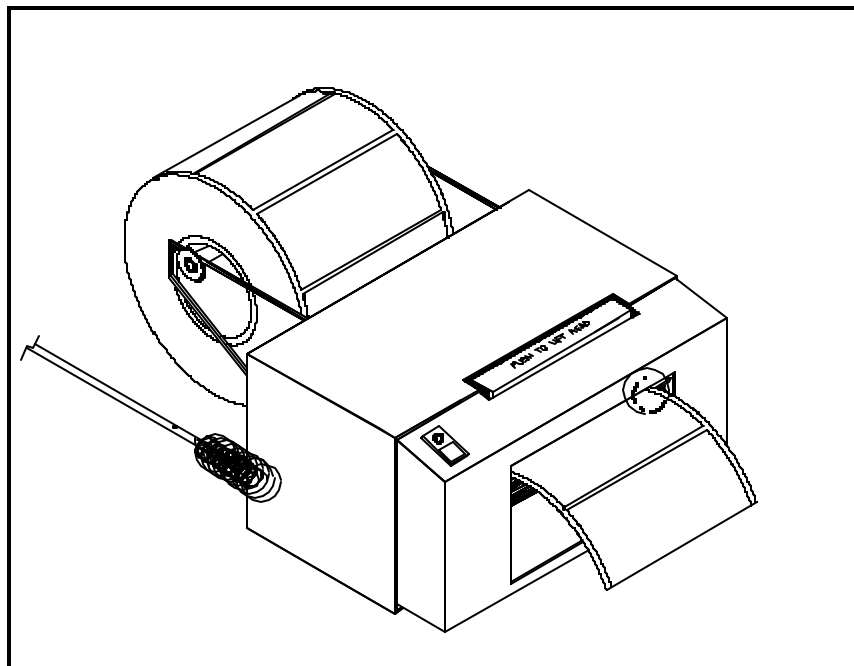# MICROCOM CORPORATION

MODEL 410

DIRECT THERMAL PRINTER

OPERATOR'S MANUAL

(6dpmm version)

January 1995   Software Version 3.35

Operator's Manual

410 Direct Thermal Printer
- Revised 01/13/95 MSG -

Table of Contents

)))

List of Tables

List of Figures

__Introduction__

The Microcom Corporation model 410 (6 dots/mm version) is a direct thermal label printer with a 640 element, 4.16 inch wide print head. The economic size and price have no effect on the printer's ability to handle a wide variety of labeling tasks - even the most demanding applications.

The resident Label Design Software (LDS) is a powerful and easy to use package that allows the user to create personalized label formats. It can be driven from a PC, mini-computer, mainframe and most special purpose computers.

Among many other features, LDS supports graphics functions and multiple serial numbering. It offers 18 different text fonts in four rotations and all popular bar code symbologies. Graphic images can also be loaded into the printer's memory. Fonts, bar codes and graphic images can be multiplied in size to offer great flexibility in custom designing labels. Once the labels are designed, they can be stored in printer memory for high speed access.

The 410 is capable of printing on most types of label stock or fax paper. It offers operation in a tag/tear, peel-and-dispense, batch mode, and user-defined advance mode. It can handle blow-hole, black-line, label gap and continuous stock.

Many thermal printer applications use the same label format, but change the data on every label. This is not a problem for the Microcom Corporation model 410 printer. Data may be changed without down-loading the same fixed format, or fixed data fields, time after time. This increases data access time and productivity.

Various options are available for the Model 410 printer. Label creation software packages are offered with database capabilities including quick and easy on-screen label design, custom fonts, bar codes and graphics.

CHAPTER 1: FEATURES AND SPECIFICATIONS

The Microcom Corporation model 410 direct thermal printer is designed with many standard features that are unique when compared to other printers. The 410 is built to meet the demands of complicated applications and rigorous use. A guarantee of excellence in engineering is provided by fulfilling the requirements for approval by UL, CSA and the FCC.

1.1   SPECIAL FEATURES

!   Operates as tag or ticket feed

!   Resolution of 6 dots/mm (.0065" per dot) and a print width of 640 dots (4.16")

!   Print length is virtually unlimited

!   WYSIWYG software compatible

!   Print speeds up to 3.0"/sec (2"/sec for large supply roll, narrow stock or peel mode)

!   Media supply rack allows roll size up to 5 inches OD (8 inch optional)

!   Prints on die-cut, continuous, fax, or preprinted label stock

!   Prints on tag stock up to 9.0 mil thickness (factory adjustment required)

!   Software-controlled contrast adjustment

!   Standard memory of 128K bytes ROM, 32K bytes RAM

!   Easy to load label path with liner for easy misfeed removal

!   Adjustable guides for easy label centering

!   Preheated head for improved print quality and life

!   Detects label gap, black line, or blow-hole stock

!   Internal statistical counter for inches and labels printed

!   Automatic label sizing on power up

!   Logo/graphics capability in four rotations (with optional RAM)

!   Incrementing and decrementing fields

!   Machine state enquiries for security and maintenance

1.2   BAR CODES

!   Code 39, Interleaved 2 of 5, CODABAR, Code 128, Code 93, Plessey, Modified Plessey, UPC-A, UPC-E, EAN-8, EAN-13

!   Selectable ratios for producing HIBC, AIAG, LOGMARS, and Bookland

1.3   FONTS

!   18 resident font styles, including OCR-A

!   All fonts expandable in height and width up to 255 times

!   Rotated fonts and bar codes: 0, 90, 180, and 270 degrees

1.4   PRINTING

!   Peel function strips label off of backing

!   Tag/tear mode advances label to the tear bar

!   Batch mode printing

!   User defined label advancement for special stock or application

!   Label-presence sensor allows printer to dispense at operator's pace

!   Label back-up to prevent wasted media in tag/tear and peel modes

1.5   INTERFACE COMMUNICATIONS

!   Serial: RS-232C, 9 pin female D-Sub connector (DCE)
                 -Flow control: XON/XOFF, CTS
                 -Baud rate: 110 to 19200, user-selectable
                 -Parity: odd, even or none
                 -Data bits: 7 or 8

!   Parallel: 25 pin female (optional)

1.6   PHYSICAL

!   Construction: Rigid painted steel construction

!   Height: 5" (127mm)

!   Width: 8.5" (216mm)

!   Depth: 10.5" (267mm)

!   Weight: 12 LBS (5.44 Kg)

1.7   ENVIRONMENT

!   Temperature: 0¨ C to 40¨ C operating

!   Humidity: 10-85% non-condensing

1.8   ELECTRICAL

!   Voltage: 117 VAC nom.,60Hz

!   Current: 3 AMPS maximum

1.9   OPTIONS

!   Cleaning kit

!   Assorted printer cables

!   On-screen label design PC software packages

!   Expandable memory: 128K bytes ROM, 64K bytes RAM <u>or</u> 256K bytes ROM, 32K bytes
         RAM

!   Media supply rack of 8 inch outer diameter (no charge option)

!   Real-time clock that battery-backs RAM

!   PCX to printer graphic conversion PC software

!   Parallel interface

!   On-demand label support rack

1.10 PRINTER VARIATIONS

!   230V European power supply

!   Battery powered model (405)

1.11 APPROVALS

!   UL, CSA, Complies with FCC, Class A

LABEL SUPPORT RACKS

LABEL SUPPLY SHAFT

PUSH TO LIFT HEAD LEVER

PEEL EDGE

TOP COVER

DRIVE ROLLER

POWER CORD

FRONT PANEL LED

PINCH ROLLER

FRONT PANEL

LABEL FEED AND LINE FEED BUTTON

Front View
Figure 1

LINE GUIDE ADJUSTMENT KNOB

THUMB NUTS

LABEL DIAPHRAGMS

SERIAL PORT

POWER SWITCH

LINE GUIDE IDLER

LINE GUIDE SHAFT

POWER CORD

PAPER LINE GUIDES

REAR PANEL
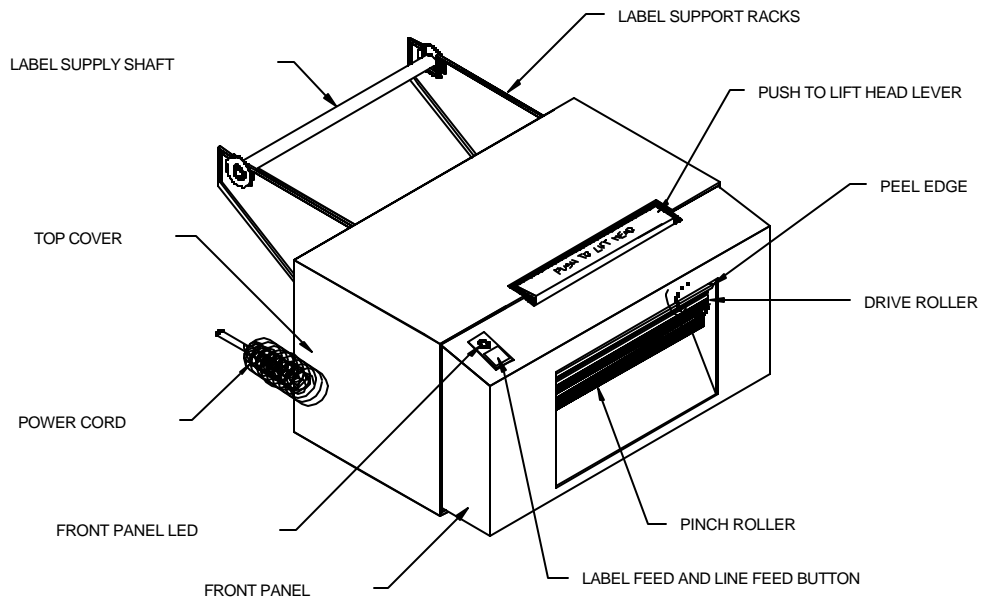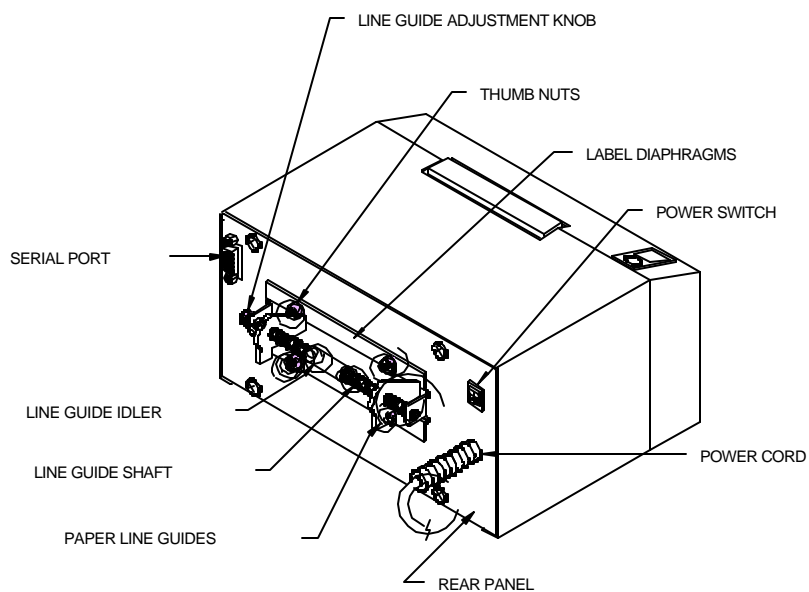
Rear View
Figure 2

CHAPTER 2: BASIC OPERATION

2.1   UNPACKING THE 410 PRINTER

While unpacking the printer, please check all packing materials closely to avoid misplacing any necessary parts. After the printer is removed from the box, verify that all parts are present and in good condition (see Figure 3). All packaging material should be kept and used if the printer is to be shipped. The printer must be returned in the original container to insure proper warranty coverage.

2.2   FRONT PANEL SWITCH AND STATUS LIGHTS

The front panel switch performs several different functions depending on the printer mode:

2.2.1   NORMAL MODE

The front panel switch (see figure 1) acts as both a paper feed button and a label request button. If the button is pressed and then released within a half second, the unit will print a label using the current label format. If the button is held for more than the half second, the unit will start to feed paper until the button is released.

2.2.2   BATCH MODE

If the printer is in the process of printing a predetermined quantity of labels (see ^D73, section 5.3), pressing the button after the printer has started to print these labels will cause the unit to pause. Pressing the button again will allow the printer to continue the batch.

2.2.3   STATUS LABEL MODE

When status label mode is accessed, the printer creates a status label and temporarily defaults all serial communication settings.

To print a status label, hold the button while turning on the printer until the status light turns orange. Release the button and a test pattern with statistical information will be printed (see figure 3). When a status label is created, the communication settings will be temporarily set to 9600 baud rate, no parity, 8 data bits, and 1 stop bit. The printer will return to the old settings, if different, after power down or a soft reset.

The printed labels and total labels represent the number of labels printed to date. The printed labels and printed inches fields are user resetable while the total labels and total inches are not. Printed inches and printed labels are reset using the ^D29 command (see section 5.3). Other useful information on the power-up label is the unit serial number, the non-resetable power-on hours, the previous serial parameters (not the default parameters caused by executing creating a status label), and the revision number of the Label Design Software (LDS).

The switch bank settings reflect the contents of the four software dip switches that configure the operation of the printer. See section 5.3, specifically ^D21, ^D22, ^D23 and ^D24, for more information on software dip switch settings.

```
PRINTER SERIAL #:  0-1083
   PRINTED LABELS:  3097
    TOTAL LABELS:  4937
  PRINTED INCHES:  7150
    TOTAL INCHES:  11885
  POWER ON HOURS:  353
   SWITCH BANK 1:  10001011
   SWITCH BANK 2:  01010001
   SWITCH BANK 3:  00000000
   SWITCH BANK 4:  00000000
SERIAL PARAMETERS:  9600-N-8-1
    LDS 410   REV 3.0   8/02/91
```
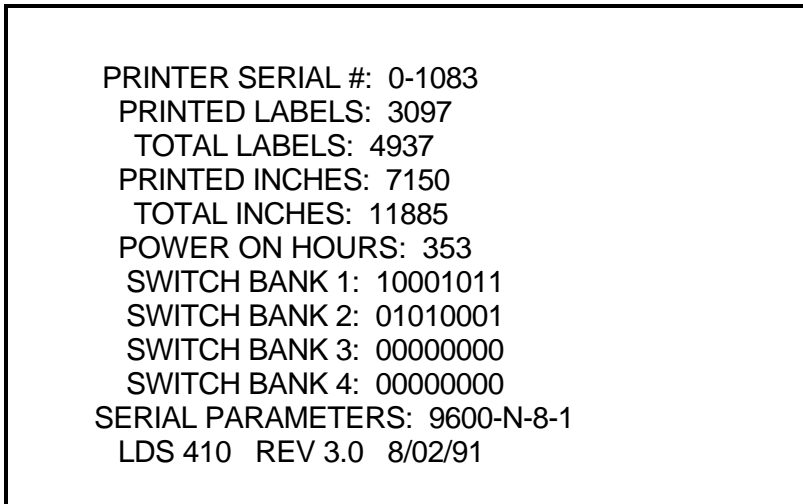
Status Label
Figure 3

2.2.4   PAPER-OUT MODE

After a paper-out condition, the front panel switch serves to load and realign the new label stock. When a paper out condition occurs, the indicator light will turn red. Pressing the button and holding it will cause the status light to go from red to yellow and feed paper. The status light will then flash yellow until the button is pressed for a label request. It will then turn yellow and the printer will print a duplicate of the last label printed and return to the blinking mode. This feature was designed to facilitate batches with serial numbers or other variable data. This process can be repeated as often as necessary to allow the paper to align itself. To return to the pre-paper out condition, tap the button while the duplicate label is being printed. The status light will turn green and normal printing may resume.

2.3   THE STATUS LIGHT

The status light has different functions depending upon the mode of the printer. Table 1 shows the relationship between the status light and the different modes.

Status Light		
Light Color	**Mode**	**Meaning**
Green	All	On-Line and ready to print
Red	All	Printer error: Caused by a paper-out condition or a hardware failure. If paper is out, follow instructions in section 2.3, otherwise turn printer off and back on. If condition persists, contact your service representative.
Flashing Red	All	Spike or low voltage on the AC line. The unit will remain in this mode until the condition is removed and the printer is powered off.
Yellow	Tag/tear, Peel	Label present. Label is ready to be removed from the printer mouth
Flashing Yellow	All	Printer is paused or in standby mode and is waiting for the front panel button to be pressed. If the paper was just changed and the reprinted label look good, press the button during the next print cycle to clear the repeat function and flashing yellow light.
Flashing Yellow and Red	All	A serial port buffer overflow has occurred. Check the host flow control for problems. (Note: the serial buffer will only accept 9 characters after the printer drops the clear to send signal or optionally sends the XOFF character.)

Table 1

2.4   LOADING PAPER

The following two sections explain the dispensing modes. Refer to figures 1, 2 and 4 for the printer components.

Printer Feed Mechanism
Figure 4

2.4.1   NORMAL AND TAG/TEAR MODES

Unwind about two feet of stock from the paper supply roll of paper. Set the roll behind the printer on the table. Remove the label supply shaft. Insert the paper with the thermally sensitive side up, under the rear threaded paper guide shaft, and into the printer until the paper stops. Turn the paper guide adjust knob at the rear of the printer until the paper guides are slightly wider than the label stock. Continue to apply pressure on the paper with your left hand. With your right hand apply slight pressure to the printhead lift lever with your little finger. Press and hold the front panel button with your pointing finger until the paper has advanced to a point past the printhead and release the pressure of your little finger from the lift lever. To align the paper, press down on the head lift lever and move the paper until the desired alignment is reached. Replace the label supply roll shaft and stock onto the wire rack.

2.4.2   PEEL-AND-DISPENSE MODE

1.   Follow the paper loading in the normal and tag mode directions.
2.   Remove enough labels to expose about two feet of backing paper.
3.   Insert the stock into the printer and allow about three inches to protrude out of the front.
4.   Make sure the leading edge of the backing paper is square and straight. (Tear at perforation or cut if necessary)
5.   Insert the leading edge of the backing paper between the black drive roller and the white pinch roller, making sure it is positioned evenly between the rollers.
6.   Press and hold the print button and feed the backing paper completely through the rollers until about three inches protrude out of the printer.
7.   Firmly push the head lift lever and press the feed button until most of the slack is taken out, then release the lift lever.
8.   Continue feeding paper until labels are reached. To avoid a paper jam, remove the labels as they start to peel.
9.   Enable the peel-and-dispense mode using the ^A1^D98<CR> command described in this manual.

        *If the label height is over 2", a label support rack should be used. This rack will support the peeled label until it is removed.

2.5   CLEARING LABEL MISFEEDS: DIAPHRAGM REMOVAL

The purpose of the label diaphragm is to provide a smooth path for labels through the printer and provide an easy means of removing label misfeeds. If a label misfeed occurs, remove the supply roll shaft at rear of printer. Remove the four black thumb nuts which hold the diaphragm sheets in place. Gently slip the sheets off the threaded studs. Once the sheets are removed, clean all foreign matter and any adhesive gum. To replace the sheets repeat this process in reverse.

2.6   CLEANING INSTRUCTIONS

The printer and printhead should be cleaned approximately every 5,000 labels or every two weeks whichever occurs first. The printer should also be cleaned whenever a label roll is changed. A Microcom Corporation cleaning kit should be used for cleaning and maintaining the model 410 printer. It is important to note that the optimum printhead life is achieved by maintaining a clean printer and printhead.

To clean the printer:

1)   Turn the printer off.

2)   Lift the printhead using the "PUSH TO LIFT HEAD" lever and remove any label stock that remains inside the head mechanism.

3)   Using the cleaning brush, sweep away all small label and adhesive particles that may be in the area of the printhead.

4)   Moisten a cleaning swab with the cleaning solution and wipe away any adhesive from the rollers or the aluminum peel bar.

5)   Dampen a swab with cleaning solution and lift the print head by pushing the lever in the direction of the arrows. Take the moistened swab and gently wipe the underside of the printhead. Repeat if necessary (if swab is extremely dirty).

6)   Moisten the felt side of a cleaning card with the cleaning solution. Insert card with felt side facing up into the rear of the printer as you would insert label stock. Hold down on the print button to feed the card through the printer (see section 2.3). Do not lift the print head for this operation. Allow the printhead to ride on the cleaning card. Repeat the process if needed. The cleaning card may be used once at each end.

7)   Remove the label diaphragm (see section 2.4).

WARNING: DO NOT TOUCH THE PRINTHEAD WITH ANY METAL OR SHARP OBJECTS

CHAPTER 3: COMMUNICATIONS

The printer may be connected to PC's, mini-computers, main frames, and many other special purpose machines. The following sections explain the communication interfaces.

3.1 CABLE PINOUT

Table 2 shows the signals of the 410's 9-pin RS-232 serial port. Out of the box, unless otherwise requested, the printer communicates serially at 9600 baud, 8 data bits, 1 stop bit and no parity with both hardware and software handshaking. This configuration may be changed through software commands as explained in the programming section of this manual. Table 3 shows the optional parallel port configuration.

If XON/XOFF hand shaking is used, the only signals the 410 requires are RXD, TXD, and GND. If hardware (CTS) hand shaking is used, a CTS signal is provided. XON/XOFF may be disabled through the software dip switch #1 (see chapter 5). The other signals are offered in the event the host computer requires them.

```
                          Serial Port Configuration

           25 TO 9 PIN                            9 TO 9 PIN

State 412     Direction      PC       State 412     Direction      PC
HI      1  DCD---->---- DCD  8        XX      1  DCD---->---- DCD   1
XX      2  TXD---->---- RXD  3        XX      2  TXD---->---- RXD   2
XX      3  RXD----<---- TXD  2        XX      3  RXD----<---- TXD   3
HI      4  DSR----<---- DTR 20        HI      4  DSR----<---- DTR   4
LO      5  GND---<->--- GND  7        LO      5  GND---<->--- GND   5
HI      6  DTR---->---- DSR  6        HI      6  DTR---->---- DSR   6
DC      7  CTS----<---- RTS  4        DC      7  CTS----<---- RTS   7
XX      8  RTS---->---- CTS  5        XX      8  RTS---->---- CTS   8
HI      9  +5V                        HI      9  +5V---->---- +5V   9

        DE-9              DB-25               DE-9              DE-9

         DC = Do Not Care                     DC = Do Not Care
         XX = Indeterminate                   XX = Indeterminate
```

Table 2

Parallel Port Configuration	
1 = /STROBE	10 = /ACK
2 = D0	11 = BUSY
3 = D1	12 = PAPER OUT
4 = D2	13 = SLCT
5 = D3	14 = NC
6 = D4	15 = /ERROR
7 = D5	16 = /INIT
8 = D6	17 = NC
9 = D7	18-25 = GROUND
(25 PIN FEMALE)	

Table 3

3.2   PRINTER CABLES

Warning: Connection of a serial printer to a parallel port may result in damage to the printer and/or computer. Connection of a parallel printer to a serial port may result in damage to the printer and/or computer.

The printer cables needed are standard and available through Microcom Corporation. You will not need a NULL-modem cable because the printer is DCE equipment.

For parallel connection, use a straight 25 pin male to 25 pin male cable, connected from the desired parallel port of the host computer to the 25 pin connector on the optional parallel board.

For serial connection, if your host computer has a...

25 pin serial com port - Use a standard 25 pin male to 9 pin male serial cable.

 9 pin serial com port - Use a 9 pin female to 9 pin male video extension cable.

CHAPTER 4: DESIGNING LABELS USING LDS

Label Design Software (LDS) refers to the firmware language resident in the printer that is used to process information sent by the host computer. All fonts, character sets and bar codes symbologies are resident in the printer.

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

    1: Control commands to define printer operation
    2: A header to define label height, width, print speed, etc..
    3: Field data to define placement of text, bar code, graphic or line
    4: Actual text data to place in the above text or bar code fields
    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 the ↵ symbol. It is important to note that all printer functions, unless otherwise noted, must be followed with a carriage return↵.

4.2   GETTING STARTED

There are many different machines that can send information to the printer: For example - main frames, mini-computers, special purpose computers and PC's. However, if you are using the printer for the first time, the easiest way to start is with a PC and terminal emulation software. This will allow two-way, serial communication with the printer. You will be able to quickly upload files and access label sizing and other features that will help considerably in formatting your first labels.

4.2.1   PC CONNECTION (SERIAL)

Items required:
-        A computer with at least one unused serial communications port. (COM1,COM2...)
-        A serial interface cable. (See section 3.2 for cable information)
-        A terminal emulation program.

Note: This communications test assumes that you have a standard serial printer.
Set the communication parameters in the PC terminal software program to 9600 baud, no parity, 8 data bits and 1 stop bit. Unless modified by the user, this is the printers' communication configuration out of the box. Depress ^C (ASCII or control code) on the PC keyboard. If the printer prints a label, proper PC to printer communications have been confirmed. Depress ^E to verify printer to PC communication. You will receive a text response from the printer.

If a terminal program is not available, it is possible to send files to the printer using the DOS COPY command. To do this you must first create a text file containing the information to be sent (i.e. ^C). You may use any text editor that **does not** add its own formatting characters).
Use the following DOS MODE command to set up the appropriate PC port.
Note: COM1 may be any available communications port on your PC.

C:>MODE COM1:9600,N,8,1,P

You must then send the file to the printer using the following DOS command.

C:>COPY FILENAME COM1

4.2.2   PC CONNECTION (PARALLEL)

Items required:
-         A computer with at least one unused parallel communications port. (LPT1,LPT2...)
-         A parallel interface cable. (See section 3.2 for cable information)

Create a text file containing the information to be sent. (^C is the print command.)

^C

You may use any text editor that does not add its own formatting characters. Send the file to the printer using the following DOS command. Note: LPT1 may be any available printer port on your PC.

C:>COPY FILENAME LPT1

4.2.3   LEARNING LDS

You can test some of the control code functions (see section 5.1) directly through the keyboard. Large label files, such as some of those illustrated in Appendix B, may be entered in a straight ASCII text word editor and then up-loaded to the printer using a terminal emulation program or the DOS copy command. (To use the DOS copy command, first use the DOS mode instruction to configure the PC. For example, MODE COM1:9600,N,8,1,P).

There are some special features offered by the printer that will aid label design. For example, the auto-size command (^A2^D39↵) will provide most of the header format information needed to define the different properties of label stock. The state of the machine is accessed through the enquiry command (^D5↵ or ^E). The statistical printer information is made available through the ^A0^D29↵ command.

The following sections of this chapter are designed to give an overview of a label format, define the label header, and list the different types of field information available. Chapter 5 explains the special functions of the control codes. Once some understanding of these basic concepts are achieved, use the quick reference guide in Appendix D for expedient label design.

4.3   FORMATTING LABELS: 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, the type of character generators or bar codes to use, etc.. Below is a sample label format. We will refer to this format as we break down the components of its structure.

(See figure 5)

```
^D57<CR>                                    A format is coming
4,615,153,,20,30,,70,4<CR>                  Header information
1,100, 40, 4, 1,4<CR>                       Field #1 information
2,100, 60,17, 1,4<CR>                       Field #2 information
3,100,100, 5, 1,6<CR>                       Field #3 information
3,100,150, 5,16,2,,,,30<CR>                 Field #4 information
^D56<CR>                                    Select RAM Format
^D2<CR>                                      Text Data is Coming
EASY<CR>                                     Text String #1
MICROCOM MAKES IT<CR>                        Text String #2
HELLO<CR>                                    Text String #3
^D3<CR>                                      Print
```

Microcom Label
Figure 5

The sequence ^D57<CR> puts the printer in format entry mode.

The next line is the header information: sizing the label (615 dots wide 153 dots high).

The next four lines are layout information for each printable text string.

The sequence ^D56<CR> selects the user layout.

The sequence ^D2<CR> tells the printer to start accepting text data for each defined field.

The next three lines contain the text for each field. The first string will be TSN# 1, the second will be TSN#2 and so on.

Text string #3 is accessed twice. The format will print the word 'easy' and then the barcode equivalent.

The sequence ^D3<CR> starts the print cycle (unless otherwise defined, it will print one copy).

4.3   LABEL HEADER

The header is broken down into eleven different parameters. These parameters contain information about the label. It is not necessary to enter information for all of the parameters: If a parameter is left blank, then the default value will be used. A carriage return must follow the label header.

The value of measurement for many of the header elements is the dot. There are 154 dots per inch across the print head (6 dots/mm). There is a maximum 640 dots in the X direction (width). Y direction (length) is virtually unlimited.

Most of the header parameters can be supplied by auto-sizing the label stock (^D39 section 5.3.3).

Below is a list of the header element mnemonics and their default values:

```
HFM, LSX, LSY, WEB, GAP, DPS, LCB, AGD, SPG, OFX, OFY
  0, 640, 443,  10,  10,  35,   0,   1, 352,   0,   0
```


Label Header Parameters of a 4" X 3" Label
Figure 6

Refer to Figure 6 for a visual representation of most header parameters.

The following is a description of each header element:

HFM   NUMBER OF FIELDS IN LAYOUT
This parameter is used to specify the number of fields in the layout. If more fields are defined than what is specified for HFM, the extras will be ignored. To prevent software confusion, do not set the HFM parameter to a number higher than the number of fields defined.

LSX   LABEL SIZE X DIRECTION
Specifies the width of the label in dots. For example: A 3" wide label would have an LSX of 3 x 154 = 462 dots. (154 dots = 1 inch)

LSY   LABEL SIZE Y DIRECTION
Specifies the height of the label in dots.

WEB   WEB SIZE
The width, measured in dots, of the webbing that is found on the left side of the label.

GAP   GAP SIZE
The height, measured in dots, of the gap between labels. Auto-sizing (See section 5.3.3) will define this value.

DPS   PRINT SPEED
The speed the printer actually prints a label. The printer will slow down in a dense area of the label, if needed, to prevent the label from being garbled. If the printer must slow down in an area, reducing the print speed will produce a better quality label.

The labels per minute a particular format will print can be calculated by the equation below:

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

The printer's default print speed is 2.1 inches per second (DSP value =34). To speed it up or slow it down, the following DPS parameters can be inserted into the label header. Please note that certain conditions such as large supply rolls, narrow label stock and tag/peel mode may require slower print speeds (about 2"/sec.) in order to acheive reliable label feed.

See Table 3 for a list of print speeds, DPS values, and inches per second.higher value slows the printer down and a smaller value speeds it up.

Print Speed			
DPS	MM/SEC	INCHES PER SECOND	INCHES PER MINUTE
25	76.8	3.0	180
26	74.2	2.9	174
27	71.7	2.8	168
28	69.1	2.7	162
29	66.6	2.6	156
30	64.0	2.5	150
31	61.4	2.4	144
32	58.9	2.3	138
33	56.3	2.2	132
34	53.8	2.1	126
35	51.2	2.0	120
36	48.6	1.9	114
37	46.1	1.8	108
38	43.5	1.7	102
39	41.0	1.6	96
40	38.4	1.5	90

Table 4

LCB LABEL CONTROL BYTE
The label control number defines the type of label stock that is used.

Continuous Stock: If set to a value of 2, the printer will not activate the gap detector circuit. After all fields are printed, the printer will advance the extra distance in the SPG header element.

Normal Stock (leading edge): If defaulted (value of 0), the printer will detect the trailing edge of the label (the beginning of the gap).

Black Line Stock: If set to a value of 1, the printer will detect the leading edge of a black line.

Blow Hole Stock (Slot-Cut): Use the default value (0) and set software dip switch #4 (^D24) for blow hole stock (see section 5.3).

AGD   NUMBER OF STEPS TO ACTIVATE GAP DETECTOR

The number of steps (dots) from the front edge of the label before the gap detector circuitry is activated. This value is usually defaulted. It is not defaulted when using stock that is smaller than 2.3 inches, the distance between the gap detector and the dot row, or on larger labels, when skipping over pre-print, gaps, or paper flutter that may cause the gap detector to trigger incorrectly. There is a long equation to manually calculate this value for small labels, but auto-sizing (^D39) the label will produce this value accurately and quickly.

SPG   NUMBER OF STEPS PAST GAP

The steps (dots) to move the label after detection of a label gap. This facilitates using very small label stock - less than 2.3 inches (the distance between the dot row and the gap detector). Use auto-sizing (^A39) to quickly evaluate this parameter for small stock.

It may also be necessary to adjust this value if using special stock: For example, if using black line stock with a perforation that is not on the black line. SPG would need to be manipulated so that the printer can print the label between the perforations, yet still trigger on the black line. In this case SPG would be calculated as the distance from the black line to the perforation.

OFX   X DIRECTION OFFSET

Equally moves all of the fields to the right. Useful for centering a label format on different label stock. For example: Transferring a small label layout to a larger label stock. (Note: This command consumes software time and may decrease the maximum print speed.)

OFY   Y DIRECTION OFFSET

Equally moves all of the fields up on the label. Also useful for adjusting a label format to a different stock. (Note: This command consumes software time and may decrease the maximum print speed.)

4.3.1   A SAMPLE SESSION WITH A LABEL HEADER

This is the label header from the sample label in section 4.2.

4,615,153,,20,30,,70,4<CR>

4   -   4 fields following the header
615 -   Label width (LSX) of 615 (615/154= ~4 inches)
153 -   Label length (LSY) of 153 (153/154 = ~1 inch)
     -   No entry in the WEB parameter means default value of 10
20 -   A GAP between labels of 20   (20/154 = ~.13 inch)
30 -   Label print speed (DPS) of 30 = 2.5 inches per second (from table)
     -   No entry for the LCN parameter means default value of 0, normal stock on backing paper
70 -   The AGD could not be defaulted because the stock was less than 2.3 inches in length (LSY). This value was produced from auto-sizing (LDS command ^D39) the label.
4   -   SPG also could not be defaulted because of the small size of the stock. Auto-sizing quickly produced this value.

<CR> A carriage return must follow the label header. There were two parameters left that were not entered into the header - OFX and OFY. Because they were not entered, the printer assumes the default values, 0 in their cases. Likewise, if the AGD and SPG were defaulted, the carriage return could have followed the DPS.

4.4   LABEL FIELDS

A field is broken down into fourteen different parameters. These parameters contain the information necessary to position data (text, bar codes, etc.) on the label. It is not necessary to enter values for all of the field parameters; the default values will be used if left blank. A carriage return must follow each label field. The following is a list of the field element mnemonics and their default values:

```
TSN, XB, YB, CC,TCI,CGN, FO, FJ, CMX,CMY, CS, TSP,CLX,CLY
  1,  0,  0,   *, 1, **,  0,  0,   1,  1,  *,   1,  *, *
```

*   The default depends on the character generator (CGN) used.
**   The default depends on the TCI used.

TSN   TEXT STRING NUMBER

Determines from which text string the field obtains the printable information. This allows for more than one field to use the same text string. A TSN of 0 accesses the clock chip text string (see section 8.3 for more details). A TSN of 1 accesses the first line of text data. A TSN of 2 accesses the second line of text data, and so forth. (Note: Text data is the information that follows the ^D2 command (section 5.3).)

XB   X BEGINNING COORDINATE

The X coordinate of the field is measured in dots. The far left edge of the print head as viewed from the front of the printer is X co-ordinate 1. There is no X co-ordinate 0. The X coordinate increases in size from left to right (See figure 7). An XB of 154 would place the text one inch from the left side of the print head.

YB   Y BEGINNING COORDINATE

The Y coordinate of the field is measured in dots. A YB of one would be specified as the first edge of the label coming out of the front of the printer during a label print. The Y coordinate increases in size from the bottom to the top of the label (See figure 7). A YB of 154 would place text one inch from the bottom of the label.

CC   CHARACTER COUNT

The number of characters that will be used in a field. If the number of characters in the
selected text string is more than the quantity specified by CC, then the remainder of the
text string is ignored. If the text string has less than the number of characters specified
by this parameter, then only those characters defined by the text string are printed. For
example, the text string - MICROCOM - would be 8 characters long.

TCI   TEXT CONVERSION IDENTIFIER

The selected text string will be printed according to this chart. The values below define
which method is used:

1	Text
2	Text Surrounded by Asterisks (Code 3 of 9)
3	Text with UPC-A/UPC-E Checksum Digit Printed
7	Graphic Image (ROM and RAM)
12	UPC-A Bar code
13	UPC-E Bar code (SEND 11 DIGITS)
14	UPC-E Bar code (SEND 7 DIGITS)
15	Interleaved 2 of 5 Bar code
16	Code 3 of 9 Bar code
20	EAN-13 Bar code
21	EAN-8 Bar code
24	MSI 1 (Plessey)
25	MSI 2 (Plessey)
26	MSI 3 (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
40	Code 128 bar code
42	Codabar bar code
43	Code 93 bar code
44	AS-10 bar code

* Refer to section 7.1.1 on how to use these TCI's

Example: For the text string - **1234567**
A TCI of one would print it as an ASCII string
A TCI of 42 would print it as a Codabar bar code

CGN   CHARACTER GENERATOR NUMBER

This refers to the character generator (font size, barcode size, etc.) that is used.

The character generators and specifications for the various fonts, barcodes, and logos are shown below. Remember, there are 154 dots per inch.

Key For Tables:

CGN   - Character Generator Number
FO   - Field Orientation
Height   - Y Direction, in Dots
Width   - X Direction, in Dots
Spacing   - Default Spacing Between Characters, in Dots
Font Type - Font Descriptor
'**-**'   - Use Default Ratio

Fonts					
CGN	Dot Height	Dot Width	Spacing	FO	Font Type
1	5	3	1	0123	Standard
2	5	5	1	0123	Standard
3	6	5	1	0123	Standard
4	7	5	1	0123	Standard
5	7	7	1	0123	Standard
6	7	7	1	0123	Bold
7	8	5	1	0123	Standard
8	9	5	1	0123	Standard
9	9	7	1	0123	Standard
10	12	8	2	0123	Standard
11	15	12	2	0123	Standard
12	18	10	2	0123	Standard
13	40	15	3	0123	Standard
14	40	20	3	01	Standard
15	9	40	4	01	Standard
16	18	21	2	0123	Numeric
17					Custom #1
18					Custom #2
19	16	10	2	01	OCR-A
20	8	8		01	Upper/ Lowercase

Table 5

This list constitutes the bar codes available on the 410 printer. Some bar codes offer different ratios to accommodate different applications. See section 7.1 on designing with bar codes for more information.

Bar code Symbologies					
Bar code	CGN	Ratio	Height	Spacing	FO
Code 3 of 9	2	2:1	1	-	0123
	3	3:1	1	-	0123
(non-standard)	4	3:1 N	1	Special	0123
I 2 of 5	2	2:1	1	-	0123
	3	3:1	1	-	0123
	5	5:2	1	-	0123
*UPC/EAN		50%	1	-	0123
*UPC Readable		50%	1	-	0123
*Code 128		50%	1	-	0123
Codabar	2	2:1	1	-	0123
	3	3:1	1	-	0123
Code 93		2:1	1	-	0123
AS-10		2:1	1	-	0123
MSI (Plessy)		1:1	1		

Table 6

* These bar codes must be multiplied by 2 for a 100% ratio

Graphic Images					
CGN	Height	Width	Spacing	Graphic	FO
1	2	255	0	Line	12
3	X	X	0	*RAM	12
4	X	X	0	*RAM	1

Table 7

X=Indeterminate
* See chapter 6 on RAM Graphic Images

FO   **FIELD ORIENTATION**
Defines the rotation of each field on the label. The point of rotation is determined from the field justification. The positioning of data relative to field orientation and field justification can sometimes be confusing. Refer to Table 8 for more detailed information on FO and FJ interaction.

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

FJ   **FIELD JUSTIFICATION**
The justification of each field on the label.
0   Right justified above base-line.
1   Left justified above base-line.
2   Right justified below base-line.
3   Left justified below base-line.
4   Centered above base-line.
5   Centered below base-line.

Whereas:

Right Justified -   Text positioned right of X co-ordinate
Left Justified   -   Text positioned left of X co-ordinate
Centered   -   Text is centered on the X co-ordinate
Above Baseline   -   Text positioned above the Y co-ordinate
Below Baseline   -   Text positioned below the Y co-ordinate

<u>Starting position definitions:</u>

Use the following to obtain proper character placement relative to orientations and justifications.

Character Starting Positions Relative to Field Orientations and Field Justifications	
Rotation	Field Orientation
0 Degrees	0 - Right justified above base-line 1 - Left justified above base-line 2 - Right justified below base-line 3 - Left justified above base-line 4 - Centered above base-line 5 - Centered below base-line
180 Degrees	0 - Left justified below base-line 1 - Right justified below base-line 2 - Left justified above base-line 3 - Right justified above base-line 4 - Centered below base-line 5 - Centered above base-line
270 Degrees	0 - Right justified below base-line 1 - Right justified above base-line 2 - Left justified below base-line 3 - Left justified centered on base-line 4 - Right justified centered on base-line 5 - Left justified centered on base-line
90 Degrees	0 - Left justified above base-line 1 - Left justified below base-line 2 - Right justified above base-line 3 - Right justified below base-line 4 - Left justified centered on base-line 5 - Right justified centered on base-line

Table 8

CMX   CHARACTER MULTIPLIER X DIRECTION

Multiplies each character in the X direction. A 5 high by 3 wide character with a CMX of 2 would produce a 5 high by 6 wide character.

CMY   CHARACTER MULTIPLIER Y DIRECTION

Multiplies each character in the Y direction. A 5 high by 3 wide character with a CMY of 2 would produce a 10 high by 3 wide character.

CS   CHARACTER SPACING

The spacing between each character. If this parameter is not used, then the default for the selected character generator (CGN) is used. Bar codes have default spacing according to the indicated multiplier. Multiplying a text string will not multiply the spacing between characters. This element should be used to properly space the characters.

TSP   TEXT STARTING POSITION

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**. See section 5.3.4 for use of this parameter with clock fields.

CLX   CHARACTER CELL LENGTH X DIRECTION

This will override the width of the characters in the selected character generator. This element is used only in special cases, such as drawing lines. It will form an incomplete character.

CLY   CHARACTER CELL LENGTH Y DIRECTION

This elements will over-ride the height of the characters in the selected character generator. This element is used only in creating lines.

4.4.1   A SAMPLE SESSION WITH A LABEL FIELD

Looking at the sample label...

^D57<CR>	A format is coming
4,615,153,,20,30,,70,4<CR>	Header Information
1,100, 40, 4, 1,4<CR>	Field #1 information
2,100, 60,17, 1,4<CR>	Field #2 information
3,100,100, 5, 1,6<CR>	Field #3 information
3,100,150, 5,16,2,,,,30<CR>	Field #3 information
^D56<CR>	Select RAM Format
^D2<CR>	Text Data is Coming
EASY<CR>	Text String #1
MICROCOM MAKES IT<CR>	Text String #2
HELLO<CR>	Text String #3
^D3<CR>	Print

... and referring to field #1.

1,100, 40, 4, 1,4<CR>

1 - Field refers to text string #1 - **EASY**. This field could have referred to **HELLO**, if it had a TSN of three. The fields do not have to be in any kind of order with respect to the data fields.

100 - Data X co-ordinate (XB) of 100 dots from left side of label

40 - Data Y co-ordinate (YB) of 40 dots from bottom of label

4 - Character count (CC) of 4 characters, the amount of characters in EASY.

1 - A TCI of 1 indicates that the data will appear on the label as text, an ASCII string, as opposed to, for example, a bar code.

4 - This CGN selection of 4 selects a font size of 7 dots high by 5 dots wide. This is the size of each character in the word EASY as it appears on the label.

<CR>- The carriage return (<CR>) signifies that this field is complete. The field parameters that were not defined will accept the default values. A FO (Field Orientation) and FJ (Field Justification) of 0 will place EASY to the right of the X co-ordinate with a rotation of 0 degrees. CMX and CMY will default to 1, so the character will be the size as defined by the font. The TSN is 1, therefore we will print the entire EASY word (a TSN of 2 would have printed ASY). CLX and CLY will default to 5 and 7, respectively, so a full character will be printed.

CHAPTER 5: PRINTER COMMANDS

The Model 410 printer has a large and versatile collection of control codes to meet the special needs of labeling applications. Most of the commands use a ^D control sequence, however the printer also recognizes a selected number of other control sequences.

For all the commands listed in this manual, the printer will recognize either the one-character control character or the two-character caret and alpha character sequence. In other words, for a PC key board, the same command can be generated either by holding down the control key and pressing the letter or by entering two characters - the ^ (a caret, the character generated if you press the Shift key and the 6) and an alpha character (upper or lower case).

To protect against errors, in situations where two-character caret-alpha sequences are used exclusively as printer commands, control character recognition can be disabled. This is done either through software dip switch #1 (^D21) or command ^D93.

Some main-frame and mini-computers cannot use the ASCII '^' character. In these cases substitute the ASCII pipe symbol '|' or use the one character control-code representation.

The caret symbol can be used in text or bar codes by preceding it with another caret.

5.1   SPECIAL PRINTER CONTROL CODES

The following control characters perform special functions. All other control characters are ignored. Some of these instructions are also accessible through a ^D sequence.

^A   **Accumulator Mode:** Used to supply parameters for ^D commands.
These parameters must be positive integers and are generally decimal numbers but they can however be binary if preceded by an ASCII B. (^AB00000001^D21<CR> equals ^A1^D21<CR>>

^B   **Text entry mode:** Instructs the printer to enter printable text entry mode. This command (or the preferred ^D2<CR>) must be sent before the text information. This command is equivalent to ^D2<CR> but does not require a <CR> after it (^Btext data string). Because control B is shorter it is easier to use in direct terminal mode. In general it is better to use ^D2 inside a file or program.

^C   **Print a label:** Starts the print cycle or batch. This command is equivalent to ^D3<CR> but does not require a <CR> after it. Because control C is shorter than ^D3<CR> it is easier to use in direct terminal mode. In general it is better to use ^D3<CR> inside a file or program.

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

^E   **Printer enquiry:** See section 5.2 for more details (equivalent to ^D5<CR> but does not require a <CR> after it). Because control E is shorter than ^D5<CR> it is easier to use in direct terminal mode. In general it is better to use ^D5<CR> inside a file or program.

^M   **Terminate text or data string:** Must be used to terminate a text or data string. (Same as a carriage return or enter key on a PC keyboard.)

^H   (or **DEL**)   **Deletes the last printable character entered:** This is usually only used when communicating to the printer through the keyboard. (Same as the backspace key on a PC keyboard.)

^K   **Print test label:** A test label consists of a series of diagonal lines. It is useful in determining the condition of the dots on the print head (equivalent to ^D11<CR>).

^L   **Form Feed.** (Equivalent to **^D12**)

^Q   **XON:** Instructs the printer to continue sending data.

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

5.2   PRINTER ENQUIRIES

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

The printer is capable of returning responses to enquiries in three different ways depending on how the machine is programmed (see software dip switch #1, ^D21, section 5.3. The text equivalent response returns a defining word, giving the state of the machine. The ^ equivalent returns an ASCII '^' response followed by the defining alpha character. The control-code equivalent returns an actual control code.

The printer will send to the host one of the following responses in response to a ^E or ^D5:

Enquiry Responses		
TEXT	^ALPHA or CONTROL CODE	DEFINITION
>RESTARTED<	^Z	Printer has been reset
>READY<	^F	Normal condition
>DATA ERROR<	^U	Communication error
>LOW STOCK<	^Y	Out of labels
>LOW TEMP<	^^	Head temperature is low
>OVER TEMP<	^[	Head temperature is high
>OVER VDD<	^\	VDD voltage is high
>TAKE LABEL<	^V	Printer is waiting for a label to be taken

Table 9

5.3   SENDING ^D PRINTER COMMANDS

Unless otherwise specified, these commands are entered by sending a ^DXX where XX is the command number. It is followed by a carriage return or another control code. Some commands load data or control numbers and are preceded by a ^AXX, where XX represents the data or control number. Unless otherwise specified, command codes should precede or follow the actual format layout. They should be placed before the ^D57 or just before the print command ^D3.

All commands not listed in 5.3.1 (the EEPROM and dip switch section) are not retained when the printer is turned off and if desired, must be sent again upon power-up.

When possible, the following commands are grouped by function. See the quick reference command summary in Appendix G for a listing by number.

Some commands can be substituted with equivalent control-codes. If this is the case, there will be an equivalence statement in the description.

Example of Command usage:
^A3^D75^D3<CR> (This sequence will print a batch of three labels).

5.3.1 SOFTWARE DIP SWITCHES AND EEPROM COMMANDS

The following commands are different from the other printer commands in that they are stored in EEPROM, are non-volatile and configure the machine upon power-up. Once sent to the printer, they do not need to be sent again.

The printer will only configure to the following commands after a the machine has been powered off and then turned back on. **The printer will not accept these commands until this is done.**

^A	**^D**	**COMMAND**
	20	**Change baud rate:** Unless otherwise requested by the customer, the baud rate of the printer is 9600. (To change baud to 19200 use ^A8^D20<CR>)

0	110 Baud
1	150 Baud
2	300 Baud
3	600 Baud
4	1200 Baud
5	2400 Baud
6	4800 Baud
7	9600 Baud
8	19200 Baud

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

21   **Change SW1:** Software dip switch #1. The dip switches are the only commands that do not use the ^A parameters. Instead, they use a ^AB sequence followed by an 8 digit 0 or 1 code.

For example: ^AB10101011^D21<CR> will configure the printer for a text equivalent enquiry response, accept control codes, even parity, disable parity, disable echo, 8 data bits and enable XON/XOFF flow control.

```
    12345678
^ABxxxxxxxx
   *******.Q 1=XON/XOFF Enable, 0=Disable
   ******.)Q 1=8 Data Bits, 0=7 Data Bits
   *****.))Q 1=Echo Enable, 0=Disable
   ****.)))Q 1=No Parity, 0=Enable Parity
   ***.))))Q 1=Odd Parity, 0=Even Parity
   **.)))))Q 1=Ignore Control Codes, 0=Accept
   *.))))))))),
   .))))))))),* Enquiry Response
               00 = Control Codes
               10 = Text Equivalent
               11 = ^ Equivalent
```

Position:

1,2   **Enquiry Response:** This determines what the printer will send back in response to an enquiry. See chapter 5.

3   **Control Codes:** This switch setting will allow or disallow printer response to control codes (below 20h).

4   **Parity:** Selects either even or odd parity error checking.

5   **Enable Parity:** Enables or disables parity error checking.

6   **Echo:** If this feature is enabled, the printer will echo all received characters to the serial port.

7   **Data Bits:** Choose 7 or 8 bit data.

8   **XON/XOFF:** Enable or disable XON/XOFF software handshaking. Clear to Send (CTS) hardware handshaking is always enabled.

^A   ^D   COMMAND
       22   Change SW2: Software dip switch #2. Below is the ^AB sequence:

```
       12345678
 ^ABxxxxxxxx
       *******.)))),
      ******.)))),*
      *****.)))),**
      *****       RRR  Power-up Label Format
      *****       000=ALWAYS EPROM Format 1
      *****       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
      ****.))))Q 1=Use Saved Format File, 0=Rom Format
      ***.)))))Q 1=Print Button Enable, 0=Disable
      **.))))))Q 1=Disable Button Use, 0=Enable
      *.)))))))Q 1=>RESTARTED< Response Enable,
0=Disable
      .))))))))Q 1=Clear Text Enable, 0=Disable
```

Position:
       1   Clear Text Function: If enabled, all variable text strings will be erased when a ^D2<CR> is processed.
       2   >RESTARTED< Response: If the printer has been reset and this switch has been enabled, the printer will respond with to the first poll by sending the >RESTARTED< message. If additional enquiries are made the printer will respond normally. The >RESTARTED< message is only sent once after reset.
       3   Button Use: Set to 1, the printer will not allow button use, even for paper feed.
       4   Print Button: If this is 0, the button can be used for paper feed, but cannot be used to initiate label printing.
       5   Power-up Format Type: Defines the power-up label format. This parameter determines whether to use a saved format file for the power-up label, or a ROM format (defined by positions 6, 7, and 8). The saved format file must be battery backed to use the saved format file feature. See Appendix C for configuration instructions and section 5.3.7 for saved format file information. Please consult your service organization if changes or additions to the fixed ROM formats are required.
   6,7,8   Power-up Label Format: These switches decide which format to use at power-up.

^A   ^D   COMMAND
         23   **Change SW3:** Software dip switch #3. Below is the ^AB sequence:

```
        12345678
 ^ABxxxxxxxx
        *******. Not Used
        ******.Q Not Used
        *****.)Q 1=Enable 460 Emulation, 0=Disable
        ****.))Q 1=Enable 450 Emulation, 0=Disable
        ***.)))Q 1=Enable Label Centering, 0=Disable
        **.))))Q 1=Send Response After a Print
        **      0=No Response After a Print
        *.)))))Q Not Used
        .))))))Q Not Used
```

Position:
         1   **Always 0**
         2   **Always 0**
         3   **Response After Print:** If enabled, an enquiry response will be sent back through the serial port after every print.
         4   **Label Centering:** The printer will center all label formats if this position is set to 1. Label centering creates an X offset for the older formats that were left justified. It will not center normal format fields on the label. It offsets a previously left justified label. Not recommended for new applications.
         5   **450 Emulation:** Only used if 450 format files are being sent to the printer.
         6   **460 Emulation:** Used if 460 format files are being sent to the printer.
         7   **Always 0**
         8   **Always 0**

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

      24   **Change SW4:** Change software dip switch #4. Below is the ^AB sequence.

```
            12345678
 ^ABxxxxxxxx
    *******.)Q Not Used
    ******.))Q Not Used
    *****.)))Q Not Used
    ****.))))Q Not Used
    ***.)))))Q1=Auto-size on Power-up, 0=Disable
    **.))))))Q1=Blow-hole Sensing Enable, 0=Disable
    *.)))))))Q1=Enable 2" Epson Emulation, 0=Disable
    .))))))))Q1=Enable 4" Epson Emulation, 0=Disable
```

Position:

      1   **4" Epson Emulation:** When set, the printer executes the same commands as an Epson printer in an 80 column format. This parameter enables the emulation on printer power-up (Also see the ^A1^D38 command in section 5.3). To exit this mode, create a status label (see section 2.1.3) and clear (0) this position in this software dip switch. This function is no longer supported.

      2   **Enable 2" Epson Emulation:** Same as position 2, but prints in a 40 column format. (Also see the ^A2^D38 command in section 5.3.) This function is no longer supported.

      3   **Blow-hole Stock:** Enable this position when using blow-hole or cut-slot stock: Stock that uses a hole instead of a gap to separate labels.

      4   **Auto-size on power-up:** When enabled, the printer automatically sizes the label stock when turned on. The printer then uses these header values for all subsequent label formats. See the ^D39 command in section 5.3 for more information on auto-sizing.

      5   **Always 0**
      6   **Always 0**
      7   **Always 0**
      8   **Always 0**

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

XX   **36**   **Adjust Contrast Base:** Used to adjust the contrast base point for such things as high-speed paper and printhead wear. This command is stored in the EEprom and skews the entire contrast window (^D35). This command has a ^A range of 10 to 200%.

5.3.2   PRINTING COMMANDS

The following commands initiate label printing or define the number of labels to be printed.

^A	**^D**	**Command**
	3	**Print Command:** Prints a single label or starts the printing of a batch of labels. This is usually the last command in a format file.
	11	**Print Test:** Prints a label with diagonal lines that is useful in determining the condition of wear of the print head. (Equivalent to ^K)
	12	**Form Feed:** (Equivalent to ^L) Prints a blank label.
	70	**Clear commands 71-76.**
	71	**Disable Copies Function:** Suspends multiple copies function and returns printer to single copy mode.
	72	**Enable Copies Function:** Allows a batch of labels to be produced. Used to restore conditions after a ^D71 has been executed. (Note: if copies function was disabled with the ^D71 command, then this function will restore copies function using previously entered copies count^D73.)
XX	73	**Load copies count:** Tells the printer to print multiple copies without incrementing serial numbers. This command can be used in conjunction with the ^D75 (load print count) to allow duplicate copies to be made inside a batch. For example, the following command string will print a total of 150 labels; three copies of each serial number and 50 different numbers (^A3^D73^A50^D75^D3<CR>).
1	74	**Infinity Print:** Prints a batch of labels but will continue to print until the printer is turned off. This command is most useful in tag/tear or peel-and-dispense modes. ^A1 activates this mode. Can be used with serial numbers. Example usage: ^A1^D74^D3<CR> - Prints until printer turned off or paused, using the front panel button.

^A	**^D**	**COMMAND**
XX	**75**	**Load Label Count:** Tells the printer to print a batch of labels using the serial number function if enabled. Can be used in conjunction with load copies count (^D73). The batch of labels will be printed when a ^D3 is executed. Therefore, this must precede a ^D3 command. The only difference between this command and ^D73 is in the ability of this command to increment and decrement sequential numbers in the batch. See section 5.3 for more information. Example usage: ^A20^D74^D3<CR> - Prints 20 serial number labels.
XXX	**76**	**Load Delay Time Between Printed Labels:** Delays the printing between labels in a batch. Preceded by ^A which contains the wait in 1/10ths of a second increments. The maximum value is 650. Example usage: ^A10^D76<CR> - introduces a one second delay between printed labels.

5.3.3   AUTO-SIZING and VALID GAP COMMANDS

The auto-size feature gives important format file values for the label header. These values are:

LSY -	Label height
GAP -	Distance between labels
AGD -	Steps until activating gap detector
SPG -	Steps past gap
^D91Value -	Sets transmissive properties of stock. See ^D91 definition later in this section. This value is obtained from auto-sizing and should be inserted as the ^A value associated with the ^D91 command. This must be done whenever stock is changed.

When auto-size is executed, a sample of approximately 10 labels will run through the printer. The printer averages the values it receives from these labels.

To auto-size labels that use a black line instead of a gap, first execute a ^A1^D47<CR> to put the unit in black line mode.

To auto-size blow-hole stock, set software dip switch 4 for blow-hole stock (see section 5.3.1) and then auto-size.

There is also a power-up auto-size feature as defined in section 5.3.3, ^D24.

^A	**^D**	**Command**
	39	**Auto-Size Label:**

0   Clears the use of auto-size values set by ^A1^D39.

1   Uses the values obtained for the variables above instead of what the user supplies in the header of the file format. This will not display the variables on the screen.

2   Automatically sizes the label and displays on the screen the values for the size variables. These values should be placed in the label header for that stock.

3   Same as ^A2^D39, but prints the values on a label, instead of on the screen.

                (Note: The LCB should be set to 1 before auto-sizing black line stock. ^A1^D47<CR>)

XX 91   **Load Value for Printer to See Valid Gap.** Obtained from the auto-size (^D39) command. This value states the translucent properties of stock to the gap detector. This ^AXX^D91 command should be at the beginning of all format files if suggested ^D91 value returned from auto-size is not between 50 and 70 or the default value creates skipping over the label gap. Skipping over the label gap is defined as the printing of one label and then the printing of a blank label. This condition occurs because the default ^D91 value cannot adjust for stock that has unusual translucent properties (old stock, thick tag stock, unusual backing paper, etc.). This problem can be rectified by auto-sizing the stock.

5.3.4   REAL-TIME CLOCK

^A   **^D**   <u>**Command**</u>
      30   Change Clock: Use the sequence below to set the time and date of the optional real-time socket:

        ^D30 <CR>
        HH:MM:SS <CR>
        DD/MN/YR/W <CR>

        Where the above parameters are defined as:

        HH = hours (24 hour format)   **DD** = day
        MM = minutes   **MN** = month
        SS = seconds   **YR** = last 2 of year
                W = day of the week
                     1 = SUN
                     2 = MON
                     3 = TUE
                     4 = WED
                     5 = THR
                     6 = FRI
                     7 = SAT

The optional clock chip produces a string of data that is accessed through use of a TSN of 0 and a TSP dependent on the data required of the clock chip.

The data string is shown below...

HH:MM:SS MN/DD/YR XXX DD/MN/YR XXX

...where xxx is the day of the week.

These values should be inserted into the Field parameters for proper clock text access:

Clock Field Parameters			
TSN	TSP	CC	DATA
0	1	8	HH:MM:SS
0	10	8	MN/DD/YR
0	19	3	Day of Week
0	23	8	DD/MN/YR
0	32	3	Day of Week

Table 10

Sample formats using the clock function:

Clock Option
Figure 7

Figure 7
^D57<CR>
2,,163,,,35,,1,178<CR>
0,320,40,8,16,2,,4,2,60,2,10<CR>
0,320,20,8,1,10,,4, , , ,10<CR>
^D56<CR>
^D3<CR>

Figure 8
^D57<CR>
3,,163,,,35,,1,178<CR>
0,320,40,12,16, 2,,4,2,60,2,23<CR>
0,320,20,12, 1,10,,4,, , ,23<CR>
1,320,110,20,1,11,,4<CR>
^D56<CR>
^D2<CR>
EUROPEAN DATE FORMAT<CR>
^D3<CR>

European Date Format
Figure 8

Figure 9
^D57<CR>
3,,163,,,35,,1,178<CR>
0,320,40,12,16,2,,4,2,60,2,10<CR>
0,320,20,12, 1,10,,4,, , ,10<CR>
1,320,110,20,1,11,,4<CR>
^D56<CR>
^D2<CR>
US DATE FORMAT<CR>
^D3<CR>

U.S. Date Format
Figure 9

Figure 10
^D57<CR>
 3,,163,,,35,,1,178<CR>
0,320,20,34,1,10, ,4<CR>
0,550,80, 8,1,10,3,4<CR>
1,320,60,18,1,13, ,4<CR>
^D56<CR>
^D2<CR>
M-410 CLOCK OPTION<CR>
^D3<CR>

Time Format
Figure 10

))

5.3.5   SERIAL NUMBER COMMANDS

The following commands, ^D80 through ^D89, refer to the serial number function of the printer. The printer can increment or decrement any single serial number on the label by any amount. However, if there is more than one serial number on the label, it can only increment or decrement those serial numbers by one. <u>Single and multiple serial commands cannot be implemented on the same label</u>.

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

^A	**^D**	**Command**
	80	Clears Commands 86, 88, 89.
	81	**Disable Serial Number Function:** Will disable either single or multiple serial number commands.

The next three commands deal with single serial number functions:

XX	**84**	**Load Text String Number to increment/decrement:** Tells the printer which text string number to increment or decrement. See section 4.4 on text string numbers. The ^A value states which string is adjusted.
XX	**85**	**Load increment/decrement step value:** This is the value that the single serial number is incremented or decremented. ^A specifies the step value.
	86	**Single Serial Number Status:**
0		Disable increment and decrement.
1		Enable increment. The serial number will be incremented by the value from ^D85.
2		Enable Decrement. The serial number will be decremented by the value from ^D85.

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

XX	**87**	**Load Field Number to Clear Increment/Decrement status:** Clear the status of one or more serial numbers with this command. Example: ^A1^D87 will command the printer not to increment/decrement field number one anymore.
XX	**88**	**Load Field Number to Increment by 1:** ^A specifies which field.
XX	**89**	**Load Field Number to Decrement by 1**: ^A specifies which field.

^A   **^D**   Command

XX   **75**   **Load Label Count:** Tells the printer to print a batch of labels using the serial number function if enabled. Can be used in conjunction with load copies count (^D73, see section 5.3). The batch of labels will be printed when a ^D3 is executed. Therefore, this must precede a ^D3 command. The only difference between this command and ^D73 is in the ability of this command to increment and decrement serial numbers in the batch.

A sample program using the single serial number feature:

^A2^D86<CR>
^A1^D84<CR>
^A5^D85<CR>
^A3^D75<CR>
^D57<CR>
1,616,297,5,6,31,,1,43<CR>
1,435,24,2,1,14,0,,1,1,3<CR>
^D56^D2<CR>
20<CR>
^D3<CR>

A sample program using the multiple serial number feature:

^A2^D88<CR>
^A1^D88<CR>
^A3^D89<CR>
^A9^D75<CR>
^D57<CR>
3,640,164,,17,30,,1,177<CR>
1,100,20,4,1,11<CR>
2,100,40,4,1,11<CR>
3,100,60,4,1,11<CR>
^D56<CR>
^D2<CR>
100<CR>
200<CR>
300<CR>
^D3<CR>

5.3.6 LABEL HEADER COMMANDS

The following ^D commands, 41 - 51, all refer to label header values. The printer will use these values for all subsequent label formats unless a ^D40 is executed, or the machine is powered off.

More information on what these label header values mean can be found in section 4.3.

Example usage: ^A924^D43<CR> - Sets the label height for all following formats to 5 inches.

^A	**^D**	**Command**
	40	**Clear Commands 41-51.**
XX	**41**	**Load number of fields in layout (HFM):** ^A determines number of fields.
XX	**42**	**Load label width in dots (LSX):** ^A indicates the width.
XX	**43**	**Load label height in dots (LSY):** ^A defines the height.
XX	**44**	**Load web size in dots (WEB):** ^A specifies the web size.
XX	**45**	**Load gap size in dots (GAP):** ^A denotes the gap size.
XX	**46**	**Load print speed (DPS):** ^A designates the print speed.
XX	**47**	**Load label control byte (LCB):** ^A specifies the number.
XX	**48**	**Load number of steps to activate gap detector (AGD):** ^A determines the number of steps.
XX	**49**	**Load number of steps past gap (SPG):** ^A designates the number of steps.
XX	**50**	**Load X direction offset (OFX):** ^A indicates the X offset.
XX	**51**	**Load Y direction offset (OFY):** ^A denotes the Y offset.

5.3.7   SAVING FORMAT FILES COMMANDS

The printer has the capability to store a format file in RAM without processing it. Later, this file can be accessed repeatedly at very high speeds, because access is now a direct memory fetch. With the use of battery backed RAM socket, the printer will retain these format files after the removal of power. The printer can be configured through software dip switch 2 (see section 5.3) to automatically process the file at power up. The printer treats these files exactly as if they were sent through the communication port.

^A	**^D**	**Command**
XX	**54**	**Send Saved Format File to Serial Port:** ^A selects which one (1-8).
XX	**58**	**Process Saved Format:** ^A selects which user entered format (1-8) is to be printed.
XX	**59**	**Save Format File:** ^A selects which slot (1-8) in which the user entered format is to be placed. The format file must be terminated by an ESC (1B hex) character.
66	**66**	**Initialize Storage Area for Format Files:** Used when format files are to be stored into Ram. This command must be issued before saving format files or when saved format files need to be changed. There is no way to erase or change one data stream, they must all be initialized. A ^A66 must precede this command.

USAGE:
Before sending the first format file, the RAM must be initiated by sending ^A66^D66<CR>. This command sequence reserves an area of memory for format storage. When this command is issued, all previously saved format files will be erased. Therefore, it also works as a memory clear operation. Only use this command before sending the first file.

Next send the ^A1^D59<CR> command sequence. This indicates to the printer that file #1 of a possible 8 is being sent to the printer. After this command, follows the format file.

The format file must be terminated with an escape character (1B hex) so that the printer knows that the complete file has been sent down. The printer will not accept an ASCII representation of the escape character.

To access the stored file, serially send ^A1^D58<CR>, where ^A1 indicates the number of the file that is accessed. The printer will now process the stored file.

All proceeding files sent to the printer to be saved also receive the ^AX^D59 command, where X denotes the number of the file. Be sure that the ^A66^D66 command is not sent again. This will erase all stored files. These files can also be accessed through the ^AX^D58 command, where X denotes the number of the file to be processed.

It is important to note that the saved format file mode works very well with variable text. Configure the format file with all the positioning data, header information and fixed text. Terminate the file with an escape character. Select the saved format and send the

variable data as normal. It may be the difference between sending a few lines of data versus the entire format! Access is very fast.

To list a file that has previously been sent to the printer, use the ^AX^D54 command, where ^AX denotes the file to be read. The printer will send the file to the serial port.

Sample files: File #1 initiates the save format file memory and downloads saved format file #1. File #1 includes all the fixed data on the label. File #2 is the file that initiates processing of file #1 and includes all variable data for the format. File #2 also prints the label. File #3 shows how a second saved format would look if the entire format was in one file.

NOTE: <ESC> = 1B hex or ESC character

File #1

^A66^D66<CR>   ;Remember, send this string first time.

^A1^D59<CR>
^D57<CR>
4,288,193,5,19,30,0,1,148<CR>
1,100,20,10,1,10,0,2,1,1,,1<CR>
1,210,20,7,1,10,0,2,2,2,,11<CR>
1,152,154,12,12,,0,2,2,100,,18<CR>
1,130,54,12,32,,0,2,2,2,,18<CR>
^D56<CR>
^D2<CR>
<ESC>

File #2

^A1^D58<CR>
24 PRINTS $ 3.79 20496340379<CR>
^D3<CR>

File #3

^A2^D59<CR>
^D57<CR>
4,620,161,,18,35,,73,3<CR>
1,120,110,50,1,11<CR>
2,120, 80,70,1,10<CR>
3,120, 60,70,1,10<CR>
4,120, 40,70,1,10<CR>
^D56<CR>
^D2<CR>
MICROCOM CORPORATION<CR>
8333-A GREEN MEADOWS DR., N.<CR>
WESTERVILLE, OH 43081<CR>
(614) 548-6262<CR>
<ESC>

The above file would be selected by sending an ^A2^D58<CR>.

5.3.8   LABEL PRESENCE SENSOR CONTROL

The label presence sensor that is standard on the 410 printer gives the printer the ability to print at the operators pace. The following modes define its operation.

^A	**^D**	**Command**
XX	**96**	**Load Advance Delay:** ^A specifies how many milliseconds to delay repositioning of the label in tag/tear and peel-and-dispense modes. Example usage: ^A1000^D96 would delay label advance by one second.
	97	**Tag/Tear Operation:** A method of dispensing a label where the label is advanced so the perforation between labels is on the tear bar. This allows heavy tag stock and regular label stock to be torn off easier. The distance of advancement may also be defined by the user, if used in conjunction with the ^D95 command. There are three modes of operation:
0		Disable tag/tear operation.
1		Advance after every label: Causes the paper to be advanced to the perforation after every label is printed. As soon as the label is taken, the paper is backed up to the beginning of the next label. This mode forces the printer and computer to operate at the speed of the operator.
2		Advance after copies count: Causes the paper to be advanced to the perforation after the number of labels specified by the copy count (^D73) or label count (^D75) commands have been printed. As soon as the labels are taken, the paper is backed up to the beginning of the next label.
3		Advance when idle: This causes the paper to be advanced to the perforation whenever the printer does not have a label request pending. When another label request is made, the paper backs up and the next label is printed.
		It is possible to have more than one mode in effect at a time. For example, Modes 2 & 3 which would cause the label stock to be advanced after a copies count and then remain advanced until another label request is made.

<u>**^A**</u>	<u>**^D**</u>	<u>**Command**</u>
	98	**Peel-and-Dispense Mode:** A method of dispensing a label, where the backing paper is automatically peeled away from the label. It allows the operator to take the label and apply it to an object without having to peel the label off the backing paper. The printer will advance the label so that it is still hanging off the tear bar. This will make it easier for the operator to take the label. Once the label is taken, the printer will back the paper into the printer so as not to waste label stock. Larger labels may require the use of the front label support rack (see section 8.1). This will prevent the label from falling off and sticking to the front of the printer. The distance of advancement can also be user defined by the ^D95 command.
0		Turn off peel-and-dispense mode with ^D98.
1		Turn on peel-and dispense mode.
XX	**95**	**Load User Defined Steps for Label to Advance:** Used in conjunction with tag/tear and peel-and-dispense mode. This value, after print, will advance the label a user defined distance instead of defaulting to the measure specified by the peel-and-dispense and tag/tear modes. This printer feature accommodates special stock and special circumstances (very small labels, label applicator, etc.). While the user may specify 64,000 steps, it is not recommended that the number of steps create a situation where the entire label is back fed into the printer. This may create labels jamming in the printer when the back edge of the label meets the print head unit.

5.3.9   TEXT STRINGS COMMANDS

The following commands support special editing features that allows the positioning of new text, protects existing text, and enters text without using the ^D2<CR> or ^B delimiter. These commands are generally used when there is a format already loaded in RAM. They are used to edit that file in order to print variations, often only the text in one field.

^A	^D	Command
	60	**Clears command 61**

XX   **61**   **Mark Text Starting Position:** ^A designates which text field to start entering new data. This is useful for creating variable data fields after a string of fixed data fields. ^AXX^D61<CR> marks the text starting position, where XX is the text string number where the new text will begin. If XX is a 2, the first line of new text entered following a ^D2<CR> will overwrite text line two. If two new text strings are entered, the existing text lines two and three will be over-written. If three new text strings are entered, the existing lines two, three and four will be overwritten, and so forth.

          62   **Pre-padded Text:** This command is sent after text that is to appear at the beginning of each field. Text sent after this command will be appended to the pre-padded text. This is useful, for example, if the first two numbers of a bar code are always constant and only the new bar code numbers need to be sent. The printer would automatically update the new bar code with the two fixed numbers. A ^D62 prevents existing text lines from being over-written. Any new text entered after a ^D62<CR> will be appended to the existing lines.

          63   **Text Mode Control:** Allows entry of new text without a ^D2 and/or clears all text when new text is added. The following ^AXX values have the following effects:

0   Disable 1 & 2.
1   Enable auto-print mode: New text entered after this command are recognized as text lines and will overwrite existing text. The ^D2<CR> is not needed at the beginning of new text.
2   Clear all previous text upon receiving new data. When one or more characters of new text is entered, the existing text area will be erased in its entirety. The printer can be programmed to enter this mode automatically upon power-up by setting position 7 of software dip switch 2 (See ^D21, section 5.3.1).
3   Enable 1 & 2.

^A	^D	Command
XX	**64**	**Auto Print String Count:** ^A tells the printer how many text strings to accept before printing. Used in conjunction with ^A1^D63.

                   When the printer is put in auto-print mode, it is not necessary to send a ^D2<CR> to inform the printer that text is coming or send a ^D3<CR> to tell the printer to print a label. The printer will accept all incoming data as text strings (except

control codes) and will print a label as soon as the number of strings equals the
amount specified by the ^D64 command. At this point, the printer will print a label
and continue to accept data. This mode is useful for interfacing to a device that
transmits raw data, such as a scale or meter.

This is an example of the D63, 64 and 65 Commands...

```
^A0^D64<CR>                                      ;clear any old settings
^D57<CR>                                         ;load new format mode
12,640,400,,20,36,,1,412<CR>                     ;header
1,320,270,3,7,1,,4,205,3,,,1,1<CR>               ;field info
1,35,325,10,1,6,,,,2<CR>                         ;field info
2,320,325,20,1,10,,4<CR>                         ;field info
3,320,305,25,1,10,,4<CR>                         ;field info
4,320,285,25,1,10,,4<CR>                         ;field info
5,35,250,10,1,6,,,,2<CR>                         ;field info
6,230,355,30,1,12<CR>                            ;field info
7,75,133,29,1,13<CR>                             ;field info
7,320,185,20,16,2,,4,2,50,2<CR>                  ;field info
8,75,089,29,1,13<CR>                             ;field info
9,75,045,29,1,13<CR>                             ;field info
10,75,001,29,1,13<CR>                            ;field info
^D56<CR>                                         ;select RAM format
^D2<CR>                                          ;begin text entry mode
SHIP FROM:<CR>                                   ;data line 01 (protected)
MICROCOM CORPORATION<CR>                         ;data line 02 (protected)
8333-A GREEN MEADOWS DR., N.<CR>                 ;data line 03 (protected)
WESTERVILLE, OH  43081<CR>                       ;data line 04 (protected)
SHIP TO:<CR>                                     ;data line 05 (protected)
           Order No:      XXX<CR>                ;data line 06
7777777777777777777777777777777777777<CR>       ;data line 07
8888888888888888888888888888888888888<CR>       ;data line 08
9999999999999999999999999999999999999<CR>       ;data line 09
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA<CR>      ;data line 10
^A3^D63<CR>                                      ;enable auto print and clear text
^A5^D64<CR>                                      ;tell printer to print after 6 (CR)
^A6^D61<CR>                                      ;tell printer to start new data entry
                                                  at data line 6 instead of 1
```

5.3.10   MISCELLANEOUS PRINTER COMMANDS

^A	**^D**	**Command**
	2	**Text string entry mode:** Precedes the text strings that are supplied to the various fields in the label. Text strings must be followed by a carriage return. (Equivalent to ^B)
	5	**Send Printer Status:** See section 5.3 (Equivalent to ^E)
	29	**Printer Statistics:** The information produced is equivalent to the status label in section 2.1.3.

0	Print statistics to 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   **Soft Reset:** Restores printer to power-up settings.

33   **Display Model and Revision Number:** Displays important reference numbers to the screen.

35   **Contrast Window Adjust:** Adjusts to a percentage of current contrast base. Used for slight variations in paper and should be turned down for ladder style (vertical) bar codes. If this command does not sufficiently lighten or darken the contrast, use the Adjust Contrast Base command (^D36, section 5.3). Values for ^A are shown below:

1	60% of Base
2	70% of Base
3	80% of Base
4	90% of Base
5	Base (default)
6	110% of Base
7	120% of Base
8	130% of Base
9	140% of Base

38   **Epson Emulation:** The 410 printer will emulate an Epson printer in this mode. There is also an Epson emulation on power-up feature as explained in section 5.3.1. The following ^A parameters define mode of operation. This function is no longer supported.

1	40 column Epson emulation
2	80 column Epson emulation

XX   **55**   **Select Default Label Layout:** Select from the ROM power-up label layout. Only used if you have a special lay-out embedded into ROM. ^A selects which one (1-8), if more than one are present.

^A	**^D**	**Command**
	56	**End of Label Fields:** Select RAM format label.

57   **Enter Label Format Mode:** This tells the printer that information for a label is following

65   **Emulation control:** This list of commands was designed for those users who were previously using an older Microcom Corporation printer and now want to use their old format files with the model 410 printer. Label centering creates an X offset for the older formats that were left justified. It will not center all the fields on the label. It offsets a previously left justified label. (Note: Not recommended for new formats.)

0	Disable All.
1	Enable Label Centering. Used only in conjunction with 450 and 460 emulation.
2	Enable 450 Emulation.
3	Enable 1 & 2.
4	Enable 460 Emulation.
5	Enable 1 & 4.

67   **Load Graphic Image:** See chapter 6 for more details.

0	Send single graphic in four rotations.
1	Send graphic #1 of 2 in 2 rotations.
2	Send graphic #2 of 2 in 2 rotations.

93   **Load Control Code Recognition Status:** Some mainframe, mini-computer, and special-purpose computers cannot send ASCII characters under 20 hex or send these numbers for reasons other than 410 operation (spooler initialization, etc). In order to maintain proper flow control, the 410 printer will ignore everything under 20 hex if so directed. There is also an EEPROM dip switch (see section 5.3) that will enable the printer to enter this mode upon power-up. (Note: if control code recognition is disabled, the printer will not process the 1Bhex (ESC) character and therefore will not be able to store data streams.)

0	Enable control code recognition.
1	Disable control code recognition.

CHAPTER 6: LOGOS

The Microcom Corporation model 410 printer is capable of storing two graphic images at 0 and 180 degree rotations, or one graphic image in four (0 ,90, 180, and 270 degree) rotations. You may either use the Microcom Corporation "pcx2410" software to create an OGO file from a downsized PCX of PCC file, or use your own software to format a graphics file into a form that the printer can understand.

The only limitation in graphic design is the 248 X 248 pixel resolution due to memory restraints. Though this resolution is sufficient for most applications, Microcom Corporation has 16bit DOS PC software available that will automatically down-size large PCX and PCC files. This software package is available from Microcom Corporation at:

http://www.microcomcorp.com/software.html

Remember: Use the X and Y format multiplier features to increase the size of your logo past the 248 by 248 window.

GOOD IDEA: Create your own software to manipulate graphic files into the OGO format.
BETTER IDEA: Use the "OGO" software to turn your PCX file into the OGO format.
BEST IDEA: Use the WYSIWYG on-screen label design package to turn any size PCX file into the OGO format.

REQUIRED FOR THE LOGO OPTION:

        1: Extra 32K RAM chip
        2: LDS ROM revision 3.0 or higher
        3: Optional:
                A) Battery-backed RAM socket for retention of graphic files during power down.
                B) Microcom Corporation "pcx2410" software to turn PCX files into OGO files.
                C) WYSIWYG software package that will down-size the largest of PCX files.

6.1   PROCEDURE FOR USING THE PCX2410 SOFTWARE

<u>To Create a Four Rotation Graphic Image:</u>
      1:     Create a PCX or PCC file by scanning, graphics utility, etc.. Be sure the image, excluding white space, is within the 248 X 248 resolution
      2:     Install Microcom Corporation "pcx2410" software onto PC
      3:     Type at DOS prompt - pcx2410 filename.ext EX: pcx2410 tree.pcx
      4:     Download resulting tree.ogo file to printer
      5:     Access graphic image by using CGN 3, a TCI of 7, and FO of 0, 1, 2, or 3

<u>To Create Two Graphic Images in 0 and 180 Degree Rotations:</u>
    1: For graphic image #1:
        A) Type at DOS prompt - pcx2410 filename.ext /1
      EX: pcx2410 tree.pcx /1
        B) Download resulting tree.og1 file to printer
        C) Access graphic image #1 by using CGN 3, TCI 7, and FO of 0 or   1
    2: For graphic image #2:
        A) Type at DOS prompt - pcx2410 filename.ext /2
          EX: pcx2410 bird.pcx /2
        B) Download resulting bird.og2 file to printer
        C) Access graphic image #2 by using CGN 4, TCI 7, and FO of 0 or   1

<u>Sample Format Files to Access Graphic Images</u>

Label format for one graphic image, four rotations (See figure 11)

```
^D57<CR>
4,615,441,,10,36,0,1,352<CR>
1,355,20,1,7,3,0,4,1,1<CR>
1,355,400,1,7,3,1,4,1,1<CR>
1,100,20,1,7,3,2,4,1,1<CR>
1,150,270,1,7,3,3,4,1,1<CR>
^D56<CR>
^D2<CR>
.<CR>
^D3<CR>
```


Graphic Image in Four Rotations
Figure 11

Label format for two graphic imgaes, two rotations (See figure 12)

```
^D57<CR>
4,615,441,,10,36,0,1,352<CR>
1,315,20,1,7,3,0,4,1,1<CR>
1,315,220,1,7,4,0,4,1,1<CR>
1,150,20,1,7,3,1,4,1,1<CR>
1,150,420,1,7,4,1,4,1,1<CR>
^D56<CR>
^D2<CR>
.<CR>
^D3<CR>
```
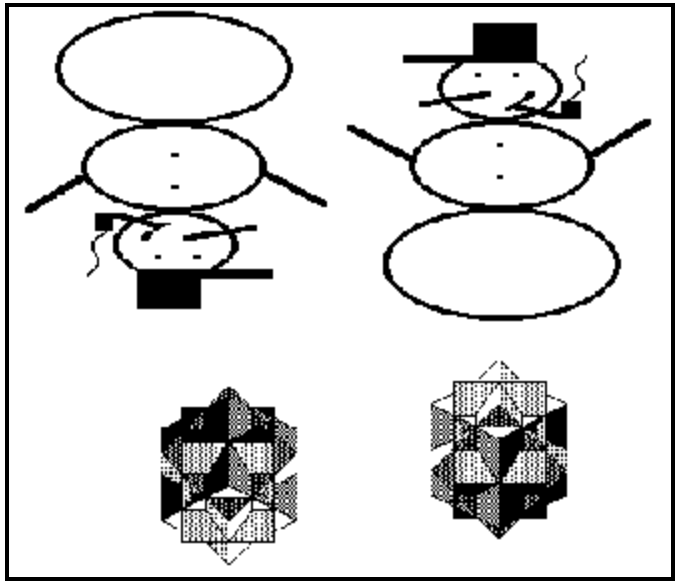

Two Graphic Images in Two Rotations
Figure 12

6.2   FORMAT OF LOGO FILES

This information is made available to companies that may need to
convert other graphic formats to the OGO format.

The file sent to the 410 printer should appear as follows, whereas:

    h   = Hex representation
    X   = Indeterminate data
   'X' = Parenthesis signal ASCII data
    db = Single byte hex width

OPENING PARAMETERS:

    If creating a graphic image file in four rotations, send:
        '^A0^D67'0dh0ah'+'
    If creating graphic image #1 file, send:
        '^A1^D67'0dh0ah'+'
    If creating graphic image #2 file, send:
        '^A2^D67'0dh0ah'+'

The following header and data information should always follow the above:

```
------------------------------------------------------
db XXh                                    ;Pixels high
db XXh                                    ;Pixels wide
db 00h                     ;Always 00h
db XXh                                     ;Bytes wide
db 20h                     ;Always 20h
db 21h                     ;Always 21h
db 20h                     ;Always 20h
db XXh                                    ;Pixels high
db XXh                                    ;Pixels wide
db 7688 DUP (?) set defines a fired dot. 7688 bytes graphic data, maximum 248 x 248 resolution.
------------------------------------------------------
'-'                                       ;Signifies end of graphic data
```

The data between the dashed lines should be decoded before being sent to the printer. This
decoding is a simplified version of ASCII hex:

EXAMPLE: Data byte = 9Bh

Step 1:   Create two bytes with leading zero
             09h, 0Bh
Step 2:   OR the resulting bytes with 30h
             39h, 3Bh
Step 3:   Put 39h, 3Bh in file to be sent down to printer

If you are sending logo #1, the format is finished. This data can be sent to the printer. Proceed with graphic image #2 from the very beginning of this format (It does not matter whether you send graphic #1 or graphic #2 first).

If you are sending one graphic image in four rotations, start the second rotation at the point of the format with the '+' sign; then send the header and graphic data.

CHAPTER 7: SPECIAL DESIGNS

7.1 DESIGNING WITH BAR CODES

When 0 and 180 degree bar codes are X multiplied (CMX) for better readability, the space between characters is also multiplied to create a more readable bar code. The printer will do this internally. Therefore, when multiplying bar codes, use the default value for the spacing element (SP) in the field parameters.

If the Y multiplier (CMY) is not multiplied, a barcode with a vertical length of one dot is produced. Of course, this will not be picked up by scanners. Multiply the Y co-ordinate to the proper height. For example: Multiply the Y co-ordinate (CMY) by 154 to create a one inch tall bar code.

If the bar code is in a ladder (or vertical) orientation (90 and 270 degrees), multiply CMY for width, and CMX for bar code length.

It may be necessary to slightly adjust the contrast base or window (^D35 or ^D36) since the dots will be continually fired in succession and may cause distorted print.
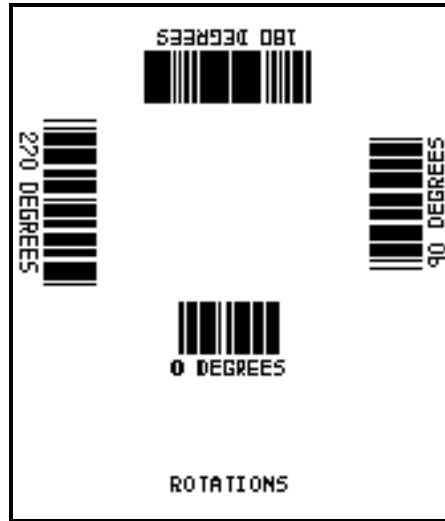
Bar Code Rotations
Figure 13

Program sample: Bar codes in four rotations (See figure 13)

```
^A3^D35<CR>
^D57<CR>
9,620,441,,10,25,,,352<CR>
1,320, 30,11, 1,10, ,4<CR>
2,320,120,11, 1,10, ,4<CR>
2,320,137, 1,16, 2, ,4, 2,40,2<CR>
3,487,254,11, 1,10,3,4<CR>
3,470,254, 2,16, 2,3,4,40, 2,2<CR>
4,320,387,11, 1,10,1,4<CR>
4,320,370, 3,16, 2,1,4, 2,40,2<CR>
5,160,254,11, 1,10,2,4<CR>
5,177,254, 3,16, 2,2,4,40, 2,2<CR>
^D56<CR>
^D2<CR>
ROTATIONS<CR>
0 DEGREES<CR>
90 DEGREES<CR>
180 DEGREES<CR>
270 DEGREES<CR>
^D3<CR>
```

7.1.1 HUMAN READABLES

Text conversion identifiers 32 and 33 refer to human readable UPC bar codes. These identifiers are designed to be used in conjunction with the UPC bar codes, and do not create the actual bar codes. They represent numerical bottom borders that extend some of the bar code lines. These bar code human readables must be lined up with the bottom of the bar codes.

Text conversion identifiers 28 and 29 are MSI human readables that do not border themselves with bar lines like 32 and 33. Their purpose is only to add the calculated check digit(s) to text lines. To design with these TCI's, select a text character generator number and multiply as with any other text field. Place this field underneath the MSI bar code. TCI 3 works in this same way but for UPC-A bar codes.

Bar code Human Readables
Figure 14

All other bar code human readables only require a text TCI of 1, a user selectable text character generator, and text positioning under the desired bar code. This field must refer to the bar code number.

Program sample: Barcodes with human readables (See figure 14)

```
^D57<CR>
16,620,441,,10,25,,,352<CR>
 1,100, 20,17, 1,10<CR>
 3, 60, 37,11,32,  ,,,2, 2<CR>
 3, 82, 55,11,12,  ,,,2,60<CR>
 2,375, 20,19, 1,10<CR>
 3,350, 37,11,33,  ,,,2, 2<CR>
 3,372, 55,11,12,  ,,,2,60<CR>
 4, 80,150,19, 1,10<CR>
 4, 65,167,12,20,  ,,,2,60,,8<CR>
 5,408,150,14, 1,10<CR>
 5,395,167, 7,21,  ,,,2,60,,7<CR>
 6,110,270, 5, 1,10<CR>
 6,120,287,12,13,  ,,,2,60,, 8<CR>
 9,180,270, 8, 3,10<CR>
 7,400,270, 5, 1,10<CR>
 7,410,287,12,13,  ,,,2,60,, 8<CR>
 8,460,270, 8, 3,10<CR>
^D56<CR>
^D2<CR>
UPC-A HR W/CHKSUM<CR>
UPC-A HR W/O CHKSUM<CR>
01234567890<CR>
EAN13  012345678901<CR>
EAN8  0123456<CR>
UPC-E  00123400005<CR>
UPC-E  10123400005<CR>
0012345<CR>
1012345<CR>
^D3<CR>
```

7.2   MAKING LINES

THICK LINES:

Label parameters CLX and CLY are used for making lines. This is done by accessing a dark dot of the line logo character and then multiplying it out, using CMX and CMY, to make a line. The only limitation is that the multipliers only extend to 255. Therefore, if the line is to exceed 255 dots, it must be extended in the next field. This can be done by incrementing XB or YB, depending on the direction of the line, by 255 in the next field to extend the line.

One must be very careful in making boxes. If one line intersects another line, that part of the line will disappear (due to a unique XORing of label data that protects the head and enables the ability to do reverse video). With minor calculations the exact placing of lines to make boxes can be predicted.
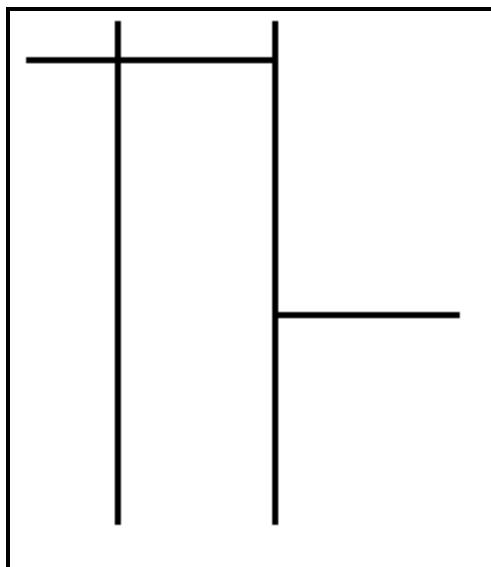
Note in the following program sample that the line logo needs to refer to some kind of text. A period is used only because there was no other text field to reference. The logo must reference a text line, but that text line can be anything but a space.

Program sample: Thick Lines (See figure 15)

```
^D57<CR>
7,506,771,,,30,0,1,361,0,0,1,616<CR>
1,240,5,1,7,1,,,4,255,,,1,1<CR>
1,240,260,1,7,1,,,4,255,,,1,1<CR>
1,400,005,1,7,1,,,4,255,,,1,1<CR>
1,400,260,1,7,1,,,4,255,,,1,1<CR>
1,244,40,1,7,1,,,156,4,,,1,1<CR>
1,404,40,1,7,1,,,100,4,,,1,1<CR>
1,55,300,1,7,1,,,185,4,,,1,1<CR>
^D56<CR>
^D2<CR>
.<CR>
^D3<CR>
```

Thick Lines
Figure 15

HALF LINES:

If you often use lines on your labels, it is a good idea to fire every other dot to extend print head life. The following program is similar to the thick line program, but also accesses a blank space to create a line that fires every other dot.

Program sample: Half Lines

^D57<CR>
2,615<CR>
1,165,1,1,7,1,3,,2,,,,1,255<CR>
1,166,100,1,7,1,,,,2,,,168,1<CR>
^D56<CR>
^D2<CR>
.<CR>
^D3<CR>

7.3   REVERSE VIDEO

If you can draw a line, you can draw a filled box. Just increase CMX or CMY to increase the
thickness of the line until it becomes a box. Place a text field in this box and you have reverse
video. When the 410 printer has two fields occupying the same space, it XOR's the data
together. This creates the reverse video. Here is a label example that shows text placed in a
filled box.

Program sample: Reverse Video (See figure 16)

^D57<CR>
10,378,960,12,12,30,,,,130,10<CR>
1,270,225,12,2,12,1,0,1,1<CR>
2,175,3,1,7,1,0,0,145,95,,,1,1<CR>
2,275,70,4,01,12,1,0,2,2<CR>
3,270,120,10,1,12,1,0,1,1<CR>
4,80,90,8,1,4,1,0,1,1<CR>
5,70,130,5,1,4,1,0,1,1<CR>
6,160,25,4,1,12,1,0,1,1<CR>
7,160,100,4,1,12,1,0,1,1<CR>
1,300,175,12,16,3,1,0,1,50<CR>
7,160,81,4,16,3,1,0,1,50<CR>
^D56<CR>
^D2<CR>
10123911234<CR>
45678<CR>
LOT NUMBER<CR>
06/10/92<CR>
11:35<CR>
QTY<CR>
0036<CR>
^D3<CR>
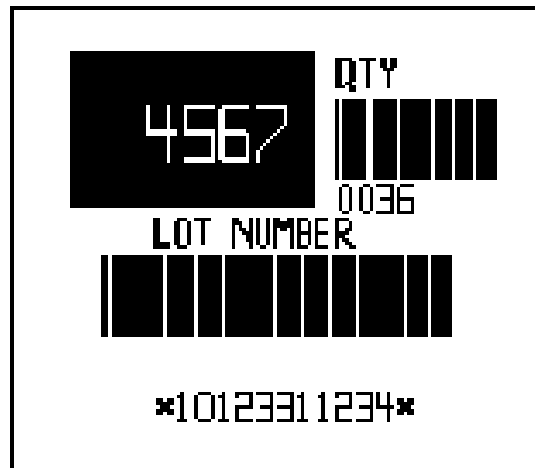
Reverse Video
Figure 16

CHAPTER 8: OPTIONS

The 410 printer has many options available to enhance the performance of the printer. Contact your sales representative for more information on these features. See Appendix B for ordering information.

8.1   LABEL SUPPORT RACK

An attachment used for peel-and-dispense mode. It allows large labels to be peeled without falling down against the printer and causing a false detection of a removed label. Recommended for labels over 2" in height.

8.2   LARGE PAPER ROLL SUPPLY HOLDER

A paper supply holder that allows the use of 8" diameter paper supply rolls. (No charge option if requested at time of order.)

8.3   CLOCK/BATTERY BACKED RAM SOCKET

This socket fits under the primary RAM chip and adds real-time clock features to the 410 printer. It also makes the RAM battery-backed (will not loose data when the power is off). The clock only needs to be set once. See the configuration guide, section 5.3.4, for more details.

This socket also creates non-volatile Ram that survives power-down conditions. Label formats and logos can be saved in RAM for quick access. See configuration guide, Appendix C, for more details. Note if Logos or large label formats are to be stored an addition clock/battery backed socket may be required.

8.4   PCX2410 SOFTWARE

This 16bit DOS PC software program converts a PCX file into an OGO file that can be downloaded to the 410 printer. The PCX or PCC file must meet the 248 X 248 pixel scale- excluding white space - for the program to create the picture. Otherwise, the graphic will begin with the first Y and X co-ordinate that contains dark pixel data, and create a window of the graphic from that point. It creates a true graphic representation (no dithering) of the PCX or PCC file. See Chapter 6 for more information on logos.

8.5   WYSIWYG SOFTWARE PACKAGES

WYSIWYG Software packages offer a **W**hat **Y**ou **S**ee **I**s **W**hat **Y**ou **G**et label design environment. Please contact Microcom Corporation for more information.

8.6   PARALLEL CONVERSION BOARDS

Some applications require a parallel interface. Microcom Corporation offers a parallel board option that is internal to the 410.

8.7   CLEANING KIT

An approved cleaning kit is offered for the 410 printer.

APPENDIX A: WARRANTY AND REPAIR PROCEDURES

<u>LIMITED WARRANTY</u>

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 500,00 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 the products.

MICROCOM CORPORATION SHALL NOT, UNDER ANY CIRCUMSTANCES WHATSOEVER, BE LIABLE TO 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 REPLACEMENT OR REPAIR OF PRODUCTS.

RETURN MATERIAL AUTHORIZATION (RMA) PROCEDURE

A Return Material Authorization (RMA) number must be obtained prior to the return of printers and/or materials the Microcom Corporation 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 accountable for printers and/or materials returned without proper authorization.

Shipping Charges:

The return of printers and/or materials returned 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 customer expense. The return of non-warranty repair 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 on the world wide web (http://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
- Serial number
- A detailed description of the problem
- Service Selection (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 number here >
> 8333A Green Meadows Dr. N.
> Westerville, OH 43081 USA

3. Return the defective item(s) for repair to the above listed address, 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 customers expense.

APPENDIX B: CLEANING KIT & ACCESSORIES

Cleaning Kit
040005 410 Cleaning Kit. IT IS SUGGESTED THE PRINTER BE CLEANED ONCE EVERY
TWO WEEKS, EVERY 5,000 LABELS, OR WHENEVER LABEL STOCK IS REPLACED.

Supply Rack
Supply Rack holds 5" or 8" OD media supply roll (must specify size at time of order).

Peel Mode Label Support Rack
Recommended for labels over 2" in length when used in peel mode.

Battery Backed RAM Socket With Clock
410012   Allows for label layout storage with built in real time clock.

32K RAM Chip
410006-10 Required for Graphic Images.

Graphics Conversion Software
Allows user to upload PCX or PCC files to printer.

Parallel Port Option
For interfacing to parallel equipment (DB-25 Female connector)

APPENDIX C: CONFIGURATION GUIDE

The 410 printer must be configured to use some of the special features. The printer can be configured by Microcom Corporation when ordered or can be configured by the user with Microcom Corporation parts.

BATTERY BACKED RAM WITH REAL-TIME CLOCK

A battery backed RAM/clock socket is required to utilize the real-time clock capabilities of the 410 printer. This socket should be placed in socket U5 after removal of the RAM chip already in that socket. The RAM chip should then be inserted into the battery backed RAM/clock socket. The clock function will not work until initialized with the time and date through command ^D30. The circuit board must at least be a C rev to use the clock feature. If it is not, the printer may be sent to Microcom Corporation for a board upgrade.

ADDITION FORMAT AREA

If needed, an extra 32K RAM is available. This option will increase the communications buffer and add addition RAM which can be used for format and/or graphics storage (see section 5.3.6). This extra RAM should be inserted into slot U4. If permanent storage is required an additional battery backed RAM/clock socket (placed beneath each RAM chip - U4, U5) can be used. (Note: The clock function of the extra RAM socket U4 will be ignored.)

Graphic Images

Logo operation requires the extra 32K RAM and battery backed RAM/clock socket in slot U4. It is not necessary to battery-back U5 for logos.

APPENDIX D: INSTALLING THE LABEL SUPPORT RACK

To install the optional label support rack, insert the lower left tab of the rack into the hole on the lower left side of the printer. Press inward on the opposite side and slide the rack downward until the tab drops into the hole on the right side. Both lower tabs should be inserted.

Press inward on the upper portion of the rack and insert the upper tabs into the two upper holes. When reloading paper, depress upper two tabs and swing rack downward.

APPENDIX E: MORE LABEL SAMPLES

DEFAULT POWER-UP LABEL

```
^D57<CR>
24,615,441,,10,36,,1,352<CR>
1,320,387,30,1,13,,4<CR>
2,320,337,30,1,13,,4<CR>
3,154,298,30,1,19,,4<CR>
4,154,277,30,1,19,,4<CR>
5,154,256,30,1,19,,4<CR>
6,154,235,30,1,19,,4<CR>
7,154,214,30,1,19,,4<CR>
3,154,160,6,16,2,,4,2,45,2,13<CR>
1,415,248,1,7,2,,4<CR>
1,415,218,1,7,2,1,4<CR>
1,400,233,1,7,2,3,4<CR>
1,430,233,1,7,2,2,4<CR>
1,569,172,1,7,1,,,21,123,,,1,1<CR>
8,586,179,8,1,11,3<CR>
8,565,171,8,15,2,3,,50,2<CR>
9,461,130,30,1,10,,4<CR>
1,164,110,2,7,1,,,157,2,,,1,1<CR>
1,164,13,1,7,1,,,2,98,,,1,1<CR>
1,476,13,1,7,1,,,2,97,,,1,1<CR>
1,164,11,2,7,1,,,157,2,,,1,1<CR>
10,320,80,30,1,11,,4<CR>
11,320,60,30,1,6,,4,,2<CR>
12,320,40,30,1,6,,4,,2<CR>
13,320,20,30,1,6,,4,,2<CR>
^D56<CR>
^D2<CR>
PRINT CAPABILITIES OF THE<CR>
M-410 DIRECT THERMAL PRINTER<CR>
INVOICE NO: 395172<CR>
ACCOUNT NO: 60417<CR>
 SHIP VIA: BEST WAY<CR>
 DEST. ZIP: 43085<CR>
PACKAGE WT: 6 LBS.<CR>
04312598<CR>
LOGOS AND CHARACTER ROTATION<CR>
MICROCOM CORPORATION<CR>
8333 GREEN MEADOWS DR., N.<CR>
WESTERVILLE, OH  43081<CR>
(740) 548-6262<CR>
^D3<CR>
```

FONTS 410

Label layouts for demonstration.

```
^D57<CR>
15,620,441,,10,27,,,352<CR>
 1,40,420,14,1,1<CR>
 2,40,405,14,1,2<CR>
 3,40,389,14,1,3<CR>
 4,40,372,14,1,4<CR>
 5,40,355,14,1,5<CR>
 6,40,338,14,1,6<CR>
 7,40,320,14,1,7<CR>
 8,40,301,14,1,8<CR>
 9,40,282,14,1,9<CR>
10,40,260,14,1,10<CR>
11,40,235,14,1,11<CR>
12,40,207,14,1,12<CR>
13,40,157,14,1,13<CR>
14,40,107,14,1,14<CR>
15,40, 62,14,1,19<CR>
^D56<CR>
^D2<CR>
FONT  1: 5X3<CR>
FONT  2: 5X5<CR>
FONT  3: 6X5<CR>
FONT  4: 7X5<CR>
FONT  5: 7X7<CR>
FONT  6: 7X7<CR>
FONT  7: 8X5<CR>
FONT  8: 9X5<CR>
FONT  9: 9X7<CR>
FONT 10: 12X8<CR>
FONT 11: 15X12<CR>
FONT 12: 18X10<CR>
FONT 13: 40X15<CR>
FONT 14: 40X20<CR>
FONT 19: OCR A<CR>
^D3<CR>

^D57
16,620,441,,10,25,,,352<CR>
 1,100, 20,17, 1,10<CR>
 3, 60, 37,11,32,  ,,,2, 2<CR>
 3, 82, 55,11,12,  ,,,2,60<CR>
 2,375, 20,19, 1,10<CR>
 3,350, 37,11,33,  ,,,2, 2<CR>
 3,372, 55,11,12,  ,,,2,60<CR>
 4, 80,150,19, 1,10<CR>
```

```
 4, 65,167,12,20,  ,,,2,60,,8<CR>
 5,408,150,14, 1,10<CR>
 5,395,167, 7,21,  ,,,2,60,,7<CR>
 6,110,270, 5, 1,10<CR>
 6,120,287,12,13,  ,,,2,60,, 8<CR>
 9,180,270, 8, 3,10<CR>
 7,400,270, 5, 1,10<CR>
 7,410,287,12,13,  ,,,2,60,, 8<CR>
 8,460,270, 8, 3,10<CR>
 ^D56<CR>
 ^D2<CR>
 UPC-A HR W/CHKSUM<CR>
 UPC-A HR W/O CHKSUM<CR>
 01234567890<CR>
 EAN13  012345678901<CR>
 EAN8  0123456<CR>
 UPC-E  00123400005<CR>
 UPC-E  10123400005<CR>
 0012345<CR>
 1012345<CR>
 ^D3<CR>

 ^D57<CR>
 9,620,441,,10,25,,,352<CR>
 4,190, 10,29, 1,10<CR>
 1,320, 52,20,15, 3,,4,2,70<CR>
 1,230, 30,20, 1,10<CR>
 3,190,142,29, 1,10<CR>
 1,320,184,20,15, 5,,4,,70<CR>
 1,230,162,20, 1,10<CR>
 2,190,274,29, 1,10<CR>
 1,320,316,20,15, 2,,4,2,70<CR>
 1,230,294,20, 1,10<CR>
 ^D56<CR>
 ^D2<CR>
 12345678901234567890<CR>
 INTERLEAVED 2 OF 5, 4:2 RATIO<CR>
 INTERLEAVED 2 OF 5, 5:2 RATIO<CR>
 INTERLEAVED 2 OF 5, 6:2 RATIO<CR>
 ^D3<CR>

 ^D57<CR>
 4,620,441,,10,25,,,352<CR>
 2, 60, 40,18, 1,10<CR>
 2, 60, 62,12,16, 3,,,2,80,2<CR>
 1, 60,200,18, 1,10<CR>
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CODE 39 6-2 RATIO<CR>
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CENTER JUSTIFIED BELOW BASELINE<CR>
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RIGHT JUSTIFIED BELOW BASELINE<CR>
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^D3<CR>

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AIAG LABEL

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^A1^D65<CR>
^D57<CR>
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1,335,1,1,7,1,3,,,,,,2,255<CR>
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SUPPLIER (V)<CR>
SERIAL (S)<CR>
DESCRIPTION<CR>
BROADCAST CODE<CR>
.<CR>
DATE<CR>
ENGR CHANGE<CR>
GREAT PRODUCTS  COLS OH 43229  MICRO  000069073<CR>
P14015248<CR>
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V046068722<CR>
S150<CR>
WHEEL<CR>
.<CR>
AA<CR>
11<CR>
06-10-92<CR>
3<CR>
^D3<CR>
```

APPENDIX F: SAMPLE BASIC PROGRAM

This program produces labels for computer diskettes. It is intended to show the simplicity that higher languages communicate with the 410 printer. Communication parameters may need to be changed for some computers.

```
 2 REM  ******************************************
 3 REM  *         DISK LABEL MAKER            *
 4 REM  * Sample BASIC program demonstration LDS. *
 5 REM  ******************************************
10 OPEN "COM1:9600,N,8,1,RS" AS #1
15 CLS
20 PRINT: PRINT: PRINT
30 INPUT"Disk Title: ",DT$
32 DT$ = LEFT$(DT$,30)        :REM Limit title to 30 characters
35 DT = LEN(DT$)
40 INPUT"Date: ",D$
45 D = LEN(D$)
47 INPUT"format: ",F$
48 F = LEN(F$)
50 INPUT"Disk Number: ",DN$
60 INPUT"Total Disks In Series: ",TD$
61 ND$ = DN$+" OF "TD$
62 ND = LEN(D$)
63 INPUT"Comment #1: ",C1$
64 C1$ = LEFT$(C1$,50)     :REM Limit comment to 50 characters
68 C2 = LEN(C1$)
66 INPUT"Comment #2: ",C2$
67 C2$ = LEFT$(C2$,50)     :REM Limit comment to 50 characters
68 C2 = LEN(C2$)
84 PRINT#1,"^A3^D97"            : REM  Tag mode #3
85 PRINT#1,"^D57"            : REM  format following
90 PRINT#1,"6,,,,,30,,70,2"       : REM  label header
95 PRINT#1,"1,150,5,";D;",1,6"     : REM  fields
100 PRINT#1,"2,530,5,";ND;",1,6"
110 PRINT#1,"3,320,110,";DT;,1,13,,4"
115 PRINT#1,"4,50,5,";F;",1,6
116 PRINT#1,"5,80,75,";C1;",1,10"
117 PRINT#1,"6,80,50,";C2;",1,10"
120 PRINT#1,"^D56^D2"            : REM  select layout and
130 PRINT#1,D$              : REM  send text data
140 PRINT#1,ND$
150 PRINT#1,DT$
155 PRINT#1,F$
156 PRINT#1,F$
157 PRINT#1,C2$
160 PRINT#1,"^D3"            : REM print label
170 PRINT:  PRINT: PRINT: INPUT"Another (Y/N)? ",YN$
180 IF (YN$ = "Y") OR (YN$ = "y") THEN 15
```

190 CLOSE
200 SYSTEM

APPENDIX G: QUICK REFERENCE COMMAND SUMMARY

^A **^D** **Command**

2 **Text string entry mode:** Precedes the text strings that are supplied to the various fields in the label (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)

11 **Print a Test Label:** (Equivalent to ^K)

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

20 **Change baud rate:** An EEPROM command
0   110 Baud
1   150 Baud
2   300 Baud
3   600 Baud
4   1200 Baud
5   2400 Baud
6   4800 Baud
7   9600 Baud
8   19200 Baud

21 **Change SW1:** Software dip switch #1. An EEPROM command. Below is the ^AB sequence:

```
    12345678
^ABxxxxxxxx
  *******.Q 1=XON/XOFF Enable, 0=Disable
  ******.)Q 1=8 Data Bits, 0=7 Data Bits
  *****.))Q 1=Echo Enable, 0=Disable
  ****.)))Q 1=No Parity, 0=Enable Parity
  ***.))))Q 1=Odd Parity, 0=Even Parity
  **.)))))Q 1=Ignore Control Codes, 0=Accept
  *.)))))))))),
  .)))))))))),* Enquiry Response
              00 = Control Codes
              10 = Text Equivalent
              11 = ^ Equivalent
```

))

22   **Change SW2:** Software dip switch #2. An EEPROM command. Below is the ^AB sequence:

```
    12345678
^ABxxxxxxxx
   *******.)))),
   ******.)))),*
   *****.)))),**
   *****      RRR Power-up Label Format
   *****      000=ALWAYS EPROM Format 1
   *****      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
   ****.))))Q 1=Use Saved Format File, 0=Rom Format
   ***.)))))Q 1=Print Button Enable, 0=Disable
   **.))))))Q 1=Disable Button Use, 0=Enable
   *.)))))))Q 1=>RESTARTED< Response Enable, 0=Disable
   .))))))))Q 1=Clear Text Enable, 0=Disable
```

23   **Change SW3:** Software dip switch #3. An EEPROM command. Below is the ^AB sequence:

```
    12345678
^ABxxxxxxxx
   *******. Not Used
   ******.Q Not Used
   *****.)Q 1=Enable 460 Emulation, 0=Disable
   ****.))Q 1=Enable 450 Emulation, 0=Disable
   ***.)))Q 1=Enable Label Centering, 0=Disable
   **.))))Q 1=Send Response After a Print
   **      0=No Response After a Print
   *.)))))Q Not Used
   .))))))Q Not Used
```

24   **Change SW4:** Software dip switch #4. An EEPROM command. Below is the ^AB sequence.

```
    12345678
^ABxxxxxxxx
    *******.)Q Not Used
    ******.))Q Not Used
    *****.)))Q Not Used
    ****.))))Q Not Used
    ***.)))))Q1=Auto-size on Power-up, 0=Disable
    **.))))))Q1=Blow-hole Sensing Enable, 0=Disable
     *.)))))))Q1=Enable 2" Epson Emulation, 0=Disable
    .))))))))Q1=Enable 4" Epson Emulation, 0=Disable
```

29   **Printer Statistics:**

0   Print statistics to 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

30   **Change Clock:** Use the sequence below to set the time and date of the optional real-time clock:
^D30 (return)
HH:MM:SS (return)
DD/MM/YY/W (return)

32   **Reset Machine:** Restores printer to power-up settings. Also used to set the EEPROM fields in memory. Section 5.3.

33   **Display Model and Revision Number**.

35   **Contrast Window Adjust:**

1   60% of Base
2   70% of Base
3   80% of Base
4   90% of Base
5   Base (default)
6   110% of Base
7   120% of Base
8   130% of Base
9   140% of Base

XX   **36**   **Adjust Contrast Base:** An EEPROM command. The ^AXX is between 10 and 200%. Section 5.3.

38   **Epson Emulation:** This function is no longer supported.
1   40 column Epson emulation (2 inch)

2 80 column Epson emulation (4 inch)

	39	**Auto-Size Label:** Section 5.3.3.
0		Clears the use of auto-size values set by ^A1^D39.
1		Uses the 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 size variables.
3		Same as ^A2^D39, but prints the values on a label, instead of on the screen.
	40	**Clear Commands 41-51.**
XX	**41**	**Load number of fields in layout (HFM):** Preceded by ^A.
XX	**42**	**Load label width in dots (LXS):** Preceded by ^A.
XX	**43**	**Load label height in dots (LSY):** Preceded by ^A.
XX	**44**	**Load web size in dots (WEB):** Preceded by ^A.
XX	**45**	**Load gap size in dots (GAP):** Preceded by ^A.
XX	**46**	**Load print speed (DPS):** Preceded by ^A.
XX	**47**	**Load label control byte (LCB):** Preceded by ^A.
XX	**48**	**Load number of steps to activate gap detector (AGD):** Preceded by ^A.
XX	**49**	**Load number of steps past gap (SPG):** Preceded by ^A.
XX	**50**	**Load X direction offset (OFX):** Preceded by ^A.
XX	**51**	**Load Y direction offset (OFY):** Preceded by ^A.
XX	**54**	**Send Saved Format File to Serial Port:** ^A selection which one (1-8). Section 5.3.6.
XX	**55**	**Select ROM Label Layout:** Select from the ROM power-up layouts. ^AXX ranges from 1 to 8.
	56	**Select User Defined Layout:** Signals to the printer the end of the label fields and precedes the text fields in a format file.
	57	**Enter Label Format Mode:** This tells the printer that information for a label is following.
XX	**58**	**Process Saved Format:** ^A selects which one (1-8). Section 5.3.6.
XX	**59**	**Save Format File:** ^A selects which one (1-8). Section 5.3.6.

	60	**Clears command 61**
XX	**61**	**Mark Text Starting Position:** ^A designates which text field to start entering new data. Section 5.3.8.
	62	**Pre-padded Text:** This command is sent after text that is to appear at the beginning of each field is sent.
	63	**Text Mode Control:** Section 5.3.8.
0		Disable 1 & 2.
1		Enable auto-print mode
2		Clear all previous text upon receiving new data.
3		Enable 1 & 2.
XX	**64**	**Auto Print String Count:** ^A tells the printer how many text strings to accept before printing. Section 5.3.
	65	**Emulation Control:**
0		Disable All.
1		Enable Label Centering. Used only in conjunction with 450 and 460 emulation.
2		Enable 450 Emulation.
3		Enable 1 & 2.
4		Enable 460 Emulation.
5		Enable 1 & 4.
66	**66**	**Initialize Storage Area for Saved Format Files:** Used when format files are to be stored into Ram. Section 5.3.8.
	67	**Load Graphic Image:** See chapter 6.
0		Send single graphic image in four rotations.
1		Send graphic image #1 of 2 in 2 rotations.
2		Send graphic image #2 of 2 in 2 rotations.
	70	**Clear commands 71-76.**
	71	**Disable Copies Function.**
	72	**Enable Copies Function.**
XX	**73**	**Load copies count:** Tells the printer to print a group of labels. Will not increment serial numbers (use ^D75).
1	**74**	**Infinity Print:** Prints a batch of labels like ^D75 but will continue to print until the machine is turned off.
XX	**75**	**Load Label Count:** Tells the printer to print a batch of labels using the serial number function if enabled.

XX   **76**   **Load Delay Time Between Labels:** Preceded by ^A which contains the wait in 1/10ths of a second. Maximum value is 650.

      80   **Clears Commands 86, 88, 89.**

      81   **Disable Serial Number Function:** Will disable either single or multiple serial number commands.

XX   **84**   **Load Text String Number to increment/decrement:** Tells the printer which text string number to increment or decrement. For single serial numbers. Section 5.3.8.

XX   **85**   **Load increment/decrement step value:** This is the value that the single serial number is incremented or decremented.

      86   **Single Serial Number Status:**
0   Disable increment and decrement.
1   Enable increment. The serial number will be incremented by the value from ^D85.
2   Enable Decrement. The serial number will be decremented by the value from ^D85.

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

XX   **88**   **Load Field Number to Increment by 1:** For multiple serial numbers.

XX   **89**   **Load Field Number to Decrement by 1:** For multiple serial numbers.

XX   **91**   **Load Value for Printer to See Valid Gap.** Section 5.3.

      93   **Load Control Code Recognition Status:**
0   Enable control code recognition.
1   Disable control code recognition.

XX   **95**   **Load User Defined Steps for Label to Advance:**

XX   **96**   **Load Advance Delay:** ^A specifies how many milliseconds to delay repositioning of the label in tag/tear and peel-and-dispense modes.

97 Tag/Tear Operation:

0   Turns off tag/tear operation.
1   Advance after every label.
2   Advance after copies count.
3   Advance when idle.

98   Peel-and-Dispense Mode: Section 2.1.2.

0   Turn off peel-and-dispense mode.
1   Turn on peel-and dispense mode.

Index

Notes