238 SERIES

DIRECT THERMAL PRINTER

OPERATOR'S MANUAL

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Proprietary Statement

This manual contains information proprietary to Microcom Corporation. This information is intended solely for the use of parties operating and maintaining such equipment described herein.

Product Enhancements

Microcom Corporation is committed to the continual improvement of performance and quality in our products. For this reason, specifications are subject to change without notice. Documentation support written up to code version 1.11.44.

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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 238 Series printers have been designed to offer the highest flexibility in finding solutions for the ticketing industry. The 238 Series High torque printers offer a reliable print mechanism that has been designed for 100 percent duty cycle in a long lasting construction. The print mechanism has been designed with a 2" printhead capable of printing up to 8" per second and is available in 203 or 300 dpi print resolutions, in a low or high torque motor configuration, guillotine or rotary cutter, and may be configured with or without a media presenter. The printer incorporates the latest features of the proven LDS software found in earlier Microcom Corporation printers.

238M Front Side View

238M Rear Side View

Chapter 1:   Printer Specifications

1.1 General Specifications

Width*	3.95" (100 mm)
Height*	2.8" (71 mm)
Depth*	4.1" (104 mm)
Weight*	2.35 lbs. (1.25 kg)
Electrical	External Supply with Auto Sensing; 90-264 VAC, 3.5A/1.5A, 47-63 Hz; +24 VDC
Current	3.5 Amps maximum
Temperature	40° F – 104° F (5° C – 40° C), operating
Humidity	10% – 85%, non-condensing
Duty Cycle	High torque motor configuration = 100% Low torque motor configuration = 20%**
RAM Memory	8 Mb
Flash Memory	20 MB
Agency Approvals	RoHS, cTUVus, CE, and complies with FCC Class A
Interface Communications	USB, Optional Ethernet

Table 1-1   General Specifications

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

** NOTE: For a 20% duty cycle example, if it takes 2 seconds to print and present a label, the printer must be idle for a minimum of 8 seconds before printing the next label, or a minimum of 10 seconds total per label.

1.2 Printing Specifications

Print Type	Direct Thermal
Print Resolution	203 DPI (8 dots/mm = 0.0049" per dot) 300 DPI (12 dots/mm = 0.0032" per dot)
Maximum Print Speed	8"/sec. (203 mm/sec.) for the high torque configuration 6"/sec. (152.4 mm/sec.) for the low torque configuration
Maximum Print Width	203 DPI = 2.21" (56 mm); 448 dots 300 DPI = 2.24" (56 mm); 672 dots
Minimum Print Length	0.25" (6 mm)

Table 1-2   Printing Specifications

1.3 Media Specifications

Media Types	Continuous, die-cut, preprinted and tag stock either rolled or fanfold
Maximum Media Thickness***	Up to .013" (.33 mm) with high torque option
Maximum Media Width	2.25" (57 mm)

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

Table 1-3   Media Specifications

Chapter 2: Features and Options

2.1 Fonts

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

2.2 Graphics

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

2.3 Bar codes

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

- ***Two-dimensional***
  - GS1 Databar Omni-directional
    Truncated
    Stacked
    Stacked Omni-directional
    Limited
    Expanded
  - PDF-417
  - Aztec
  - QR Code
  - Data matrix

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

- Expandable in height and width.

2.4 Special Features

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

2.5 Options

- +24 VDC Universal 100W Desktop Power Supply
- 300 dpi print head
- Heavy Duty Rotary Cutter
- Presenter Assembly
- Pinch Assembly
- Ethernet Port
- Pre-Stock Out Sensor Assembly
- Low Paper Sensor Assembly
- Paper Supply Holders
- Media Catch Trays
- 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 shows a 238M, power supply and optional USB Cable. 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

2 prong 24VDC input

USB Mini Connection

Adjustable Line guides - should be adjusted to contact the edges of the media

AUX - Mini Molex 4 Pin connector for optional reflective sensor

Optional reflective sensor light used to show when sensor operation
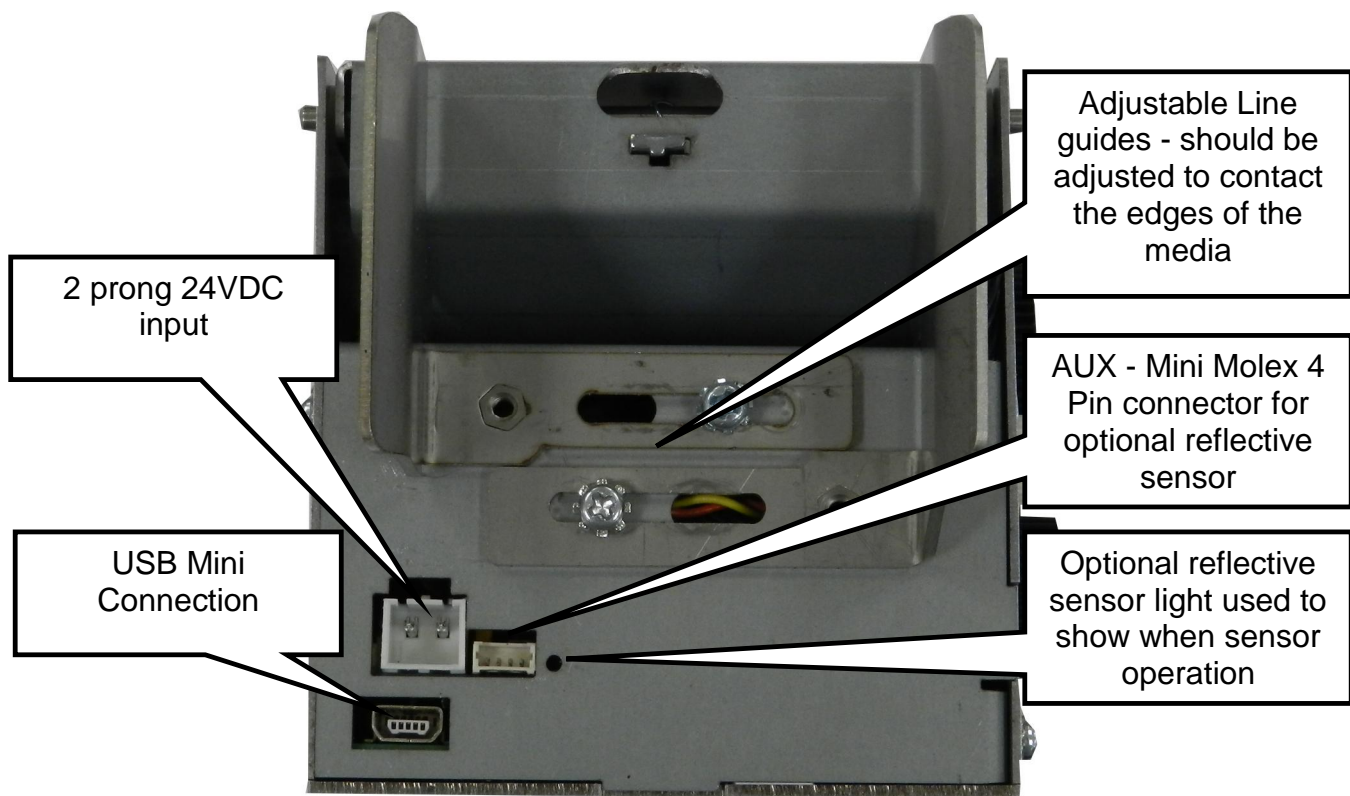
Figure 3-2   Printer Rear Panel

3.2   Printer Power

The printer has a universal auto-sensing internal power supply that operates in the 90-264 VAC, 3.5/1.5A, 47-63 Hertz range. The two-prong female end of the power cord plugs into the mating connector located on the back of the printer.

3.3   USB Communication Interface

The 238 printer provides a single USB port for communication to a host device using a USB Type A to Mini B cable. In order to communicate with the printer, the FTDI USB driver must be installed on the host computer.   This may be downloaded at http://www.microcomcorp.com/support/drivers/.

3.3.1   USB Driver Setup

Below is sample dialog while installing the FTDI based USB driver found on the Microcomcorp.com website.
If there is an available Internet connection, Windows will silently connect to the Windows Update website and install any suitable driver it finds for the device once connected. If a manual install is desired, follow the instructions below.

Run the CDM.exe driver to install the FTDI based USB.

Click "Continue Anyway" if this dialog box pops up.
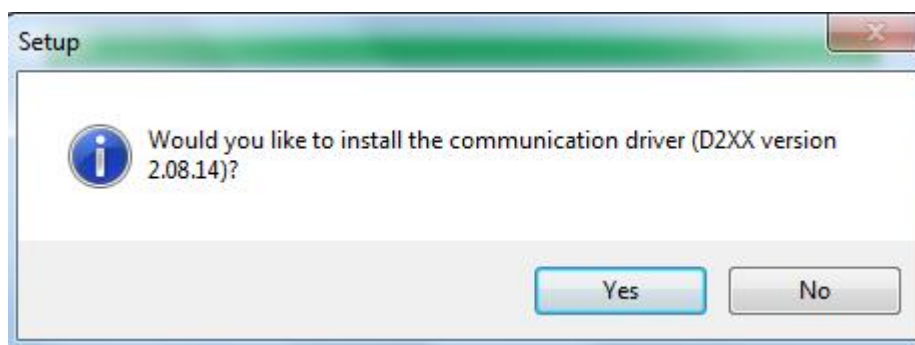
The next step is to install the D2xx.dll. While this is a communication port (RS-232) emulator, no configuration of the RS-232 port serial parameters is required.

Once installed, the FTDI USB device will show up as a USB SERIAL PORT (COMx) listed under the "COMM PORTS AND LPT" within Device Manager. The "x" indicates the COMM port number this will be used for that USB port connection to the printer.

Connect the power cable and the USB cable to the printer and turn the printer on. If already connected, disconnect USB and then reconnect the USB. The FTDI USB device should now recognize and install.

3.4 Optional Ethernet Communication Interface

The printer provides an option to add an ethernet port to the printer. The printer Ethernet port must be properly set up and the printer active port must be set to Ethernet, see the ^D108 command for more information.

3.4.1   Ethernet - Microcom Ethernet Option Board

The Microcom Ethernet Option Board provides different methods of configuring the Ethernet port for usage.

Printer's ship from the factory with DHCP enabled and if a DHCP server does not assign an IP address within a minute, the printer will use AUTO IP to assign an available IP address (169.254.X.X with X representing a random unused value) and the NET Mask assigned to 255.255.0.0.

The printer's reset default is set to a static IP address of 192.168.200.3, a NET mask of 255.255.255.0, a local port of 9100, and the Telnet port of 23. This is only if the Ethernet option board has been reset.

Please note that you will need to add the 192.168.200.3 address to your network in order to communicate to the printer via the Web Interface if DHCP is disabled.

3.4.1.1   IP Discovery Application – Microcom Ethernet Option

The quickest and easiest method of assigning the ethernet connection settings would be to use the IP Discovery application. Download this application from our website at: https://www.microcomcorp.com/products/438s/#downloads and selected by going to the UTILITIES tab.

Run the application after downloading and installing.
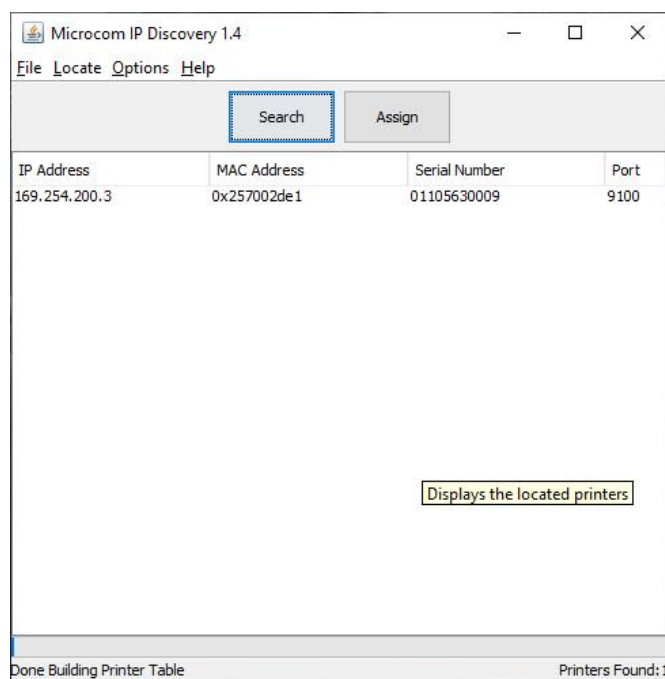
Select the "Search" button to find the printer attached to the network. Printers detected on the network are reported in the window. The printers listed, will list their current IP address, MAC address, and serial number.

Select the printer that you would like to make changes to and double click on the entry or select the ASSIGN to set the Ethernet parameters.

3.4.1.2   HTTP Web Configuration – Microcom Ethernet Option

Follow these instructions to use the HTTP Web interface to configure the Microcom Ethernet Option board.

Power the printer up with the print button pressed and held in and then release the button once the printer boots and the light turns solid green. This is the diagnostics mode and a printout will print. The printer's current IP address is listed on this printout. Note: cycle printer power to exit the diagnostics mode.

Open and internet browser, preferably Chrome or Firefox.

Enter the current IP address in the browser bar (please note that your network will need to be able to access this address).
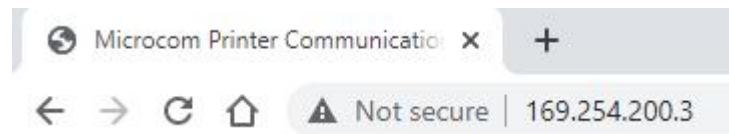
The browser should initially ask for a username and password; both of which default to 'mic'.

Once signed in, the configuration page of the application is displayed:

Once the changes are made, the "Save Config" button must be selected to save the new parameters and reboot the ethernet board.

The File Upload section of the configuration screen may be used to send commands or files directly to the connected printer. Any feedback sent from the printer will be displayed in the window. Notice the ^D29 command in the Send Command line and the response in the window.
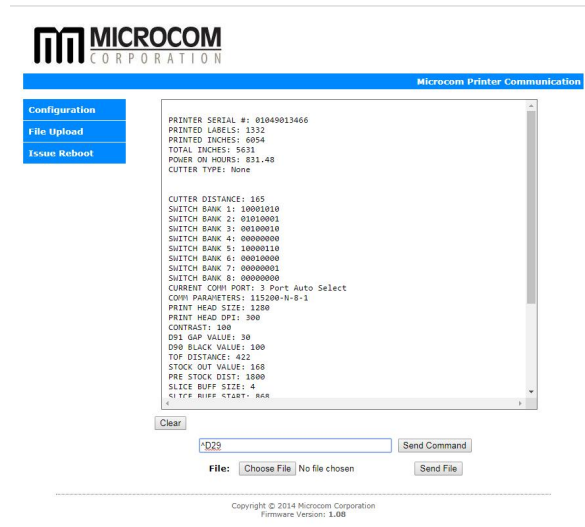
3.4.1.3 Telnet Using MCT – Microcom Ethernet Option

A terminal program like MCT may be used to open a Telnet session on port 23 of the ethernet option. This may be used to configure the Ethernet settings as well. The Username and Password are "mic" by default. Typing 'h' after logging in provides the list of available commands.
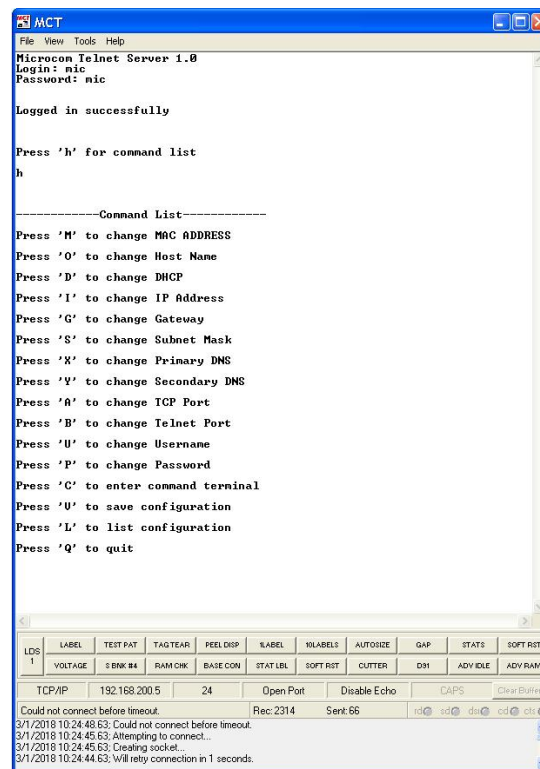
3.4.1.4   **Telnet Using Command Prompt – Microcom Ethernet Option**

Open the Microsoft command line and enter "telnet microcom". The user name and password by default are both "mic". The "v" option must be used to save and reboot to save any changes.
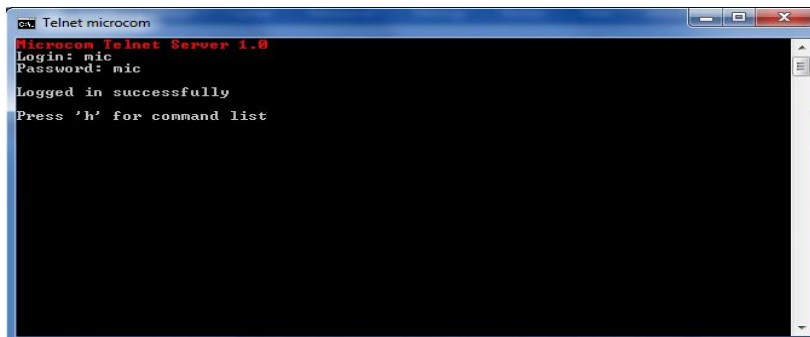
3.4.1.5   **LDS1 Commands – Microcom Ethernet Option**

The LDS1 commands may also be sent to the printer to configure the Microcom Ethernet Option. The ^D177 command is used to configure the Ethernet option. A basic summary is included below; for more detailed information, please refer to the ^D177 command in Chapter 5.

	LDS1	**Description**
1.		
2.	^A0^D177	Compare and save parameters
3.	^A1^D177	Change IP address
4.	^A2^D177	Change TCP port
5.	^A3^D177	Change DHCP enablement
6.	^A4^D177	Change NetBIOSName
7.	^A5^D177	Change Gateway
8.	^A6^D177	Change Subnet Mask
9.	^A7^D177	Change MAC address
10.	^A8^D177	Display printers current Ethernet parameters
11.	^A9^D177	Save current parameters

3.4.2   Configuring the printer to use Ethernet

Before the printer uses the Ethernet port, the printer must also be configured to use the ethernet port by using the ^D108 command. See the ^D108 command under Chapter 5 for additional information.

Modes 1 (^A1^D108) sets the XPORT/USB Autodetect while modes 5 (Microcom Ethernet Option) and 6 (3 Port Auto Select) may be used to configure the printer for Microcom Ethernet Option.

Turn the printer ON with the print button pressed and held in. Release the button after the printer status light turns a solid Green. This is the diagnostics mode that may be used to connect to the printer to set the appropriate ^D108 command setting.

Using a Terminal Program, like MCT connect to the active printer port (typically Serial or USB) and send the appropriate ^D108 command to the printer.

The MCT screen capture below shows a printer connected to the USB port with the ^D29 being issued.

LDS1	**Description**
^A0^D108	Auto select
^A1^D108	2 Port Auto Select (USB, Xport Ethernet Only)
^A2^D108	Onboard USB
^A3^D108	Onboard RS-232
^A4^D108	Onboard USB
^A5^D108	Ethernet Option Board (Microcom Ethernet Option)
^A6^D108	3 Port Auto Select (USB, Serial, Microcom Ethernet Option)

```
MCT                                                              —   □   ×
File  View  Tools  Help
^D29
PRINTER SERIAL #: 01105630009
PRINTED LABELS: 115
PRINTED INCHES: 399
TOTAL INCHES: 474
POWER ON HOURS: 639.05
CUTTER TYPE: Rotary
CUTTER MODEL: Microcom
CUTTER ENABLED: Full
CUTTER DISTANCE: 110
SWITCH BANK 1: 10001010
SWITCH BANK 2: 01010001
SWITCH BANK 3: 00100010
SWITCH BANK 4: 00000000
SWITCH BANK 5: 10000110
SWITCH BANK 6: 00000000
SWITCH BANK 7: 00000001
SWITCH BANK 8: 00000000
CURRENT COMM PORT: Onboard USB
COMM PARAMETERS: 115200-N-8-1
PRINT HEAD SIZE: 832
PRINT HEAD DPI: 203
CONTRAST: 100
D91 GAP VALUE: 30
D90 BLACK VALUE: 100
TOP DISTANCE: 285
STOCK OUT VALUE: 168
PRE STOCK DIST: 1800
SLICE BUFF SIZE: 4
SLICE BUFF START: 1240
CUTTER CLEARS: 0
EURO LOCATION: 0
ERROR INPUT: 00H
TRANSMISSIVE DISTANCE: 264
REFLECTIVE DISTANCE: 487
CONTRAST LIMIT: 150
ADVANCE/RETRACT SPEED: 8
PRINT MODE: 0
NET BIOS NAME: MCOM_002DE1
DHCP SETTING: ENABLED
TCP PORT: 9100
IP ADDRESS: 192.168.200.3
SUBNET MASK: 255.255.255.0
GATEWAY: 192.168.200.5
MAC ADDRESS: 00:02:57:00:2D:E1
ETHERNET REV: 01.13
TAKE UP DELAY: 0
APPLICATION REV: 1.11.44
BOOTLOADER REV: 1.00.12
CODE ASSY PN: 076010-011144
```

You would connect to the printer using the active port. The example above shows that the active port is the USB port, so connect to this port and send the appropriate command to enable ethernet use.

Sending a ^A1^D108 would set the printer to the 2 Port Autoselect between the USB or the XPORT Ethernet port.

Sending a ^A5^D108 or ^A6^D108 command would set the printer to either use the Microcom Ethernet Option board or to the 3 Port Auto Select (Serial, USB, or Microcom Ethernet).

3.5   Qualsoft Windows Driver

3.5.1   Installing the Windows Driver

This section explains the driver installation process. The Qualsoft Windows print driver may be used with Windows 7, 8.1, and 10 operating systems. If the printer is intended to be used on a USB connection, the appropriate USB driver must be installed before the printer is able to be used with the driver. The X38 based products use an FTDI based driver while the X85 based products use a Microcom Corporation based driver.

The driver requires that the User has ADMIN privileges in order to install the driver. The installation process sample shows the Windows 7 installation.

1. Right click on the installer, and select "Run as administrator".

2. Click the "Next" to continue the installation.
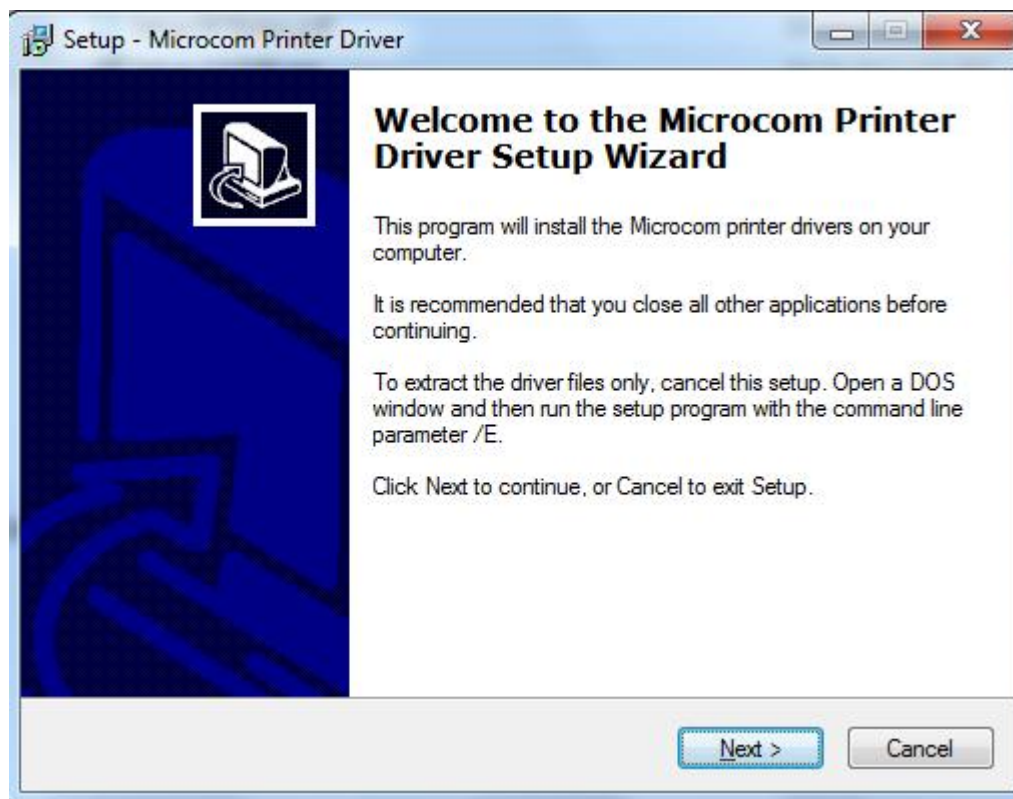
3. Wait for the installer to finish setting up the driver files.
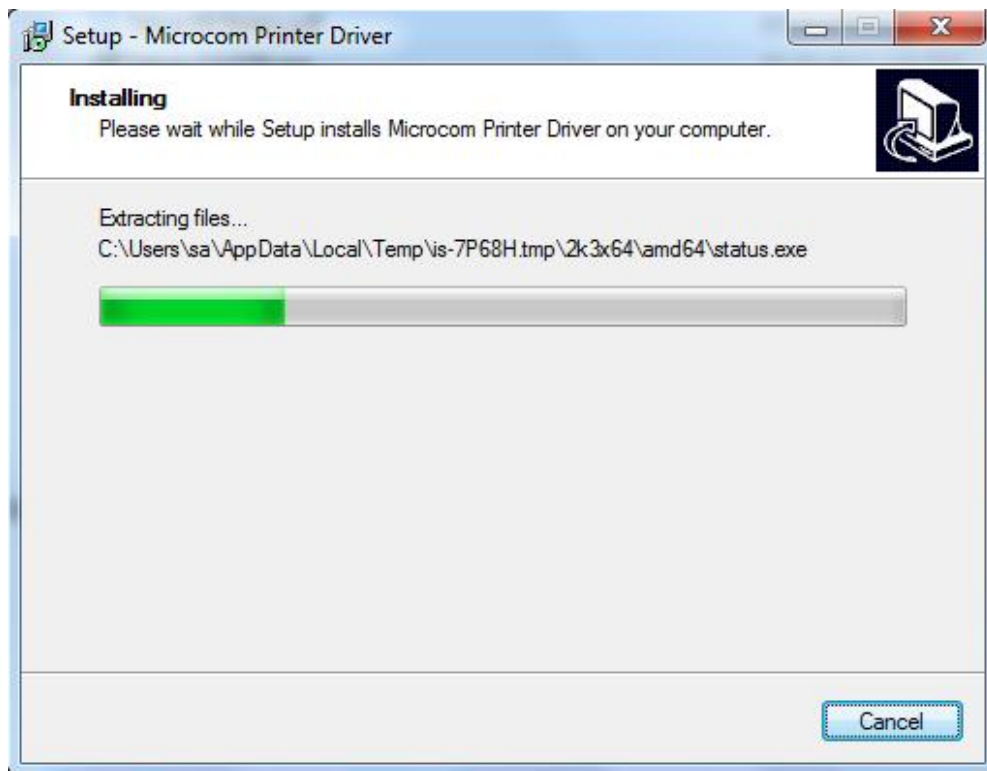
4. Select the New install or Uninstall existing driver if already running a Qualsoft version or if installing more than one printer, select the Install another printer model (Copy n).
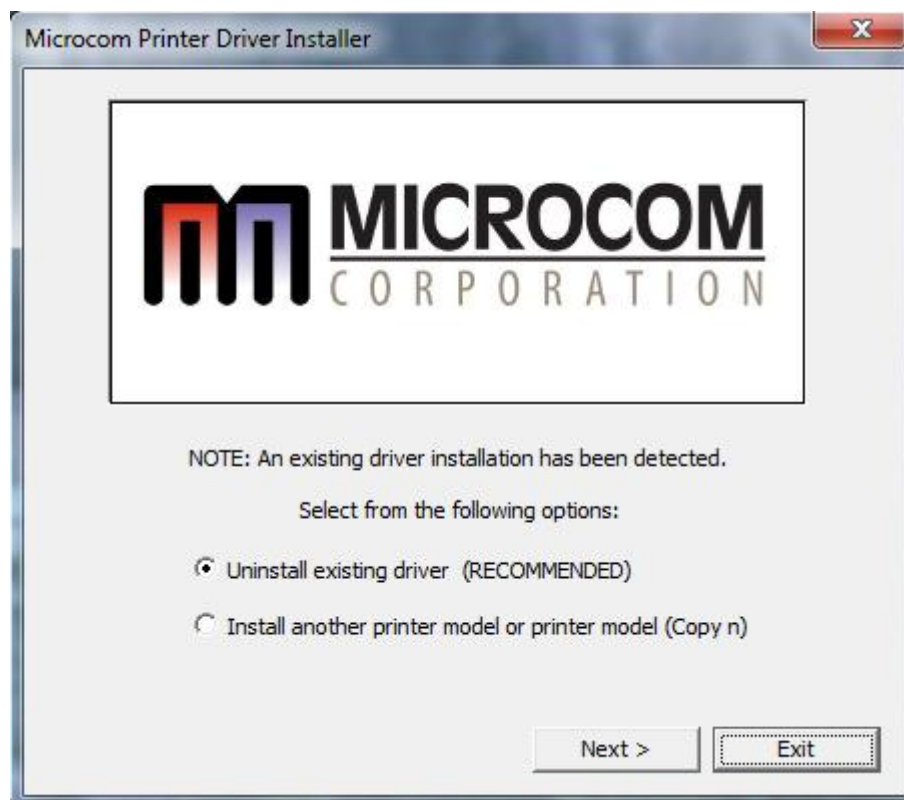
5. Select the Model number of the printer being installed.

6. Select the communication port that is going to be used with the printer.
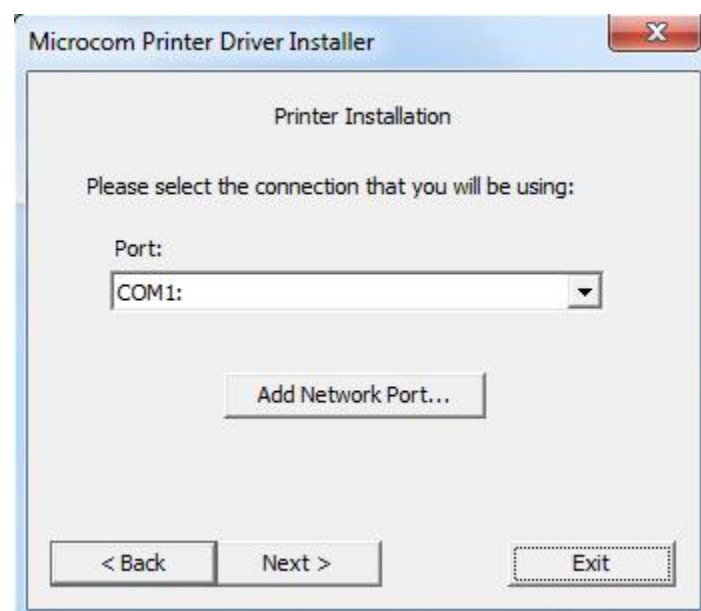
7. Select next to start the installation.
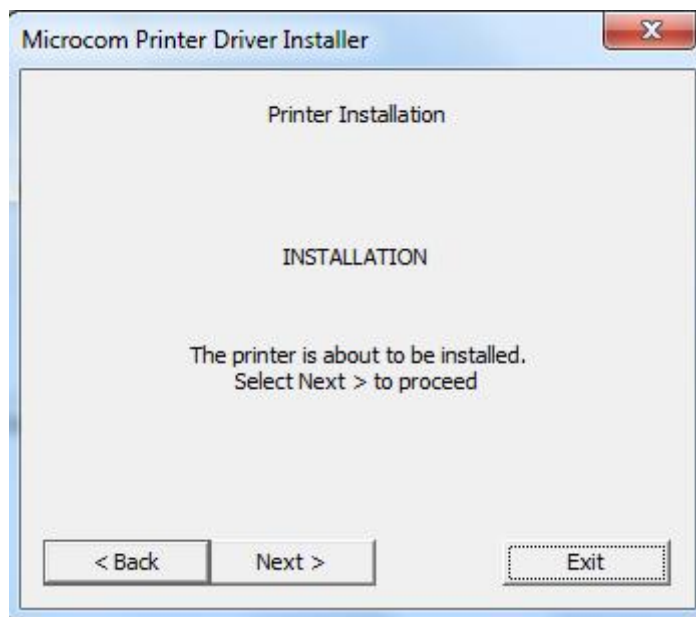
8. Once the installation is complete, select "Exit" to finish the installation.

9. Select "OK" if prompted to restart and complete the installation.
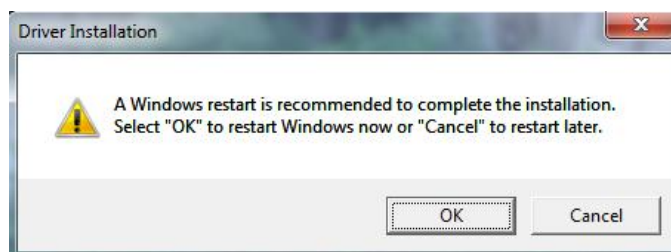
3.5.2   Configuring the Driver

This section will explain how to configure the Windows Driver for proper operation. The example below also shows a Microcom Thermal Printer under Unspecified devices. This is the USB driver that is loaded when the printer is powered on and the printer USB port is connected to the printer.
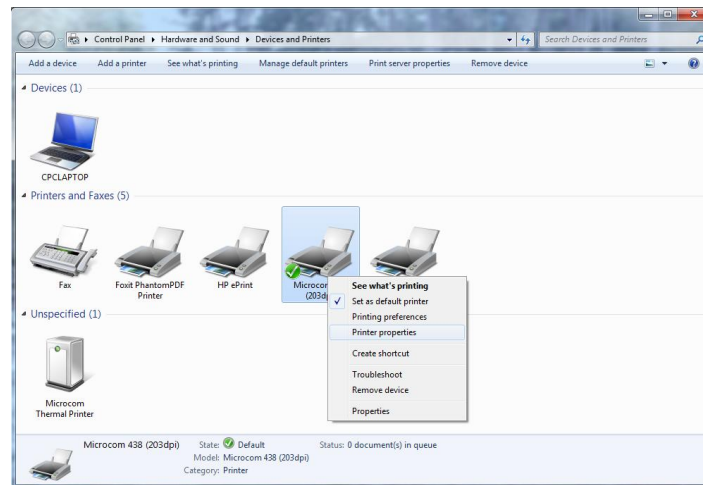
Under Devices and Printers, you should see the printer model that was installed. Right click on the icon and select Printer properties to setup and to change the driver settings.

3.5.3   Printer Properties Page - General tab

This opens the printer properties page. From this screen, Print Test Page may be selected to generate a test page that is sent to the printer. The test page is printed on the media size and type that are specified in the driver preferences.
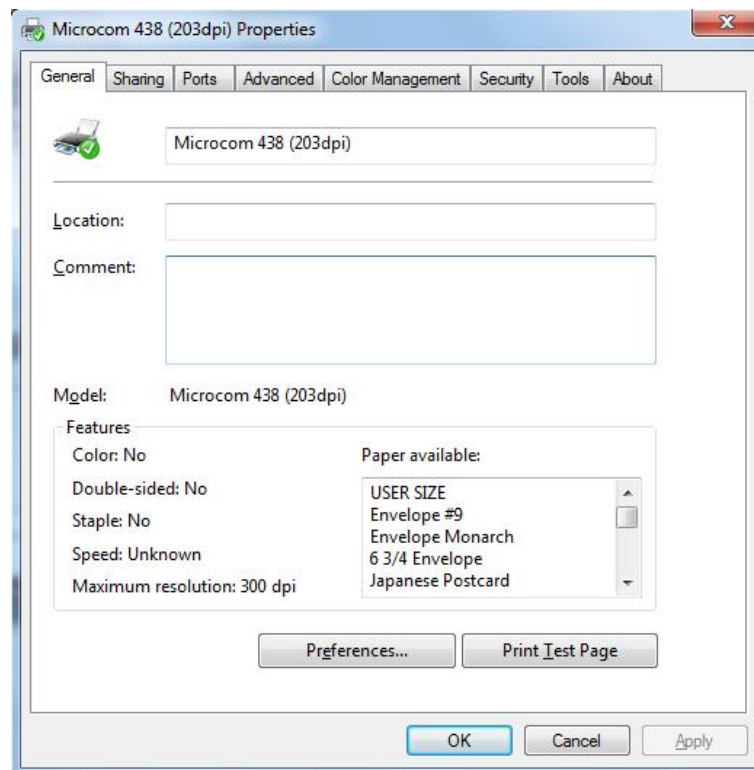
3.5.4 Printer Properties Page - Ports tab

Selecting the Ports tab at the top allows the printer port to be changed if connecting to a different printer communication port.
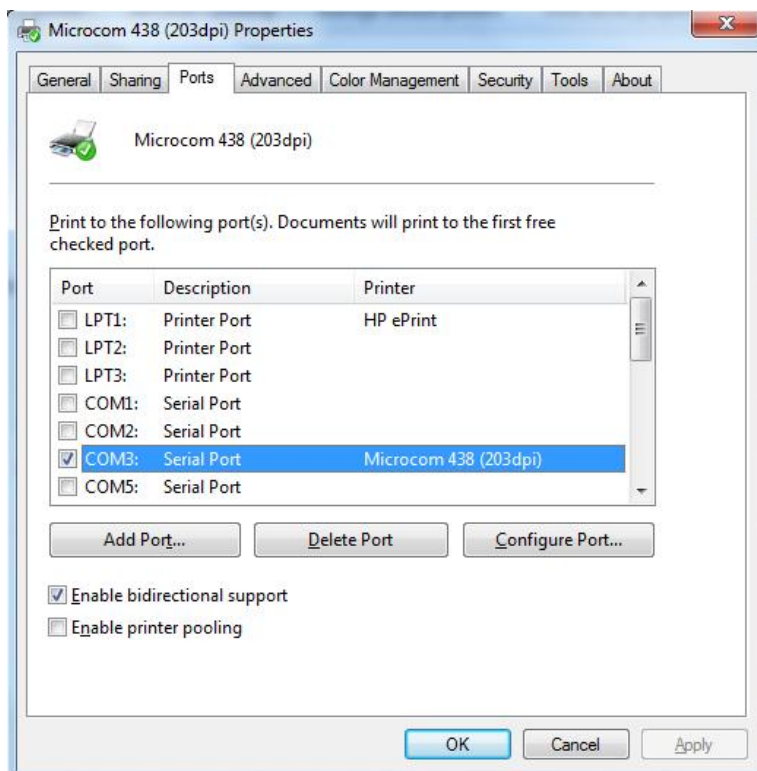
3.5.5 Printing Preferences - About tab

Selecting the Preferences icon at the bottom left of the Printing properties window opens the driver "About" tab. This shows the driver version number and release date.

3.5.6   Printing Preferences - Print tab

The Print tab shows the available options that may be set. Typically, these are already set for proper operation and do not need to be adjusted.
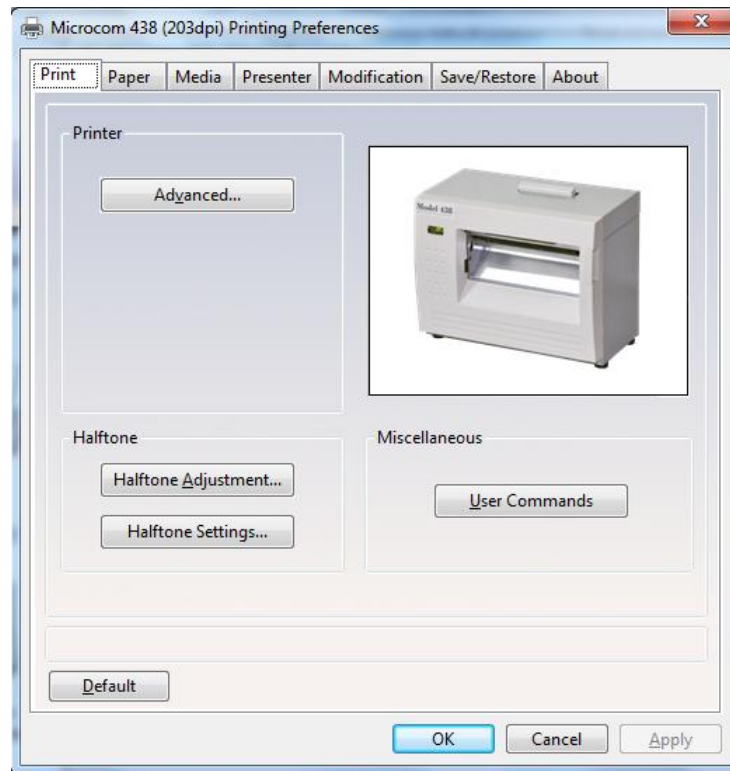
3.5.6.1   Print tab - Advanced

The Advanced tab is used to specify the print resolution and the printhead width. This tab is automatically set when selecting the printer model to install and should be ignored. This screen is typically used for development testing and custom solutions.
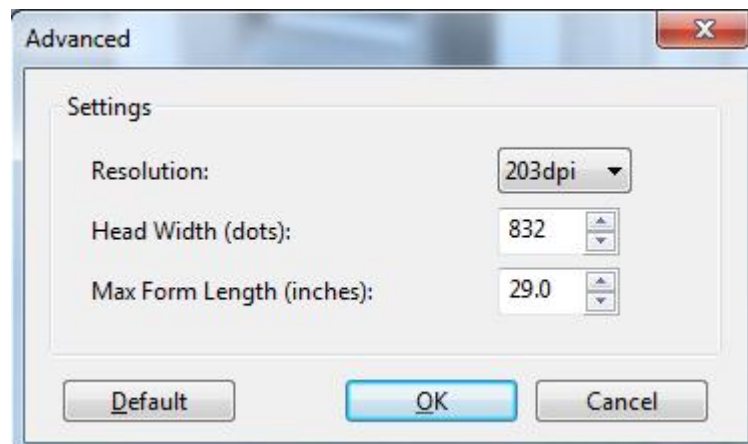
3.5.7   Print tab - Halftone Adjustment

The Halftone Adjustment icon opens the dialog windows below. This allows the user to manipulate the image settings that the driver uses to produce images.
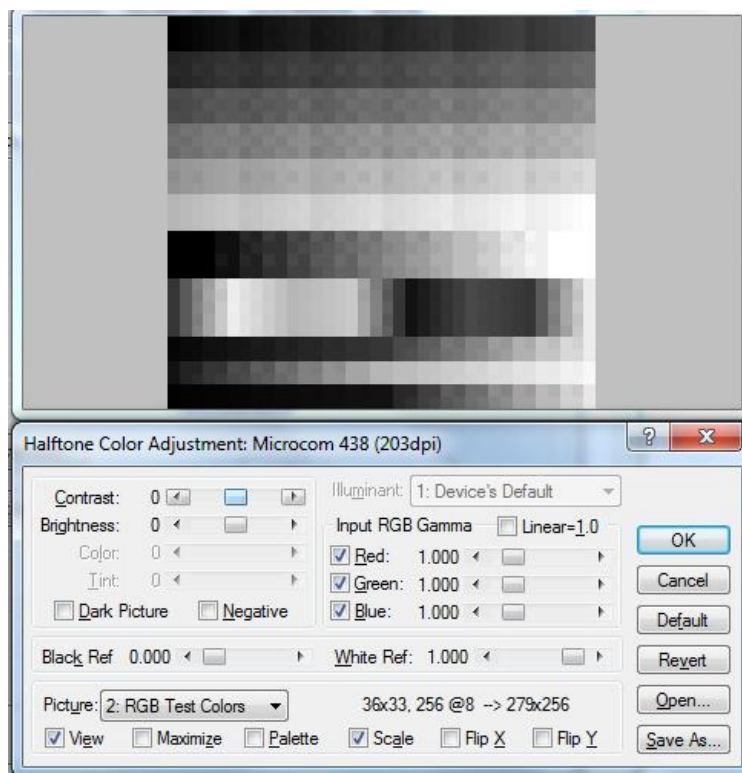
3.5.8   Print tab - Halftone Properties

The Halftone Properties page allows for dithering options and additional image manipulation to alter the image that is produced and printed.
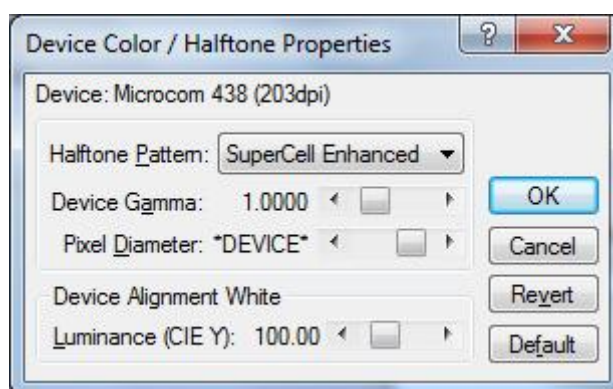
3.5.9   Print tab - User Commands

The User commands tab allows for the user to pass printer commands directly into the data stream. This is typically used for either troubleshooting or custom override commands.
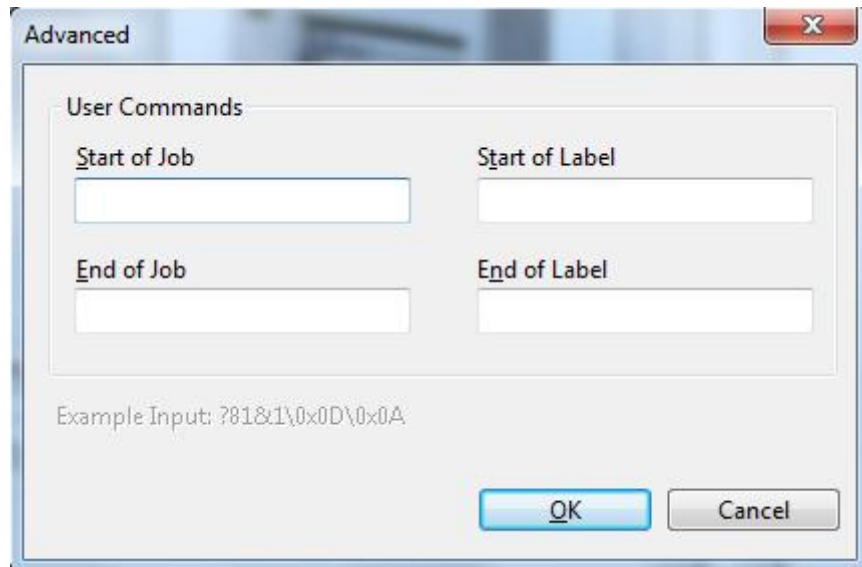
3.5.10   Printing Preferences - Paper tab

The Paper tab is where the user adds custom form sizes and adjusts minor handling effects. The form sizes that are created here are added to the Windows Print Server Properties for the model installed.
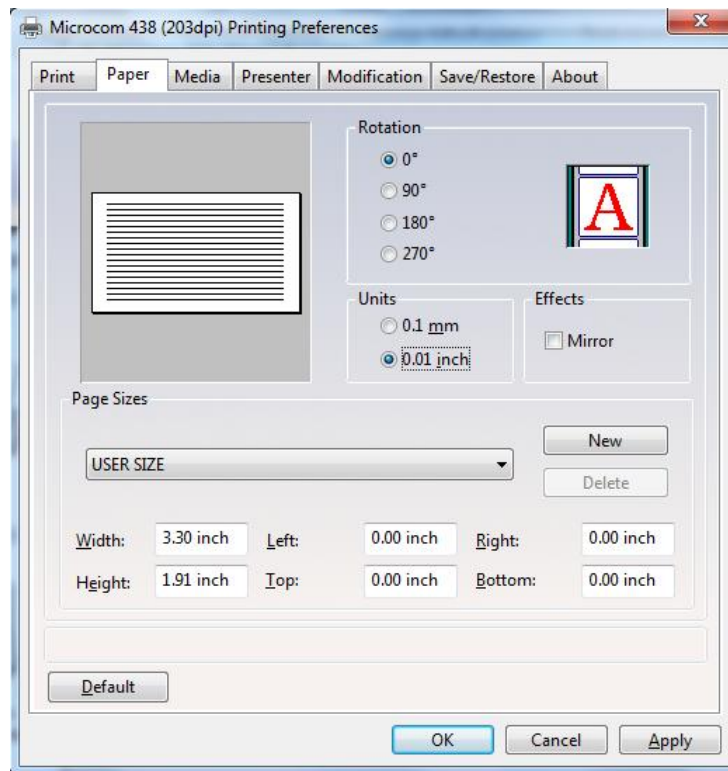
3.5.10.1   Paper tab - Rotation
The rotation setting rotates the image being printed. This is used when Portrait or Landscape is used. The "A" image shows the rotation setting impact.

3.5.10.2   Paper tab - Units
This is used to select the units that the driver uses for most measurements. Some units are in dots or pixels and should be entered as such.

3.5.10.3   Paper tab - Page Sizes
This is where the user enters forms to the Print Server Properties of the driver. Select the drop down menu to select standard forms that have been installed with the driver or enter the size of your form and select the New icon to create a form size that matches your media.

3.5.10.4   Paper tab - Mirror
Selecting this option will cause the image to appear like it being observed in a mirror.
3.5.10.5   Paper tab - Default
This button will cause the driver to load in its default settings for the model driver installed. Please note that this default may not represent your media type or size.

3.5.11   Printing Preferences - Media tab
The Media tab is used to set specific setting of the media size and operations that in a form that the printer requires to maintain correct registration.
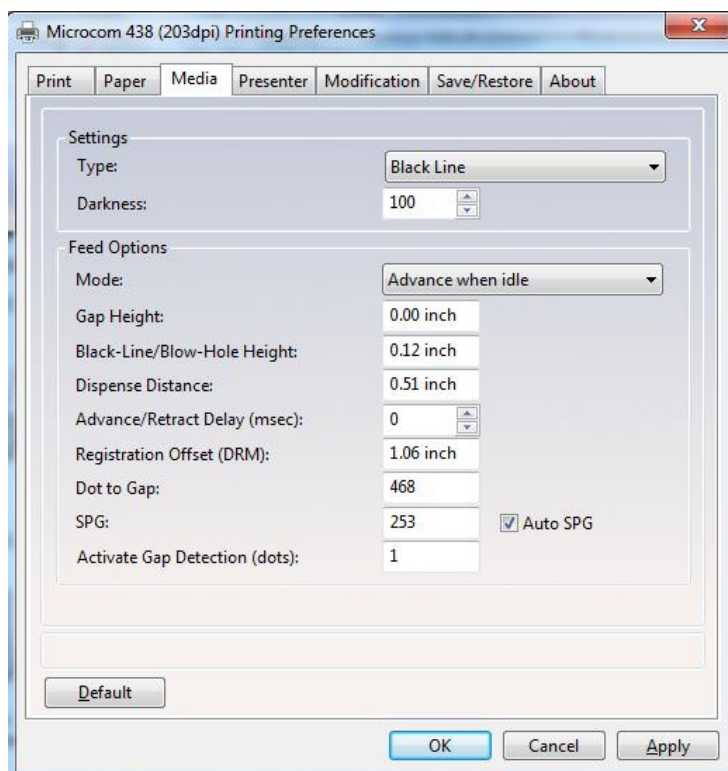
3.5.11.1   Media tab - Settings
The Settings control the Type of registration that the printer will use to align the media being used and the Darkness of the image being printed.

3.5.11.1.1   Settings - Type
This field sets the registration method that the printer will use to register job to job. This type should be set to the type of registration mark that is used to indicate the form size. The Continuous setting instructs the printer to ignore registration marks and will move media based on the form size settings. The Blackline setting cause the printer's reflective sensor to look for a blackline mark and register based on the other Feed options. The Diecut and Blowhole settings cause the printer to use its transmissive sensor to detect the backing material between labels or an actual hole in the media.

3.5.11.1.2   Settings - Darkness
This sets the darkness or contrast that the printer uses to image. As the value increases, the higher the thermal temperature setting is used for imaging. The lowest temperature that produces quality images should be used to extend the printhead life.

3.5.11.2   Media tab - Feed Options
The Feed options handle post printing dispensing and media options that are used by the printer to properly register the media from page to page.

3.5.11.2.1   Feed Options - Mode
The Mode is used to select the type of dispense option used after the printer has printed. The options include None, Advance when idle, Advance every label, Cut after label, and Cut with LPD.

Selecting the "None" option will disable the dispense modes. The printer will print the job and then stop without performing any dispense option.

The Advance when idle dispense option causes the printer to advance the Dispense Distance after the printer's communication port has gone idle. This mode does not require a label present sensor to function. For example: If printing 5 jobs, the printer would advance after printing the fifth job.

The Advance every label is a dispense mode that does use the printer's label present sensor. The printer will print a job and then advance the job by the Dispense Distance. A second job will not be processed until the printed/dispensed job has been taken (the LPD no longer detects the advanced job). Once the job has been taken, the printer will process the next print job. The Advance/Retract delay is also used in conjunction with this command. This delay starts after the label has been taken.

Cut after label causes the printer to advance the Dispense Distance after the job has been printed and then cycles the cutter. This mode does not use the Label Present Sensor.

The Cut with LPD is a mode that the printer will advance the Dispense Distance after printing and cut the label. The LPD is used to prevent the next job from printing until the current job has been taken by the user.

3.5.11.2.2   Feed Options - Gap Height
This field is used to specify the height of the backing material between labels typically found on die cut media types. As the media is moved through the printer, the height of the Gap would be what the printer's transmissive sensor would detect and use for page to page registration.

3.5.11.2.3   Feed Options - Blackline/Blowhole Height
This field is used to specify the height of the blackline or Blow hole that is used for registration on media types containing a blackline of blowhole. The printer uses its reflective sensor to detect the blackline as the media is passed through the printer and would use its transmissive sensor to detect the blowhole.

3.5.11.2.4   Feed Options - Dispense Distance
This is the distance that the printer uses to move the media forward to dispense and it used in conjunction with the Mode. The printer moves out this distance and then would retract the same distance so it does not impact registration.

3.5.11.2.5   Feed Options - Advance/Retract Delay
This field is used to specify how long the printer will wait in msec after the media has been taken when the Advance every label mode or Cut with LPD modes are used.

3.5.11.2.6   Feed Options - Registration Offset (DRM)
The registration offset is used by the printer to calculate the correct SPG (Steps Past Gap) value that the printer will use for registration. This distance is from the first printable area of the media to beginning of the registration mark as it would pass through the printer.

3.5.11.2.7   Feed Options - Dot2Gap
This field is the distance of the registration sensors to the dot row and is used to calculate the Steps past gap or SPG value used to align the print from page to page. This value is fixed value for each printer model. Some printer models have a different sensor location for the blackline reflective sensor and the Transmissive Gap sensor. Please review the printer manual for more information regarding the correct value for the Dot2Gap. The value entered is in dots or pixels.

3.5.11.2.8   Feed Options - SPG
The Steps Past Gap (SPG) is a format header parameter that the printer uses to register the page properly. If the Auto SPG is checked, the driver will automatically calculate the proper SPG based on the other entered fields. If unchecked, the SPG is entered in manually. This value is entered in as dots.

3.5.11.2.9   Feed Options - Activate Gap Detection (dots)
The Activate Gap Detection is the distance in dots that the printer will move media before trying to detect a registration mark. The default of 1 typically works for most media types. If the media being used contains preprint in the sensor area, the AGD may need to be used to disable registration detection until passing over the preprinted areas.

3.5.12 Printing Preferences - Presenter tab
The Presenter tab controls the operation of the optional presenter or pinch assemblies available on some printer models. A presenter and pinch assemblies are post-printing devices that typically take a printed and cut form and presents it to the user only after is has printed completely. Not every printer model is capable of running a presenter. Check with your sale representative to see if a presenter is supported. This tab is ignored on models that do not support the use of a presenter.
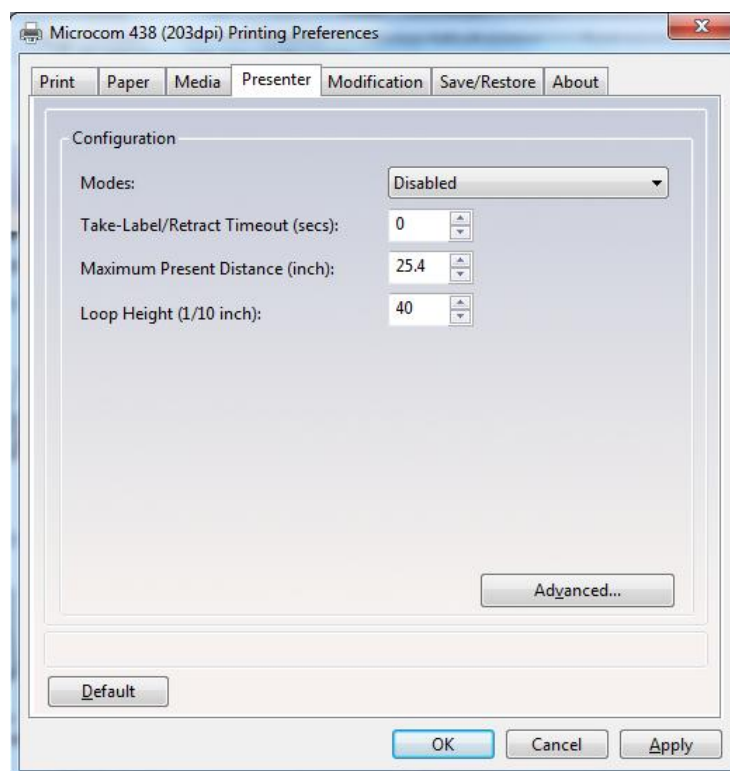
3.5.12.1 Presenter tab - Configuration
The fields listed under the Configuration section control the Presenter operation on printer model that are compatible with the presenter.

3.5.12.2 Configuration - Modes
This is used to select the mode of the presenter. The valid modes are enabled, passthrough, and disabled. When selecting Enabled, the printer with presenter would present the media using the other fields for operation while selecting Passthrough mode will simply cause the presenter to run while the printer is printing.

3.5.12.2.1 Configuration - Take-Label/Retract Timeout (secs)
This field controls the time that the presenter will present the paper before retracting into the waste bin.

3.5.12.2.2 Configuration - Maximum Present Distance (inch)
This is the maximum size that the printer will present when using the enabled mode. This value is in inches.

3.5.12.2.3   Configuration - Loop Height (1/10 inch)
The Loop Height is a value in 1/10 inch that the printer uses to delay the presentation of the media. The printer would print and form a loop at the presenter and once this value is reached, the presenter would present.

3.5.12.3   Configuration - Advanced
The Advanced button is included as a manual override of the recommended settings that the presenter will use for the various speeds. Typically, these values do not need to be adjusted for the presenter to function.
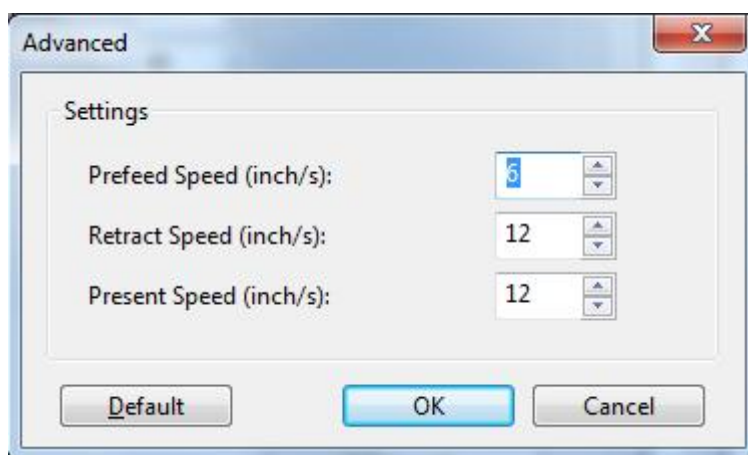
3.5.13   Printing Preferences - Modification tab
This tab is used to control the number of copies, print speed, and port monitor status enable.

3.5.13.1   Modification - No of Labels
This field controls how many copies of the current page will be printed.

3.5.13.2   Modification - Print Speed (inch/s)
The Print Speed filed controls the print speed that the printer uses to print a page.

3.5.13.3   Modification - Disable Status
The Disable Status checkbox is used to control whether the Port Monitor Status popup window is displayed or not. This is used to get real time status from the printer while printing via the Windows driver.
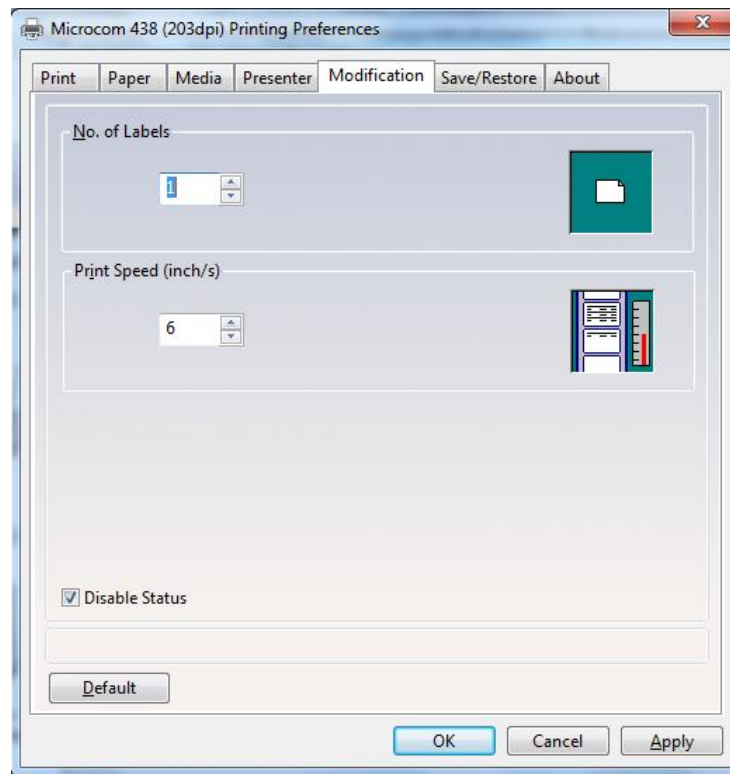
3.5.14 Printing Preferences - Save/Restore tab

The Save/Restore tab is used to export or import driver settings and to force back to the factory defaults based on the printer model installed.
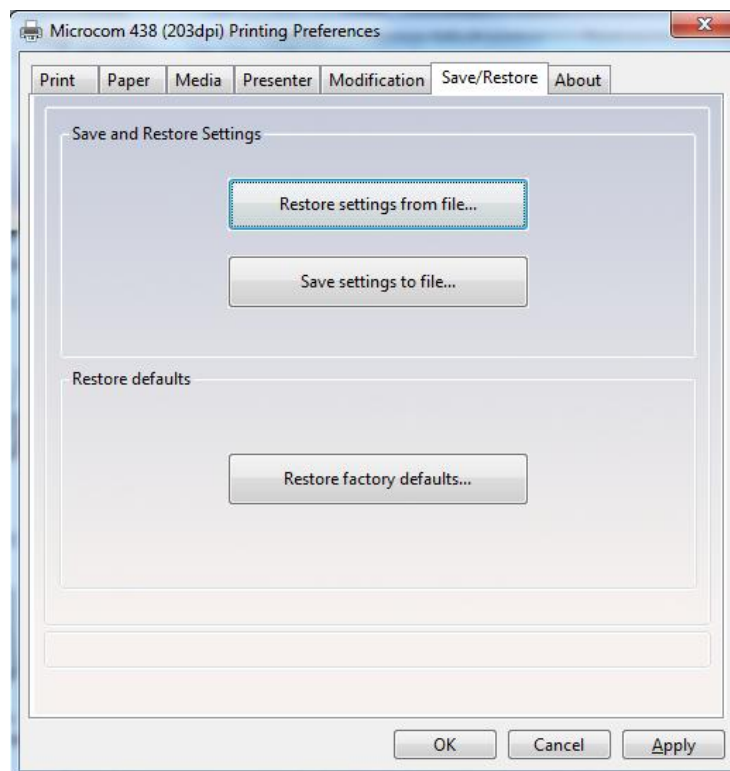
3.5.14.1   Save/Restore - Restore settings from file…

This is used to import or restore driver settings from a. MDS file. The driver settings are contained within a. MDS file and may be restored or configured if imported using the Restore feature.

3.5.14.2   Save/Restore - Save settings to file…

This is used to export or save the current settings in a. MDS file. This file contains the driver setup used to configure the driver.

3.5.14.3   Save/Restore - Restore factory defaults…

This will force the driver defaults of the printer model installed.

3.5.15   Status Messages

This section describes the Windows compatible Status messages that are displayed in spooler and the Status Monitor feature found on the Modification tab. These messages may be extracted using the GetPrinterData MSDN API call. The standard message and the printer meaning are listed below.

3.5.15.1   PRINTER_STATUS_WAITING

This message indicates that the printer is okay and ready to print. LDS1 control language printer message would be the >READY<.

3.5.15.2   PRINTER_STATUS_BUSY

Message indicates that the printer is busy printing a job. No LDS1 equivalent control language printer message.

3.5.15.3   PRINTER_STATUS_PAPER_OUT

This message indicates that the printer does not detect media in the printer or has run out of media. The LDS1 equivalent control language printer message would be >STOCK NOT LOADED< or >LOW STOCK<.

3.5.15.4   PRINTER_STATUS_PAPER_JAM

Message is used to indicate that the printer has detected a media jam. The LDS1 control language printer message would be the >LPD STOCK JAM<.

3.5.15.5   PRINTER_STATUS_PAPER_PROBLEM

This message is used to indicate that the optional >INPUT 1< sensor is active. The >INPUT 1< message is the equivalent LDS1 control language printer message that is reported.

3.5.15.6   PRINTER_STATUS_USER_INTERVENTIO N

This message indicates that the printer is in an error condition that needs to be corrected before the printer may continue. The LDS1 messages that generate this error would be >CUTTER ERROR<, >DATA ERROR<, >FAIL TIMEOUT<, or >FAIL SIZE< LDS1 control messages.

3.5.15.7   PRINTER_STATUS_OFFLINE

Message indicates that the printer is powered down or the driver is unable to communicate with the printer. No LDS1 equivalent control language printer message.

3.5.15.8 PRINTER_STATUS_OUTPUT_BIN_FULL

This message is used to report that the printer is reporting that its catch tray is full or that the printer's media is advanced blocking the LPD sensor while in a dispense mode. The LDS1 control language messages that generate this message would be the >TRAY FULL< and >TAKE LABEL< messages.

3.5.15.9 PRINTER_STATUS_DOOR_OPEN

This message is generated when the printer detects that its printhead assembly is not fully closed. Not all printers support this feature. The LDS1 control language message equivalent would be the >HEAD UP< message.

3.5.15.10 PRINTER_STATUS_IO_ACTIVE

This message is used to indicate that the optional >INPUT 2< sensor is active. The >INPUT 2< message is the equivalent LDS1 control language printer message that is reported.

3.6 Loading Media

The printer should have the Autoload feature enabled to make the loading process and easy one.

1. Make sure that the paper guides are adjusted so the edges of the media ride against the guides going into the printer preventing side to side movement.

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

3. Autoload should detect the paper and load and align the media.

If the Autoload feature is not enabled, then insert the media into the printer, press and hold the print button to feed the media through the printer until it exits the printer.
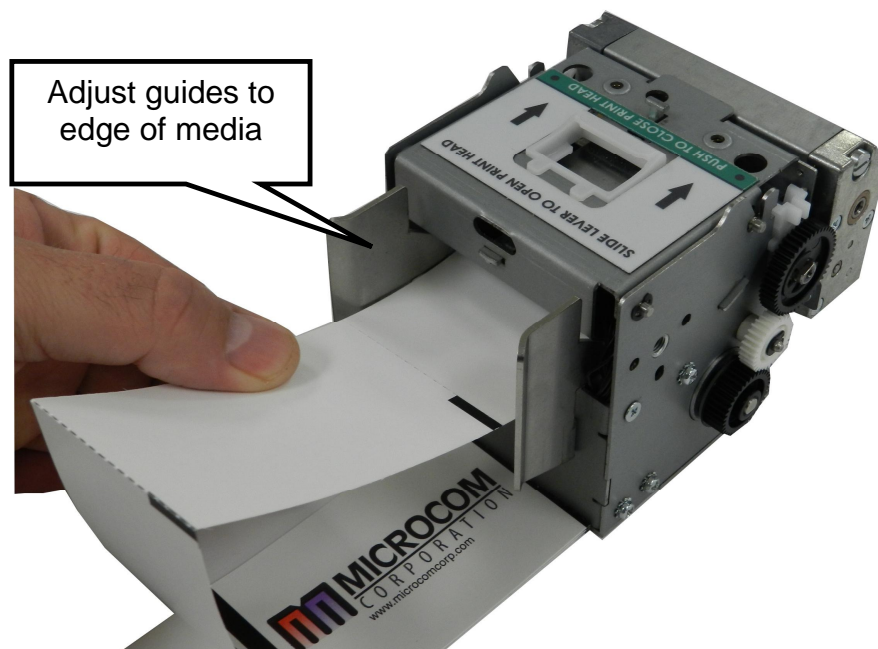
Figure 3-3   Loading Media

3.7   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.

Motor - Indicates that the motor signal is active and that the printhead power is on

Power indicator - Indicates that the machine is powered

Status light - Indicates the current state of the printer
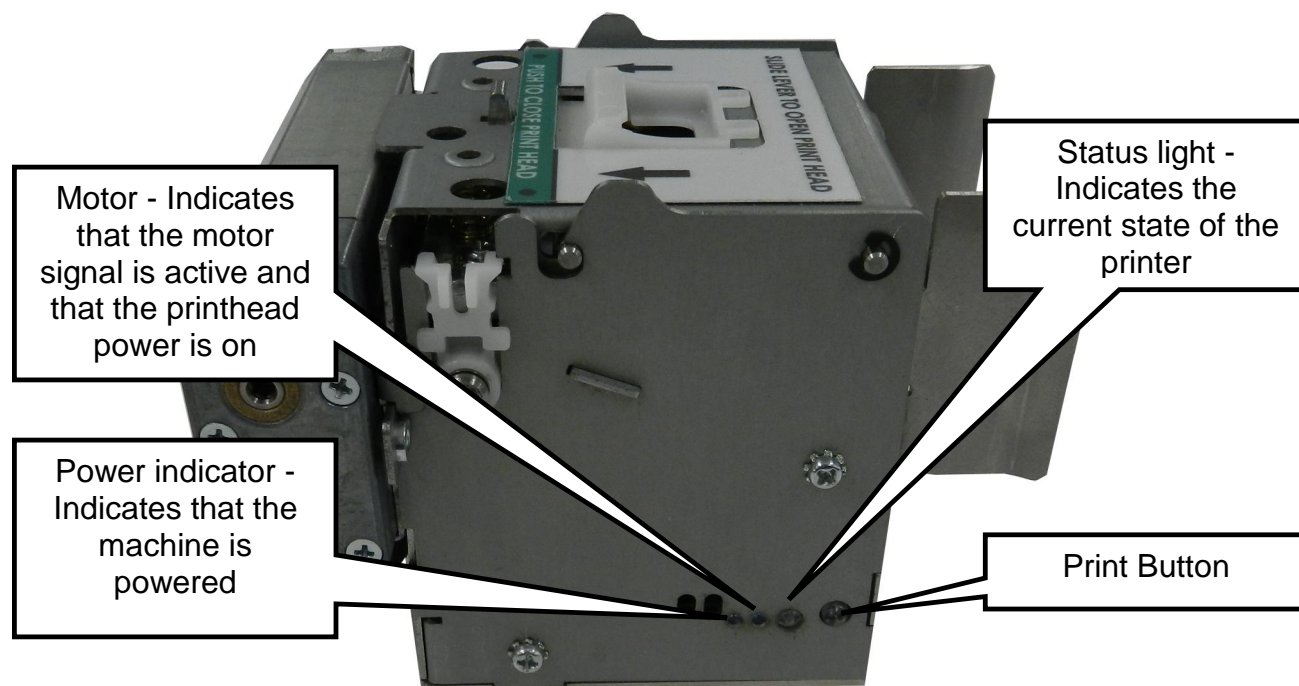
Print Button

Figure 3-4   Print Button and Status Indicator Light

3.7.1   Print Button

Operation	Description
Printing a label	Press the Print Button while the printer is READY to reprint the last label or Power up 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 READY to advance label media. The printer will continue advancing label media until the Print Button is released.

Table 3-1   Print Button Description

3.7.2   Status Indicator Light

Light Color	Description
Solid Green	Indicates that the power is on and the printer is in a ready state.
Flashing Green	Indicates that the communication port has detected activity.
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	Printer is out of paper
Flashing Red	Indicates an error has occurred. The printer will remain in this state until the condition is removed. If an unexplained error persists, contact your Service Representative.

Table 3-2   Status Indicator Light Description

3.8 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.

3.8.1 Ready Mode: GREEN

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

In READY Mode the Print Button has several different functions:
a) Pressing the button quickly will reprint the last label
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: Form Feed labels until the button is released.

3.8.2 Ready Mode: Flashing GREEN

The printer is in the Communication Mode when it is not printing but has detected communication activity over the active communication port. The indicator light is Flashing GREEN, which indicates that the printer is receiving data over its active communication port.

3.8.3 Error Mode: Flashing RED

The printer is an Error mode when it has stopped due to an error condition.   The Status Indicator Light will be flashing 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.

3.8.4 Paper Out: Flashing AMBER

The printer will flash amber when it does not detect paper but its internal registration sensors. Once paper is inserted into the printer, the light will turn Green and the printer will enter its idle or ready state.

3.8.5 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.

3.8.5.1   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 print the Status Label. The printer will enter the DIAGNOSTICS Mode, and print the Statistics label and a print test pattern.

In the DIAGNOSTICS Mode, the printer is forced to use the RS-232 port at 115,200 baud. The 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 or a Soft RESET command is issued (^D32). These are the only 2 ways to get out of the DIAGNOSTICS mode.

3.8.5.2   Statistics Label

The Statistics Label may be printed either by entering the DIAGNOSTICS Mode or sending the Printing Statistics Command. The diagonal line test pattern is also used to show thermal dots that have expired on the printhead. These areas will appear as vertical lines in the test pattern printout.

```
PRINTER SERIAL #: 00516645051
PRINTED LABELS: 303
PRINTED INCHES: 1533
TOTAL INCHES: 1571
POWER ON HOURS: 32.8
CUTTER TYPE: Guillotine
CUTTER ENABLED?: YES
CUTTER COUNTS: 1789
KIOSK CUT MODE: Disabled
KIOSK DISTANCE: 0
SWITCH BANK 1: 10001010
SWITCH BANK 2: 01010001
SWITCH BANK 3: 00000000
SWITCH BANK 4: 00000000
SWITCH BANK 5: 00000000
SWITCH BANK 6: 00000001
CURRENT COMM PORT: Autoselect USB/RS232
RS232 PARAMETERS: 115200-N-8-1
PRINT HEAD SIZE: 1280
PRINT HEAD DPI: 300
% CONTRAST:  100
D91 GAP VALUE: 30
TOF DISTANCE:  179
STOCK OUT VALUE:  100
PRINTER CODE REV: 1.11.34
BOOTLOADER CODE REV: 1.00.11
CODE ASSY PN. 071010-011134
```

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

KIOSK CUT MODE: Disabled
KIOSK DISTANCE: 0
SWITCH BANK 1: 10001010
SWITCH BANK 2: 01010001
SWITCH BANK 3: 00000000
SWITCH BANK 4: 00000000
SWITCH BANK 5: 00000000
SWITCH BANK 6: 01110010
CURRENT COMM PORT: Autoselect USB/RS232
RS232 PARAMETERS: 115200-N-8-1
PRINT HEAD SIZE: 1280
PRINT HEAD DPI: 300
% CONTRAST:  100
D91 GAP VALUE: 30
TOF DISTANCE:  160
STOCK OUT VALUE:  100
PRINTER CODE REV: 1.11.34
BOOTLOADER CODE REV: 1.00.11
CODE ASSY PN. 071010-011134
```

Figure 3-5   Status Label Example

3.9   Printer Integration

When designing a kiosk, it is important to consider how the printer will be used, operated, serviced, integrated with other kiosk components, and integrated into the enclosure itself. The printer has some basic requirements in order to operate reliably for years. The printer has some basic requirements in order to operate properly for years. Microcom has a staff that is committed to helping integrate our products. We will do as much as needed to ensure that the process goes correctly and smoothly. Reference documents, 3D CAD files and drawings can be provided.

The general issues are:

- Only trained personnel should have access to, operate, or service the printer.
- Dispense position of the media, top, front or dropped into a tub.
- Mounting of the printer to the kiosk.
- Printer Power Requirements.
- Interface between the host computer and the printer.
- Media Handing – The design of the kiosk should consider the type of media to be used: roll or fan-fold media; the appropriate media dispensing system; the location of the media in the kiosk relative to the printer; and the overall size of the media package (roll diameter or stack height).
- Operator access for loading, cleaning and service.
- The printer's user interface for status lights and also access to view and press the feed button while observing the status light for media loading, setup, and servicing the printer.

- Space to open, clean the print head or remove jams and replace the print head.
- The media path between the printer and media (roll or fan-fold).
- Access to the mounting hardware in order to service or replace the printer.
- Ambient Lighting and external light sources which can affect printer's behavior.
- Keeping the printer cool and free from dust.

3.9.1   Environmental Considerations

Unless specified differently in the operator's manual or in the product specification sheet, the operating environment for Microcom printers is listed below.

- Relative humidity: 10-85% non-condensing
- Operation Temperature: 40° to 104° F (5° to 40° C)

3.9.2   Printer Mounting Orientations

The printer can be mounted horizontally or vertically, both up dispensing and down dispensing, depending on the design of the kiosk. The 238 Series offers many configurations and options. Drawings and 3D CAD files are available upon approval and request. Environmental conditions that may affect operation: Humidity, temperature, air circulation air in the kiosk, and static buildup on adjacent kiosk components and surfaces, etc. Media considerations: Paper length, partial or full cut, curl at the end of the media roll, thickness and weight, perforations on fan-fold media, etc. Other considerations: Media mounting, media path, media access, printer maintenance, cabling, etc.

It is recommended; when the designer wants the media to fall clear of the printer when cut, that the printer be mounted vertically and the use of static prevention are used. See the Electrostatic Discharges section later in the guide.
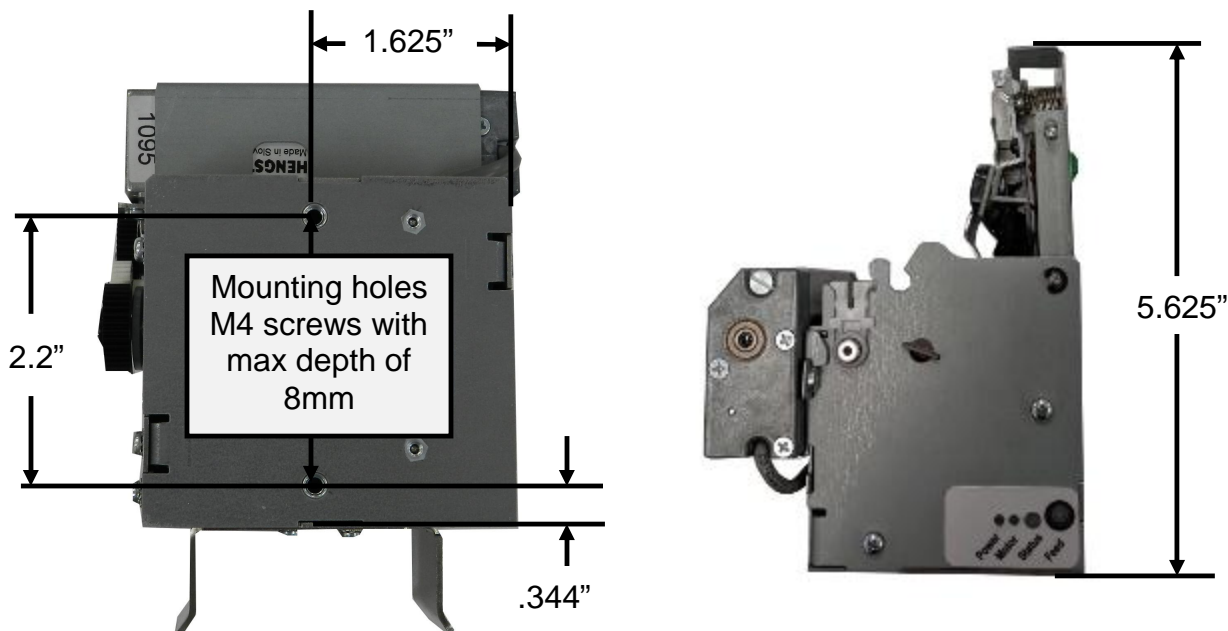
Figure 3-6   Mounting location

3.9.3   Media Mounting Considerations
The printer uses direct thermal media which is chemically treated to react to heat.
The printer has several basic requirements for running the media to the printer from a roll or fan-fold media which include:

The printer uses direct thermal media which has been chemically treated to react to heat. The printer has some basic requirements for the media to run successfully through the printer.

• The centerline of the media roll or fan-fold stack should align with the center of the printer's paper path to provide the best tracking of the media and reduce media damage. A media guide is required for printing accurately and consistently.

• Do not blow air onto the media. Air should be pulled from the kiosk to keep out dust (which shortens print head life and affects print quality) and chemicals (such as cleaning solutions like ammonia or bleach). Air flow within the kiosk should not pull exhaust heat from other kiosk components and power supplies across the media or printer.

• Avoid direct sunlight, incandescent or infrared lighting or heat sources. These light sources can come from openings in the kiosk and other kiosk components. Incandescent light bulbs, sun light and heat sinks are examples of heat sources that shouldn't be near the printer or media.

• The media path must be smooth and not cause excessive drag. It should be clear of cables, other kiosk components, or surfaces other than media guides, supply holders or the fan-fold media tray. Roll media must be able to turn with minimal resistance and allow the printer to smoothly pull media without jerking or snagging. Minimize friction with the roll holder contact and avoid sharp corners in the media path. Larger, heavier media rolls are more susceptible to these issues. Fan-fold media must have sufficient room to unfold and not bind on media guides, tray surfaces or media perforations. An improper media path can produce a compressed print, slipping, and jamming which can occur more frequently as the printer ages.

3.9.4   Designing a Roll Support
Media roll supports may be purchased from Microcom. If you are designing a custom roll support, please be aware of the following design guidelines.

• Implement a simple design which allows the media to be gently placed in the kiosk.

• Minimize the drive train load caused by the media supply. Do not use wires, cables or rods as a   roll holder - all of these can cause the roll to stop and start and rock back and forth. The inside of the roll core should be smooth and free from dust. The larger the roll, the greater the effect it has on drag and possible slipping.

• The spindle used inside the core should be sized properly so that it doesn't fit tight or cause the core to rock on the spindle. A good rule is to make the spindle at least .05" smaller than the inside diameter of the core.

• Leave plenty of access room to load media when designing the area for your roll holder.

3.9.5 Designing for Fan-Fold Media

Fan-fold media must be handled correctly. When it unfolds, it can get caught and the stack may fall into other components and cabling. Make a tray to hold the fan-fold media. This tray could be the box that fits into a shoe provided by the stock converter. Always test and observe the media for these types of problems. Fan-fold media can un-fold differently at the beginning and end of the stack. This stock can also stick to itself because of the perforations. Choose a stock converter with experience with this process. The media stack should never be able to be pulled into the back of the printer. When using fan-fold stock, the stack should be located back from the printer far enough to allow the media to unfold prior to entering the back of the printer to prevent it from jamming. Once again, the fan-fold media should be in proper alignment with the paper path of the printer. This misalignment can cause jamming or the print image not to appear correctly on the stock.

3.9.6 Designing Media Guides

The media guides need to have a minimum radius of .5". The surface should be smooth and not touch the edges of the media (causes drag or edge damage). They need to be in alignment with the printer and the supply holder. Additional guides to ensure the paper tracks straight may be necessary. These guides should be sized properly to ensure tracking without damage to the stock. Check with the stock converter for the proper tolerance and then size the left and right guides for some clearance over their maximum width. It is recommended that a minimum of 1.5" long guides be used to ensure the stock doesn't fold over on itself or tear. These guides could also be used to keep cables away from the media.

3.9.6.1 Designing the Media Dispense Path

Properly dispensing the media from the printer is critical to the operation of the printer and quality print.

• The media dispense chute should always be wider than the maximum width stock for the printer being used.

• Upon exiting the printer, the media should never be forced or bent as this will cause jamming.

• The stock should never be expected to drop through a chute as this may be unlikely due to electrostatic discharge as covered later in this document.

• The exit chute should act as a funnel and always be larger than the dispense point.

• Never allow the user to grab the printed media prior to the cut operation as this could cause jamming or stretched print. The use of a presenter or drop tub is recommended. Guides specific to a fixed length can also be designed.

3.9.6.2 Cables and Routing

Always use cable ties and locking connectors if possible, allow for kiosk component servicing, and avoid electrical noise sources.

• Cables that are near the printer, media path, or media should be tied to the kiosk chassis or printer mounting hardware. The operator can accidentally disconnect the printer or other kiosk components when maintaining the kiosk. Cabling must not interfere with the proper

operation of the printer and media. The operator can become caught on cabling and drop heavy media damaging the kiosk, printer, or hurting themselves.

• Service Loops - There should be enough slack in the cabling to not put pressure on the cable connectors or the circuit boards. Enough slack is needed to disconnect the printer (or their kiosk components) for servicing. Allow for movement needed to access the cable locks or slide the printer out.

• Avoid electrical noise sources: fluorescent lighting and ballast, power supplies, fans, AC power lines, CRT monitors, etc.

• Avoid twisting power and communication cables together. This can cause electrical noise on the communication port or raise emissions levels.

3.9.7   Power Supply Requirements

Thermal printers have special power requirements to operate correctly and safely within compliance regulation guidelines. To achieve optimum performance, an approved power supply should be used. Power supplies sold by Microcom Corporation have gone through rigorous testing to ensure the proper function of the printer. If a non-Microcom supplied power supply is used with the printer, it must comply with the requirements of that printer. The same ground MUST be used for the printer, printer power supply, and any device (PC, USB hub, etc.) connected to the printer communication ports, and the same AC power circuit should be used whenever possible for these devices. If the printer does not have an integrated power switch, it is recommended that the power supply have one on the ac input side to the power supply. Plugging and unplugging the 24 volt supply into the back of the printer hot can cause damage to the printer. Using an insufficient power supply can cause damage to the printer. Thermal printers require high over current peaks of power that must be handled by the power supply. When Short Circuit Protection or Over Current Protection is activated, the power supply should shutdown automatically. Once the abnormal condition resulting in the failure is removed, the power supply should restart accordingly. If over Voltage Protection is activated, the power supply will shut down. The power supply should be fully protected against short circuits and automatically recover gracefully.

The output circuits (USB, Serial) may not be power limited. Equipment connected to these output connectors shall be of the Certified type with their own fire enclosure. If a non-Microcom Corporation supplied power supply is used, it shall be of the Certified type and a limited Power Source.

It is highly recommended that Microcom provide the power supply in order to prevent damage to the printer or cause the printer not to function properly.

3.9.8   Electrostatic Discharges and Ground Connections

The printer should have a dedicated earth ground connection. Preventing ESD and earth currents from affecting the printer's operation requires proper connection to the printer chassis via a 12 AWG wire to earth ground. The ground wire should be connected to the printer chassis using a closed loop connector. Measure the resistance with an ohm meter to ensure proper grounding.

The same ground MUST be used for the printer, printer power supply, and any device (PC, USB hub, etc.) connected to the printer USB or serial ports. The same AC power circuit ground location should be used whenever possible for these devices.

If the printer is in a low humidity environment, the use of anti static brushes or tinsel may be required.
Electrostatic discharges can cause damage to the print head, memory or electronics. This damage will manifest itself as lost pixels on the print head, memory scrambling, communication to the printer lost or other issues causing the printer not to function properly. This damage can be immediate or happen over time.

When working with the USB port, it is imperative that ESD and Ground connections are adhered to or potential disconnect issues may be encountered. We also recommend disabling the ability to allow the computer to turn off the USB device under the Power management.

Example:
1. Open the system Device Manager.
2. Scroll to the Universal Serial Bus Controllers and expand the listing.
3. Open the USB Root Hub's listed (not the USB 2.0 Root Hub's).
4. Go to the Power Management tab under the Properties.
5. Uncheck the "Allow the computer to turn off this device to save power".
6. Select OK and repeat for the remaining USB hubs.

3.10 TOF Sensor

The TOF Sensor is used to detect when media is present and is used in conjunction with the Top-Of-Form operation. A TOF is when the printer uses the sensor to detect the edge of the media and retracts the configured distance. See the D121 and D123 commands for more details regarding the TOF operation.

A printer adjusts the distance over which the LPD sensor will detect reflections.   The maximum range may be adjusted over a distance of 0.20" to 0.85". Distances are measured from the surface of the sensor to the reflecting surface. The sensor is calibrated and set at the factory. This pot may be used to decrease sensor range to avoid false reflections from stationary objects such as a cutter.

TOF sensor location
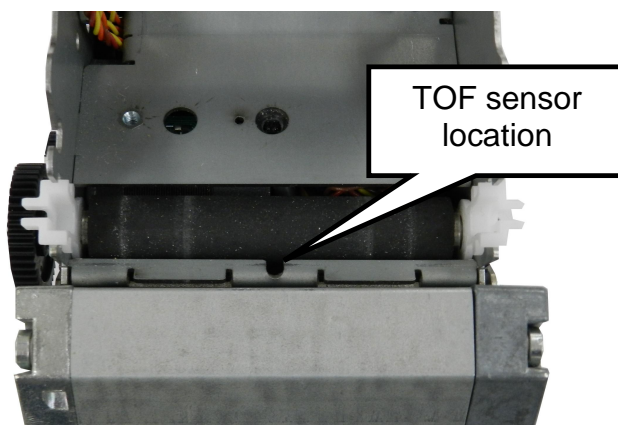
Figure 3-7   TOF (Top-Of-Form) Sensor

3.11 Printer Options

This section provide additional information regarding the optional components that are available for the 238 printer series.

3.11.1   Cutter Options

The printer is capable of using different cutter types for different applications. This section provides information regarding the different cutter options available.

3.11.1.1   Low Torque Guillotine Cutter

The low torque guillotine cutter used on applications with media up to 4 mil thick. Testing should occur of thicker media types to verify that reliable operation would occur. The Presenter Option uses this cutter.
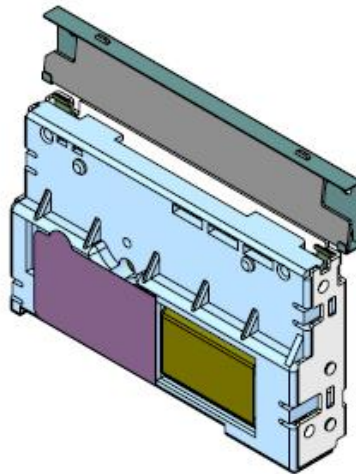
Figure 3-8   Low Torque Guillotine Cutter

3.11.1.2   High Torque Guillotine Cutter

The high torque guillotine cutter used on applications with media up to 7.5 mil thick. Testing should occur of thicker media types to verify that reliable operation would occur. The Pinch Option uses this cutter.
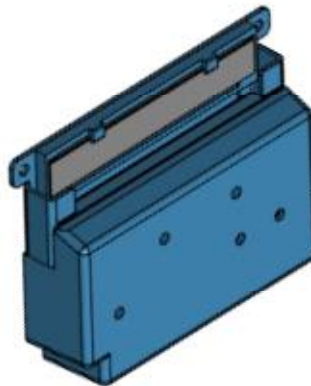
Figure 3-9   High Torque Guillotine Cutter

3.11.1.3   Rotary Cutter

The rotary cutter used on applications with media up to 13 mil thick. Testing should occur of thicker media types to verify that reliable operation would occur. The Presenter and Pinch Option are not able to use this cutter.
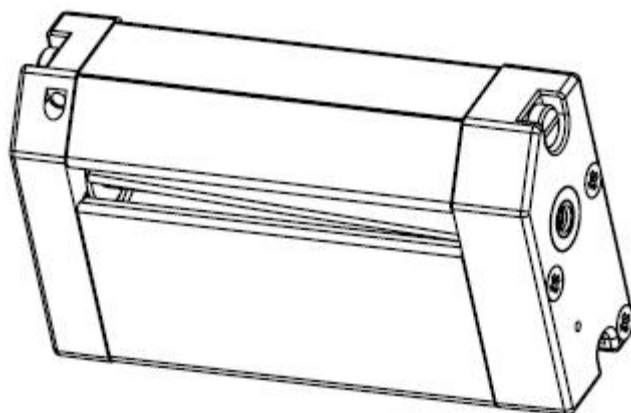
Figure 3-10 Rotary Cutter

3.11.1.4   Linerless Rotary Cutter

The rotary cutter used on linerless media applications with media up to 13 mil thick. Testing should occur of thicker media types to verify that reliable operation would occur. The Presenter and Pinch Option are not able to use this cutter.
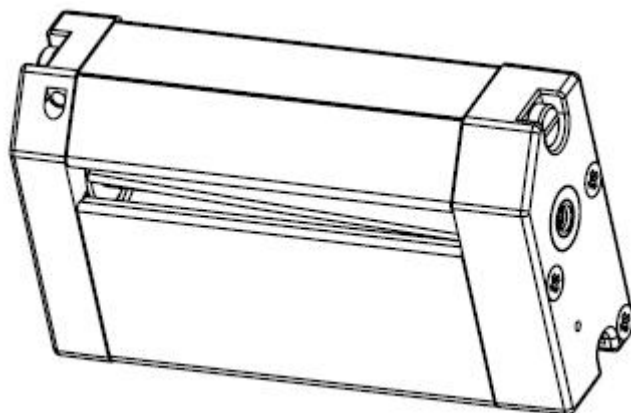
Figure 3-11 Linerless Rotary Cutter

3.11.2   AUX Option

The AUX port provides the ability to connect an optional reflective sensor that may be configured to send out a >INPUT 1< status message when the sensor is active high or active low. This message may then be used by the kiosk system to alert the software for different events. Early low stock detection or door open indications are a couple of examples how the sensor has been used.

3.11.2.1   Remote Stock Sensor

The low paper sensor is an optional reflective sensor available that may be used to detect numerous scenarios. The typically application for this sensor is to detect paper or media levels prior to the printer reporting out of stock errors. The operations range for the low paper sensor as .25" to .75" with .5" being the optimal range.
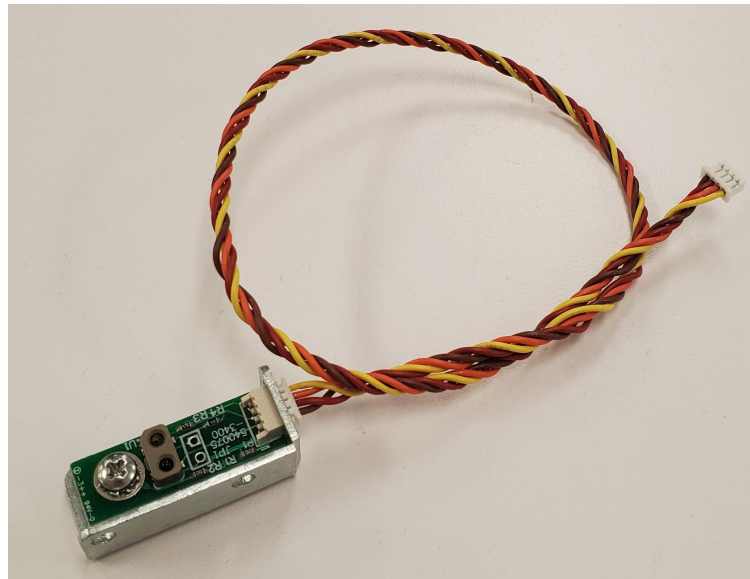
Figure 3-12 Low paper sensor
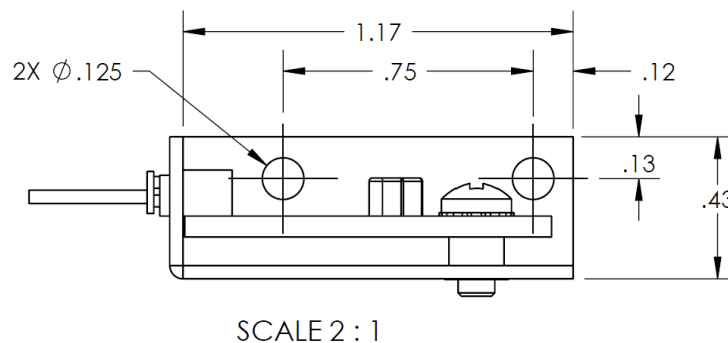
Figure 3-13 Remote stock sensor mounting bracket

3.11.2.2 Paper Supply Holder Option

The paper supply holder used to hold rolled media types. The supply holder arm mounts to the side of the printer and may also be configured to use a low stock sensor to detect a low media threshold on the supply roll. The sensor connects to the printers AUX port located on the back panel of the printer.
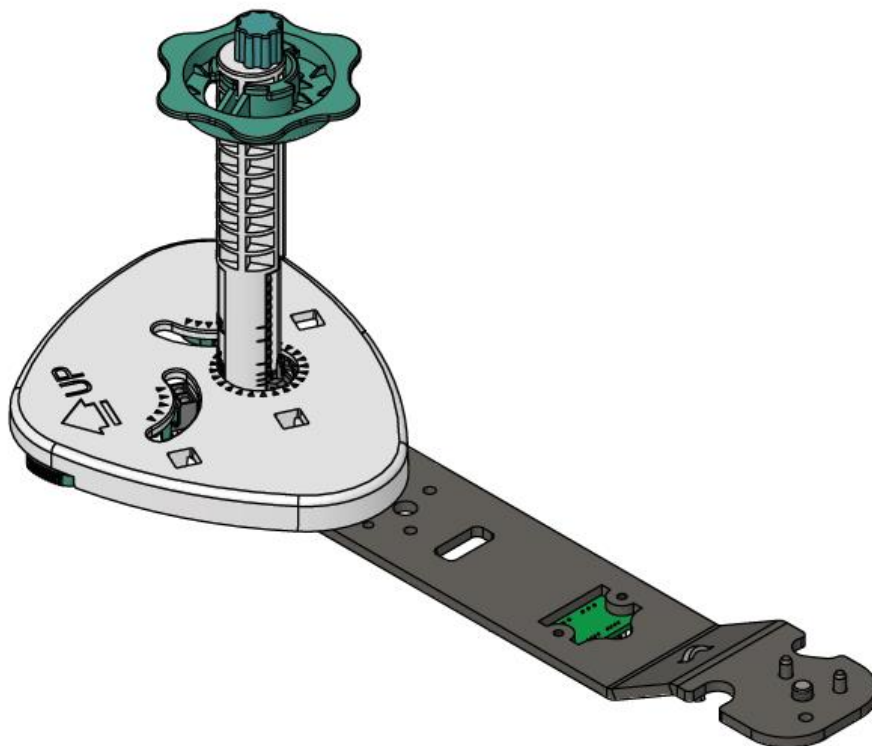
Figure 3-14 Optional paper supply holder

3.11.3 Presenter Option

The Presenter option is an assembly that mounts to the front of the printer and used to hold the printed media until the entire form is complete. The Presenter option primarily used to dispense 4mil thick receipt paper but different media types may also work. The Presenter is a Looping type of presenter that loops the media until printing is complete and then presenter to the user. Additional information discussed in Chapter 5 regarding the commands that control the presenter.
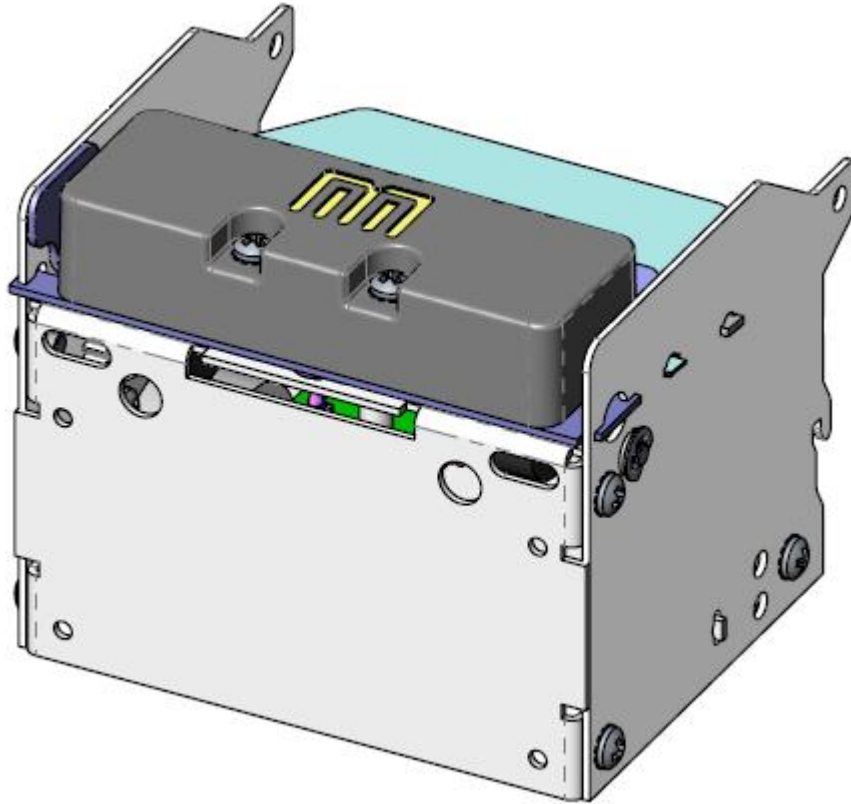
Figure 3-15 Optional Presenter Assembly

3.11.4   Pinch Option

The Pinch option is an assembly that mounts to the front of the printer and used to hold the printed media until dispensed. The Pinch option presents all forms of media with thickness up to 7mil. The Pinch assembly hold the printed/cut media for a programmable time and then ejects the media. Additional information discussed in Chapter 5 regarding the commands that control the presenter.
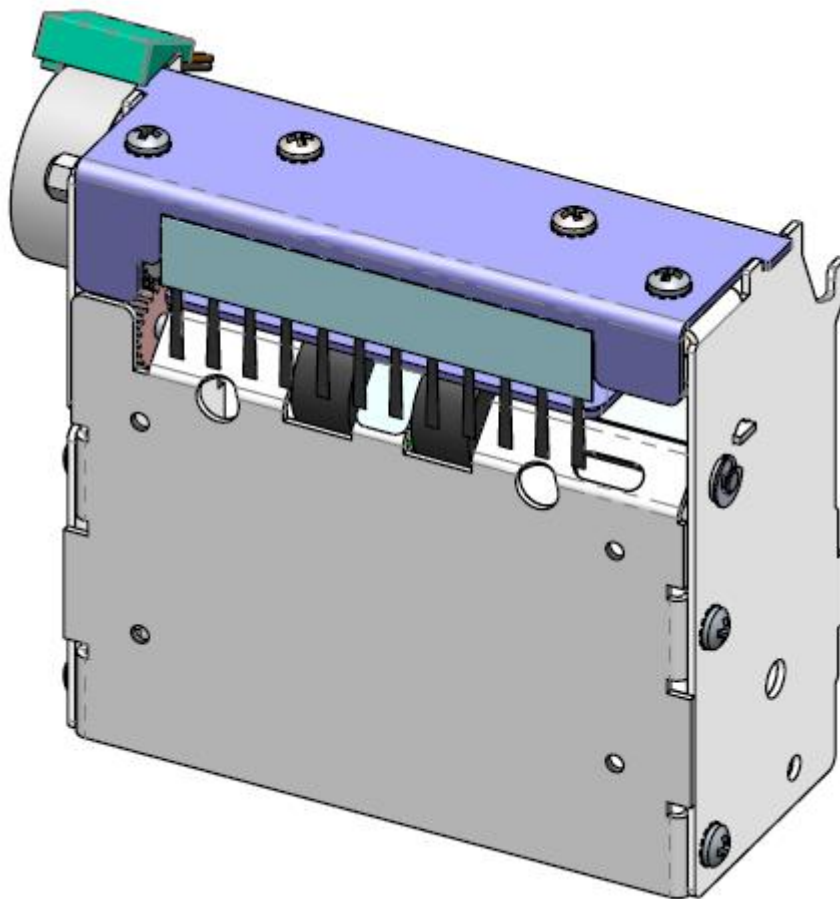
Figure 3-16 Optional Presenter Assembly

3.11.5 Back Light Bezel Option

The back light bezel option attached to the front or the presenter or pinch assemblies and lights up green in color indicating that the printed media is ready to be taken. After the media is taken, the green light goes off. The bezel plate provides mounting holes that may be used to attach the assembly to the inner wall of a kiosk or stand. The printer powers the bezel lights so no additional power source is needed.
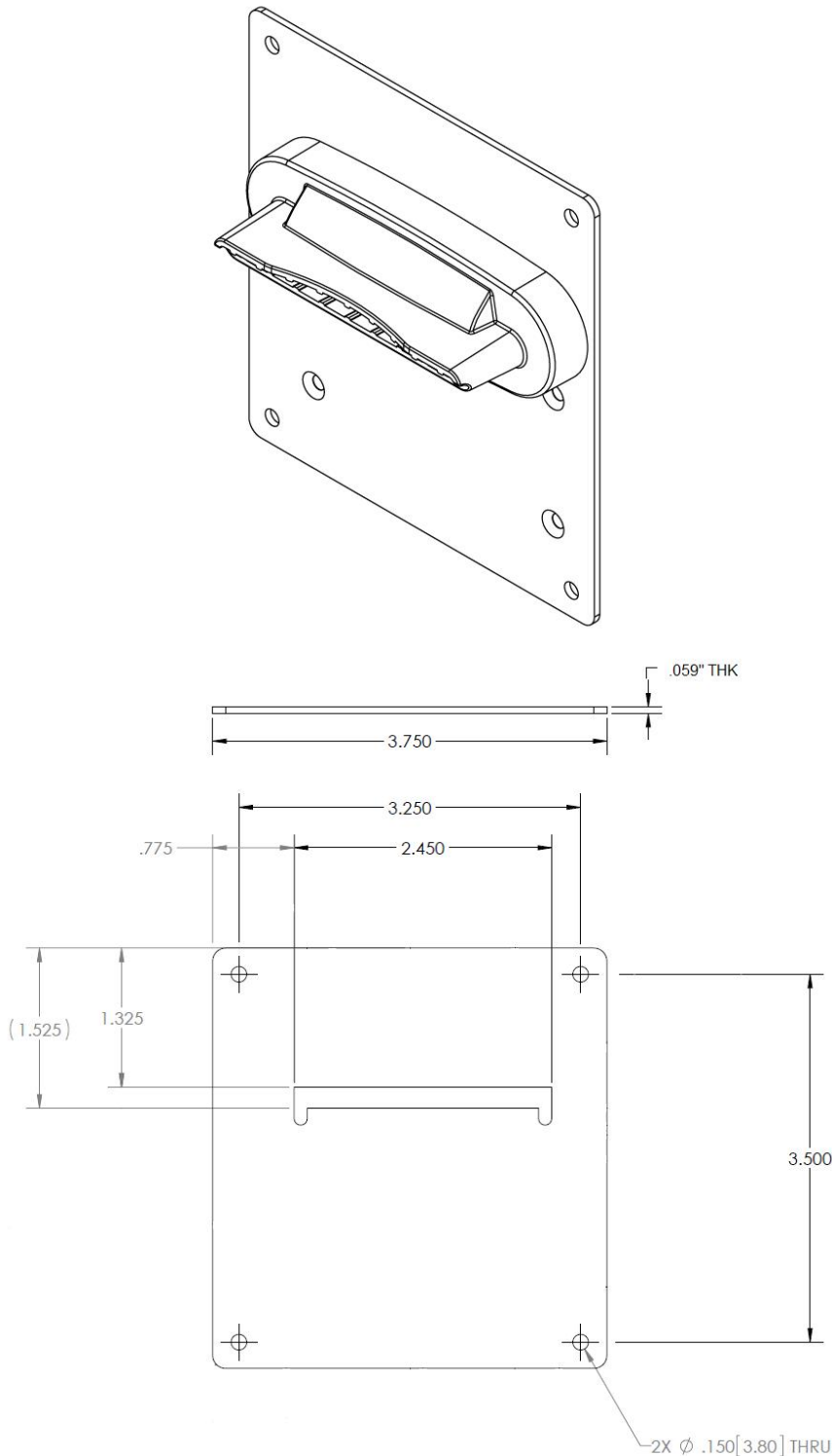
Figure 3-17 Optional Back light bezel

Chapter 4:   Designing Labels Using LDS

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

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

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

4.1 Control Characters

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

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

4.2 LDS Design Exercises

There are many different machines capable of sending information to the printer including main frames, mini-computers, special purpose computers and PC's. For the purpose of simplicity, the design exercises contained in this manual will use one of the easiest methods by using a 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 communication port (COM1, COM2…).
- An interface cable.
- A VT-100 terminal emulation program such as MCT.
- A text editor that does not add formatting characters such as Microsoft® Notepad.
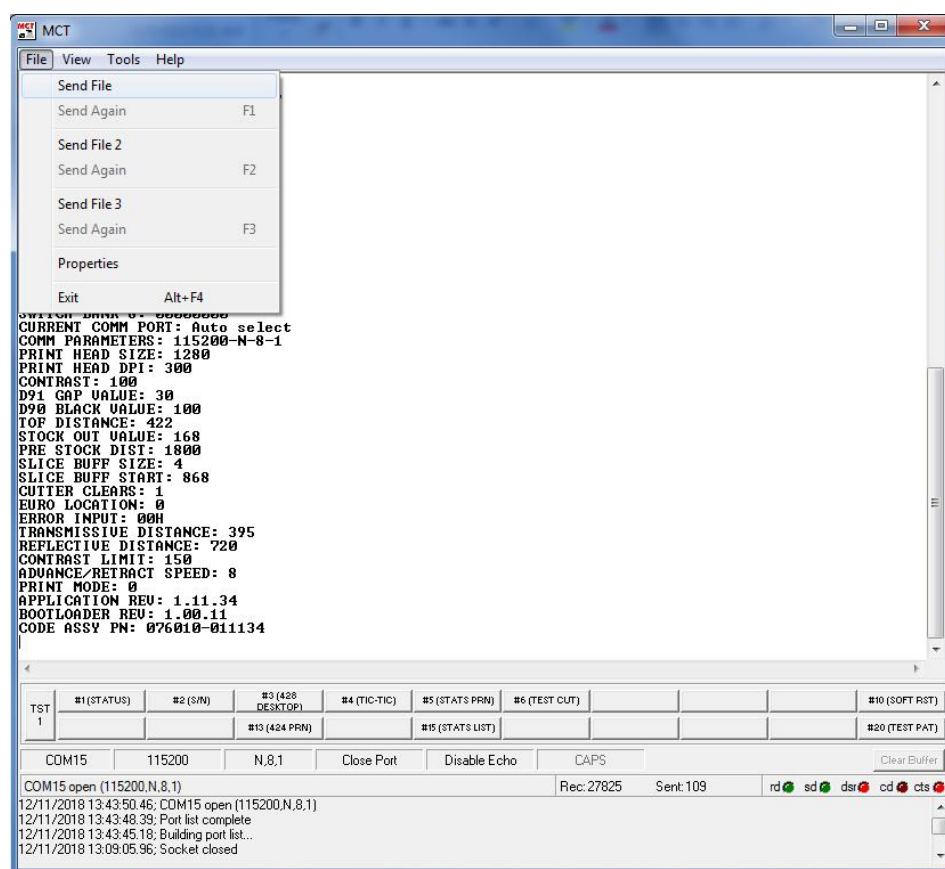
Figure 4-1   MCT Window Example

4.2.1   Format Creation

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

The LDS programming language uses thermal dots as the unit of measure. All commands and parameters, unless noted otherwise, should be entered using dots. The printer is capable of being fitted with a 203 dpi or a 300 dpi head. The examples contained in this document discuss a 300 dpi printer.

The conversion values for the 300dpi print head:

Dots/mm	*Inch/Dot*
12	0.0033 (1/300)

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

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

press the "Shift" key and the "6") plus the alpha character. See Chapter 5 for additional information regarding control codes and printer commands.

There are some special features offered by the printer that assist in label design. For example, the auto-size command (^A2^D39 <CR>) provides most of the header format information needed to define the different properties of the media being used. The current state of the printer is accessed through the enquiry command (^D5 <CR>, Ctrl E, or 5 NULL characters (HEX 00) if binary compression has been enabled). The statistical information of the printer is made available through the use of the ^A0^D29 <CR> or more simply ^D29 <CR> command.

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

4.3 Label Design: An Overview

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

Below is a sample label format created for a 300dpi printer on a 1.25x1.0 die-cut label. We will refer to this format as we break down the steps and components to produce the format. Refer to Figure 4-2 for a printed representation.

^D57 <CR>	A label format is coming.
5,672,300,19,38,7,0,1,276,0,0<CR>	Header Information.
1,336,250,8,7,10,0,4,2,2,,,,,0<CR>	Field #1 format information.
2,336,200,11,7,10,0,4,2,2,,,,,0<CR>	Field #2 format information.
3,336,150,26,7,10,0,4<CR>	Field #3 format information.
4,336,100,6,7,10,0,4<CR>	Field #4 format information.
4,336,25,6,16,3,,4,2,50<CR>	Field #4 format information.
^D56 <CR>	Signals the end of the label field definition.
^D2 <CR>	Text data is coming.
Microcom <CR>	Text data string #1.
Corporation <CR>	Text data string #2.
Thermal Printing Solutions <CR>	Text data string #3.
012345 <CR>	Text data string #4.
^D3 <CR>	Print format.

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

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

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

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

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

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

The command ^D3<CR> instructs the printer to print.
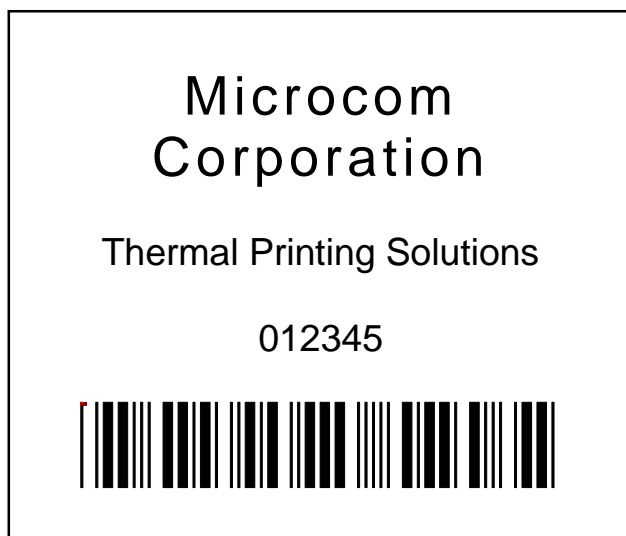
Figure 4-2   1.25X1.0 Sample Label

4.4 Label Header

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

The values for header elements requiring measurements are expressed as thermal dots or pixels. Dot or pixel size varies depending upon the print resolution of the print head. The dot size of a 300 dots per inch head (12 dots/mm) is 0.0033". The dot size is the same in both the horizontal and vertical direction. For example, a 4" X 6" label printed with a 300 DPI print head would be 1200 (4 X 300 dots in the horizontal or "X" direction, and 1800 (6 X 300) dots in the "Y" direction.

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

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

HFM, LSX, LSY, WEB, GAP, DPS, LCB, AGD, SPG, OFX, OFY
5   672   300   19   38   7   0   1   276   0   0

Feed Direction

2" PRINT HEAD

Web Value
.0625" or
19 Dots

Microcom
Corporation

Thermal Printing Solutions

012345

LSY
1.0" or 300 Dots

X beginning

This is the
origin; 1,1

Y beginning

Gap Value
.125" or 38 Dots

2.24" or 672 Dots
(Total Print Head Dots)
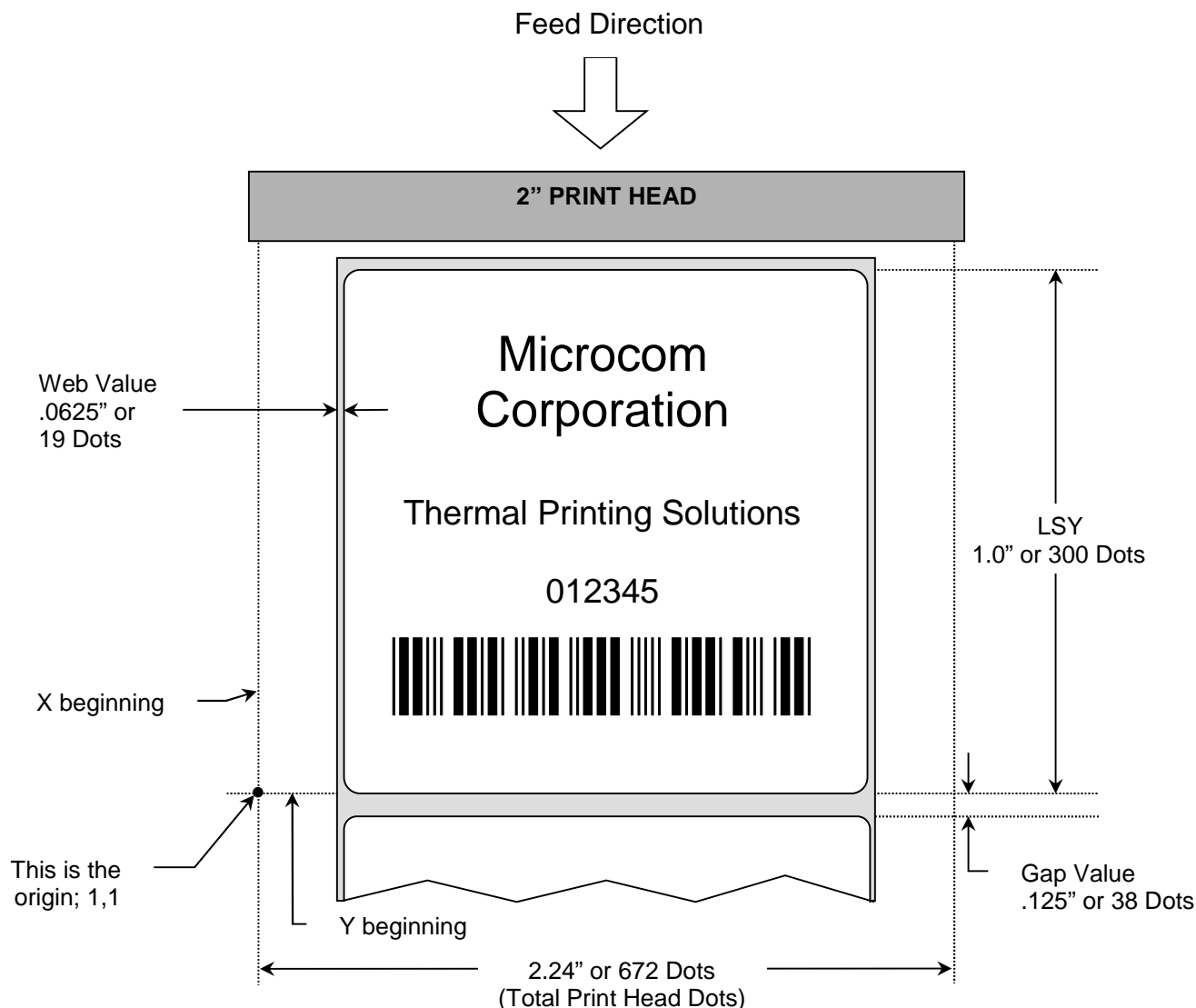
Figure 4-3   Header Elements

4.4.1   HFM   (Number of Fields in Layout)

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

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

that the fields that are actually sent. This would cause the printer to produce corrupt images.

4.4.2   LSX   (Print Head Size X)
HFM, **LSX**, LSY, WEB, GAP, DPS, LCB, AGD, SPG, OFX, OFY

This parameter is used to specify the width of the print head using dots as the unit of measure. The maximum width of the LSX parameter is determined by the width of the print head. LDS has been specifically designed to accommodate a variety of print head widths. The printer LSX value should always be set to 672 when a 300dpi printhead is used.

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 19 dots.

4.4.5   GAP   (GAP Size)
HFM, LSX, LSY, WEB, **GAP**, DPS, LCB, AGD, SPG, OFX, OFY

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

4.4.6   DPS   (Print Speed)
HFM, LSX, LSY, WEB, GAP, **DPS**, LCB, AGD, SPG, OFX, OFY

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

The maximum print speed for the low torque configuration should be limited to 6ips or a DPS setting of 4. If faster speeds are selected when using the low torque configuration, the unit will stall and not move media properly.

Labels per minute can be calculated by the equation below:

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

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

Table 4-1   DPS Values

4.4.7   LCB   (Label Control Byte)

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

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

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

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

4.4.7.2   Continuous Media (setting = 2)

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

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

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

For example: Imagine the same format as mentioned above that has an LSY value of 900 (3" x 300 = 900), an SPG value of 352, 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 352 dots. Regardless of the format fields, if the LSY is set to 900 and the SPG is set to 352 the printer will advance a total of 1285 dots (900+352=1285).

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

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

4.4.8   AGD (Activate Gap Detector)
HFM, LSX, LSY, WEB, GAP, **DPS**, LCB, **AGD**, SPG, OFX, OFY

This parameter selects the number of step (dot rows) that the printer will skip before registration mark sensing is activated. This value is usually set to "1". It is a good idea to set it to a value to ignore areas of pre-printed or perforated stock that might cause incorrect registration mark detection.

4.4.9   SPG (Steps Past Gap)
HFM, LSX, LSY, WEB, GAP, DPS, LCB, AGD, **SPG**, OFX, OFY

This parameter is used to specify the number of steps (thermal dots) to advance the media after a registration mark has been detected.   This parameter is required to properly register print on each label. The table below lists proper SPG settings for particular printer configurations when the LSY is greater than the D2G parameter value, the D2G value is used.

Registration Sensor/Print Head DPI	D2G Value
Transmissive (GAP) / 203 DPI	187
Reflective (Blackline) / 203 DPI	187
Transmissive (GAP) / 300 DPI	276
Reflective (Blackline) / 300 DPI	276

Table 4-2   Dot to Gap Parameters

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

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

NOTE: All values are in pixels or dots.

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

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

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

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

Calculation Examples:

Die-cut Media:
A 300 DPI printer is being used with 1.25" x 1" media containing a .125" die-cut gap. The SPG would be calculated as follows:

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

SPG = (276 + 300 - 300) mod (300 + 38)

SPG = 276 mod 338

SPG = 276

D2G (276) =	The Dot to Gap distance for the transmissive sensor (Table 4-2).
LSY (300) =	The height of the printable area; 1" x 300 DPI = 300 dots.
SBL (38) =	The Space Between Labels, or die-cut GAP in this case; .125" x 300 DPI = 38 dots.
DRM (300) =	The Distance to Registration Mark is from the leading edge of the printable area to the next registration mark; 1" x 300 DPI = 300 dots.

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

4.4.10   OFX   (Offset X Direction)

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

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

4.4.11   OFY   (Offset Y Direction)

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

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

4.5 Sample Header

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

    5,672,300,19,38,7,0,1,276,0,0<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.
19	=	WEB measures 0.0625" or 19 dots.
38	=	GAP measures 0.125" or 38 dots.
7	=	Print speed (DPS) of 7 = 4.5 inches per second.
0	=	LCB of 0 for die-cut labels.
1	=	AGD of 1 step.
276	=	SPG of 287 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, 250, 8,   7, 10, 0, 4,   2,   2,   ,   , , , 0**

Feed Direction
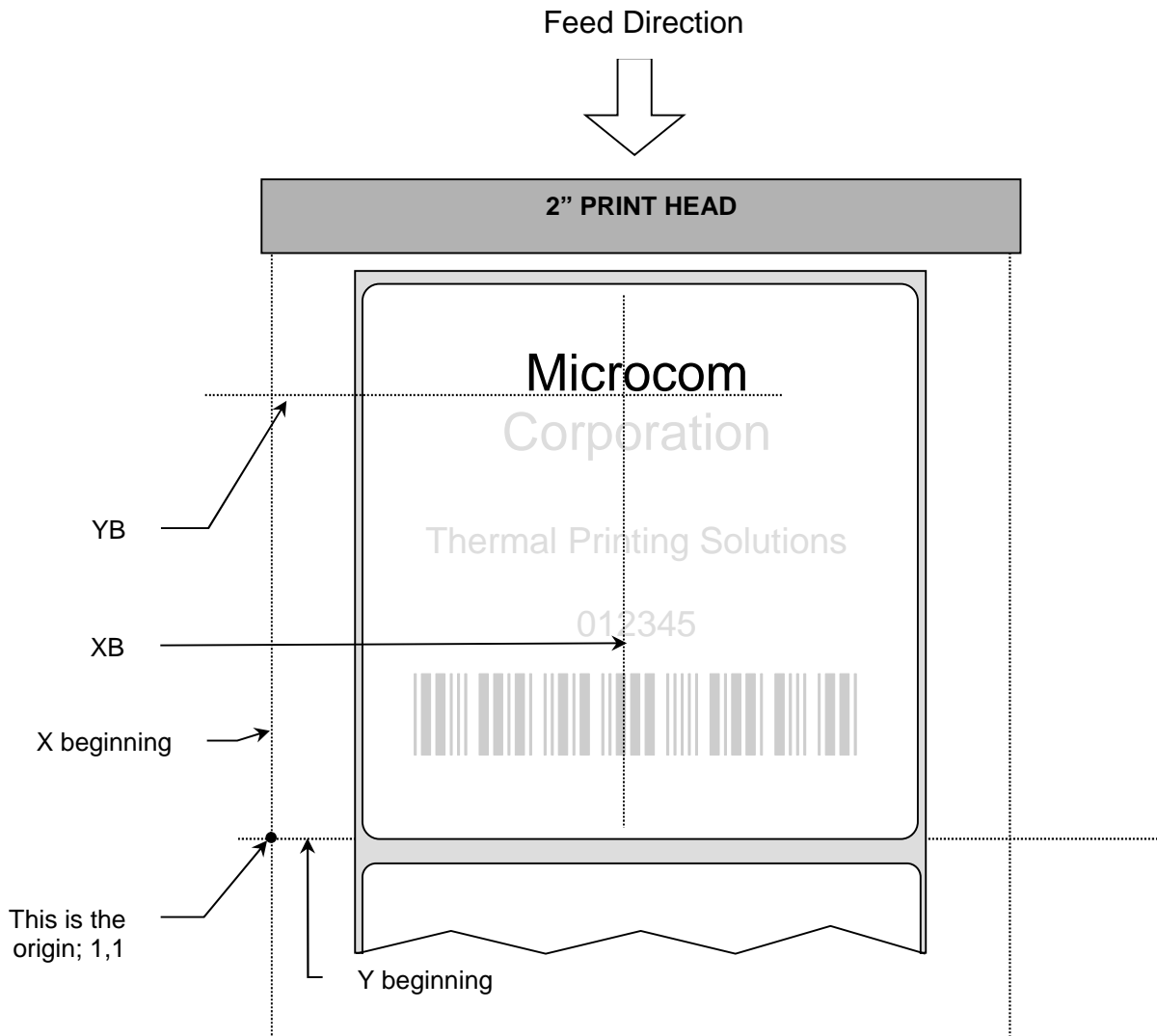
Figure 4-4   Label Format Field Elements

4.6.1   TSN   (Text String Number)
TSN, XB, YB, CC, TCI, CGN, FO, FJ, CMX, CMY, CS, TSP,,, AN

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

4.6.2   XB   (X Beginning Coordinate)
TSN, **XB**, YB, CC, TCI, CGN, FO, FJ, CMX, CMY, CS, TSP,,, AN

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

Example: The print head is 672 dots, if 2" or 600 dot wide media was used, the offset of 190 should be added to each XB coordinate.

Offset example: 672 - 600 = 72; 72/2 = 36.

4.6.3   YB   (Y Beginning Coordinate)
TSN, XB, **YB**, CC, TCI, CGN, FO, FJ, CMX, CMY, CS, TSP,,, AN

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

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

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

4.6.5   TCI   (Text Conversion Identifier)
TSN, XB, YB, CC, **TCI**, CGN, FO, FJ, CMX, CMY, CS, TSP,,, AN

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

TCI VALUE	TCI DESCRIPTION
1	Regular Text (standard embedded fonts, no barcode)
2	Text Surrounded by Asterisks
3*	Text with UPC-A / UPC-E Checksum Digit Added
6	Line Draw
7	FLASH Fonts and Graphics
8	RAM Fonts and Graphics
12	UPC-A Symbol
13	UPC-E Symbol (Send 11 Digits)
14	UPC-E Symbol (Send 7 Digits)
15	Interleaved 2 of 5 Barcode
16	Code 39 Symbol
17*	Text with UPC-E Checksum and Extended Bars Added
20	EAN-13 Symbol
21	EAN-8 Symbol
22*	Text with EAN-13 Checksum and Extended Bars Added
23*	Text with EAN-8 Checksum and Extended Bars Added
24	MSI 1 Symbol (Modified Plessey)
25	MSI 2 Symbol (Modified Plessey)
26	MSI 3 Symbol (Modified Plessey)
28*	Text with MSI Checksum Added – Type 1
29*	Text with MSI Checksum Added – Type 2
32*	Text with UPC-A Checksum and Extended Bars Added
33*	Text with UPC-A with Extended Bars Added
35	GS1 Databar
36	Postnet Symbol (Zip+4)
37	Postnet Symbol (Zip+6)
40	Code 128 Symbol (Automatic Compression)
41	Code 128 Symbol (Manual Compression)
42	Codabar Symbol
43	Code 93 Symbol
46	PDF-417 Symbol
47	Datamatrix Symbol
48	Intelligent Mail Barcode
49	Planetcode Symbol
50	UCC/EAN 128 Symbol
51*	Text with EAN 128 Information
52	Aztec
53	QR Code

* Human Readable - Refer to Chapter 8

Table 4-3   TCI Values

4.6.6   CGN   (Character Generator Number)

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

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

4.6.6.1   Embedded Fonts

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

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

Table 4-4   CGN—Embedded Fonts

4.6.6.2   Downloadable Fonts and Graphics

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

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

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

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

Standard Downloadable Font Set		
CGN VALUE	POINT SIZE	FONT TYPE
10	6	Swiss™721 Normal 0 degree
11	6	Swiss™721 Normal 90 degree
12	8	Swiss™721 Normal 0 degree
13	8	Swiss™721 Normal 90 degree
14	10	Swiss™721 Normal 0 degree
15	10	Swiss™721 Normal 90 degree
16	12	Swiss™721 Normal 0 degree
17	12	Swiss™721 Normal 90 degree
18	14	Swiss™721 Normal 0 degree
19	14	Swiss™721 Normal 90 degree
20	16	Swiss™721 Normal 0 degree
21	16	Swiss™721 Normal 90 degree
22	20	Swiss™721 Normal 0 degree
23	20	Swiss™721 Normal 90 degree
24	24	Swiss™721 Normal 0 degree
25	24	Swiss™721 Normal 90 degree
30	6	Swiss™721 Bold 0 degree
31	6	Swiss™721 Bold 90 degree
32	8	Swiss™721 Bold 0 degree
33	8	Swiss™721 Bold 90 degree
34	10	Swiss™721 Bold 0 degree
35	10	Swiss™721 Bold 90 degree
36	12	Swiss™721 Bold 0 degree
37	12	Swiss™721 Bold 90 degree
38	14	Swiss™721 Bold 0 degree
39	14	Swiss™721 Bold 90 degree
40	16	Swiss™721 Bold 0 degree
41	16	Swiss™721 Bold 90 degree
42	20	Swiss™721 Bold 0 degree
43	20	Swiss™721 Bold 90 degree
44	24	Swiss™721 Bold 0 degree
45	24	Swiss™721 Bold 90 degree
50	12	OCR-A Normal 0 degree
51	12	OCR-A Normal 90 degree

Standard Downloadable Font Set		
CGN VALUE	POINT SIZE	FONT TYPE
52	12	OCR-B Normal 0 degree
53	12	OCR-B Normal 90 degree
54	8	OCR-B Normal 0 degree
55	8	OCR-B Normal 90 degree

Table 4-5   CGN - Standard Downloadable Font Set

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

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

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 7 8	2:1 3:1 5:2 7:3 8:3	1 1 1 1 1	- - - - -	0123 0123 0123 0123 0123
UPC / EAN *	-	40 %	1	-	0123
UPC Readable *	-	40 %	1	-	0123
Code 128 & UCC / EAN 128 *	-	40 %	1	-	0123
Codabar	2 3 5	2:1 3:1 5:2	1 1 1	- - -	0123 0123 0123
Code 93	-	2:1	1	-	0123
MSI (Modified Plessey)	-	1:1	1	-	0123

Table4-6   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)

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

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

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

4.6.8   FJ   (Field Justification)

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

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

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

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

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

Table 4-7   FO & FJ Character Starting Positions

4.6.9   CMX   (Character Multiplier X Direction)

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

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

4.6.10   CMY   (Character Multiplier Y Direction)

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

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

4.6.11   CS   (Character Spacing)

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

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

4.6.12   TSP   (Text Starting Position)

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

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

4.6.13   ,,,   (Reserved Spaces)

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

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

4.6.14   AN   (Attribute Number)

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

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

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

4.7   Line Draw

It is possible to design lines into a label utilizing some of the elements of label format fields. Specifically, a TCI value of "6" enables the line draw function. XB and XY provide a starting position for a line draw. CMX and CMY provide length and thickness to a line. Other

elements not necessary to draw a line such as CC, CGN, FO, FJ, CS, and AN are ignored by simply adding delimiters (commas) without values.

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

```
^D57 <CR>
2,672,900,19,38,7,0,1,276,0,0 <CR>
1,340,712,,6,,,,600,25,,,,,0 <CR>
1,286,127,,6,,,,25,600,,,,,0 <CR>
^D56 <CR>
^D2 <CR>
Line <CR>
^D3 <CR>
```
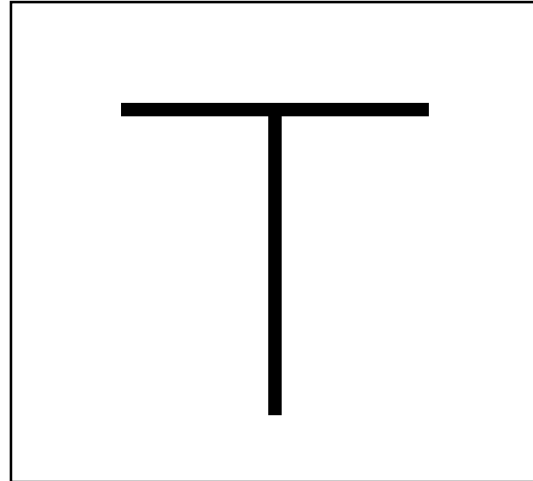
Figure 4-5   Line Draw Sample

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

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

Feed Direction

4" PRINT HEAD

CMX

CMY

YB

XB

X beginning

This is the origin; 1,1

Y beginning
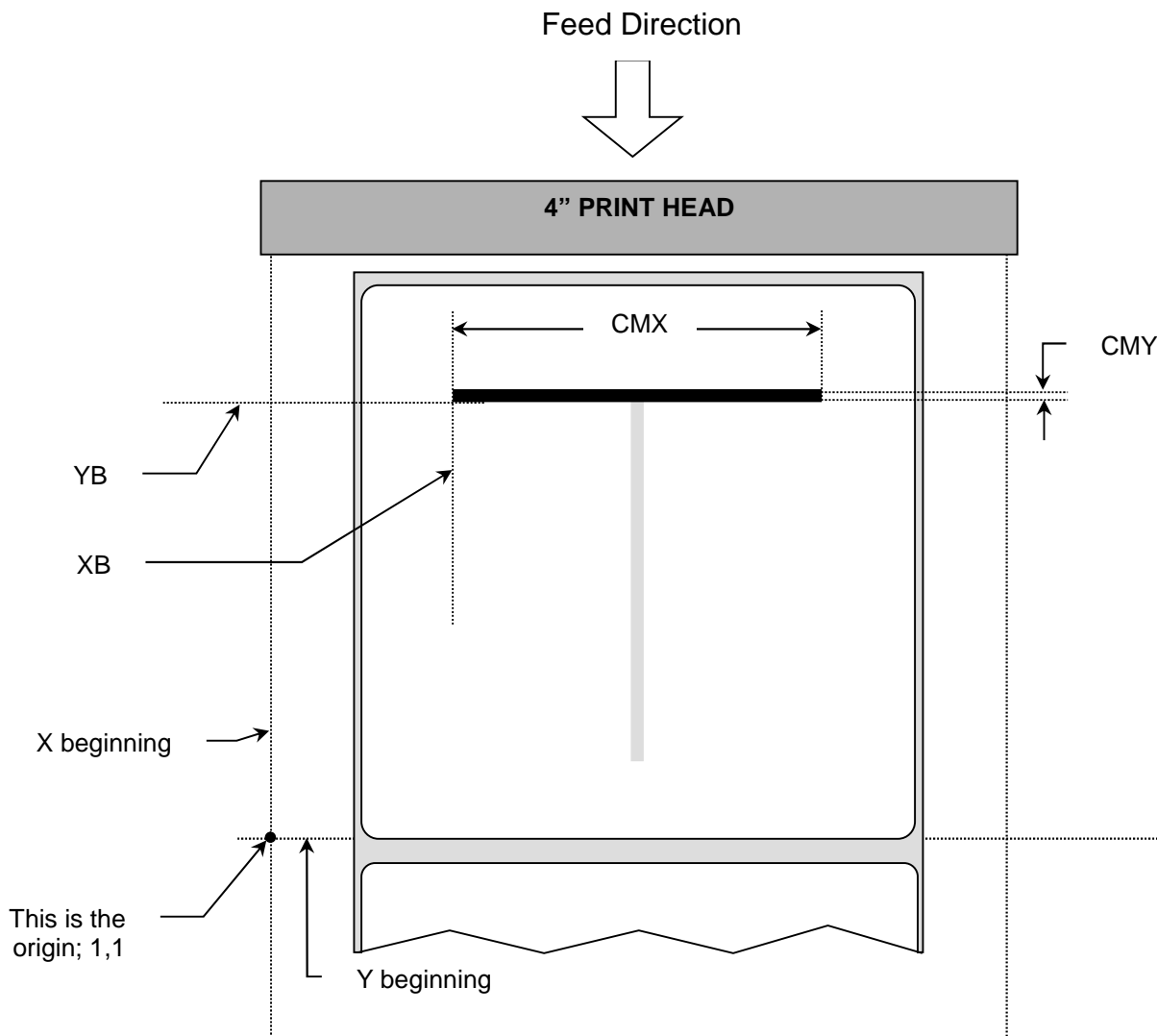
Figure 4-6   Label Format Line Draw

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

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

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

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

TCI (Text Conversion Identifier) The TCI is always set to a "6" for line draw.
CGN (Character Generator Number) This element is not used in line draw. No value is necessary, however, a comma needs to be entered to acknowledge the position.

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

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

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

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

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

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

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

4.8 Reverse Video

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

4.8.1   Black Box 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
6,672,300,19,38,7,0,1,276,0,0
1,186,94,,6,,,,300,200,,,,,1
1,336,250,8,7,10,0,4,2,2,,,,,0
2,336,200,11,7,10,0,4,2,2,,,,,0
3,336,150,26,7,10,0,4
4,336,100,6,7,10,0,4
4,336,25,6,16,3,,4,2,50
^D56
^D2
Microcom
Corporation
Thermal Printing Solutions
012345
^D3
```
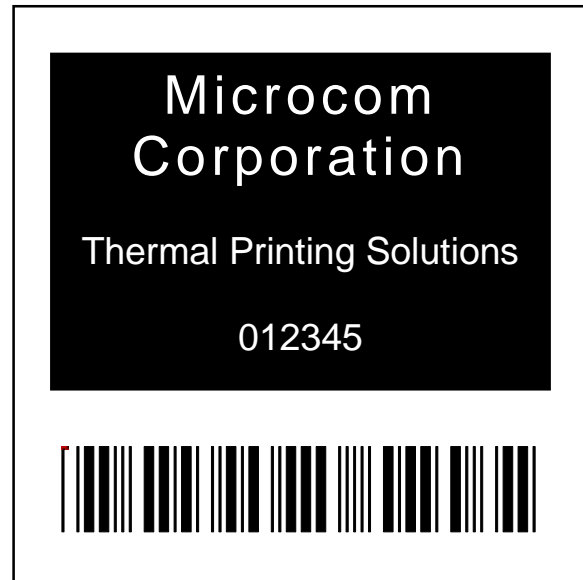
Figure 4-7   Reverse Video Sample

4.8.2   Auto Reverse Video

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

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

```
^D57
5,672,900,19,38,7,0,1,276,0,0
1,640,700,8,1,5,0,4,2,2,,,,,8
2,640,591,11,1,5,0,4,2,2,,,,,8
3,640,443,26,1,5,0,4,,,,,,,8
4,640,296,6,1,5,0,4,,,,,,,8
4,640,148,6,16,3,,4,3,75,,,,,0
^D56
^D2
Microcom
Corporation
Thermal Printing Solutions
012345
^D3
```
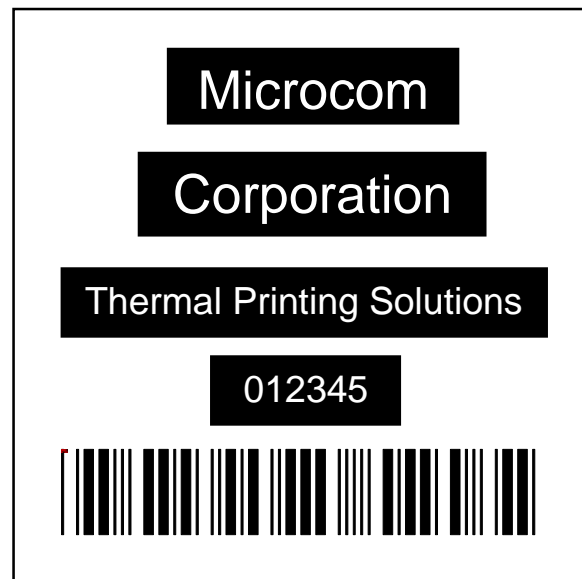
Figure 4-8   Auto Reverse Video Sample

Chapter 5 Printer Commands

The 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.

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 **Error! Reference source not found.**. Each string is represented by a single byte with nothing separating them. The end of the response is terminated with a 0xFF character.

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 SECTOR n<		The flash was unable to erase at the memory sector noted by the "n"

Table 5-1   Enquiry Responses

5.1.1.2   Optional Presenter Status

If the Enable Presenter (Switch Bank #8 bit 6; D28 command) is enabled, and the ^A65^D172 is issued, the printer will report the Presenter codes that are active. The presenter is an option that is used to control the presentation of printed media to the user. The presenter status messages are only in text form. To clear presenter errors, media should be reloaded, the ^A83^D172 presenter reset, or the 5 NULL Error clear character combination may be sent.

Text Mode Response	Definition
>PRESENTER READY<	Ready to Present
>PRESENTER BUSY<	Presenter has started but not yet finished the present cycle
>PRESENTER WAITING FOR PRESENT COMMAND<	Presenter is waiting for the present command after performing the prefeed
>PRESENTER WAITING FOR LABEL TAKEN<	After the media has been presented but before it has been taken or retracted
>PRESENTER LABEL RETRACTED<	Indicates that the last job was retracted into the waste bin
>PRESENTER PRE FEED ERROR<	The output sensor never detected the media during a prefeed cycle
>PRESENTER PRESENT ERROR<	Input sensor never detected absence of media during a present cycle before the timeout
>PRESENTER RETRACT ERROR<	Input sensor did not detect the absence of media during the retraction process before the timeout
>PRESENTER COMM ERROR<	Framing or overrun error was detected by the presenter
>PRESENTER COMM FAILURE<	No response was received from the presenter after a command was sent to it.
>PRESENTER POROGRAMMING ERROR<	Flash update process did not complete successfully
>PRESENTER WDT ERROR<	Reset occurred due to the watchdog timeout

Table 5-2   Optional Presenter Status 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: ^AB10100000^D21<CR> configures serial port #1 for text equivalent enquiry responses, accept control codes, and disables echo.

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

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

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

> <u>**Position:**</u>
> **1**   **Clear Text Function:** If enabled, all variable text strings will be erased when the ^D<CR> is processed.
> > **1= Enable**
> > **0 = Disable**
>
> **2**   **>RESTARTED< Response:** If the printer has been reset and this switch has been enabled, the printer will respond with the >RESTARTED< message for the first enquiry ONLY, to denote the reset condition and then >READY< with following enquiries.
> > **1 = Enable   (>RESTARTED< on first inquiry then >READY<)**
> > **0 = Disable   (Always responds with >READY<)**
>
> **3**   **Button Use:** If set to a "1", the printer will disable the Print Button.
> > **1 = Disable**
> > **0 = Enable**
>
> **4**   **Print Repetition:** Defines the function of the Print Button. If set to a "0", the button can be used for feeding labels but the print function is disabled and blank forms will be issued.
> > **1 = Label PRINT**
> > **0 = Label FEED only**
>
> **5**   **Power-ON Format Type:** Determines whether to use a saved format file or a standard ROM format. User downloaded Label FORMAT files are saved in non-volatile FLASH memory. Any of these FORMATs may be used for the Power-ON label. When SW2:5=1, the format is selected by SW2 switch positions 6, 7, and 8.
> > **1 = Power-ON label is selected by SW2: 6, 7, and 8**
> > **0 = Power-ON label is standard format**
>
> **6,7,8** **Power-up Format:** These switches work in conjunction with switch location 5 above. They determine which stored format is loaded at power-up. The printer can be instructed not to load a format at power-up by setting all three switches to 0.
> > **000 = No Power-up Format**
> > **001 = ROM or Saved Format File 1**
> > **010 = ROM or Saved Format File 2**
> > **011 = ROM or Saved Format File 3**
> > **100 = ROM or Saved Format File 4**
> > **101 = ROM or Saved Format File 5**
> > **110 = Rom or Saved Format File 6**
> > **111 = ROM of Saved Format File 7**

5.2.1.3   **Software Switch #3**

^AB   **^D**   <u>**COMMAND**</u>
  XX   **23**   **Change SW3:** Software Switch #3

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

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

         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:** 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 (detecting media).
                 1 = Send >INPUT 1< report when not detecting
                 0 = Send >INPUT 1< report when detecting

         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:** 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 (detecting media).
                 1 = Send >INPUT 2< report when not detecting
                 0 = Send >INPUT 2< report when detecting

         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   **RESERVED**

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

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

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

> **0000 = Not Decoded (Default)**
> **0001 = Danish**
> **0010 = 860**
> **0011 = Spanish**
> **0100 = 850**
> **0101 = German**
> **0110 = 865**
> **0111 = Swiss**
> **1000 = 852**
> **1001 = French**
> **1010 = 863**
> **1011 = Swedish**
> **1100 = 437**

                    1101 = Italian
                    1110 = English - UK
                    1111 = English – US

5.2.1.5   Software Switch #5

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

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

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

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

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

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

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

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

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

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

5.2.1.6   **Software Switch #6**

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

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

> <u>**Position**</u>**:**
> **1**   **RESERVED**
>
> **2**   **RESERVED**
>
> **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   RESERVED

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   RESERVED

456   RESERVED

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   RESERVED

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   RESERVED

5   **RESERVED**

6   **Enable Presenter:** The presenter is an option that is attached to the printer and cutter and is used to dispense media using various modes. The printer needs to be using 1.1.99 code or later and have PIC code 2.02 or later in addition to the actual presenter hardware to be installed on the printer before this will function. See also the ^D172 and ^D175 commands for additional operational information.
                        1 = Enable Presenter
                        0 = Disable Presenter

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 printers 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**   <u>COMMAND</u>
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. Only 1 port may 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**   <u>Command</u>
X   **108** **Serial Port Source (Non-volatile)**
0   **Auto Select:** When the printer powers up, it scans the USB and RS-232 ports and selects the "Active" port. The USB port will be selected if the USB cable is connected between the printer and a PC that is powered "ON." The RS-232 port will be selected if the USB cable is not plugged in and a character comes in on the RS-232 port. The printer will continue to scan both ports until one or the other condition is satisfied.

1   **2 Port Auto Select:** Starting with code version 1.11.20 and later, the printer determines on power up if it detects the USB connected and if not, will set the active port to the Xport Ethernet device. By default, the printers are configured with an IP address of 192.168.200.3 on Port 9100 at the factory.

3   **RS232:** When the active port is set to a 3, the printer will ignore other ports being plugged into the machine and will only be active on the RS232 port.

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   **Microcom Ethernet option board:**   When the active port is set to a 5, the printer will ignore other ports being plugged into the machine and will only be active on the Microcom Ethernet option board. By default, the printers are configured with an IP address of 192.168.200.3 on Port 9100 at the factory.

6   **3 Port Auto Select:**   When the active port is set to a 3, the printer will auto select between the USB, Microcom Ethernet option board, and the serial port.

5.2.2.3   Ethernet Option Board Configuration

Printers may be configuration with an Ethernet option board and allows for ethernet connectivity. This command is used to configure the Ethernet option board using LDS1 command. Additional information is also discussed in Chapter 3 regarding this optional port.

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

X   **177**   **Configure Ethernet Option Board:** The values are written to RAM and not saved until the save command is sent. All commands require the command to be sent, followed by a <CR> or carriage return character and then the value that is also terminated with a <CR> character.

1   **Set IP Address:** This command is used to set the printers IP address.
Syntax Example:
                        ^A1^D177 <CR>
                        192.168.200.3 <CR>

2   **Set the TCP Port:** This command is used to set the printers TCP port.

3   **Enable DHCP:** This command is used to enable or disable DHCP. A value of 1 enables DHCP while a value of 0 disables DHCP.

4   **Set the NetBIOS name:** This sets the Net BIOS or HOST name that may be used in a web browsers URL address field instead of the IP address. The name may be up to 15 characters in length with the default being microcom.

5   **Set the Gateway Address:** This command allows a Gateway address to be entered. The default Gateway is set to 0.0.0.0.

6   **Set the Subnet Mask Address:** This command sets the Subnet mask of the printer. The default is set to 255.255.255.0.

7   **Set the MAC Address:** The MAC address is assigned at the Factory and should not be changed. If the CPU connected to the Ethernet Option Board is replaced, the MAC will need to be set. Contact Microcom Corporation for a valid MAC address if needed.

8   **Display printer parameters settings in RAM:** This command is used to report back the parameters that are stored in RAM. Any value that has changed will not be saved unless the save command is selected.

9   **Save Configuration Parameters:** The command saves parameters that are stored in RAM and writes the values into non-volatile memory.

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. This command is typically only sent one time and requires a reset or power cycle before being active.

Printer Model	**Dots/Inch**	**D79 value**
238	203	448
238	300	672

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)
              ^A672^D78<CR>   (Sets 672 dots)

EXAMPLE #2: How to set the printer for an 832 dot, 203 dpi print head:
              ^A0^D79<CR>   (Sets 203 dpi)
              ^A448^D78<CR>   (Sets 448 dots)

5.2.4   USB Image Print Mode

<u>**^A**</u>   <u>**^D**</u>   <u>**COMMAND**</u>

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

	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.

^A   ^D   COMMAND

XX   90   Reflective Detection Threshold: This command is non-volatile and is used to set the reflective or blackline threshold value (0-255) at which the printer detects a blackline used for print registration. The default is set to a value of 100 and should work for most media types.

XX   91   Transmissive Detection Sensitivity: This non-volatile command is used to set the transmissive or GAP threshold value (0-255) at which the printer detects gap and/or blow-hole registration marks. The default is set to a value of 30 and should work for most media types.

XX   124   Stock Out Threshold: This command is non-volatile and is used to set the stock out threshold value (0-255) at which the printer detects an out of stock or >LOW STOCK< error condition. The threshold is typically set to a value that is 80 percent of the transmissive sensor reading when no media is detected by the transmissive sensor. This value is calibrated at the factory and should not require adjustment unless the transmissive sensor has been replaced.

X   129   Auto Set Threshold: This command will cause the printer to scroll 1350 dots, determine the proper threshold value, and set the nonvolatile threshold for proper registration. The ^Ax selects either reflective or transmissive detection.
0   Automatically sets the transmissive threshold value.
1   Automatically sets the reflective threshold value.

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 238	187
300dpi 238	276

Table 5-4   Transmissive Dot2Gap Values

<u>^A</u>	<u>^D</u>	<u>COMMAND</u>
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 238	187
300dpi 238	276

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.

<u>^A</u>	<u>^D</u>	<u>COMMAND</u>
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		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.

5.3 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 enable, Autoload type, and Autoload sensor functions.

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, bits 6 and 7 to enable the AutoLoad+FF feature.

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.)
1,672,900,19,38,7,0,1,276,0,0 <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.

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

<u>^A</u> **<u>^D</u>** **<u>COMMAND</u>**
      3 **Print Command: (Equivalent ^C)** Informs the printer to print a single label or start printing a batch of labels. Since commands are processed in the order they are received, this is typically the last command in the format file. This command is equivalent to the "^C" control code.

<u>^A</u> **<u>^D</u>** **<u>COMMAND</u>**
     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.

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

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

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

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

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

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

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

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

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

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

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

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

5.5.1 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:

<u>^A</u> **<u>^D</u>** **<u>COMMAND</u>**
80 **Clears Commands 86, 88, 89.**

81 **Disable Serial Number Function:** This command disables both single and multiple serial number functions.

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

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>
> 1,672,600,,38,4,0,1,276,0,0 <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>
2,672,600,,38,4,0,1,276,0,0 <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>
6,672,900,,38,7,0,1,276,0,0 <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 does not retract until the next format which helps to prevent paper jams going into the cutter or media wrapping around the platen roller. Mode 4 uses the optional LTS sensor. When using this mode, 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.

XX	111	Kiosk Cutter Mode
0		Disable Kiosk Cutter Mode.
1		Enable Kiosk Cutter Mode.
4		Enable Full Kiosk Cutter Mode with LTS

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.

^A   ^D   <u>COMMAND</u>
XX   112   Kiosk Cutter Advance/Retract Distance Command: The valid range is from 0 to 1000 with the recommended distance of .54".

5.7.3   Volatile Cutter Operation

<u>^A</u>   <u>^D</u>   <u>COMMAND</u>
**   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   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   Retraction 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.

^A	**^D**	**COMMAND**
XX	**96**	**Retraction 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
	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.

^A	**^D**	**COMMAND**
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
                                                 5,672,900,20,40,7,0,1,276,0,0
                                                 1,340,650,12,1,5,0,4,2,2,,,,,0
                                                 ^D56
                                                 ^D2
                                                 Saved Format
                                                 ^D3
                                                 ^[

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

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

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.)

^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
5,672,900,19,38,7,0,1,276,0,0
1,340,650,12,1,5,0,4,2,2,,,,,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.

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   <u>COMMAND</u>
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 <u>WILL</u> be erased.*

<u>*Hint*</u>*: 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.

<u>*Hint*</u>*: 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   <u>COMMAND</u>
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

<u>^A</u> **<u>^D</u>** **<u>COMMAND</u>**
       5 **Send Printer Status: (Equivalent ^E)**

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.

X **153** **Feed Forward Distance:**
This command will move the motor in the forward direction by the X amount (specified in dots) when issued. The maximum value is 65535. The feed speed is defined by the D155 command.

X **154** **Feed Reverse Distance:**
This command will move the motor in the reverse direction by the X amount (specified in dots) when issued. The maximum value is 65535. The feed speed is defined by the D155 command.

^A	^D	COMMAND

X   155   Set Feed Speed:

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

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

X   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 where 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 of 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

X   172   Presenter Configuration:
This command is used to configure the presenter setup and operational parameters. The "x" value represents either a value from 2 to 5 digits that is used to configure the presenter. The printer will respond with the >PRESENTER DONE< message to indicate that the command received has been processed. The presenter's commands are configured at the factory and typically do not need to be changed. Access to the presenter commands is provided in the event custom paper and application require the presenter to be adjusted to provide the most reliable dispensing.
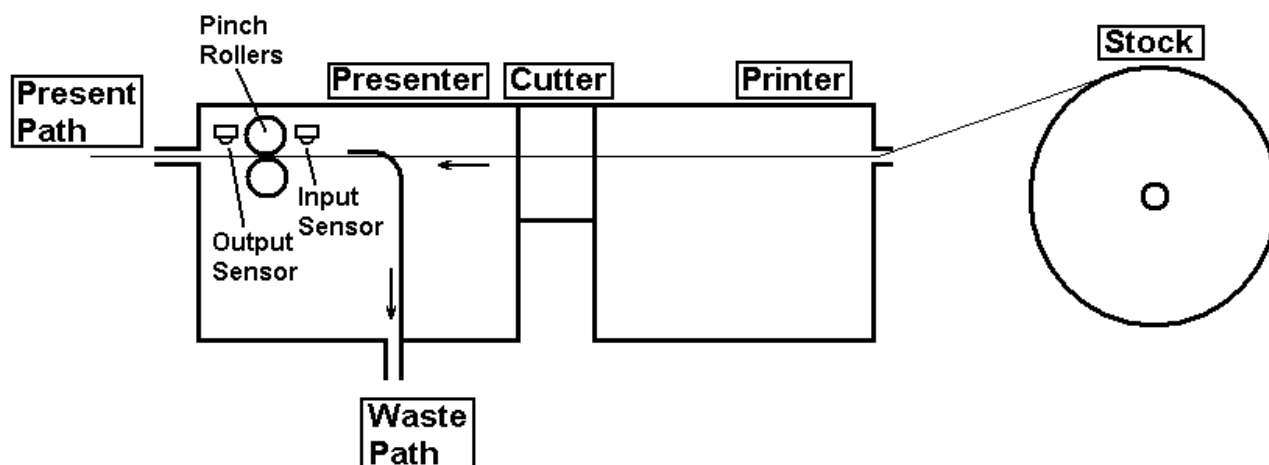
Figure 5-1   Optional Presenter

^A	**^D**	**COMMAND**
65	**172**	Returns the current status of the presenter. Valid responses:

>PRESENTER READY<
>PRESENTER BUSY<
>PRESENTER WAITING FOR PRESENT COMMAND<
>PRESENTER WAITING FOR LABEL TAKEN<
>PRESENTER LABEL RETRACTED<
>PRESENTER PRE FEED ERROR<
>PRESENTER PRESENT ERROR<
>PRESENTER RETRACT ERROR<
>PRESENTER COMM ERROR<
>PRESENTER COMM FAILURE<
>PRESENTER PROGRAMMING ERROR<
>PRESENTER WDT ERROR<
>PRESENTER DONE<

Example: ^A65^D172 requests the presenter status.

66   Returns the current settings of the presenter that are saved in non volatile memory.

Example: ^A66^D172 requests the presenter settings.

PRESENTER PRE FEED SPEED: xx
PRESENTER ADVANCE SPEED: xx
PRESENTER RETRACT SPEED: xx
PRESENTER ADVANCE DISTANCE: xx
PRESENTER RETRACT TIMEOUT: xx
PRESENTER ACCELERATION xx
>PRESENTER DONE<

67   Returns the current code version of the presenter.

Example:
PRESENTER REV: xx.xx
>PRESENTER DONE<

68   Displays the available presenter commands.

Example:
65: Return Status
66: Return Settings
67: Return Revision
68: Return Commands
69: Set Acceleration
70: Set Pre Feed Speed
71: Set Present Speed
72: Set Retract Speed
73: Set Present Distance
74: Reserved
75: Set Present Delay

76: Save Settings
77: Restore Settings
78: Erase Memory
79: Force Defaults
80: Pre Feed
81: Present
82: Clear Errors
83: Restart
84: Reflash
85: Oscillate Test
86: Feed Test
87: Sensor Test
88: Prefeed Control
>PRESENTER DONE<

^A	**^D**	**COMMAND**
69	**172**	Sets the acceleration of the presenter's motor. This sets the number of micro steps the motor will accelerate through before reaching its target speed. Valid values are 0-254 and are issued just prior to the 69 command. The motor uses acceleration every time it starts but doesn't decelerate when it stops.

Example ^A2269^D172 sets the printer to accelerate over the first 22 micro steps.

70   Sets the prefeed of the presenter's motor. This is the speed that the presenter uses to move the media from the leading edge of the stock to the output sensor. Valid values are 1-48 and are issued just prior to the 70 command. The speed is entered in as n and the speed in inches per second formula is n/2 +2.

Values for speed (n):
n   speed
1 = 2.5 ips
2 = 3.0 ips
3 = 3.5 ips
.
.
.
48 = 26.0 ips

Example: ^A270^D172 sets the pre feed speed to 2 (3.0 ips).

71   Sets the present speed. This is the speed that the presenter uses during the time that it is presenting the media. This command uses the same values as the Prefeed speed (70) from above.

Example: ^A270^D172 sets the pre feed speed to 2 (3.0 ips).

^A	**^D**	**COMMAND**
72	**172**	Sets the retraction speed. This is the speed that the presenter uses when the media is being retracted. This command uses the same values as the Prefeed speed (70) from above.

Example: ^A270^D172 sets the pre feed speed to 2 (3.0 ips).

73   Sets the present distance. This is the distance the media moves from the prefeed position to the present position. Valid values are 1-254 and represent 1/10th of an inch, giving a range of from .1" to 25.4" in 1/10" increments. Distance in inches = n/10.

Example: ^A10773^D172 sets the present distance to 10.7".

75   Set Label Taken Timeout. This is the time that the presenter will wait for the presented label to be taken before retracting it into the trash bin. Valid values are 1-254.
n   time
1 = 2 sec
2 = 4 sec
3 = 6 sec
.
.
.
254 = 8 min 28 sec
Time in seconds = n*2.

Example: ^A3075^D172 sets the timeout to 1 minute.

76   Save Presenter settings. This command is used to save the presenters configuration settings in non volatile memory. When the presenter is powered on for the first time, the default below parameters will be used.

DEFAULT_PRE_FEED_SPEED	12	(8.0 ips)
DEFAULT_PRESENT_SPEED	12	(8.0 ips)
DEFAULT_RETRACT_SPEED	12	(8.0 ips)
DEFAULT_PRESENT_DISTANCE	254	(25.4")
DEFAULT_PRESENT_DELAY	4	(8 sec)
DEFAULT_ACCELERATION	60	(60 steps)

^A76^D172 saves the current settings.

77   Restore Saved Settings. This command restores the last saved presenter setting from non volatile memory.

78   Erase Non Volatile Memory. This command erases all the saved parameters stored in non volatile memory.

79   Load Defaults. This command is used to load presenter defaults.

DEFAULT_PRE_FEED_SPEED	12	(8.0 ips)
DEFAULT_PRESENT_SPEED	12	(8.0 ips)
DEFAULT_RETRACT_SPEED	12	(8.0 ips)
DEFAULT_PRESENT_DISTANCE	254	(25.4")
DEFAULT_PRESENT_DELAY	4	(8 sec)
DEFAULT_ACCELERATION	60	(60 steps)

^A	**^D**	**COMMAND**
80	**172**	Prefeed. This command is used to manually send the Prefeed command when using the manual mode. This command starts the manual present process by running the motor the pre feed speed until the media blocks the output sensor or the motor timeout of 5400 micro steps is reached.

281   Present. This command is used to manually issue a present command when using the manual mode (mode 8).

82   Clear Errors. This command is used to clear any presenter errors that are being reported. This command does not restart the presenter nor does it clear any printer errors.

83   Restart. This command is used to restart the presenter firmware.

85   Oscillate Test Ticket. This command is used for diagnostics testing purposes and causes the media to move between the output and input sensors at the present speed. Remove the media to exit this diagnostics test.

X   **175**   **Presenter Mode:**
This command is used to select the mode that the optional presenter will use to determine the method used to present the media. This command is effective immediately and does not require a reset. The minimum length of a form is 3.00", the distance from the cutter to the presenter pinch.

0   Presenter Disabled. All functions of the presenter are disabled even though Switch 8 setting has enabled the presenter.

1   Auto, Loop, Present Path. As the label is printed, the leading edge of the label will get caught and held by the presenter pinch roller and a loop will form in the media behind the presenter. When the job has finished printing and is cut, the presenter will then present the label. If the label is not taken before the timeout, it will be retracted to the waste shoot under the printer. The label needs to be long enough to present correctly.

2   Auto, No Loop, Present Path. The presenter will turn on when the printer begins to print (known as the presenter pre feed) and will stay on until the label begins to be cut. This will eliminate the formation of the loop. The pre feed speed will need to be close to the print speed for best performance. If the pre feed speed is faster than the print speed, the presenter will chatter as the presenter motor slips on the stock. If it is too slow, a loop will begin to form as the label proceeds to print. For best results, make the presenter speed 1/2 an inch per second slower than the print speed.

^A	**^D**	<u>**COMMAND**</u>

3   **175**   Auto, Loop, Waste Path. In this mode, the waste and present paths are switched. The present location will follow the waste path under the printer. The intended use is for printers that are mounted vertically with the waste path pointing toward the customer. If the presented media is not taken before the timeout, it will be retracted into the trash via the present path which would be pointing down.

4   Auto, No Loop, Waste Path. This is a combination of modes 2 and 3. No loop will form and the waste path will be used to present.

5   Auto, Loop, Present Path, Front Eject. This is the same as mode 1 but instead of using the waste path to discard the ticket, it will be ejected out of the front of the presenter. The present and waste paths are the same.

6   Auto, No Loop, Present Path, Front Eject. This is the same as mode 5 but forms no loop.

7   Auto, Pass-through Mode. In this mode the presenter will simply pass the media through as if the presenter isn't there. The presenter will not hold the media retract if the user doesn't take it, and the present LED will not turn on. The presenter speed will need to be slightly slower than the printers print speed otherwise the unit will chatter. The presenter will pause when the printer stops to cut the stock. After the cut is complete, the presenter will feed the stock out of the front until it clears the sensors.

8   Manual Present Mode. This mode is used to manually control all aspects of the presenter. The label format contains all the necessary presenter commands or the host manually sends them. The host also needs to send Status Requests to the presenter to get status and error messages to know when the presenter is ready to present.

9   Show Current Mode. This will show the current mode in the form: Presenter Mode = n where n = 0 through 8.

10   Enable Pinch Assembly. This mode is enabled when the optional Pinch Assembly is used to dispense the media.

X   **178**   **Pre-takeup Delay:** This command is used in conjunction with the Takeup feature of the printer and requires that takeup code is installed in the PIC and is also enabled by the ^D26 command. The command delays the start of the takeup motor by the X value in steps after the main motor starts. The valid range is 0 to 65535 steps. Please note that if a value is selected that exceeds to format LSY, the takeup would not turn on.

Chapter 6: Downloadable Graphics

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

6.1 FLASH Data Types

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

1) 120 FLASH memory banks are 64Kbyte sectors for storing downloadable FONTS and GRAPHICS.
2) 128 slots for label FORMAT.
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 FORMAT.

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

6.3 Using the BMP2MIC.exe GRAPHIC Conversion Utility

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

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

1) <u>In File</u>   This is the *.bmp file to be converted. (Limit the file name to 8 characters and locate file in the same directory as the conversion utility to simplify data entry into the program.)
2) <u>Out File</u>   Create a name for the converted GRAPHIC File. (Limit the file name to 8 characters. An extension is not necessary.)
3) <u>Out Type</u>   See Section 6.4.
4) <u>Slot Number</u>   Select an open slot number for storage. Use ^D119 to determine which slots are open.
5) <u>Limit</u>   The maximum print width (in dots). Use ^D29 to determine print head size.
6) <u>Destination</u>   Use "0" for FLASH and "1" for RAM.

6.3.1 BMP2MIC.exe GRAPHIC Conversion Utility Procedure

1. Execute the conversion utility from a DOS prompt.

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

C:\WINDOWS>cd\

C:\>BMP2MIC.exe
```

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

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

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

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


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

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

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

Note: Add a space between fields.

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

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

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

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

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

6.3.2   Printing the Graphic file

Once the graphics file has been created, it may be sent to the printer to be stored and printer later. To print the graphic, you would send the printer a format that uses a TCI or 8 for RAM graphics or a TCI of 7 for Flash Graphics with the CGN point to the memory slot of the saved graphic. When printing graphics in your format, the format line must reference a period (".") in order to properly print the graphic.

Please not that a Graphic is nothing more than a 1-character font so they would share the same flash structure. Make sure that you verify that you desired memory slot is available by issuing a ^D119 command and verifying that the memory slot is available. The printer does not override a previously stored file so if you try to save a graphic to an occupied memory slot, the stored item may become corrupted and not print properly. You would need to first clear that memory location before saving.

Please see the example below:

        ^A100^D140 <CR>

        Send the converted Graphic file to the printer; Jet.mic using the file above.

        Now send a format to the printer that recalls memory slot 100.

        ^D57 <CR>
        1,448,609,,25,7,2,1,187,0,0 <CR>
        1,200,100,1,7,100<CR> <---------TCI of 7 for flash memory and slot 100 from above example
        ^D56 <CR>
        ^D2 <CR>
        .<CR> <------------------------ "." (Period) in the format to represent the graphic to be printed
        ^D3 <CR>

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*>

<u>*Where:*</u>
<*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.

6.6 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   **106**   **Save GRAPHICs or FONTs into RAM Memory without Compression:** This command is intended for legacy support only and Microcom Corporation recommends either the ^D104 or ^D107 commands. Fonts must be less than 64KB for this command to function.

XX   **107**   **Save GRAPHICs or FONTs into RAM Memory using Binary Compression:**

XX   **133**   **Save Compressed GRAPHIC to FLASH.**

Chapter 7: Downloadable Fonts

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

7.1 FLASH Data Types

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

1) 120 FLASH memory banks are 64Kbyte sectors for storing downloadable FONTS and GRAPHICS, using TCI #7.
   These FONTS are downloaded using the ^D135 command.
   These GRAPHICS are downloaded using the ^D133 command.
   (See Chapter 6, Downloadable GRAPHICS.)
2) 128 slots for label FORMATS.
   These FORMATS are downloaded using the ^D130 command.
3) 7 "embedded" FONTS. These FONTS are downloaded at the factory.

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

7.2 RAM Data Types

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

1) RAM memory slots #1 thru #255 are used to store downloadable FONTS and GRAPHICS using TCI #8.
   These FONTS are downloaded using the ^D127 command.
   These GRAPHICS are downloaded using the ^D107 command.
   (See Chapter 7, Downloadable GRAPHICS.)
2) 128 slots for label FORMATS.
   These FORMATS are downloaded using the ^D59 command.

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

7.3 Using the Font Conversion Utilities

The printer treats downloadable fonts just like the standard bitmapped font mentioned in Chapter 5. TrueType® fonts can be converted using the "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. This 16 bit DOS utility converts TrueType® TTF fonts into a format that is suitable for downloading to the printer.

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>

<u>*Where:*</u>
<RAM Memory Slot Number> is the memory slot location (1-255) where the FONT will be saved. 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>

<u>Where:</u>
<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   Save FONTS to FLASH (^D135)

xxyy   135   Save FONTS to FLASH.
This command is not normally seen by the user. It is put into a FONT file by the FONT converter program which generates a special ^Axxyy^D135 code which is placed at the beginning of the FONT download file. The ^Axxyy tells the printer the overall size of the file according to this format:
> xx = the number of additional 64KB sectors in the FONT file set
> yy = CGN # (1-255)

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

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

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

The FONT download file may be larger than 64Kbyte. The only limit on the file size is the amount of memory available to hold the file. When the FONT file is created, a specific reference number, called a CGN # is assigned to the file by the user. After the FONT file has been downloaded and stored in FLASH, the printer retrieves the FONT from FLASH by using its CGN # and TCI #7(for FLASH). The FONT may be stored anywhere in the printer's FLASH memory; it is NOT restricted to a specific FLASH memory location. The printer maintains an 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 Downloadable Font Command Summary
The following commands refer to the use of downloadable fonts and graphics:

^A   ^D   COMMAND
**   100   Clear User RAM:**
This command clears all downloadable fonts, graphics, and stored label formats.

**   101   List Memory Bytes Available:**
The printer will send the ">" character followed by the amount of available bytes and then finally a "<" character. (i.e. >192690<)

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

XX   **106**   **Load GRAPHIC or FONT into RAM Memory without Compression:**
This command is intended for legacy support only and Microcom Corporation recommends either the ^D104 or ^D107 commands. Fonts must be less than 64KB for this command to function.

XX   **127**   **Save FONTS to RAM.**

XX   **135**   **Save a FONT to FLASH.**

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

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 X5
X1 X2 X3 X4 X5 5	NS X1 X2 X3 X4 X5 0 0 0 5
X1 X2 X3 X4 X5 6	NS X1 X2 X3 X4 X5 0 0 0 6
X1 X2 X3 X4 X5 7	NS X1 X2 X3 X4 X5 0 0 0 7
X1 X2 X3 X4 X5 8	NS X1 X2 X3 X4 X5 0 0 0 8
X1 X2 X3 X4 X5 9	NS X1 X2 X3 X4 X5 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.
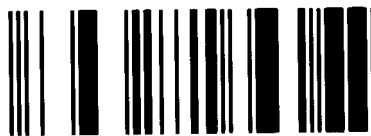
Figure 8-1   GS1 Databar Omni-Directional

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.
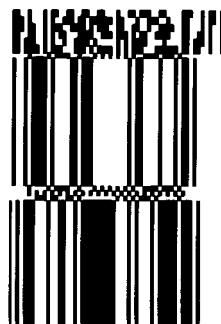
Figure 8-4   GS1 Databar Stacked Omni-directional Sample

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) XY Multiplier
      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

XY Multiplier:
>   Specifies the multiplier used to alter the XY size of the barcode. The range is 1 to
>   600 with 1 being the default.

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*
> 1<CR> <------------------------- *Multiplier is set to 1*
> 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   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 8-2   Code128 Special Function Access

8.1.15   Code 128 (Manual Compression), TCI 41

The Code 128 bar code is a variable length, high density, alphanumeric symbology that is extensively used worldwide. This bar code uses three subsets (A, B, and C) which allows for the encoding of the full 128 ASCII character set along with special control codes. This bar code uses manual compression, which provides full control by manually shifting between the available subsets using the special function access codes. The codes (#n) are placed within the data string to access the desired functions listed in the table below. When

using manual compression the printer defaults to subset B if no start code is defined. The printer will also not attempt to compress the data unless subset C is used. Once in subset C the user must send the appropriate code (#n) to return to either subset A or B.

ABC*#3*012345*#5*abc

The printer defaults to subset B

The "#3" code, while in subset B, switches to subset C.

The "#5" code, while in subset C, switches
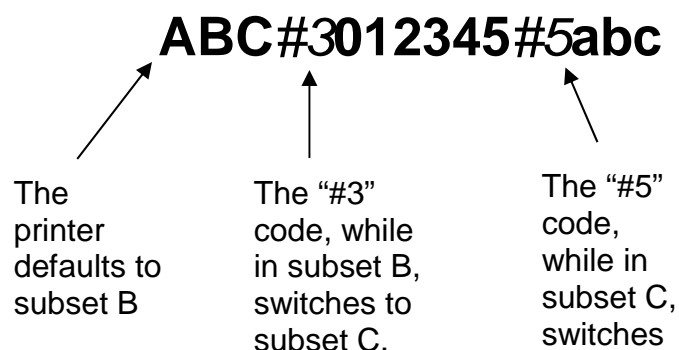
Figure 8-8   Code 128 Subset Switching

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.

8.1.16   Codabar (Rationalized), TCI 42
Codabar is a variable length linear symbology that is commonly used in libraries, blood banks, and in the air parcel business. Codabar is capable of encoding the 16 following characters: 0123456789-$:/. + and the four start/stop characters ABCD. This symbology uses 2:1, 3:1, 4:2, 5:2, and 8:3 ratios, which may be selected using the CGN parameter.

8.1.17   Code 93, TCI 43
Code 93 is a variable length, alphanumeric symbology that is capable of encoding 48 different characters and through the use of control characters can encode the full 128 ASCII character set. The 48 characters include the "space", numerical characters 0 through 9, the English alphabet (uppercase only), characters $%+-. / along with five special characters including the start/stop character.

8.1.18   PDF-417, TCI 46

The Portable Data File 417 or PDF-417 is a two-dimensional stacked symbology that is capable of encoding the entire ASCII character set, 2710 digits, and up to 1108 bytes in a single bar code. The requirements for generating a PDF-417 symbology are the text data, placement information, size configuration, rotation, aspect ratio, and Error Correcting Code or ECC. The character count (CC) parameter only has to be set to one character that will be used as a placeholder and not printed. The PDF-417 format command (^D77) is used to load the data as well as formatting instructions for the bar code and is placed on the first line of the format.

The following format is used to generate a PDF-417 bar code:

> ^D77<CR>
> :Text Data^\
> Number_of_Rows<CR>
> Number_of_Columns<CR>
> Rotation<CR>
> ECC_Percent<CR>
> ECC_Level<CR>
> Aspect_Ratio<CR>

This format is then followed by the placement instructions and text placeholder.

:Text Data^
This parameter is where the desired data is placed and must be terminated with the "^\[" or 0x1C control code. The text data may include carriage returns and other control codes.

Number of Rows<CR>
This parameter specifies the number of rows used for rendering the PDF-417 symbology. The PDF-417 symbology may have as few as 3 or as many as 90 rows with a default setting of 90. A carriage return character must be used to terminate this field.

Number of Columns<CR>
This parameter specifies the number of columns used for rendering the PDF-417 symbology. The PDF-417 symbology may have 1 to 30 columns with a default setting of 30. A carriage return character must be used to terminate this field.

Rotation<CR>
This parameter controls the rotation of the rendered PDF-417 symbology in 90-degree increments. The valid arguments for this parameter would be 0, 90, 180 or 270 with the default being set to 0. A carriage return character must be used to terminate this field.

ECC_Percent<CR>
The ECC_Percent parameter is used to set the percentage of overall data dedicated to the Error Correction Control (ECC) of the PDF-417 symbology. This parameter has to be set to 0 if the ECC# method is desired. The default ECC% is set to 0. A carriage return character must be used to terminate this field.

ECC_Level<CR>

The ECC_Level parameter is used to set the level of error correction of the PDF-417 symbology with a default value set to 0. This parameter can only be used if the ECC% parameter is set to 0. Refer to Table 17 for the valid ECC_Level values and their equivalent correction code words. A carriage return character must be used to terminate this field.

Aspect Ratio<CR>
This parameter is used to adjust the aspect ratio of the PDF-417 symbology. The value is entered in ratio format (height: width) and has a default value of 2:1 and has a range from 1 to 9. 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 8-3   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>
2,672,609,,25,35,0,1,276<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>
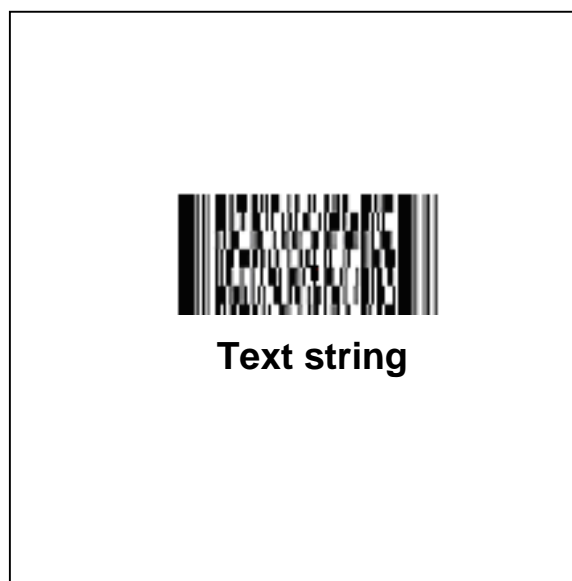
Text string

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>
2,672,609,,25,35,0,1,276<CR>
1,190,300,1,46<CR>
2,190,200,11,1,5<CR>
^D56<CR>
^D2<CR>
placeholder<CR>
Text string<CR>
^D3<CR>

Text string
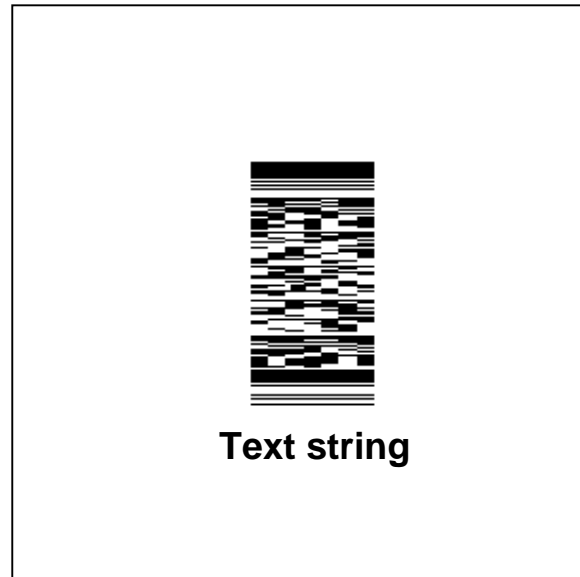
Figure 8-10 PDF-417 Sample Format #2

8.1.19   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
2,672,900,,,10,0,1,276
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.

Please note that to generate a proper GS1 barcode, the appropriate AI's need to be sent surrounded by "[" and "]" (bracket) characters.

GS1 Data Example: [10]1234567890123[11]210621

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 8-4   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 8-5   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 used 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 8-6   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 print 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
3,672,900,,,10,0,1,276
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.

8.1.20 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
1,672,600,0,38,08,2,1,276,0,0
1,400,400,1,48 <----------------------------------- Placement information
^D56
^D2
.
^D3
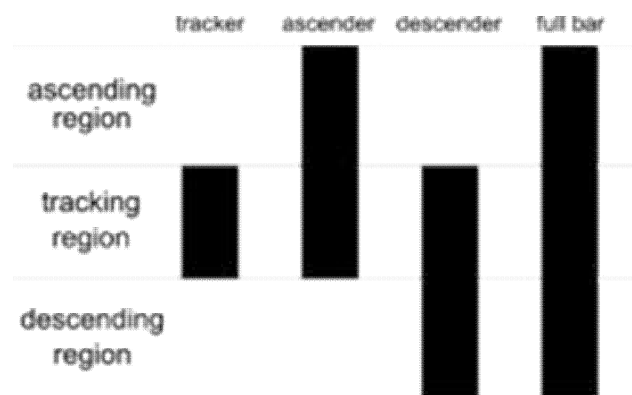
Figure 8-11   Intelligent Mail Barcode bars

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 8-7   Intelligent Mail Barcode Structure

Complete data string from above:
01234567094987654321 01234567891
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.

8.1.21   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
1,672,600,0,38,08,2,1,276,0,0
1,400,400,1,49,,,4,12,3 <------- Placement information
^D56
^D2
.
^D3

8.1.22   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 8-8   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.

8.1.23   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.

8.1.24   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
2,672,300,19,38,7,0,1,276,0,0
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 8-9   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 8-10   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 8-11   Aztec Modes

8.1.25   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
2,672,300,19,38,7,0,1,276,0,0
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 8-12   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 8-13   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 8-14   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>
5,672,609,,25,35,0,1,276,0,0 <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>
```
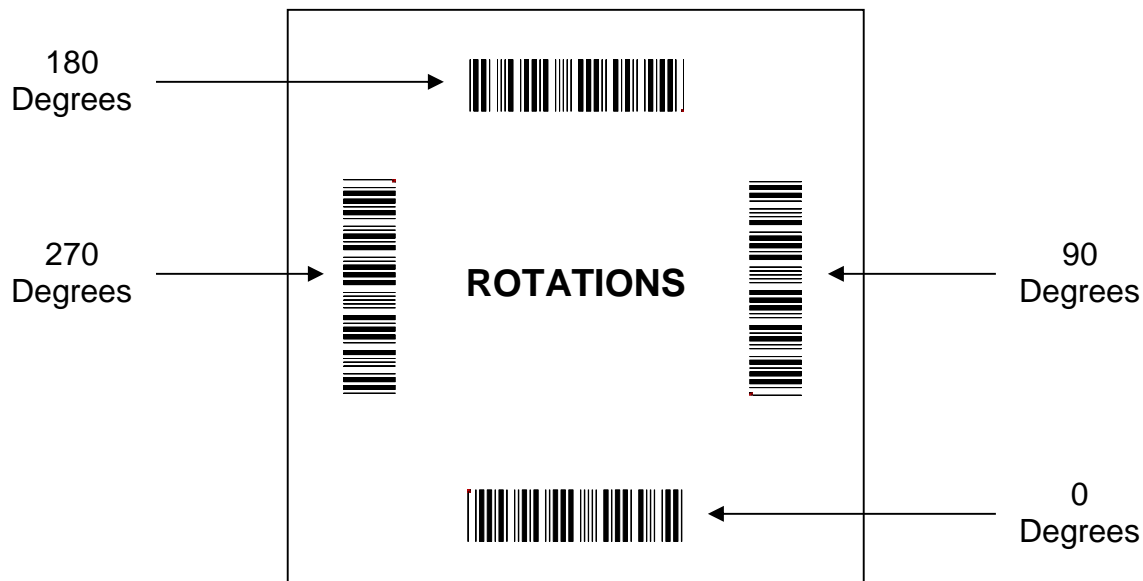

Figure 8-12 Bar Code Rotations

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 8-15   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 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>
4,672,609,,25,35,0,1,276,0,0<CR>
1,200,418,11,12,,,,2,50<CR>
1,178,400,11,32,,,,2,2<CR>
1,200,150,11,12,,,,2,50<CR>
1,178,125,11,32,,,,2,2<CR>
^D56<CR>
^D2<CR>
01234567890<CR>
^D3<CR>
```

Chapter 9   Code Page Switching

9.1 What is Code Page Switching?

There are 256 numeric codes used on the PC to represent letters, symbols, and numbers. Up to 256 codes are available to represent lower and upper case letters, numbers, punctuation marks, and all the mathematical symbols on a PC's keyboard. This may seem like more than enough, but it is not possible to represent all the letters and characters used in every language using one-character set of 256 codes.

For example:
- Some languages have a much larger alphabet than others and include many accented characters.
- Many graphics characters are used.

9.2 Character Sets

To accommodate the use of different languages, the printer provides a number of character sets. The numeric Hex codes are sent by the PC to the printer to represent different characters depending on which character set is being used by the printer.

Code page 437 is the famous original IBM PC character set. It is the most common and is used for several languages, including English, German, and French. Character sets 865 and 860 contain the characters needed for Danish and Portuguese, respectively. In these character sets, some symbols available in 437 have been removed to make room for the extra letters needed. For example, the code for (franc) has been used for Ó in 860.

These character sets are stored in the printer's FLASH memory as tables called code pages. The printer allows you to change the code page that is being used by changing the settings in Soft Switch #4, using the ^D24 command.

9.3 Code Pages

The printer provides 15 standard code pages. Please note that the printer implements the codes from 32 up. Code numbers below 32 are reserved for operational control codes. These are the Code Pages that are implemented in the printer:
1. Code Page 437
2. Code Page 850
3. Code Page 852
4. Code Page 860
5. Code Page 863
6. Code Page 865
7. USA
8. British
9. German
10. French
11. Italian
12. Danish
13. Spanish
14. Swedish
15. Swiss

9.3.1   Code Pages

The Default Code Page is selected when SW4 :(5-8) = 0000.

Microcom M1 Base Font Set
wjm 2005-12-13 rev 2007-04-03

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1	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
	^	—	´	‾	'	'	°	·	□	¸	˛	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

The printer uses the "^" caret and "|" pipe characters as delimiters so you must send 2 characters in a row to print them; ^^ would print a single ^.

Sending the HEX code of the character for the other non-standard characters will cause the printer to print them. Example: Sending a 0xA8 would produce the Copyright character.

9.3.2   Danish Code Page

The Danish Code Page is selected when SW4 :(5-8) = 0001.

Refer to Section 5.1.2.4 for more details on SW4 settings.

Danish

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
1 16					0x2021 244	0x00a7 189	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
					‡	§										
2 32	0x0020 32	0x0021 33	0x0022 34	0x0023 35	0x0024 36	0x0025 37	0x0026 38	0x0027 39	0x0028 40	0x0029 41	0x002a 42	0x002b 43	0x002c 44	0x002d 45	0x002e 46	0x002f 47
		!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
3 48	0x0030 48	0x0031 49	0x0032 50	0x0033 51	0x0034 52	0x0035 53	0x0036 54	0x0037 55	0x0038 56	0x0039 57	0x003a 58	0x003b 59	0x003c 60	0x003d 61	0x003e 62	0x003f 63
	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4 64	0x0040 64	0x0041 65	0x0042 66	0x0043 67	0x0044 68	0x0045 69	0x0046 70	0x0047 71	0x0048 72	0x0049 73	0x004a 74	0x004b 75	0x004c 76	0x004d 77	0x004e 78	0x004f 79
	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5 80	0x0050 80	0x0051 81	0x0052 82	0x0053 83	0x0054 84	0x0055 85	0x0056 86	0x0057 87	0x0058 88	0x0059 89	0x005a 90	0x00c6 211	0x00d8 210	0x00c5 208	0x00dc 219	0x005f 95
	P	Q	R	S	T	U	V	W	X	Y	Z	Æ	Ø	Å	Ü	_
6 96	0x0060 96	0x0061 97	0x0062 98	0x0063 99	0x0064 100	0x0065 101	0x0066 102	0x0067 103	0x0068 104	0x0069 105	0x006a 106	0x006b 107	0x006c 108	0x006d 109	0x006e 110	0x006f 111
	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7 112	0x0070 112	0x0071 113	0x0072 114	0x0073 115	0x0074 116	0x0075 117	0x0076 118	0x0077 119	0x0078 120	0x0079 121	0x007a 122	0x00e6 215	0x00f8 214	0x00e5 212	0x00fc 207	0x2022 127
	p	q	r	s	t	u	v	w	x	y	z	æ	ø	å	ü	•

Figure 9-2   Code Page - Danish

9.3.3　860 Code Page

The 860 Code Page is selected when SW4 :(5-8) = 0010

This code page is also known as DOS Portuguese.

860 Code Page

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1 / **16**					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 / **32**	0x0020 32	0x0021 33 !	0x0020 32	0x0023 35 #	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (	0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 / **48**	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 / **64**	0x0040 64 @	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 / **80**	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x005b 91 [	0x005c 92 \	0x005d 93]	0x005e 94 ^	0x005f 95 _
6 / **96**	0x0060 96 `	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 / **112**	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x007b 123 {	0x007c 124		0x007d 125 }	0x007e 126 ~	0x2022 127 •
8 / **128**	0x00c7 180 Ç	0x00fc 207 ü	0x00e9 197 é	0x00e2 192 â	0x00e3 226 ã	0x00e0 200 à	0x00c1 224 Á	0x00e7 181 ç	0x00ea 193 ê	0x00ca 164 Ê	0x00e8 201 è	0x00cc 230 Ì	0x00d4 223 Ô	0x00ec 217 ì	0x00c3 225 Ã	0x00c2 162 Â
9 / **144**	0x00c9 220 É	0x00c0 161 À	0x00c8 163 È	0x00f4 194 ô	0x00f5 234 õ	0x00f2 202 ò	0x00da 237 Ú	0x00f9 203 ù	0x00cc 230 Ì	0x00d5 233 Õ	0x00dc 219 Ü	0x00a2 191 ¢	0x00a3 187 £	0x00d9 173 Ù	0x0020 32	0x00d3 231 Ó
0A / **160**	0x00e1 196 á	0x00ed 213 í	0x00f3 198 ó	0x00fa 199 ú	0x00f1 183 ñ	0x00d1 182 Ñ	0x00aa 249 ª	0x00ba 250 º	0x00bf 185 ¿	0x00d2 232 Ò	0x0020 32	0xeffc 248 □	0x002d 247 -	0x0020 32	0x0020 32	0x0020 32
0B / **176**	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0C / **192**	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0D / **208**	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0E / **224**	0x0020 32	0x00df 222 ß	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x2020 243 †	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0F / **240**	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x00b0 179 º	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32

Figure 9-3　Code Page - 860

9.3.4   Spanish Code Page

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

Spanish

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
1					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 Section 5.1.2.4 for more details on SW4 settings.

850 Code Page

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1 / **16**					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 / **32**	0x0020 32	0x0021 33 !	0x0022 34 "	0x0023 35 #	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (	0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 / **48**	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 / **64**	0x0040 64 @	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 / **80**	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x005b 91 [	0x005c 92 \	0x005d 93]	0x005e 94 ^	0x005f 95 _
6 / **96**	0x0060 96 `	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 / **112**	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x007b 123 {	0x007c 124 |	0x007d 125 }	0x007e 126 ~	0x2022 127 •
8 / **128**	0x00c7 180 Ç	0x00fc 207 ü	0x00e9 197 é	0x00e2 192 â	0x00e4 204 ä	0x00e0 200 à	0x00e5 212 å	0x00e7 181 ç	0x00ea 193 ê	0x00eb 205 ë	0x00e8 201 è	0x00ef 221 ï	0x00ee 209 î	0x00ec 217 ì	0x00c4 216 Ä	0x00c5 208 Å
9 / **144**	0x00c9 220 É	0x00e6 215 æ	0x00c6 211 Æ	0x00f4 194 ô	0x00f6 206 ö	0x00f2 202 ò	0x00fb 195 û	0x00f9 203 ù	0x00ff 239 ÿ	0x00d6 218 Ö	0x00dc 219 Ü	0x00f8 214 ø	0x00a3 187 £	0x00d8 210 Ø	0x0020 32	0x0192 190 ƒ
0A / **160**	0x00e1 196 á	0x00ed 213 í	0x00f3 198 ó	0x00fa 199 ú	0x00f1 183 ñ	0x00d1 182 Ñ	0x00aa 249 ª	0x00ba 250 º	0x00bf 185 ¿	0x0020 32	0x0020 32	0xeffc 248 □	0x002d 247 -	0x00a1 184 ¡	0x0020 32	0x0020 32
0B / **176**	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x00c1 224 Á	0x00c5 208 Å	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0C / **192**	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x00e3 226 ã	0x00c3 225 Ã	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0D / **208**	0x0020 32	0x0020 32	0x00ca 164 Ê	0x00cb 165 Ë	0x0020 32	0x00cd 229 Í	0x00ce 166 Î	0x00cf 167 Ï	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x00cc 230 Ì	0x0020 32
0E / **224**	0x00d3 231 Ó	0x00df 222 ß	0x00d4 223 Ô	0x00d2 232 Ò	0x00f5 234 õ	0x00d5 233 Õ	0x2020 243 †	0x0020 32	0x0020 32	0x00da 237 Ú	0x0020 32	0x00d9 173 Ù	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0F / **240**	0x0020 32	0x0020 32	0x003d 61 =	0x2014 245 —	0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x00b0 179 °	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32

Figure 9-5   Code Page - 850

9.3.6   German Code Page

The German Code Page is selected when SW4 :(5-8) = 0101.

Refer to Section 5.1.2.4 for more details on SW4 settings.

German															
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**0A**	**0B**	**0C**	**0D**	**0E**	**0F**
1 **16**					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 **32**	0x0020 32	0x0021 33 !	0x0022 34 "	0x0023 35 #	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (| 0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 **48**	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 **64**	0x00a7 189 §	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 **80**	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x00c4 216 Ä	0x00d6 218 Ö	0x00dc 219 Ü	0x005e 94 ^	0x005f 95 _
6 **96**	0x0060 96 `	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 **112**	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x00e4 204 ä	0x00f6 206 ö	0x00fc 207 ü	0x00df 222 ß	0x2022 127 •

Figure 9-6   Code Page - German

9.3.7 865 Code Page

The 865 Code Page is selected when SW4 :(5-8) = 0110

This code page is also known as DOS Nordic.

865 Code Page

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1 **16**					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 **32**	0x0020 32	0x0021 33 !	0x0020 32	0x0023 35 #	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (	0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 **48**	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 **64**	0x0040 64 @	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 **80**	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x005b 91 [	0x005c 92 \	0x005d 93]	0x005e 94 ^	0x005f 95 _
6 **96**	0x0060 96 `	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 **112**	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x007b 123 {	0x007c 124 |	0x007d 125 }	0x007e 126 ~	0x2022 127 •
8 **128**	0x00c7 180 Ç	0x00fc 207 ü	0x00e9 197 é	0x00e2 192 â	0x00e4 204 ä	0x00e0 200 à	0x00e5 212 å	0x00e7 181 ç	0x00ea 193 ê	0x00eb 205 ë	0x00e8 201 è	0x00ef 221 ï	0x00d4 223 Ô	0x00ec 217 ì	0x00c4 216 Ä	0x00c5 208 Å
9 **144**	0x00c9 220 É	0x00e6 215 æ	0x00c6 211 Æ	0x00f4 194 ô	0x00f6 206 ö	0x00f2 202 ò	0x00fb 195 û	0x00fa 199 ú	0x00ff 239 ÿ	0x00d4 223 Ô	0x00f6 206 ö	0x00f8 214 ø	0x00a3 187 £	0x00d8 210 Ø	0x0020 32	0x0192 190 ƒ
0A **160**	0x00e1 196 á	0x00ed 213 í	0x00f3 198 ó	0x00fa 199 ú	0x00f1 183 ñ	0x00d1 182 Ñ	0x00aa 249 ª	0x00ba 250 º	0x00bf 185 ¿	0x0020 32	0x0020 32	0xeffc 248 □	0x002d 247 -	0x0020 32	0x0020 32	0x0020 32
0B **176**	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0C **192**	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0D **208**	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0E **224**	0x0020 32	0x00df 222 ß	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x2020 243 †	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0F **240**	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x00b0 179 °	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32

Figure 9-7   Code Page - 865

9.3.8　Swiss Code Page

The Swiss Code Page is selected when SW4 :(5-8) = 0111.

Refer to Section 5.1.2.4 for more details on SW4 settings.

Swiss

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
1					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.

852 Code Page

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1 **16**					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 **32**	0x0020 32	0x0021 33 !	0x0022 34 "	0x0023 35 #	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (	0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 **48**	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 **64**	0x0040 64 @	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 **80**	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x005b 91 [	0x005c 92 \	0x005d 93]	0x005e 94 ^	0x005f 95 _
6 **96**	0x0060 96 `	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 **112**	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x007b 123 {	0x007c 124 |	0x007d 125 }	0x007e 126 ~	0x2022 127 •
8 **128**	0x00c7 180 Ç	0x00fc 207 ü	0x00e9 197 é	0x00e2 192 â	0x00e4 204 ä	0x00e0 200 à	0x00e5 212 å	0x00e7 181 ç	0x00ea 193 ê	0x00eb 205 ë	0x0020 32	0x0020 32	0x00ee 209 î	0x0179 29 Ź	0x00c4 216 Ä	0x0106 19 Ć
9 **144**	0x00c9 220 É	0x0020 32	0x0020 32	0x00f4 194 ô	0x00f6 206 ö	0x0020 32	0x0020 32	0x015a 25 Ś	0x015b 24 ś	0x00d6 218 Ö	0x00dc 219 Ü	0x0020 32	0x0020 32	0x0141 131 Ł	0x0020 32	0x0020 32
0A **160**	0x00e1 196 á	0x00ed 213 í	0x00f3 198 ó	0x00fa 199 ú	0x0104 17 Ą	0x0105 16 ą	0x0020 32	0x0020 32	0x0118 21 Ę	0x0119 20 ę	0x0020 32	0x017a 28 ź	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0B **176**	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x00c1 224 Á	0x00c5 208 Å	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x017b 27 Ż	0x017c 26 ż	0x0020 32
0C **192**	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0D **208**	0x0020 32	0x0020 32	0x0020 32	0x00cb 165 Ë	0x0020 32	0x00cd 229 Í	0x00ce 166 Î	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0E **224**	0x00d3 231 Ó	0x00df 222 ß	0x00d4 223 Ô	0x0143 23 Ń	0x0144 22 ń	0x00b6 242 ¶	0x0020 32	0x0020 32	0x0020 32	0x00da 237 Ú	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0F **240**	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x00b0 179 °	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32

Figure 9-9　Code Page - 852

9.3.10 French Code Page

The French Code Page is selected when SW4 :(5-8) = 1001.

Refer to Section 5.1.2.4 for more details on SW4 settings.

French

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
1 / **16**					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 / **32**	0x0020 32	0x0021 33 !	0x0022 34 "	0x00a3 187 £	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (	0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 / **48**	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 / **64**	0x00e0 200 à	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 / **80**	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x00b0 179 °	0x00a7 189 §	0x00e7 181 ç	0x005e 94 ^	0x005f 95 _
6 / **96**	0x0060 96 `	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 / **112**	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x00e9 197 é	0x00f9 203 ù	0x00e8 201 è	0x0022 34 "	0x2022 127 •

Figure 9-10 Code Page - French

9.3.11 863 Code Page

The 863 Code Page is selected when SW4 :(5-8) = 1010

This code page is also known as DOS CanadaF.

863 Code Page	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1 16					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 32	0x0020 32	0x0021 33 !	0x0020 32	0x0023 35 #	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (	0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 48	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 64	0x0040 64 @	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 80	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x005b 91 [	0x005c 92 \	0x005d 93]	0x005e 94 ^	0x005f 95 _
6 96	0x0060 96 `	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 112	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x007b 123 {	0x007c 124 |	0x007d 125 }	0x007e 126 ~	0x2022 127 •
8 128	0x00c7 180 Ç	0x00fc 207 ü	0x00e9 197 é	0x00e2 192 â	0x00c2 162 Â	0x00e0 200 à	0x2021 244 ‡	0x00e7 181 ç	0x00ea 193 ê	0x00eb 205 ë	0x00e8 201 è	0x00ef 221 ï	0x00d4 223 Ô	0x003d 61 =	0x00c0 161 À	0x00a7 189 §
9 144	0x00c9 220 É	0x00c8 163 È	0x00ca 164 Ê	0x00f4 194 ô	0x00cb 165 Ë	0x00cf 167 Ï	0x00fb 195 û	0x00fa 199 ú	0x0020 32	0x00d4 223 Ô	0x00dc 219 Ü	0x00a2 191 ¢	0x00a3 187 £	0x00d9 173 Ù	0x0020 32	0x0192 190 ƒ
0A 160	0x0020 32	0x0020 32	0x00f3 198 ó	0x00fa 199 ú	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x00ce 166 Î	0x0020 32	0x0020 32	0xeffc 248 □	0x002d 247 -	0x0020 32	0x0020 32	0x0020 32
0B 176	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0C 192	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0D 208	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0E 224	0x0020 32	0x00df 222 ß	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x2020 243 †	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0F 240	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x00b0 179 °	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32

Figure 9-11 Code Page - 863

9.3.12   Swedish Code Page

The Swedish Code Page is selected when SW4 :(5-8) = 1011.

Refer to Section 5.1.2.4 for more details on SW4 settings.

Swedish

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
1 **16**					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 **32**	0x0020 32	0x0021 33 !	0x0020 32	0x0057 87 W	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (	0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 **48**	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 **64**	0x00a7 189 §	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 **80**	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x00e0 200 à	0x00e7 181 ç	0x00e8 201 è	0x005e 94 ^	0x005f 95 _
6 **96**	0x00e1 196 á	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 **112**	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x00e4 204 ä	0x00f6 206 ö	0x00fc 207 ü	0x00e9 197 é	0x2022 127 •

Figure 9-12 Code Page - Swedish

9.3.13   437 Code Page

Code Page 437 is the famous code page used in the original IBM PC. This code page contains lot of box drawing characters and a few foreign letters. The 437 Code Page is selected when SW4 :(5-8) = 1100.

This code page is also known as DOS Latin US.

437 Code Page

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1 **16**					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 **32**	0x0020 32	0x0021 33 !	0x0022 34 "	0x0023 35 #	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (	0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 **48**	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 **64**	0x0040 64 @	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 **80**	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x005b 91 [	0x005c 92 \	0x005d 93]	0x005e 94 ^	0x005f 95 _
6 **96**	0x0060 96 `	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 **112**	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x007b 123 {	0x007c 124 |	0x007d 125 }	0x007e 126 ~	0x2022 127 •
8 **128**	0x00c7 180 Ç	0x00fc 207 ü	0x00e9 197 é	0x00e2 192 â	0x00e4 204 ä	0x00e0 200 à	0x00e5 212 å	0x00e7 181 ç	0x00ea 193 ê	0x00eb 205 ë	0x00e8 201 è	0x00ef 221 ï	0x00ee 209 î	0x00ec 217 ì	0x00c4 216 Ä	0x00c5 208 Å
9 **144**	0x00c9 220 É	0x00e6 215 æ	0x00c6 211 Æ	0x00f4 194 ô	0x00f6 206 ö	0x00f2 202 ò	0x00fb 195 û	0x00f9 203 ù	0x00ff 239 ÿ	0x00d6 218 Ö	0x00dc 219 Ü	0x00a2 191 ¢	0x00a3 187 £	0x0020 32	0x0020 32	0x0192 190 ƒ
0A **160**	0x00e1 196 á	0x00ed 213 í	0x00f3 198 ó	0x00fa 199 ú	0x00f1 183 ñ	0x00d1 182 Ñ	0x00aa 249 ª	0x00ba 250 º	0x00bf 185 ¿	0x0020 32	0x0020 32	0xeffc 248 □	0x002d 247 -	0x00a1 184 ¡	0x0020 32	0x0020 32
0B **176**	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0C **192**	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0D **208**	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0E **224**	0x0020 32	0x00df 222 ß	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x2020 243 †	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
0F **240**	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x00b0 179 °	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32

Figure 9-13 Code Page - 437

9.3.14 Italian Code Page

The Italian Code Page is selected when SW4 :(5-8) = 1101

Refer to the ^D24 command description for more details on SW4 settings.

Italian

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
1 **16**					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 **32**	0x0020 32	0x0021 33 !	0x0022 34 "	0x00a3 187 £	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (	0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 **48**	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 **64**	0x00a7 189 §	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 **80**	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x00b0 179 °	0x00a7 189 §	0x00e9 197 é	0x005e 94 ^	0x005f 95 _
6 **96**	0x00f9 203 ù	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 **112**	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x00e0 200 à	0x00f2 202 ò	0x00e8 201 è	0x00ec 217 ì	0x2022 127 •

Figure 9-14 Code Page - Italian

9.3.15   British Code Page

The British Code Page is selected when SW4 :(5-8) = 1110.

Refer to Section 5.1.2.4 for more details on SW4 settings.

British	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
1 16					0x2021 244 ‡	0x00a7 189 §	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32	0x0020 32
2 32	0x0020 32	0x0021 33 !	0x0022 34 "	0x00a3 187 £	0x0024 36 $	0x0025 37 %	0x0026 38 &	0x0027 39 '	0x0028 40 (	0x0029 41)	0x002a 42 *	0x002b 43 +	0x002c 44 ,	0x002d 45 -	0x002e 46 .	0x002f 47 /
3 48	0x0030 48 0	0x0031 49 1	0x0032 50 2	0x0033 51 3	0x0034 52 4	0x0035 53 5	0x0036 54 6	0x0037 55 7	0x0038 56 8	0x0039 57 9	0x003a 58 :	0x003b 59 ;	0x003c 60 <	0x003d 61 =	0x003e 62 >	0x003f 63 ?
4 64	0x0040 64 @	0x0041 65 A	0x0042 66 B	0x0043 67 C	0x0044 68 D	0x0045 69 E	0x0046 70 F	0x0047 71 G	0x0048 72 H	0x0049 73 I	0x004a 74 J	0x004b 75 K	0x004c 76 L	0x004d 77 M	0x004e 78 N	0x004f 79 O
5 80	0x0050 80 P	0x0051 81 Q	0x0052 82 R	0x0053 83 S	0x0054 84 T	0x0055 85 U	0x0056 86 V	0x0057 87 W	0x0058 88 X	0x0059 89 Y	0x005a 90 Z	0x005b 91 [	0x005c 92 \	0x005d 93]	0x005e 94 ^	0x005f 95 _
6 96	0x0060 96 `	0x0061 97 a	0x0062 98 b	0x0063 99 c	0x0064 100 d	0x0065 101 e	0x0066 102 f	0x0067 103 g	0x0068 104 h	0x0069 105 i	0x006a 106 j	0x006b 107 k	0x006c 108 l	0x006d 109 m	0x006e 110 n	0x006f 111 o
7 112	0x0070 112 p	0x0071 113 q	0x0072 114 r	0x0073 115 s	0x0074 116 t	0x0075 117 u	0x0076 118 v	0x0077 119 w	0x0078 120 x	0x0079 121 y	0x007a 122 z	0x007b 123 {	0x007c 124		0x007d 125 }	0x007e 126 ~	0x2022 127 •

Figure 9-15 Code Page - British

9.3.16   USA Code Page

The USA Code Page is selected when SW4 :(5-8) = 1111.

Refer to Section 5.1.2.4 for more details on SW4 settings.

USA

	0	1	2	3	4	5	6	7	8	9	0A	0B	0C	0D	0E	0F
1					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.
Interior Cleaning	Compressed air, static protected vacuum cleaner, soft-bristle brush, and/or lint-free cloth dampened with Isopropyl Alcohol.	As Needed.

Table 10-1   Recommended Maintenance Schedule

⚠️ CAUTION: Microcom Corporation will not be held responsible for damage caused by any non-approved solvent, cleaning material and/or method. The use of such non-approved materials and/or methods may void appropriate expressed or implied warranties.

10.2   Thermal Printer Cleaning Card

Any decline in print quality, voids or dropout areas in bar codes and/or graphics may indicate that the print head is dirty and needs to be cleaned. The necessary cleaning materials can be purchased through Microcom Corporation by contacting your sales representative and ordering the *Cleaning Kit, part # 040005-0000*. The print head should be cleaned after every roll of media or after every 512 feet of fanfold media (a typical stack of tag or fanfold media is approximately 3,200 tags).

A thermal printer card is the quickest and easiest way to clean the print head, drive roller, and peel edge all at the same time. Follow the steps below for the proper cleaning procedure.

1. Remove any installed media and cut thermal card to fit in the printer width.

2. Dampen both sides, on one end, of the cleaning card with isopropyl alcohol or use a pre-moistened cleaning card.

3. Release the printhead assembly to insert the cleaning card under the printhead.

Slide latch forward to release the printhead
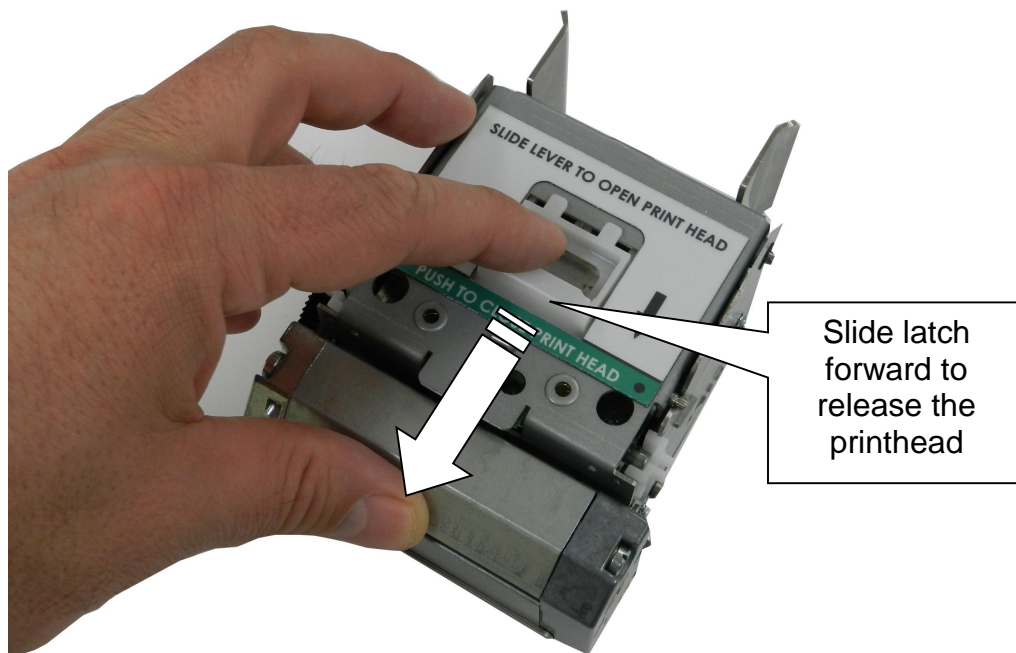
Figure 10-1   Releasing the Printhead Assembly

Rotate the printhead up to gain access to inside the printer
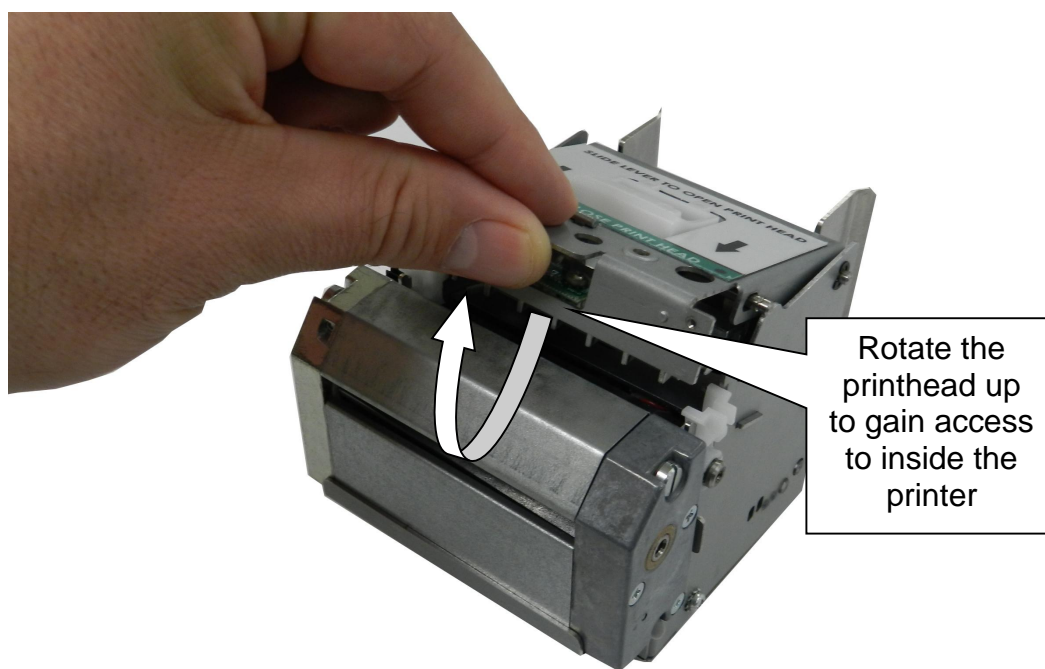
Figure 10-2   Rotate the Printhead Assembly to the Open Position

4. Re-latch the printhead assembly, hold the printer, and slowly pull the cleaning card (you will feel resistance) out of the printer.

Press down on both sides of the printhead to latch the printhead

Pull the cleaning card downwards to remove the card and clean the printhead
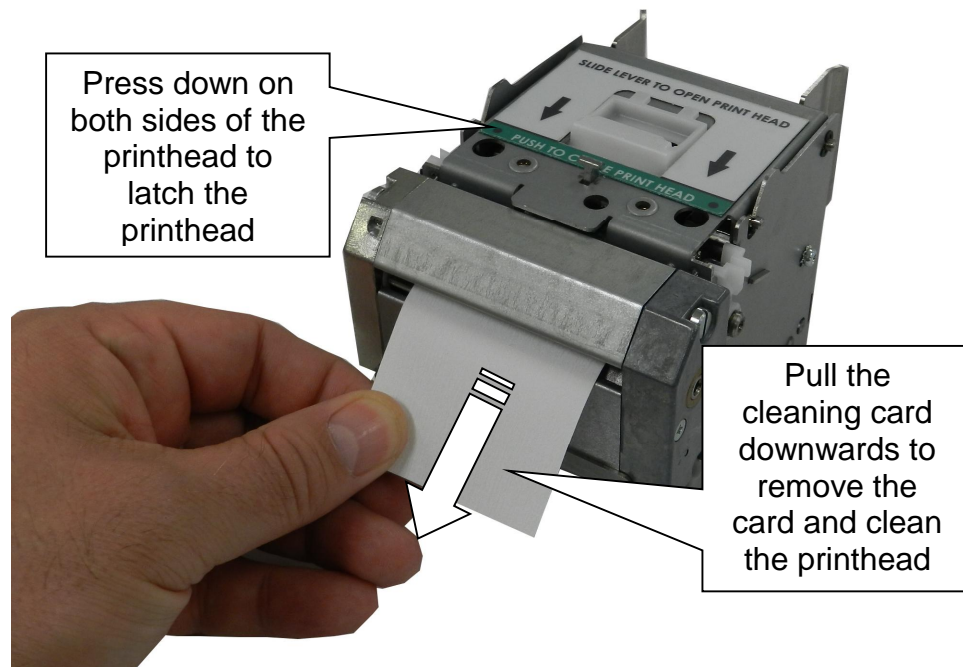
Figure 10-3 Remove the Cleaning Card

5. Reinstall the media and check print quality.

6. Repeat cleaning steps if necessary.

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

10.3   Internal Cleaning

The overall internal cleaning of the printer is important to help reduce the dust and other contaminates residing in the printer that may attach to the print head or drive roller and affect the printer's performance.

1. Remove any installed media.

2. Turn the printer power "OFF."

3. Release the printhead assembly and rotate to the open position.

4. The exposed Drive Roller, Printhead, and Paper Path may be cleaned using a cotton swab or lint-free wiping rag dampened with isopropyl alcohol.

5. Dust and debris may be removed from the sensors using compressed air.
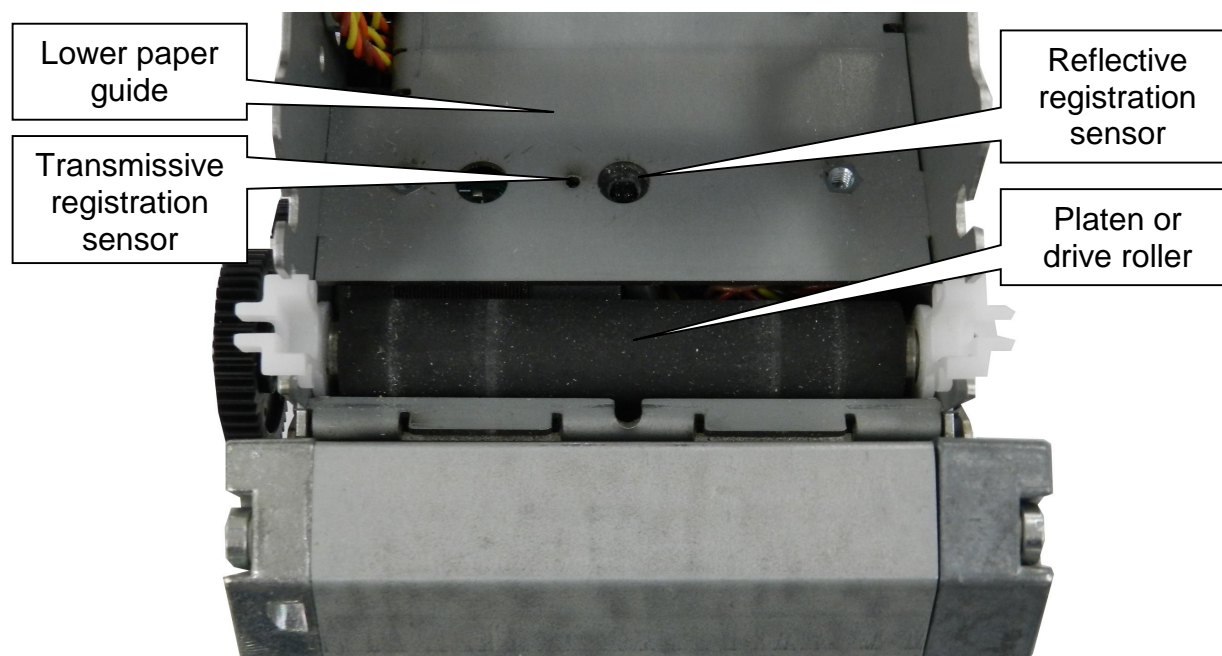
Figure 10-4 Internal Cleaning

10.4 Print Head Maintenance

If print quality has not improved after using a thermal cleaning card, or if one is not available, foam or cotton tipped swabs or a clean lint-free cloth dampened with isopropyl alcohol may be used. Follow the steps below to clean the print head.

1. Release the Print Head Assembly and rotate to the open position.

2. With a foam or cotton tipped swab or soft, lint-free cloth dampened with isopropyl alcohol, clean the thermal elements by gently rubbing the swab down the length of the print head dot row. Allow for the alcohol to evaporate, then repeat if necessary.

3. Reinstall media and run labels to check print quality.

4. If poor print quality persists, print head or other parts may be damaged.

CAUTION: Isopropyl Alcohol or other approved non-Abrasive solution should be used to clean the drive roller. The use of other cleaning solvents or materials is not recommended and may degrade the performance of the drive roller.
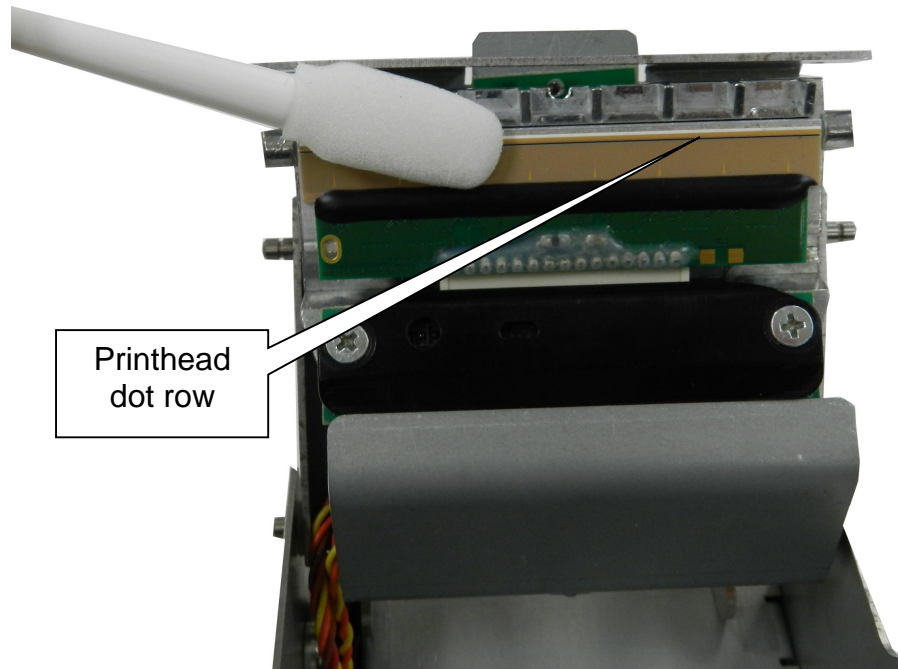
Figure 10-5 Cleaning the Print Head

10.5 Replacing the Drive Roller

Over time, the platen may harden and cause print issues and need to be replaced. The printer is equipped with an easy replaceable drive roller assembly.

1. Slide the printhead latch forward to release the printhead assembly and then rotate to the open position.

2. Squeeze the white plastic bushing together on both sides of the platen to release from the sheet metal and lift the platen assembly up and out of the printer.

Squeeze the white plastic together to release the roller on both sides and then lift up to remove
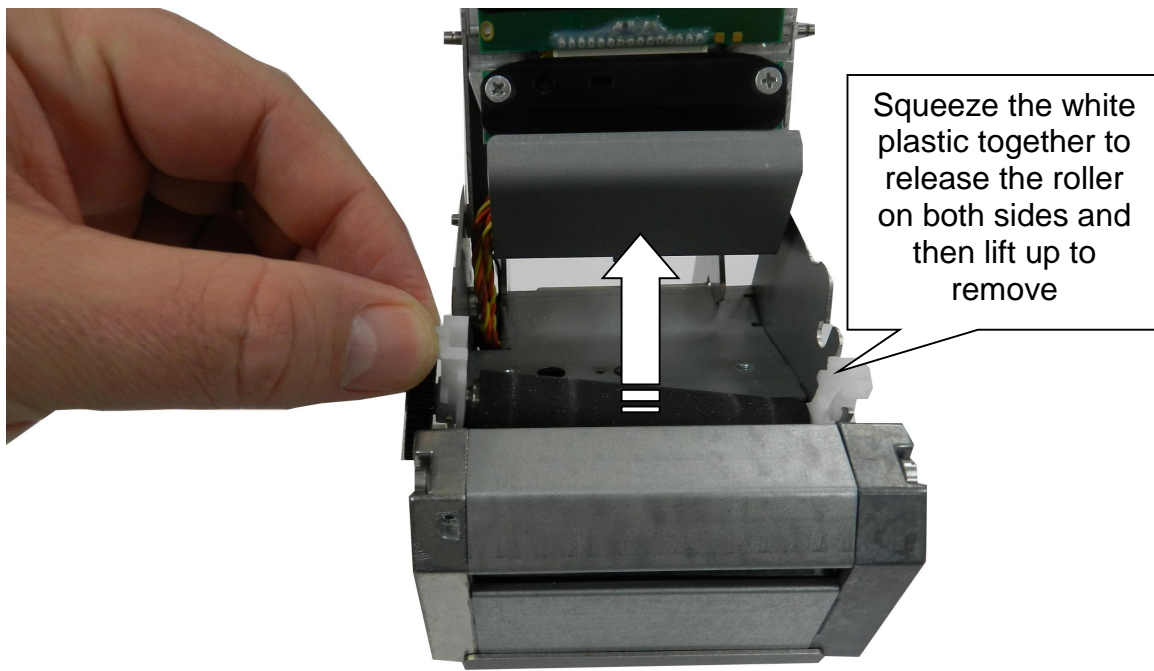
Figure 10-6 Removing the Platen

3. Replace the assembly with a new platen assembly making sure that the bushings snap into the sheet metal.

4. Close the printhead assembly to the home position and latch into place.

Chapter 11: Troubleshooting

11.1   Troubleshooting Tips

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

- ✓ Verify that the power cord is connected to the printer, as well as the AC outlet.

- ✓ Verify that the printer power switch is in the "ON" position.

- ✓ Verify that the AC outlet is functioning properly.

- ✓ Contact your Service Representative.

The printer has no communication:

- ✓ Verify that the communication cable is properly connected to the printer and to an available communication port on the host computer.

- ✓ Verify that the FTDI USB Driver has been installed and is displayed under the COM and LPT ports under the Device Manager when the printer is connected and turned on.

- ✓ Verify that the host communication port is functioning properly.

- ✓ Verify that nothing else is configured on the same port.

- ✓ Power cycle the printer, this reloads the USB driver.

- ✓ Contact your Service Representative.

Nothing prints out on media:

- ✓ Did anything change? Was a new batch of media used?

- ✓ Verify that the media being used is direct thermal paper. Test on a second printer to verify that the paper is good.

- ✓ Verify that printhead is fully latched in the down position.

- ✓ Verify that the contrast is set to a value of 80 or above.

- ✓ Contact your Service Representative.

Vertical blank or light lines appear on printed areas:

- ✓ Clean the print head.

- ✓ Print a test pattern by sending a ^K to the printer to observe any failed dots.

- ✓ Print head may need to be replaced.

- ✓ Contact your Service Representative.

The print does not align to my media:

- ✓ Verify that the media contains some sort of registration mark.

- ✓ Verify that the printer is received proper formatting instructions for the media being used.

- ✓ Verify that nothing is blocking the internal registration mark sensors.

- ✓ Contact your Service Representative.

The status indicator light is solid amber in color:

- ✓ Indicates that the printer is in the Bootloader mode and is not running an application.

- ✓ Load in a compatible MCA application.

- ✓ 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:

- ✓ Generally happens after a paper out error.

- ✓ Verify that media is inserted to the printer.

- ✓ Refer to Chapter 5 for information regarding the Enquiry Command to help identify the error condition.

- ✓ Cycle power.

The status indicator light is flashing green in color:

- ✓ This is normal behavior.

- ✓ This indicates that the communication port detects activity.

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Appendix

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.

RMA Procedure

Return Material Authorization (RMA) Procedure

A Return Material Authorization (RMA) number must be obtained prior to the return of printers and/or materials to Microcom Corporation's Service Department. The purpose of the RMA number is to provide effective tracking and control of returned printers and/or materials. Microcom Corporation will not be responsible or held accountable for printers and/or materials returned without proper authorization.

Shipping Charges:

The return of printers and/or materials to Microcom Corporation for repair should be returned freight and insurance prepaid. Microcom Corporation will pay the return shipping charges (standard ground service) on all warranty repairs; expedited services will be paid at the customer's expense. The return of non-warranty repairs to printers and/or materials will be shipped by a shipping carrier and service determined by the customer.

Receiving a Return Material Authorization (RMA) number:

1.   To receive an RMA number, either complete the online RMA request form located at Microcom's website (www.microcomcorp.com) or contact the Microcom Corporation Service Department and provide the representative with the following information:
- Company name.
- Contact name and phone number.
- Model number.
- Printer serial number.
- A detailed description of the problem.
- Service option requested (1 Day, 3 Day, 5 Day, or Standard turnaround).
- Purchase Order Number.

2.   The shipping label should contain the following information:
Microcom Corporation
Attn: Service Dept. RMA# <place RMA number here>
8220 Green Meadows Dr. N.
Lewis Center, OH 43035 USA

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

4.   Upon receipt of an RMA number, the customer contact will be notified by a Microcom Corporation representative regarding repair charges, at which time the ship method will be determined. Items returned for repair with inadequate packaging material will be returned to the customer in Microcom Corporation approved packaging at the customer's expense.

^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:

<u>^A</u> **<u>^D</u>** **<u>COMMAND</u>**

      2   **Text String Entry Mode**: Precedes the text strings that are supplied to the various fields in the format (Equivalent to ^B).

      3   **Print Command**: Prints a single label or starts the printing of a batch of labels (Equivalent to ^C).

      5   **Send Printer Status**: (Equivalent to ^E).

      7   **Update printer flash**: This command is used to update the printer's software which includes the application, the bootloader, and the embedded fonts.

      8   **Cycle the cutter**: This command makes the cutter cycle once.

      11   **Print Test Pattern**: (Equivalent to ^K).

      12   **Print Blank Label**: (Equivalent to ^L).

X   **20**   **Set Bits Per Second:**
0   110 bps
1   150 bps
2   300 bps
3   600 bps
4   1200 bps
5   2400 bps
6   4800 bps
7   9600 bps
8   19200 bps
9   38400 bps
10   57600 bps
11   115200 bps
12   230400 bps (only used for D149 Image Mode)
13   460800 bps (only used for D149 Image Mode)
14   921600 bps (only used for D149 Image Mode)

^AB	**^D**	**COMMAND**

21   **Software Bank Switch #1:** A non-volatile command used to set the various functions identified below.

^AB12345678

Position:

12	**Enquiry Responses:**
	00 = Control Codes
	10 = Text Equivalent
3	**1 = Ignore Control Codes; 0 = Accept**
4	**1 = Odd Parity; 0 = Even Parity**
5	**1 = Disable Parity (NONE); 0 = Enable Parity**
6	**1 = Enable Echo; 0 = Disable**
7	**1 = 8 Data Bits; 0 = 7 Data Bits**
8	**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 = >INPUT 1< reported when not present; 0 = >INPUT 1< reported when present**
3	**1 = Send Enquiry Response after Print; 0 = Disable**
4	**1 = >INPUT 2< reported when not present; 0 = >INPUT 2< reported when present**
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	**Reserved**
3	**1 = Enable Pre-Stock Out Feature; 0 = Disable**
4	**1 = Enable >STOCK NOT LOADED< response; 0 = Disable**
5	**Reserved**
6	**1 = General Purpose I/O Enable; 0 = Custom I/O Enable**
7	**1 = Enable Takeup Control; 0 = Enable Cutter Control**
8	**Reserved**

27   **Software Bank Switch #7:** A non-volatile command used to set the various functions identified below.
^AB12345678
Position:

123	**Reserved**
456	**Reserved**
7	**1 = Disable System Parameter Saving; 0 = Enable**
8	**1 = Enable Finish Mode; 0 = Disable**

28   **Software Bank Switch #8:** A non-volatile command used to set the various functions identified below.
^AB12345678
Position:

1	**Reserved**
2	**Reserved**
3	**1 = Disable Line Feeds; 0 = Enable**
4, 5	**Reserved**
6	**1 = Enable Presenter Option; 0 = Disable**
7	**1 = Enable Reflective Stock Out Detection; 0 = Disable**
8	**1 = Enable LTS Jam Detection; 0 = Disable**

^A	**^D**	**COMMAND**
X	**29**	**Printer Statistics:**
0		Print Statistics to the serial port.
1		Print Statistics on a label.
2		Clear the Printed Labels variable in the statistics.
3		Clear the Printed Inches variable in the statistics.
	32	**Restart Printer:** Restores the printer to power-up settings. Also used to set the non-volatile fields in memory.
	33	**Display Model and Revision Number**

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

^A	^D	COMMAND
	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.
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**
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**

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^A	^D	COMMAND
X	**78**	**Set print head number of dots.**
448		203dpi 238M (448 dots)
672		300dpi 238M (640 dots)
640		203dpi 338M (640 dots)
960		300dpi 338M (960 dots)
832		203dpi 438 (832 dots)
1280		300dpi 438 (1280 dots)
832		203dpi 438M (832 dots)
1280		300dpi 438M (1280 dots)

X   **79**   **Set print head dots/inch (dpi).** This command sets the dot density of the print head. This command MUST be sent BEFORE the # of Dots is set with the ^D78 command.
0   203 DPI
1   300 DPI

         80   **Clears Command 86, 88, and 89**

         81   **Disable Serial Number Function:** This command disables the serial number function for either single or multiple serial numbers.

XX   **84**   **Load Text String Number to Increment/Decrement:** Instructs the printer which text string to increment/decrement. Only used in conjunction with single serial numbers.

XX   **85**   **Load Increment/Decrement Step Value:** The ^Axx specifies the value that the serial number will be incremented or decremented.

X   **86**   **Single Serial Number Status:**
0   Disable Increment/Decrement
1   Enable Increment. The serial number will be increased by the ^D85 value.

2   **86**   Enable Decrement. The serial number will be decreased by the ^D85 value.

XX   **87**   **Load Field Number to Clear Increment/Decrement Status:** Clears the status of one or more serial numbers.

XX   **88**   **Load Field Number to Increment by 1:** The ^Axx specifies which field to increment when using the multiple serial number function.

XX   **89**   **Load Field Number to Decrement by 1:** The ^Axx specifies which field to decrement when using the multiple serial number function.

XX   **90**   **Reflective Detection Sensitivity:** The ^Axx value sets the point (0-255) at which the printer detects a blackline registration mark using the reflective sensor. The printer's threshold default is a value of 100 for the reflective sensor. If this value is not set correctly the printer may false sense a registration mark or report an invalid >LOW STOCK< error.

^A	**^D**	**COMMAND**
XX	**91**	**Transmissive Detection Sensitivity:** The ^Axx value sets the point (0-255) at which the printer detects a diecut registration mark (gap) and/or blow-hole using the transmissive sensor. The printer's threshold default is a value of 30 for the transmissive sensor. If this value is not set correctly the printer may false sense a registration mark or report an invalid >LOW STOCK< error.
X	**93**	**Load Control Code Recognition Status:**
0		Enable control code recognition
1		Disable control code recognition
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**	**Retraction 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
X	**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 USB or Serial
1		2 Port Autoselect (USB or Xport Ethernet)
2		USB
3		RS232 Serial
5		Ethernet Option Board
6		3 Port Autoselect (USB, Ethernet option board, or Serial)

Diagnostics mode = Autoselect USB or Serial
Order of detection:
0 (^A0^D108) = USB then Serial
1 = USB then Xport Ethernet
6 = USB, Ethernet Option Board, then Serial

X	**110**	**General Purpose Status Byte**

XX	**111**	**Kiosk Cutter Mode:** This command enables the non-volatile full 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.
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 .54".

XX	**113**	**Verbose Mode:**
0		Disable Verbose Mode.
1		Enable Verbose Mode.

	114	**GS1 Databar Entry Command:** The GS1 Databar (formerly known as RSS-14) barcode is fully supported by the printer. Refer to the Chapter on Barcodes for the formatting requirements.

^A	^D	COMMAND
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
3		Enter rapid fire continuous sync mode
4		Enter rapid fire external print 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 on Microcom Rotary cutter equipped 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.
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 being in dots or pixels with a recommended distance of .037".
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.

^A	^D	COMMAND
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 printer to delete a graphics from flash memory. Issuing a "0" for the ^A value causing the printer to delete all flash graphics. The ^A value is used to select the memory slot or CGN # that will be deleted. The valid values for Axx are 0 to 255.

xxyy 135   Save FONTS to FLASH: This command is used to save font's into the printer's non-volatile flash memory. The ^Axxyy^D135 command is placed at the beginning of a font file download and instructs the printer to save the following data as a font file. The <ESC> (^[or 0x1B) instructs the printer the end of file download and acts as the command terminator.

xx   The number of additional 64KB sectors needed to save the graphic file.
yy   The memory slot location of the graphic being saved; CGN # (1-255)

XX   136   Delete a FONT from RAM: Instructs the printer to delete a graphics from RAM. Issuing a "0" for the ^A value causing the printer to delete all RAM fonts. The ^A value is used to select the memory slot or CGN # that will be deleted. The valid values for Axx are 0 to 255.

XX   137   Delete a FONT from FLASH: Instructs the to delete a font stored in flash memory. Issuing a "0" for the ^A value causing the printer to delete all flash fonts. The ^A value is used to select the memory slot or CGN # that will be deleted. The valid values for Axx are 0 to 255.

XX   138   Process a FLASH FORMAT: This commands instructs the printer to process or run a saved format from flash memory as if it was sent to the printer.

XX   139   Send a FLASH FORMAT to the Communication Port: This command instructs the printer to send the contents of a stored format to the printer's active communications port without processing the stored format.

140   Clear all User FLASH: Instructs the printer to delete all fonts and graphics

stored in non-volatile flash memory. Format files stored in flash are not deleted by this command. This command is equivalent to sending a ^A0^D134 and a ^A0^D137 to the printer.

^A	^D	COMMAND
	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.
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.

^A	**^D**	**COMMAND**
	149	**USB Image Print Mode:** This is a special Image print mode protocol used with the USB Port at higher Baud rates.
X	**153**	**Feed Forward Distance:** Moves motor in the forward direction by the X amount specified in dots.
X	**154**	**Feed Reverse Distance:** This command will move the motor in the reverse direction by the X amount, specified in dots.
X	**155**	**Set Feed Speed:** Sets the feed speed used with the D153 and D154 commands.
0		8.0 ips (inches per second)
1		7.5 ips
2		7.0 ips
3		6.5 ips
4		6.0 ips
5		5.5 ips
6		5.0 ips
7		4.5 ips
8		4.0 ips
9		3.5 ips
10		3.0 ips
11		2.5 ips
12		2.0 ips
13		1.5 ips
14		1.0 ips
X	**157**	**Takeup Motor Run Time:** Only used with custom Takeup PIC code. The value for X represents how long the takeup motor will run, in milliseconds, after printing has stopped.
0		0
1		25 25 msec
2		50
3		75
4		100
5		125
6		150
7		175
8		200
9		225
10		250
11		275
12		300
13		325
14		350
15		375
16		400
17		425
18		450

19	475
20	500
21	525
22	550
23	575
24	600
25	625

^A	**^D**	**COMMAND**
X	158	**Set the Transmissive Dot2Gap Value:** This is the distance of the transmissive sensor, that detects diecut and blow hole registration marks, to the dot row.
187		238 and 338 Series 203dpi
276		238 and 338 Series 300dpi
468		438 203pi
730		438 300dpi
264		438T Series 203dpi
395		438T Series 300dpi
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**
X	165	**Set the Reflective Dot2Gap Value:** This is the distance of the reflective sensor, that detects blackline registration marks, to the dot row.
187		238 and 338 Series 203dpi
276		238 and 338 Series 300dpi
468		438 203pi
730		438 300dpi
487		438T Series 203dpi
720		438T Series 300dpi
	166	**Generate 4-State Intelligent Mail Barcode**
X	172	**Presenter Configuration:** Sets and configures the optional presenter.

^A	^D	COMMAND
X	**175**	**Presenter Mode:** Selects the present mode of the optional presenter.
0		Disable Presenter
1		Auto, Loop, Present Path
2		Auto, No Loop, Present Path
3		Auto, Loop, Waste Path
4		Auto, No Loop, Waste Path
5		Auto, Loop, Present Path, Front Eject
6		Auto, No Loop, Present Path, Front Eject
7		Auto, Pass-through
8		Manual Present
9		Show Current Mode
10		Pinch Assembly

X   176   Generate Planet Code Barcode

X   177   Ethernet Option Board Configuration

1		Set IP Address (default is 192.168.200.3)
2		Set TCP port
3		Enable DHCP
4		Set NetBIOS Name
5		Set Gateway Address
6		Set Subnet Mask
7		Set MAC Address (only needed if replacing the CPU)
8		Display Ethernet Parameters
9		Save Ethernet Parameters

X   178   Set Pre Takeup Delay: This is used in conjunction with the Takeup code and enablement on switch bank D26. Sets a delay by the value for "x" that represents the number of steps the printer moves before running the takeup motor. The range is 0 to 65535. If the delay distance is set to a value greater than the label height, the takeup will not turn on.

X   193   Generate Aztec Barcode

X   194   Generate QR Code Barcode

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:

User Notes

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