functions identified below. **^AB12345678** **Position:** **1** **1 = Enable Custom Test Ticket; 0 = Disable** **2** **UNUSED** **3** **1 = Disable Line Feeds; 0 = Enable** **4, 5** **STL Autosize (see also ^D147 and STL Reference Guide)** 00 = Standard D147 Autosize 10 = Enable STL Table Mode Autosize 11 = Enable STL User Mode Autosize **6** **1 = Enable Presenter Option; 0 = Disable** **7** **1 = Enable Reflective Stock Out Detection; 0 = Disable** **8** **1 = Enable LTS Jam Detection; 0 = Disable**
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)
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.

^A	^D	COMMAND
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. Uses the same values as the DPS header value; 0 to 13.
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.
	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.

^A	^D	COMMAND
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**
X	**78**	**Set print head number of dots.**
448		203dpi; 2" (448 dots)
640		300dpi; 2" (640 dots)
640		203dpi; 3" (640 dots)
960		300dpi; 3" (960 dots)
832		203dpi; 4" (832 dots)
1280		300dpi; 4" (1280 dots)
832		203dpi; 4" (832 dots)
1280		300dpi; 4" (1280 dots)
832		203dpi; 4" (832 dots)
1280		300dpi; 4" (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

^A	^D	COMMAND
	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.
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

^A	^D	COMMAND
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
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.

^A	^D	COMMAND
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.
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 (RS232/USB) **1** Ethernet **2** RESERVED **3** RS232 **4** USB

^A	^D	COMMAND
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.
4		Enable full Kiosk Cutter Mode with LTS
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	**GS1 Databar Data Entry Command:** The GS1 Databar, formerly known as the RSS-14. There are 6 different types of GS1 Databar 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.
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.

^A	^D	COMMAND
	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)
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.

^A	^D	COMMAND
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.
2	143	**Save Backup 1 and Reboot (Hard Reset):** This command operates just like option 1 above and also saves a second set of configuration parameters into the first backup position. If the printer powers on and does not detect a configuration, it will first search the first backup position and restore the configuration stored in this location. The command may be sent along with the ^A1^D143 command and is typically only sent when the configuration actually changes.

^A	^D	COMMAND
3	143	**Save Backup 2 and Reboot (Hard Reset):** This command operates just like option 1 above and also saves a third set of configuration parameters into the second backup position. If the printer powers on and does not detect a configuration, it will first search the first backup position. If it does not find a configuration in the first backup, it will then search the second backup location and restore the configuration stored in this location. The command may be sent along with the ^A1^D143 and ^A2^D143 commands and is typically only sent when the configuration actually changes.
	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.

^A	^D	COMMAND
0	**155**	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

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.

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 Transmissive 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
x		203dpi 238
x		300dpi 238
468		203dpi 438
730		300dpi 438
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
X	**162**	**Set Advance/Retract Speed:** This command is used to set the advance/retract speed of the dispense commands (^D97, ^D98, ^D99, ^D111) and uses the same speed table as the ^D46 command.
	163	**Read Current Sensor Status:** This command is used to report the current status of the printer's sensors. This is useful in setup and/or troubleshooting.
	164	**Generate Data Matrix Barcode:** Refer to Chapter 8 for more details.
X	**165**	**Set the Reflective Dot2Gap Value:** This is the distance of the reflective sensor, that detects blackline registration marks, to the dot row.
487		203dpi x28
284		203dpi x24m
720		300dpi x28
438		300dpi x24m
x		203dpi 238
x		300dpi 238
468		203dpi 438
730		300dpi 438
	166	**Generate 4-State Intelligent Mail Barcode:** Refer to Chapter 8 for more details.
X	**170**	**Enter Autoheader User Mode:** See the ^D28 command for more details.
	171	**Enter Telnet Pass-Through Mode on Xport Ethernet device**
X	**176**	**Generate Planet Code Barcode:** Refer to Chapter 8 for more details.
X	**193**	**Generate Aztec Barcode:** Refer to Chapter 8 for more details.

^A	^D	COMMAND
X	194	**Generate QR Code Barcode:** Refer to Chapter 8 for more details.

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