

MODEL 412

THERMAL PRINTER

OPERATOR'S MANUAL

Part Number 880016-0221

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Introduction

The Model 412 is a Direct Thermal or Thermal Transfer label printer with a high resolution (832 dots, 8 dots/mm) 2 or 4 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 you 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 downloadable graphics and fonts, multiple serial numbering, and flexible character spacing. It offers many font sizes and all popular bar code symbologies. Graphic images can be printed or stored in the printer's memory for future use. Bitmapped Fonts, bar codes, and graphic images can be multiplied in size and printed in 0,90,180,270 degree rotations. Once the labels are designed, they can be stored in the printer for high speed access.

The 412 is capable of printing on most types of label or fax stock. It offers operation in a tag/tear, peel-and-dispense, or cut-off mode. It can handle blow-hole, black-line, label gap, and continuous stock.

Many printer applications use the same label format, but change the data on every label. This is not a problem for the 412 printer. Data may be changed without down-loading the same fixed format, or fixed data fields, time after time. This, along with a greatly increased communication speed, increases data access time and productivity.

Microcom Corporation also offers Windows™ drivers and WYSIWYG (What You See Is What You Get) software packages which allow quick and easy on-screen label designing, along with database capabilities.

CHAPTER 1: FEATURES AND SPECIFICATIONS

The Model 412 Direct Thermal / Thermal Transfer printer is designed with many features that are unique when compared to other printers.

1.1 SPECIAL FEATURES

- Direct thermal or thermal transfer tag/ticket feed operation
- Resolution of 8 dots/mm (.0049" per dot) and a print width of 448 dots (2.2") or 832 dots (4.09")
- Print speed up to 3.0 inches per second
- Internal media supply holds roll sizes up to 5 inches OD
- Prints on die-cut, continuous, fax, or preprinted labels up to 9.0 mil thick
- Software-controlled contrast adjustment
- Standard memory of 512Kbytes ROM and 512Kbytes RAM
- Easy to load label path
- Detects label gap, black line or blow-hole stock using reflective and transmissive sensors
- Internal statistical counter for inches and labels printed
- Downloadable bitmap fonts and graphics
- Field incrementing and decrementing
- Remote printer interrogation.

1.2 BAR CODES

- Code 39, Interleaved 2 of 5, CODABAR, Code 128, UCC/EAN-128, Code 93, Plessey, Modified Plessey, UPC-A, UPC-E, EAN-8, EAN-13, Postnet, PDF-417 and MaxiCode

1.3 FONTS

- Bitmapped fonts (normal/bold and OCR-A and OCR-B)
- Converted HP LaserJet™ or TrueType® font compatibility
- Fonts can be printed with proportional or non-proportional spacing
- All bitmapped fonts expandable in height and width
- Printable in 0, 90, 180, and 270 degree rotations

1.4 PRINTING

- Optional peel function with label taken sensor
- Optional cutter
- Batch and tag/tear mode advances label to the tear bar
- Label back-up prevents wasted media in tag/tear and peel modes

1.5 INTERFACE COMMUNICATIONS

- Serial: RS-232, 9-pin female D-Sub connector (DCE) and 2Kbytes buffer
 - Flow control: XON/XOFF, CTS
 - Baud rate: 110 to 115,200, user-selectable
 - Parity: odd, even or none
 - Data bits: 7 or 8
- Parallel: 36-pin Centronics® female

1.6 PHYSICAL

- Heavy duty plastic shell and a rigid metal print mechanism.
- Height: 6.00" (152.4mm)
- Width: 8.75" (222.25mm)
- Depth: 11.00" (279.4mm)
- Weight: 7.5 lbs (3.4 kg)

1.7 ENVIRONMENT

- Temperature: 5° C to 40° C operating
- Humidity: 10-85% Non-condensing

1.8 ELECTRICAL

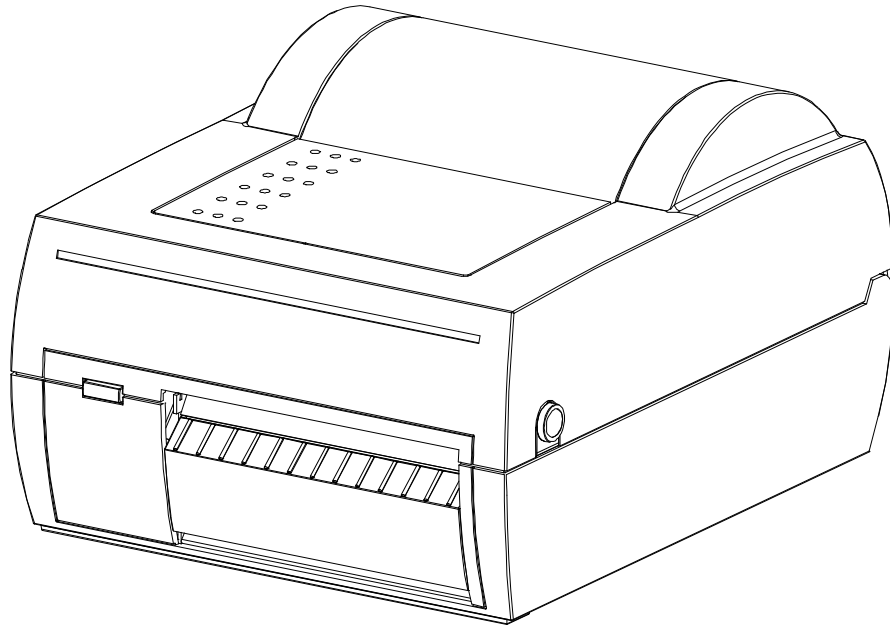
- Voltage: 100 ~ 240 VAC, 50 ~ 60Hz
- Current: 3 AMPS maximum

1.9 OPTIONS

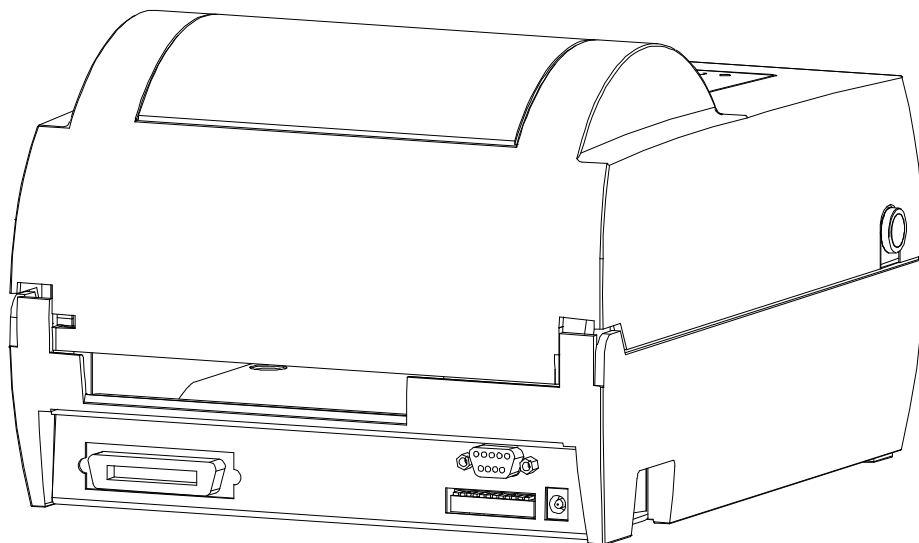
- Cutter
- Thermal Transfer
- Assorted printer cables
- Labels Taken Sensor
- Battery backed real-time clock
- On-screen label design PC software packages
- PCX / BMP graphics and SFP / TTF font conversion software
- Windows™ 95/98/NT4/2000/XP driver
- Cleaning kit
- Twinax / Coax Interface adapter

1.10 APPROVALS

- CUL (UL and CSA), CE, Complies with FCC class A



412 Printer
Front View
Figure 1

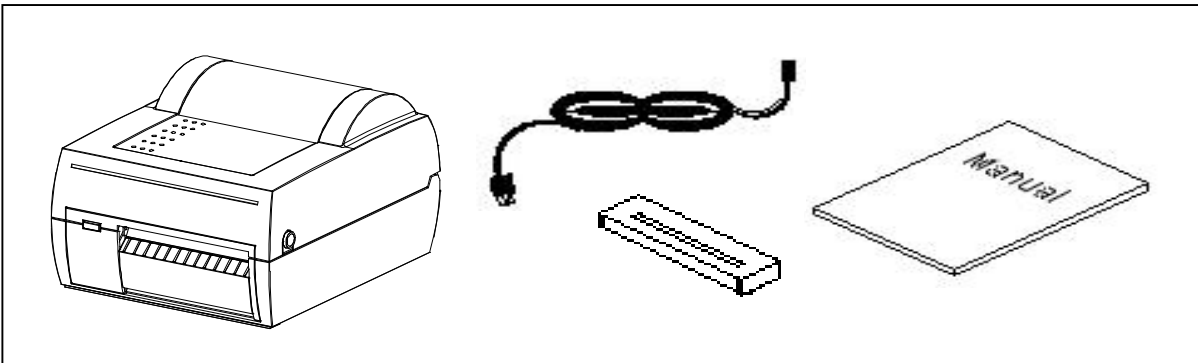


412 Printer
Rear View
Figure 2

CHAPTER 2: BASIC OPERATION

2.1 UNPACKING THE 412 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.



Printer Parts
Figure 3

2.2 INITIAL POWER UP

Before connecting the printer to a power source, verify that the line voltage and frequency (Hz) is within the range printed on the power supply.

Plug the printer in and turn the power switch on. The front panel LED should turn green. If this does not occur, check the power source and if necessary call your service organization.

2.3 FRONT PANEL SWITCHES AND STATUS LIGHTS

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

2.3.1 NORMAL MODE

The front panel button is used to issue a label request. If the button is pressed while the printer is idle, the unit will print a label using the current label format. If the button is pressed while a label is printing, the printer will enter pause mode.

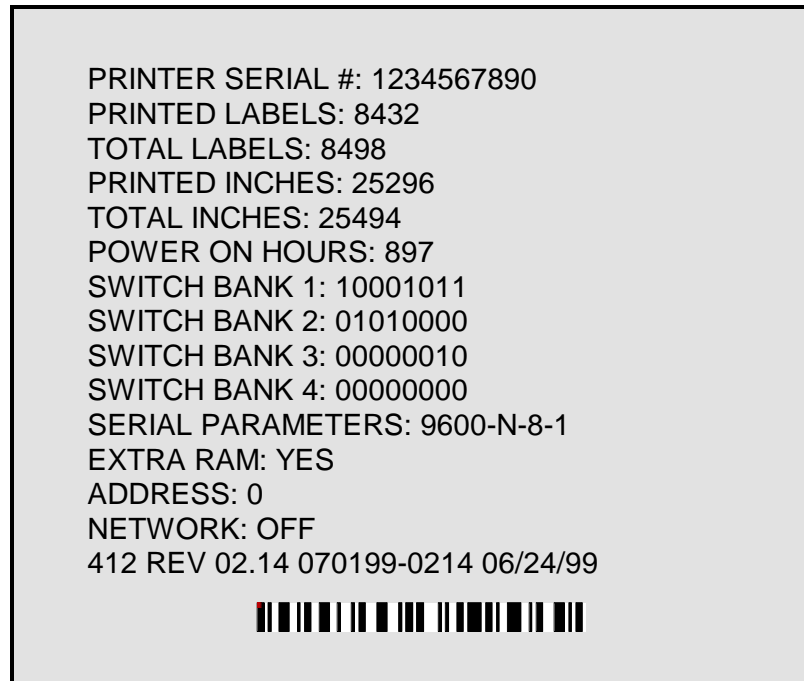
2.3.2 STATUS LABEL MODE

To print a status label, hold the front panel button while turning on the printer. Release the button and a test pattern with statistical information will be printed (see Figure 4). When a status label is created, the software dip switches are temporarily set to defaults. 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 can be reset by the user while the total labels and total inches cannot. 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, power-on hours, serial

parameters (not the default parameters caused by executing creating a status label), and the revision number of the firmware.

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.



Status Label
Figure 4

2.3.3 PAPER-OUT MODE

When a paper out condition occurs, the red error indicator will light. Once the new labels are loaded, quickly press and release the front panel button to print a duplicate of the last label printed. This label can be repeated until proper registration occurs. To return to the pre-paper out condition, tap the button while the duplicate label is being printed. The red error light should go out and normal printing may resume.

2.4 THE STATUS LIGHT

The status lights have different functions depending upon the mode of the printer. The following table explains the meanings.

Status Light	
Color	Meaning
Solid Green	Power is on.
Flashing Green during Download	Font or graphic file transferring successfully.
Flashing Red during Download	Font or graphic file transfer is failing.
Solid Red	Printer error: Possibly caused by paper-out, ribbon-out, take-up full, or hardware failure. If an unexplained condition persists, contact your service representative.
Continuous Flashing Red	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.
Solid Yellow	Printer is paused.

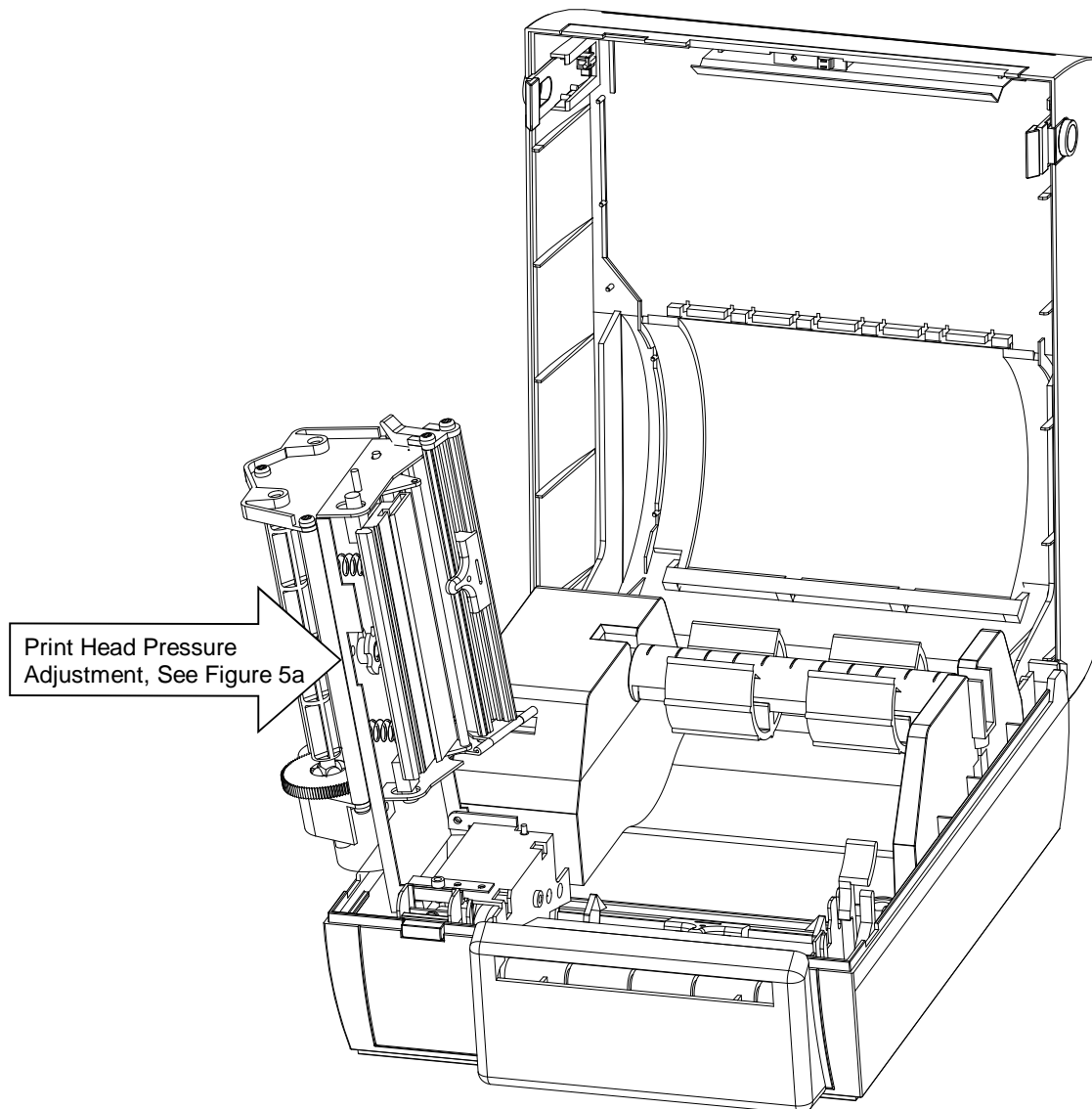
Table 1

2.5 LOADING PAPER

The 412 can dispense labels in a many different ways. The following two sections explain the dispensing modes. If narrow stock is used (3.5 inches wide or less), it may be necessary to adjust the print head support screw (see section 2.6).

Thermal Transfer Note:

The 412 will, on **power-up**, automatically sense a loaded ribbon and select thermal transfer mode. Please note that the printer will not select thermal transfer mode if the ribbon is loaded after the printer is turned on. To correct the situation simply cycle the power once the ribbon has been loaded.



Internal View of Printer
Figure 5

2.5.1 NORMAL AND TAG/TEAR MODES

Place the label roll on the internal supply shaft and adjust the paper width stop. Raise the print head and feed the paper through the printer until it comes out of the front. Lower the print head.

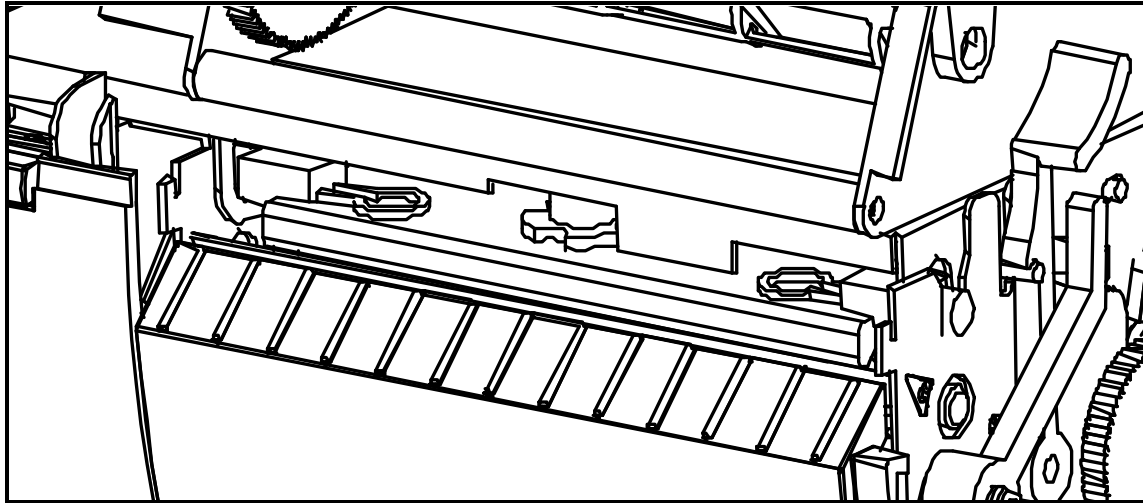
2.5.2 PEEL-AND-DISPENSE MODE

1. Load the media as described in section 2.5.1 above.
2. Feed and remove enough labels to expose about 6"-12" of backing paper.
3. Release pressure from the peel mechanism by pulling the pinch release lever forward.
5. Thread the backing paper through the opening between the pinch roller and the driver roller and remove slack.
6. Close the pinch roller by pushing the pinch roller release lever backwards.

7. Use the feed button to align the labels. (Be sure to remove the labels as the are peeled.)
8. Enable the peel-and-dispense mode using the ^A1^D98←.

2.6 PRINT HEAD PRESSURE ADJUSTMENT

When using narrow media, it is possible to increase drive roller life by reducing the print head pressure. To make the adjustment, simply turn the green adjustment knob (see Figure 5)



counter-clockwise. If thick tags are used, additional pressure may be added by turning the knob clockwise.

Print Head Pressure Adjustment
Figure 5a

2.7 CLEANING INSTRUCTIONS

The printer and print head should be cleaned every 5,000 labels, every two weeks, or between label roll changes, whichever occurs first. A Microcom Corporation cleaning kit should be used for cleaning and maintaining a Microcom Corporation printer product. It is important to note that the optimum print head life is achieved by maintaining a clean printer and print head.

To clean the 412 printer:

- 1) Turn the printer off.
- 2) Lift the print head and remove any label stock.
- 3) Use the cleaning brush to sweep away all small label and adhesive particles that may be in the area of the print head.
- 4) Moisten a cleaning swab with the cleaning solution and wipe away any adhesive from the rollers or the peel bracket.
- 5) Dampen a swab with cleaning solution and gently wipe the underside of the print head. Repeat if necessary (if swab is extremely dirty).

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

CHAPTER 3: COMMUNICATIONS

The 412 can be interfaced to PC's, mini-computers, main frames, and special purpose machines. It is capable of serial RS-232, RS-485 or Centronics® parallel communication. The following sections explain the communication interfaces.

Out of the box, unless otherwise requested, the serial port communicates at 9600 bits per second, 8 data bits, 1 stop bit and no parity with both hardware and software handshaking. This configuration may be changed as shown in Appendix E.

3.1 CABLE PINOUT

Table 2a shows the signals of the 9 pin RS-232 serial port and Table 2b shows the signals of the 2 and 4 wire RS-485 . If serial communication is selected and XON/XOFF hand shaking is used, the only signals the 412 requires are the RXD, TXD, and GND signals. If hardware (RTS/CTS) hand shaking is used, a RTS signal is provided. XON/XOFF may be disabled through software dip switch #1 (see Chapter 5). The other signals are offered in the event the host computer requires them.

RS-232 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 2a

Table 2b describes the RS-485 two and four wire pinouts. The internal jumper block (JP6) is used to select the mode. To enable two wire communication, a jumper shunt should be placed over pins 2 and 3. The four wire mode is selected by placing the shunt over pins 1 and 2.

Table 2b also contains entries called SW1, SW2, SW3 and SW4. These pins are provided to allow automatic address selection via the external cable wiring. To use this method of address assignment, the printer's internal jumpers (JP7, JP9, JP10 and JP11) must each have a shunt installed between pins 2 and 3. (Placing the shunt on pins 1 and 2 will disable this feature and require the use of the rear panel switches.)

RS-485 Serial Port Configuration	
Two Wire Interface	Four Wire Interface
1 Not Used or SW3 *	1 Not Used or SW3 *
2 Not Used	2 Transmit-
3 Transmit- / Receive-	3 Receive-
4 Not Used or SW2 *	4 Not Used or SW2 *
5 GND	5 GND
6 Not Used	6 Transmit+
7 Not Used or SW1 *	7 Not Used or SW1 *
8 Transmit+ / Receive+	8 Receive+
9 +5 or SW4 *	9 +5V or SW4 *
DE-9	DE-9
* The function of this pin is determined by JP7, JP9, JP10 and JP11.	

Table 2b

3.2 PRINTER CABLES

The 412 uses standard cables which may be purchased through Microcom Corporation or a local computer supply company. NULL modem adapters are not normally used because the printer is DCE equipment

For parallel connections, use a standard 25 pin to 36 pin Centronics® printer cable, connected from the desired parallel port of the host computer to the 36 pin connector on the model 412.

For RS-232 serial connections,

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

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

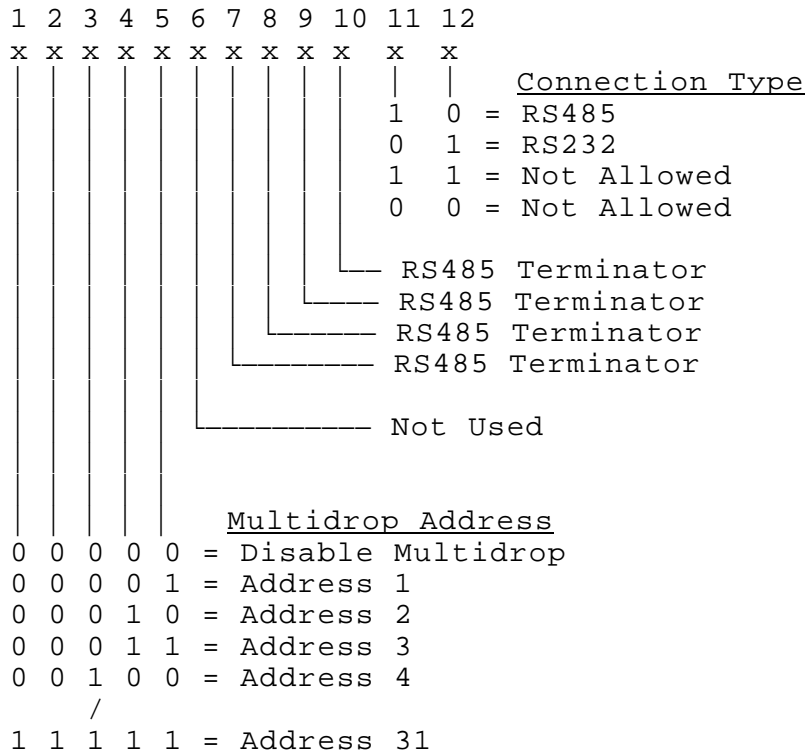
For RS-485 serial connections,

The RS-232 cables mentioned above can be used to connect a single printer via RS-485. Custom cables or adapters may be required in order to connect multiple printers.

Warning: Connecting a serial port to a parallel port may damage the printer and/or computer.

3.3 MULTIDROP COMMUNICATIONS

Multidrop mode allows a single host to communicate with up to 31 printers in a network. With a separate address for each printer, the host can force some printers into a sleep mode while the rest continue to respond to the host. Multidrop mode will function using RS-232 or RS-485. Special care should be taken when using RS-232 due to the loads placed on the RS-232 port of the host. The twelve position dip switch, located on the rear of the printer, is used to control the operation of this feature.

Hard Switch 1

Two commands are used in conjunction with multidrop mode. (See chapter 5 for more information about printer commands.)

^Axx^D108 Sleep Mode: If xx=0 all printers in multidrop mode will sleep. Otherwise, XX represents a printers address. Only the printer with this address will be affected.

^Axx^D109 Wake Mode: If xx=0 all printers in multidrop mode will wake-up. Otherwise, XX represents a printers address. Only the printer with this address will be affected.

In wake mode, a printer will respond to all communications. When a printer is in sleep mode, it will ignore all commands from the host except "wake up" (^D109) provided the address is correct or the general address is used (xx=0).

Example commands:

^A0^D109← All printers in multidrop mode will wake-up and begin responding to all communications from the host.

^A17^D108← If there is a printer in the network with an address of 17 (as determined by the hardware switch settings), it will go to sleep. It will ignore all commands until it receives a wake-up command or is restarted with the multidrop function disabled.

Additional Notes:

- 1.) If multidrop is enabled, the printer will always start in “sleep mode”. It must be sent a “wake-up” command before it will respond to other commands.
- 2.) The host should not use hardware flow control when using RS-485.
- 3.) Do not send commands that will return data if more than one printer is enabled. The printers will send their data at the same time and the host will receive garbled information.
- 4.) The ^D29 command may be used to display address and network information.
- 5.) Multidrop mode does not affect the front panel button operation.

CHAPTER 4: DESIGNING LABELS USING LDS

Label Design Software (LDS) refers to the firmware resident in the printer used which is used to create labels. All fonts, character sets and bar codes are resident in the printer. Additional fonts and graphic images may be sent from a host.

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 412. For example, main frames, mini-computers, special purpose computers and PC's. However, the easiest way to start is with a PC and a terminal emulation software program. This will method of connection will allow two-way, serial communication with the printer.

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 for testing. (Such as HyperTerminal™)

Set the communication parameters in the PC terminal software program to 9600 bits per second, no parity, 8 data bits and 1 stop bit. Unless modified by the user, this is the printers' communication configuration out of the box. Send the characters ^D3 and a carriage return character to the printer. If the printer prints a label, proper PC to printer communications have been confirmed. Send the characters ^D5 followed by a carriage return character to verify printer to PC communication. A text response should be returned 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, create a text file containing the information to be sent (i.e. ^D3←).

Note: Use an editor that **does not** add its own formatting characters.

Use the following DOS MODE command to set up the appropriate PC port. (COM1 may be any available communications port on your PC.)

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

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. (^D3← is the print command.)

```
^D3
```

Note: Use an editor that does not add its own formatting characters.

Send the file to the printer using the following DOS command. (LPT1 may be any available printer port on your PC.)

```
C:>COPY FILENAME LPT1
```

4.2.3 LEARNING LDS

Small control code functions (see section 5.1) or label formats files can be entered directly through the keyboard. Large label files should be entered in an ASCII text editor and then uploaded 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 412 that will aid in 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←, ^E or 5 NULL characters). 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 A 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.. The number of fields is limited only by the amount of free memory.

Below is a sample label format. We will refer to this format as we break down the components of its structure.

(See Figure 6)

^D57←	A label format is coming
5,812,1218,,20,35	Header information
1,250,1068,8,1,5,,,2,2←	Field #1 information
2,200,900,11,1,5,,,2,2←	Field #2 information
3,175,760,26,1,5←	Field #3 information
4,295,560,11,1,5←	Field #4 information
4,110,50,11,16,3,,,3,406←	Field #5 information
^D56←	Select RAM Format
^D2←	Text Data is Coming
Microcom←	Text String #1
Corporation←	Text String #2
Thermal Printing Solutions←	Text String #3
01234567890←	Text String #4
^D3←	Print Label 1

The sequence ^D57← puts the printer in format entry mode.

The next line is the header information: sizing the label (812 dots wide 1218 dots high).

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

The sequence ^D56← selects the user layout.

The sequence ^D2← tells the printer to start accepting data for each defined field. (Field #1 defines where Data #1 should be positioned.) (Note: The label prints from bottom to top.)

The next three lines are data for each field.

Text string #4 is accessed twice. The format will print '01234567890' and then the bar code equivalent.

The sequence ^D3← starts the print cycle. (Default is one copy. See section 5.3.2)



Microcom Label
Figure 6

4.4 LABEL HEADER

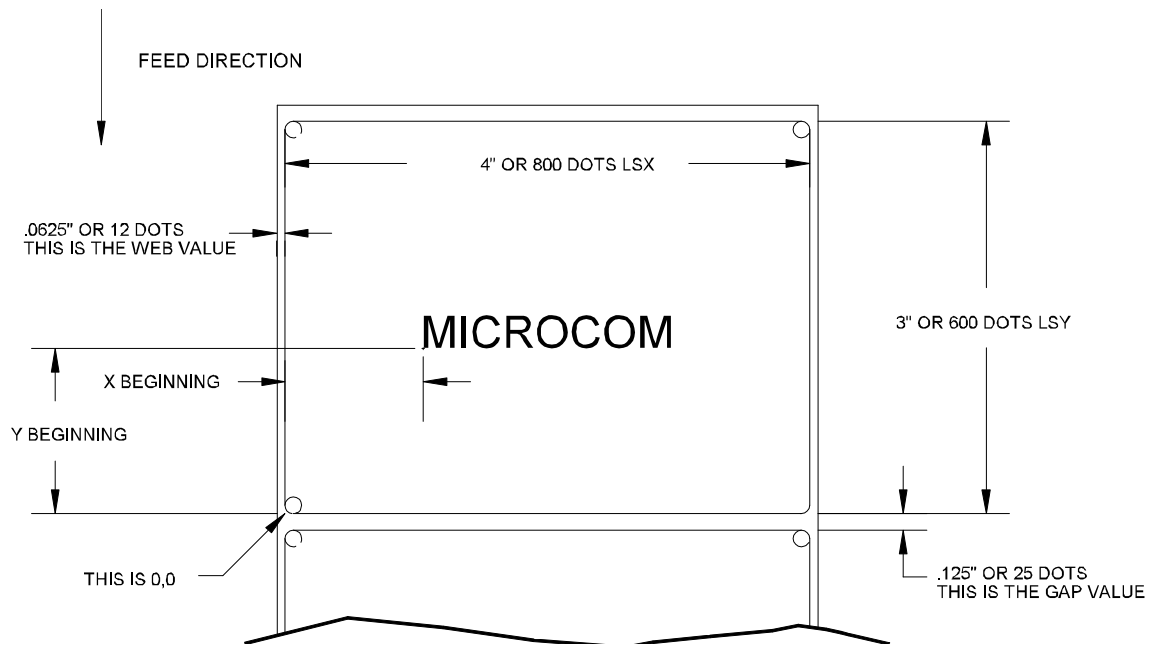
The header consist of eleven parameters. These parameters contain information about the label. It is not necessary to enter information for all of the parameters: If a parameter is left blank, then the default value will be used. A carriage return must follow the label header parameters.

The value of measurement for many of the header elements is the dot. There are 203 dots per inch on a 412 print head (8 dots/mm). There is a maximum 832 dots in the X direction (width). The Y direction (length) is virtually unlimited.

Most header parameters can be supplied using the auto-size command. (See 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
0,832,614,13,24,35,0,1,478,0,0
```



Label Header Parameters of a 4" X 3" Label
Figure 7

Refer to Figure 7 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 203 = 609 dots. (203 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 prints a label. Generally, better print quality is obtained at lower print speeds.

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

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

The printer's default print speed is 2 inches per second (DPS value = 35). To speed it up or slow it down, the following DPS parameters can be inserted into the label header. Note that a higher value slows the printer down and a smaller value speeds it up.

See Table 3 for a list of print speeds, DPS values, and inches per second.

Print Speed			
DPS VALUE	MM PER SECOND	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 3

LCB LABEL CONTROL BYTE

This parameter selects between the various gap detection methods.

Normal Stock (leading edge): If set to a value of 0, the printer will detect the leading edge of the label or “blow hole” (the start of the next label).

Continuous Stock: If set to a value of 2, the printer will not search for a gap or other sense mark. The printer will print all fields that contain data and advance the paper the amount specified in the SPG parameter. Blank or empty fields will not be printed. For example, Imagine a receipt format that contains 100 lines. If data is provided for the first 50 lines, the printer will not advance the “extra” blank 50 lines. The printer will stop immediately after printing the last pixel and then advance the amount specified in the SPG parameter.

If the AGD is set to 0, the printer will always feed the same amount of media regardless of the data. In this case, the amount of label feed is determined by adding the SPG value to the LSY.

Blow Hole Stock (Slot-Cut): If set to a value of 0, the printer will detect the leading edge of a blow hole (see software dip switch #4 (^D24) for blow hole stock).

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

Black Line Stock (optional reflective sensor): If set to a value of 3, the printer will detect the leading edge of a black line.

AGD NUMBER OF STEPS TO ACTIVATE GAP DETECTOR

This parameter selects the number of steps (dots) that the printer should skip before gap sensing is activated. This value is usually defaulted. It is not defaulted when using stock that contains pre-print or gaps that may cause the gap detector to trigger incorrectly.

SPG NUMBER OF STEPS PAST GAP

The number of steps to advance the label after detection of a label gap. Use auto-sizing (section 5.3.3) to quickly evaluate this parameter for small stock.

It may also be necessary to adjust this value if using material with a sense position not located at the end of the stock.

The 412 uses the following formula to determine the SPG setting:

If label height is greater than or equal to 478 then $SPG=478$

If label height is less than 478, subtract $(LSY+GAP)$ from 478 until the answer is negative, then add $(LSY+GAP)$ back to become positive again. Subtract the AGD value (usually 1) and the result will be the correct SPG.

OFX X DIRECTION OFFSET

This parameter moves all the fields in the X direction without changing the fields themselves.

OFY Y DIRECTION OFFSET

This parameter moves all the fields in the Y direction without changing the fields themselves.

4.4.1 A SAMPLE SESSION (HEADER)

This is the label header from the sample label in section 4.3.

```
5,812,1218,,20,35←
```

- 5 - 5 fields following the header
- 812 - Label width (LSX) of 812 ($812/203 = 4$ inches).
- 1218 - Label length (LSY) of 1218 ($1218/203 = 6$ inches).
 - The WEB parameter can be defaulted.
- 20 - A GAP between labels of 20 ($20/203 = 0.10$ inch).
- 35 - Label print speed (DPS) of 35 = 2 inches per second (from Table 3)
 - No entry for the LCB parameter means default value of 0, normal stock on backing paper.
 - The AGD could be defaulted. This value was confirmed using the auto-size command.
 - SPG could be defaulted. This value was confirmed using the auto-size function.
- ← - A carriage return must follow the label header. There were some 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, since the AGD and SPG were defaulted, the carriage return could have followed the DPS.

Note: Defaulted fields must be separated by commas and ending commas may be omitted.

4.5 LABEL FIELDS

A field is broken down into many different parameters. These parameters contain the information necessary to position data (text, bar codes, graphics, 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. The fields to be defaulted must be separated by commas. A carriage return must follow each label field.

4.5.1 BIT MAPPED TEXT, BAR CODE, AND FONT/GRAPHIC FIELDS

The following is a list of bit mapped (ROM stored and downloaded) field element mnemonics and their default values:

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

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

** The default depends on the TCI used.

Note: All values must be positive integers.

TSN TEXT STRING NUMBER

Determines from which text string the field obtains the data. 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 5.3.4). A TSN of 1 accesses the first line of data. A TSN of 2 accesses the second line of data, and so forth. Data is the text that follows a ^D2← command in a label layout. A graphic image field must point to a valid text string that contains at least 1 character. Maximum value is 65536.

XB X BEGINNING COORDINATE

The X coordinate of the field is measured in dots. The far left edge of the label as viewed from the front of the printer is X coordinate 1. There is no X coordinate 0. The X coordinate increases in size from left to right (See Figure 7). An XB of 203 would place the text one inch from the left side of the label.

YB Y BEGINNING COORDINATE

The Y coordinate of the field is measured in dots. A YB of 1 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 203 would place text one inch from the bottom of the label.

CC CHARACTER COUNT

This parameter determines 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. This parameter should be set to a value of 1 if the field is a graphic image.

TCI TEXT CONVERSION IDENTIFIER

This parameter determines what form the text string will be printed in. The following values define which text conversion method is used:

- 1 Regular Text (standard)
- 2 Text Surrounded by Asterisks
- 3 Text with UPC-A/UPC-E Checksum Digit Added
- 8 Downloadable Fonts and Graphics
- 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
- *17 Text with UPC-E Checksum and Extended Bars Added
- 20 EAN-13 Bar Code
- 21 EAN-8 Bar Code
- *22 Text with EAN-13 Checksum and Extended Bars Added
- *23 Text with EAN-8 Checksum and Extended Bars Added
- 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
- 36 Postnet (Zip+4)
- 37 Postnet (Zip+6)
- 38 Maxicode Bar Code
- 40 Code 128 Bar Code (Automatic Compression)
- 42 Codabar Bar Code
- 43 Code 93 Bar Code
- 44 AS-10 Bar Code
- 50 EAN-128 Bar Code
- 51 Text with EAN-128 Information

* Refer to Section 7.1.1 on how to use these TCI's.

Example: For the string - **1234567**

A TCI of 1 would normally be used when printing regular text .

A TCI of 42 would print a Codabar bar code.

CGN CHARACTER GENERATOR NUMBER

EMBEDDED FONTS

The following is a list of the character sets and specifications for the embedded fonts. When accessing downloaded fonts or graphics, this position is used to select which downloaded font or graphic (1-255) to use.)

Bitmapped Font Descriptions			
CGN	Point	Font Type	Sample
1	6	Swiss™ 721 Bold	6pt ABCDEFG1234567890abcdefghijklmnopqrstuvwxyz!@#%&'*(
2	8	Swiss™ 721 Normal	8pt ABCDEFG1234567890abcdefghijklmnopqrstuvwxyz
3	10	Swiss™ 721 Normal	10pt ABCDEFG1234567890abcdefg
4	12	Swiss™ 721 Normal	12pt ABCDEF123456789abcdef
5	14	Swiss™ 721 Normal	14pt ABCDE1234567abcde
7	12	OCR-A	ABCDEFG1234567890abcdefghijklmnopq
8	12	OCR-B	ABCDEFG123456789abcdefghijklmnop

Note: The Swiss™ 721 typeface is similar to Arial™.

Table 4

EMBEDDED BAR CODES

Many bar codes can be printed with various ratios and character spacing options. The following table illustrates these options. See Chapter 8 for more information on designing with bar codes.

Bar Code Symbolologies					
Bar Code	CGN	Ratio	Height	Spacing	FO
Code 3 of 9	2	2:1	1	2	0123
	3	3:1	1	2	0123
	5	5:2	1	2	0123
	8	8:3	1	3	0123
I 2 of 5	2	2:1	1	-	0123
	3	3:1	1	-	0123
	5	5:2	1	-	0123
UPC/EAN*	-	40%	1	-	0123
UPC Readable*	-	40%	1	-	0123
Code 128 & UCC/EAN-128*	-	40%	1	-	0123
Codabar	2	2:1	1	-	0123
	3	3:1	1	-	0123
	5	5:2	1	-	0123
Code 93	-	2:1	1	-	0123
AS-10	-	2:1	1	-	0123
MaxiCode (CGN=Mode)	2	-	-	-	0123
	3	-	-	-	0123
	4	-	-	-	0123
	5	-	-	-	0123
	6	-	-	-	0123
MSI (Plessy)	-	1:1	1	-	0123

Table 5

* These bar codes must be multiplied by 2 for a 80% ratio.

FO FIELD ORIENTATION

This parameter defines the rotation of each field on the label. The point of rotation is determined from the field justification.

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

FJ FIELD JUSTIFICATION

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

- 0 Left justified above base-line.
- 1 Right justified above base-line.
- 2 Left justified below base-line.
- 3 Right justified below base-line.
- 4 Centered above base-line.
- 5 Centered below base-line.

Starting position definitions:

Table 6 shows how to obtain proper character placement relative to orientations and justifications.

Character Starting Positions Relative to Field Orientations and Field Justifications	
Rotation	Field Orientation and Justification
0,180 Degrees	0 - Left justified above base-line 1 - Right justified above base-line 2 - Left justified below base-line 3 - Right justified below base-line 4 - Centered above base-line 5 - Centered below base-line
90,270 Degrees	0 - Left justified above base-line 1 - Right justified above base-line 2 - Left justified below base-line 3 - Right justified below base-line 4 - Centered on Y axis, right of X coordinate 5 - Centered on Y axis, left of X coordinate

Character Starting Positions
Table 6

CMX CHARACTER MULTIPLIER X DIRECTION

This parameter multiplies each character in the X direction. The valid range is 1 to 65536.

CMY CHARACTER MULTIPLIER Y DIRECTION

This parameter multiplies each character in the Y direction. The valid range is 1 to 65536.

CS CHARACTER SPACING

This parameter adjusts the spacing between each character. If this parameter is not used, then the default for the selected character generator (CGN) is used. The values (0-127) add dots and (128-255) subtract dots. For example, a value of 4 inserts 4 dots between characters and a value of 131 would subtract 4 dots between characters. 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

This parameter marks the starting position of the character in the text string to be used as data. This is useful for allowing several fields to use sections of the same text string, minimizing the amount of data transmitted. For example, for the text string **0123456789**, A TSP of 5 and a CC (character count) of 2 would print **45**. See section 5.3.4 for use of this parameter with clock fields.

,,, RESERVED SPACES**AN ATTRIBUTE NUMBER**

If this parameter is set to a value of 2, the character spacing will be fixed/non-proportional. A value of 0 is proportional (if available). Reversed text (white on black) is created by setting this value to 1 and printing a black box on top of the text. (Special note: The AN of the line field should also be set to a 1 for a reversed image.) A value of 3 will print both fixed/non-proportional character spacing and reversed text.

4.5.2 LINES

A line field is broken down into ten different parameters. The first position should point to any valid text string. The next position is the X starting coordinate followed by the Y coordinate. The next position is a constant of 6 followed by three blank positions. The next two positions are the X size and Y size. Finally there is an attribute position. All fields defaulted must be separated by commas, and a carriage return must follow each graphics field definition.

The following is a list of line field mnemonics and their default values:

```
1,XB,YB,,6,,,,XS,YS,,,,AN
1, 1, 1,,6,,,, 1, 1,,,, 0
```

Note: All values must be positive integers.

TSN TEXT STRING NUMBER

This value should point to any valid text string (the string must contain at least one character in order for the line to print). A period character is typically used to mark a line field but any character may be used. The line will not print if it's TSN points to a blank text string.

XB X BEGINNING COORDINATE

The X coordinate of the field is measured in dots. The far left edge of the label as viewed from the front of the printer is X coordinate 1. There is no X coordinate 0. The X coordinate increases in size from left to right (see Figure 7). An XB of 203 would place the line one inch from the left side of the label. The valid range is limited to the print head width (832).

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 203 would place the line one inch from the bottom of the label. The valid range is 1 to 65536.

CONSTANT FIELD

This field is always defaulted.

CONSTANT FIELD

This field should be set to a value of 6.

CONSTANT FIELDS

The next 3 fields are always defaulted.

XS X SIZE

The X size of the line. Valid range is 1 to 832.

YS Y SIZE

The Y size of the line. Valid range is 1 to 65536.

,,,, **CONSTANT FIELDS**

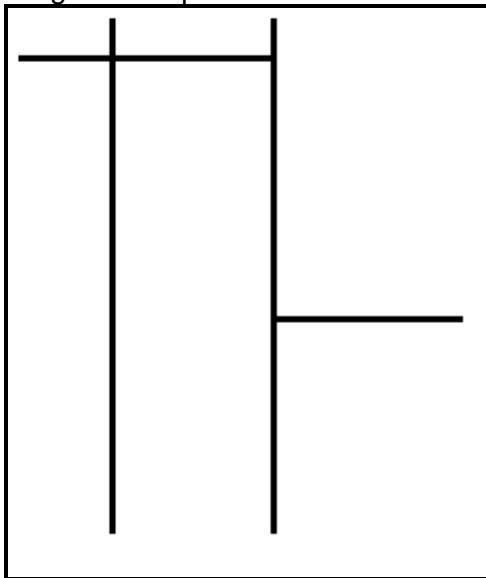
The next 4 fields are always defaulted.

AN **ATTRIBUTE NUMBER**

If set top a value of 1, the line will not reverse any text that is printed under it. A value of 0 will instruct the printer to reverse any field that is under it (“reverse video” or “white print on a black background”). (Note: The line field will only reverse text that has already been printed on the label. Therefore, to produce a reversed image, the line field **MUST** be printed **AFTER** the image field.)

MAKING LINES

Program sample: Lines



```

^D57←
4←
1,50,500,,6,,,150,10←
1,100,50,,6,,,10,500←
1,250,50,,6,,,10,500←
1,250,250,,6,,,150,10←
^D56←
^D2←
.←
^D3←

```

Lines
Figure 8

4.5.3 A SAMPLE SESSION (FIELDS)

Looking at the sample label...

```

^D57←          A label format is coming
5,812,1218,,20,35←  Header information
1,250,1068,8,1,5,,,2,2←  Field #1 information
2,200,900,11,1,5,,,2,2←  Field #2 information
3,175,760,26,1,5←      Field #3 information
4,295,560,11,1,5←      Field #4 information
4,110,50,11,16,3,,,3,406←  Field #5
^D56←          Select RAM Format
^D2←           Text Data is Coming
Microcom←      Text String #1
Corporation←   Text String #2
Thermal Printing Solutions← Text String #3
01234567890←   Print Label 1
^D3←

```

... and referring to Field #1.

```
1,250,1068,8,1,5,,,2,2←
```

- 1 - Field refers to text string #1 - **Microcom**. This field could have referred to **Corporation**, if it had a TSN of 2. The fields do not have to be in any kind of order with respect to the data fields.
- 250 - X beginning (XB) 250 dots from left edge of the print head.
- 1068 - Y beginning (YB) 1068 dots from bottom of label.
- 8 - Character Count (CC) of 8 characters, the amount of characters in **Microcom**.
- 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.
- 5 - This CGN selection of 5 selects an 14pt font.
- ,, - This will default the next two positions.
- 2 - This sets the X multiplication to 2.
- 2 - This sets the Y multiplication to 2.
- ← - A carriage return signals the end of this field.

The field parameters that were not defined will default. A FO and FJ of 0 will place EASY to the right of the X coordinate 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 the entire word **EASY** will print (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 412 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 412 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 and pipe characters can be used in text or bar codes by entering them twice.

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← equals ^A1^D21←>
- ^B Text entry mode:** Instructs the printer to enter printable text entry mode. This command (or the preferred ^D2←) must be sent before the text information. This command is equivalent to ^D2← but does not require a ← 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← but does not require a ← after it. Because control C is shorter than ^D3← it is easier to use in direct terminal mode. In general it is better to use ^D3← 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 ← or another control sequence (^A9^D73^D3← equals ^A9^D73← and ^D3←).
- ^E Printer enquiry:** See section 5.2 for more details (equivalent to five NULL's or a ^D5←). The ^E command does not require a ← after it. If Binary Compression is enabled, the ^E and ^D5 ← commands will not function and five NULL characters should be sent instead. Because Binary Compression is enabled by default, it is wise to use the five NULL character method when possible.

- ^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 (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←).
- ^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 412 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 series of 5 NULL characters (The ^E or ^D5 commands can be used if binary compression is disabled. Refer to soft switch 3 position 7 in chapter 5.3.1):

Enquiry Responses		
TEXT	^ALPHA or CONTROL CODE	DEFINITION
>READY<	^F	Normal condition
>CUTTER ERROR<	^G	Cutter cannot rotate
>RIBBON BROKE<	^K	Printer is out of ribbon
>HEAD IS UP<	^L	Print head is raised
>DATA ERROR<	^U	Communication error
>TAKE LABEL<	^V	Printer is waiting for a label to be taken
>LOW STOCK<	^Y	Out of paper
>RESTARTED<	^Z	Printer has been reset
>OVER TEMP<	^]	Head temperature is high
>UNDER VDD<	^\ ^	VDD voltage is low
>OVER VDD<	^	VDD voltage is high
>INPUT 1<	^	Optional INPUT 1 sensor triggered

Table 7

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 dip switches and non-volatile commands 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 D for a listing by number.

Example of Command usage:

^A3^D75^D3↵ (This sequence will print a batch of three labels).

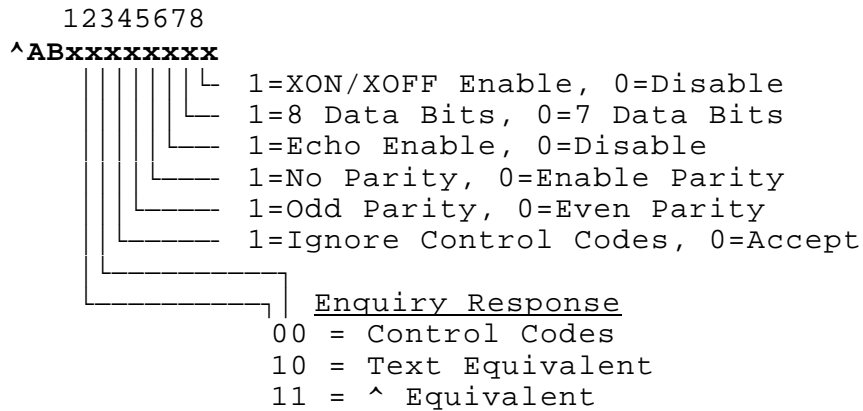
5.3.1 SOFTWARE DIP SWITCHES AND NON-VOLATILE COMMANDS

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

The following commands are loaded on power-up. Although they can be set, they will not be used until the printer has been restarted. **The printer will not use these settings until this is done.**

^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.

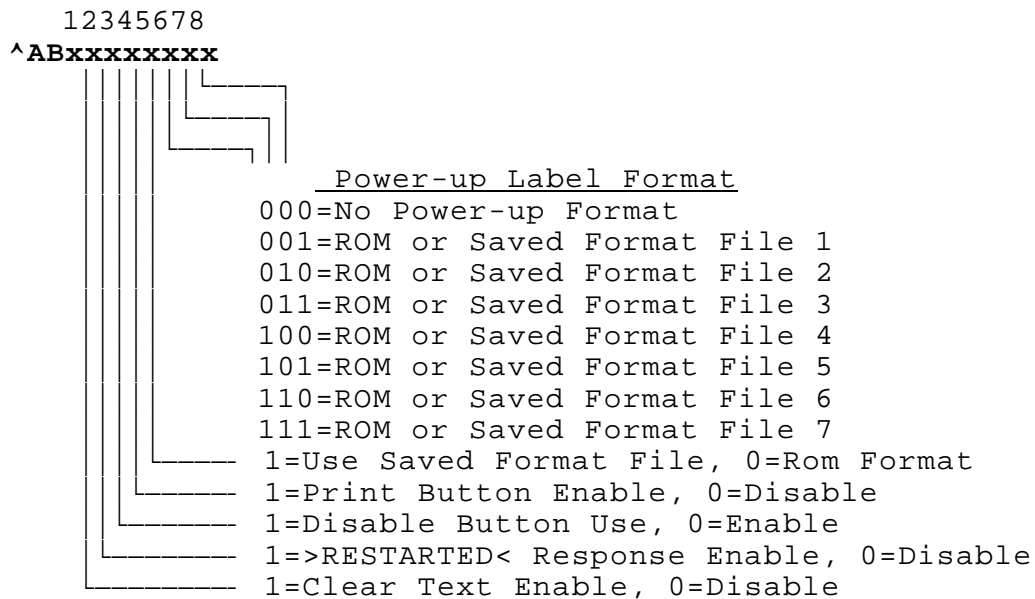
For example: ^AB10100001^D21← will configure serial port #1 for text equivalent enquiry response, accept control codes, disable echo, and enable XON/XOFF flow control.



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** **Not Used**
- 5** **Not Used**
- 6** **Echo:** If this feature is enabled, the printer will echo all received characters to the serial port.
- 7** **Not Used**
- 8** **XON/XOFF:** Enable or disable XON/XOFF software handshaking. CTS/RTS hardware handshaking is always enabled.

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



Position:

- 1** **Clear Text Function:** If enabled, all variable text strings will be erased when a ^D2← 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 set to 0, the button may be held to feed paper but will only print a blank label if tapped (Functions as a “disable label reprint” switch)
 - 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 are used in conjunction with switch 5 above. They determine which stored format is loaded at power-up. The printer can be instructed not to load a format at power-up by setting all three switches to 0. (Please note: The printer will not print unless a valid format has been loaded. A format may be loaded by using these switches to automatically load a previously stored format or by simply sending non-stored format to the printer.)

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

```

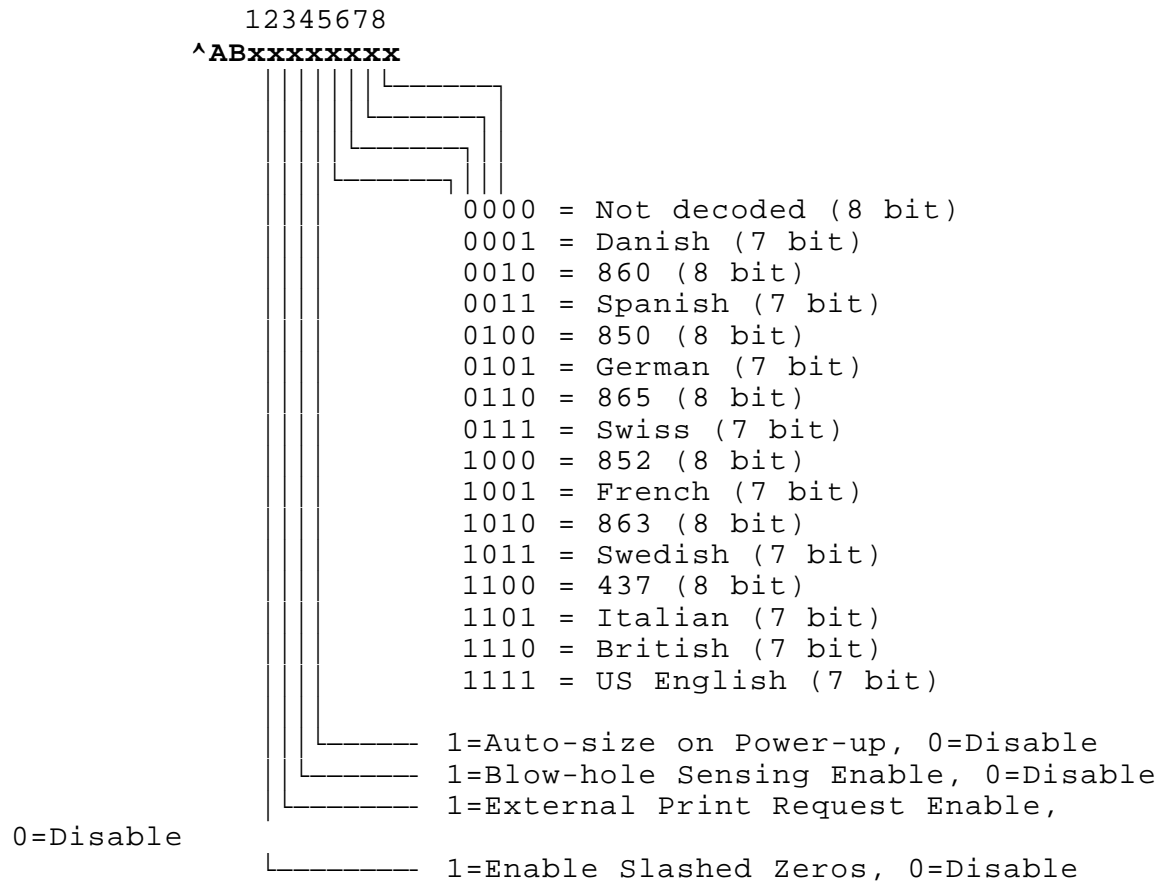
      12345678
^ABxxxxxxxx
  | | | | | | | |
  | | | | | | | L Detect Black Line On Power-up
  | | | | | | | 1=Enable Binary Compression, 0=Disable
  | | | | | | | Always 0
  | | | | | | | Always 0
  | | | | | | | Always 0
  | | | | | | | 1=Send Response After Print
  | | | | | | | 0=No Response After Print
  | | | | | | | 1=Invert >INPUT 1< Polarity, 0=Normal
  | | | | | | | 1=Disable Extended ASCII, 0=Enable

```

Position:

- 1** **Extended ASCII:** If enabled, characters over 7F hex will be processed.
- 2** **Invert >INPUT 1< Polarity:** The >INPUT 1< message is normally returned when the associated reflective sensor detects a signal. The polarity of this signal should be inverted when used as a stock level sensor. (This feature is currently available only on the model 322M printer)
- 3** **Response After Print:** If enabled, an enquiry response will be sent back through the first serial port after every print.
- 4** **Always 0**
- 5** **Always 0**
- 6** **Always 0**
- 7** **Binary Compression:** If enabled, the printer will accept downloaded binary compressed font or graphic files and enquiry responses must be sent using the five NULL character method.
- 8** **Detect Black Line on Power-up:** If this bit is set, the printer will automatically run a few labels and correctly set the ^D91 value.

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



Position:

- 1 Slashed Zeros:** If enabled, the printer will print a slash through the embedded zero characters.
- 2 External Print Request:** If enabled, the printer will check Pin 7 of the 9 Pin serial connector located on the rear of the printer. If Pin 7 is low, the printer will begin printing the currently loaded label and will continue to print new labels until the signal is high.
- 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 Code Page Selection**
- 6 Code Page Selection**
- 7 Code Page Selection**
- 8 Code Page Selection**

<u>^A</u>	<u>^D</u>	<u>COMMAND</u>
XX	36	Adjust Contrast Base: Used to adjust the contrast base point for such things as high-speed paper and print head 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.

<u>^A</u>	<u>^D</u>	<u>Command</u>
	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 72-76.
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←).
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← - Prints until printer turned off or paused, using the front panel button.
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← - Prints 20 serial number labels.

<u>^A</u>	<u>^D</u>	<u>COMMAND</u>
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↵ - 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
^D91 Value -	States transmissive properties of stock to the gap detector. 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↵ 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.

<u>^A</u>	<u>^D</u>	<u>Command</u>
	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.
5		Diagnostic Mode
		(Note: The LCB should be set to 1 before auto-sizing black line stock. ^A1^D47←)
XX 91		Gap Detection Sensitivity: The proper value may be obtained using the auto-size (^D39) command. The ^A value sets the point (0-255) at which the printer detects a gap or black mark. When the printer is powered on or reset, this command will default to 30 if using the transmissive sensor and 120 if using the reflective sensor. Although the default value should work properly with most media, it is a good idea to place this command at the beginning of all format files in order to guarantee that it has not been changed by another user or application. If this value is not correct, the printer may not detect the end of the label and may feed extra media or stop too soon.

5.3.4 REAL-TIME CLOCK

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

^D30←
HH:MM:SS←
DD/MM/YY/W←

HH = hours (24 hour format) **MM** = month
MM = minutes **DD** = day of month
SS = seconds **YY** = last 2 digits of year

W = day of the week
1 = SUN
2 = MON
3 = TUE
4 = WED
5 = THR
6 = FRI
7 = SAT

The optional clock produces a string of text that is accessed through use of a TSN of 0 (See Table 10 for definitions of field parameters).

The text string is shown below...

HH:MM:SS MM/DD/YY XXX DD/MM/YY 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	TEXT
0	1	8	HH:MM:SS
0	10	8	MM/DD/YY
0	19	3	Day of Week
0	23	8	DD/MM/YY
0	32	3	Day of Week

Table 8

^A **^D** **Command**
31 **Show Clock:** This command will send the date and time to the serial port.

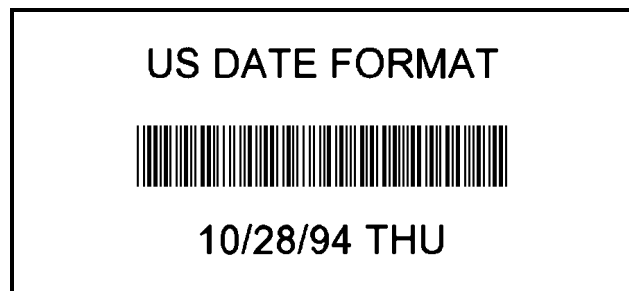
Sample formats using the clock function:

```
^D57←
3←
0,410,100,12,16,2,,4,2,60,2,23←
0,410,25,12,1,5,,4,,,,23←
1,410,200,20,1,5,,4←
^D56←
^D2←
EUROPEAN DATE FORMAT←
^D3←
```



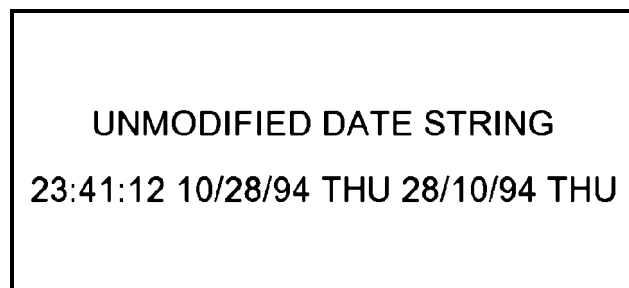
European Date Format
Figure 9

```
^D57←
3←
0,410,100,12,16,2,,4,2,60,2,10←
0,410,25,12,1,5,,4,,,,10←
1,410,200,20,1,5,,4←
^D56←
^D2←
US DATE FORMAT←
^D3←
```



US Date Format
Figure 10

```
^D57←
2←
0,410,25,34,1,5,,4←
1,410,100,22,1,5,,4←
^D56←
^D2←
UNMODIFIED DATE STRING←
^D3←
```



Unmodified Date Format
Figure 11

5.3.5 SERIAL NUMBER COMMANDS

The following commands, ^D80 through ^D89, refer to the serial number function of the 412 printer. The 412 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, then all serial number fields can only increment or decrement by one. Single and multiple serial commands cannot be implemented on the same label. Please note that the ^D57 command will clear most of the serial number commands. Therefore, all serial number commands should be placed either after the ^D56 command, or just before the print command ^D3.

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.

<u>^A</u>	<u>^D</u>	<u>Command</u>
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:

```

^D57←
1←
1,416,25,2,1,5←
^D56←
^A2^D86←
^A1^D84←
^A5^D85←
^A3^D75←
^D2←
20←
^D3←

```

A sample program using the multiple serial number feature:

```

^D57←
3←
1,400,25,4,1,5←
2,100,75,4,1,5←
3,100,125,4,1,5←
^D56←
^A2^D88←
^A1^D88←
^A3^D89←
^A3^D75←
^D2←
100←
200←
300←
^D3←

```


5.3.6 SAVING FORMAT COMMANDS

The printer can store up to 128 format files in RAM. Once stored, these files can be loaded from memory at very high speeds. 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 5.3.1), to automatically process the file at power up. The printer treats these files exactly as if they were sent through the communication port.

The maximum number of stored files depends on the size of the files and the amount of memory installed in the printer. The standard 512K RAM configuration offers 448K of format storage area .

<u>^A</u>	<u>^D</u>	<u>Command</u>
XX	54	Send Saved Format File to Serial Port: ^A selects which one (1-128).
XX	58	Process Saved Format: ^A selects which user entered format (1-128) is to be printed.
XX	59	Save Format File: ^A selects which slot (1-128) in which the user entered format is to be placed. The format file must be terminated by an ESC (1B hex) character.
XX	66	Clear Single Stored Label Format: ^A select which slot to clear (1-128).
100		Clear User RAM: This command will clear all downloaded fonts, graphics, and stored label formats. 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 a single slot.

USAGE:

Before sending the first downloadable format file, graphic, or font, the RAM must be initiated by sending ^D100←. When this command is issued, all previously saved files will be erased. Therefore, it also works as a memory clear operation. Only use this command before sending the first file or when a total RAM clear is needed.

Next send the ^A1^D59← command sequence. This indicates to the printer that file #1 of a possible 128 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.

To access the stored file, serially send ^A1^D58←, 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 ^D100 command is not sent again. This will erase all stored files.

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. The format can be selected and only the variable data needs to be sent.

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 ^[

File #1

```
^D100^←      ;Send this string first time.
^A1^D59^D57^←
4,288,193,5,19,30,0,1,148^←
1,100,20,10,1,5,0,2,1,1,,1^←
1,210,20,7,1,5,0,2,2,2,,11^←
1,152,154,12,12,,0,2,2,100,,18^←
1,130,54,12,32,,0,2,2,2,,18^←
^D56^←
^D2^←
<ESC>
```

File #2

```
^A1^D58^←
24 PRINTS $ 3.79 20496340379^←
^D3^←
```

File #3

```
^A2^D59^D57^←
4,620,161,,18,35,,73,3^←
1,120,110,50,1,5^←
2,120, 80,70,1,4^←
3,120, 60,70,1,4^←
4,120, 40,70,1,4^←
^D56^←
^D2^←
MICROCOM CORPORATION^←
8220 GREEN MEADOWS DR., N.^←
LEWIS CENTER, OH 43035^←
(740) 548-6262^←
<ESC>
```

The above file would be selected by sending an ^A2^D58^←.

5.3.7 LABEL DISPENSING COMMANDS

Peel and dispense, Tag/Tear and the optional cutter commands require the printer to advance and retract media. The following commands define this operation.

<u>^A</u> <u>XX</u>	<u>^D</u> <u>96</u>	<u>Command</u>
	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 print: This command instructs the printer to advance the media, the number of steps specified using the ^D95 command, between each label printed. Once advanced, the printer will wait for the label to be removed. When the label is removed, the printer will retract the media the number of steps specified using the ^D95 command. This command will assume a default ^D95 value of 162 and utilizes the optional Label Taken Sensor.
2		Advance after copies count: This command instructs the printer to advance the media, the number of steps specified using the ^D95 command, after printing the number of labels specified by the copies count (^D73) or labels count (^D75) commands. Once advanced, the printer will wait for the labels to be removed. When the labels are removed, the printer will retract the media the number of steps specified using the ^D95 command. This command will assume a default ^D95 value of 162 and utilizes the optional Label Taken Sensor.
3		Advance when idle: After printing a label, if no other label is being processed, this command instructs the printer to advance the media the number of steps specified using the ^D95 command. When the printer receives the next print request, it will retract the media the number of steps specified using the ^D95 command and continue to process the next label. This command will assume a default ^D95 value of 162 and does not use the optional Label Taken Sensor. It was created to allow users to tear off media whenever the printer is not printing.
	98	Peel-and-Dispense Mode: This command should be used when the printer is configured to automatically peel labels from the backing paper. It instructs the printer to advance the media, the number of steps specified using the ^D95 command, between each print cycle. Once advanced, the printer will wait for the label to be removed. When the label is removed, the printer will retract the media the number of steps specified using the ^D95 command. This command uses the optional Label Taken Sensor. It is very similar to the ^A1^D97 command but assumes a default ^D95 value of 83. Normally this value should

be adjusted so that the printed label remains slightly short of falling off of the peel bar.

- 0** Turn off peel and dispense mode with ^D98.
 - 1** Turn on peel and dispense mode.
 - 2** (Custom Applicator Mode - peel and dispense without delay.)
- 99** **Cutter Control:** This command will enable or disable full and/or partial cuts. Command 102 and 103 can be used to set the cut intervals. The Full Cut Interval (^D102) and the Partial Cut Interval (^D103) may be used at the same time but where a full and partial cut coincide, only the full cut will be preformed. (Partial cuts are only available if the full/partial cutter was installed. If this command is set to a value of 2, the printer will pause after the partial cut and wait for the user to take the label.) The cut point is adjusted using the ^D95 command. The ^D99 command will assume a default ^D95 value of 155.
- 0** Disable cutter.
 - 1** Enable Full Cut
 - 2** Enable Partial Cut
 - 3** Enable Full and Partial Cut
- XX 95** **Load User Defined Steps for Label to Advance:** This command is used in conjunction with the tag/tear (^D97), peel-and-dispense (^D98) and cutter (^D99) commands. It is used to adjust the number of steps that the printer will advance and retract media. While the maximum value is 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 a label jam in the printer when the back edge of the label meets the print head.

5.3.8 TEXT STRINGS COMMANDS

- | <u>^A</u> | <u>^D</u> | <u>Command</u> |
|-----------|-----------|--|
| | 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← 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← 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 used to pre-pad data. Any data already loaded into a field will be retained if the ^D62 command is sent. The following is an example:

<pre>^D57← <header>← <field definition1>← <field definition2>←</pre> |

```

<field definition3>←
^D56←
^D2←
A←
B←
C←
^D62←
^D2←
line1←
line2←
line3←
^D3

```

The above example would print:

```

Aline1
Bline2
Cline3

```

- 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: If this command is selected, the printer will accept new text strings without the need to send a ^D2 command. The printer will also auto-print a label when the number of received text string equals the number specified using the ^D64 command. This mode is very useful when interfacing to a scale, bar code wand or other simple host.
 - 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.
- XX 64 Auto-Print String Count:** This command is used in conjunction with the ^A1^D63 auto-print command. The ^A value sets the number of text strings to accept before printing. When the printer is in auto-print mode, it is not necessary to send a ^D2← to enter new text or to send a ^D3← to print a label. The printer will accept incoming text strings and print a label as soon as the number of strings equals the amount specified by the ^D64 command.

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

```

^A0^D64←           ;clear any old settings
^D57←             ;load new format mode
11,832,640,,20,36← ;header
1,47,463,10,1,2←  ;field info
2,416,439,20,1,3,,4← ;field info
3,416,412,25,1,3,,4← ;field info
4,416,385,25,1,3,,4← ;field info
5,47,350,10,1,2←  ;field info
6,307,503,30,1,3←  ;field info
7,60,207,29,1,5←  ;field info

```


CHAPTER 6: DOWNLOADABLE GRAPHIC IMAGES

The 412 printer has 255 slots available for storing fonts or graphics. Existing graphic images can be converted to the proper format using either the "PCX2MIC.EXE" or "BMP2MIC.EXE" software utilities. The graphic image format sections are provided to support developers that wish to create 412 graphic files from within their own applications.

6.1 USING THE GRAPHIC CONVERSION UTILITIES

The following section details the process required to convert and download graphics. The conversion utilities "PCX2MIC.EXE" and "BMP2MIC.EXE" may be downloaded at <http://www.microcomcorp.com>. These 16 bit DOS utilities convert PCX or BMP type graphic images to a format suitable for downloading to the 412 printer.

6.1.1 PCX2MIC.EXE PROGRAM

- A) Run the program - PCX2MIC
- B) Follow the on screen instructions and note the slot # the image was placed in.
- C) Make sure the slot is clear. Printer memory can be cleared using the ^D100 command.
- D) Download resulting file (filename.N12 or .R12) file to printer
- E) Section 4.5.3 explains how to access loaded images.

6.1.2 BMP2MIC.EXE PROGRAM

- A) Run the program - BMP2MIC
- B) Follow the on screen instructions and note the slot # the image was placed in.
- C) Make sure the slot is clear. Printer memory can be cleared using the ^D100 command.
- D) Download resulting file (filename.N12 or .R12) file to printer
- E) Section 4.5.3 explains how to access loaded images.

6.2 GRAPHIC IMAGE DOWNLOAD METHODS

The model 412 supports compressed and uncompressed graphic image and font downloads. The compressed format (^D107) shortens download time by reducing the number of bytes sent to the printer. Please note that the compressed format is only usable on 8 bit data connections and will not function using a 7 bit connection. The uncompressed format (^D104) is usable on 7 or 8 bit data connections. The ^D104 method is more flexible but it encodes the image data using ASCII-HEX. This results in a much larger file size. Microcom Corporation recommends using the compressed format when possible.

6.2.1 COMPRESSED BINARY IMAGE COMMAND (^D107)

This command allows graphic images or fonts (fonts must be less than 64KB uncompressed) to be transmitted in binary, thereby cutting the number of bytes sent in half. Furthermore, this command allows for data compression by converting strings of 0h or FFh bytes to shorter byte-plus-count sequences. These sequences are expanded to the proper number of bytes within the printer. This command is only useable on data connections that support 8-bit data such as a serial port configured for 8 data bits and no parity, or a parallel port. This command will not function correctly with a serial port configured to 7 data bits.

The following is the format of ^D107 command when used with a graphic image file.

```
^A <slot number> ^D107←
```

<rotation> *<count>* *<image data>*

Where:

<slot number> is a slot number, 1 through 255 (in ASCII). Note: The 412 uses the same TCI for fonts and graphics. They are both accessed by using a TCI of 8. Therefore a font and a graphic cannot have the same CGN number.

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

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

<image data> is the compressed binary image. Refer to section 6.3 for a detailed description of this data.

Compression Algorithm

The binary data that make up the image file is a run-length compressed version of the image data described in section 6.2. Bytes with a value of 0h or FFh are followed by another byte indicating the number of times that value is repeated.

For example, suppose the original (uncompressed) image file has a sequence of bytes like this: (all values are in hexadecimal)

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

The encoded result would look like this:

00 00 01 02 03 04 00 05 FF 00 FD FF 04 00 00 FF 00

Here's the interpretation:

00 - the first byte is 00
 00 - count of 0 - the previous 00 byte is not repeated
 01 - a 01 byte
 02 - a 02 byte
 03 - a 03 byte
 04 - a 04 byte
 00 - another 00 byte in the file
 05 - count of 5 - insert 5 more 00 bytes (total of 6 in sequence)
 FF - a FF byte
 00 - count of 0 - the previous FF byte is not repeated
 FD - a FD byte
 FF - another FF byte
 04 - count of 4 - insert 4 more FF bytes (total of 5 in sequence)
 00 - another 00 bytes
 00 - count of 0 - the previous 00 byte is not repeated
 FF - another FF byte
 00 - count of 0 - the previous FF byte is not repeated.

The compression scheme is slightly inefficient for single occurrences of 0h or FFh, causing these to occupy 2 bytes each. However, most image bitmaps include large areas of either

blank space (which is coded as large numbers of 0h bytes) or black space (coded as large numbers of FFh bytes).

If a string of more than 255 0h or FFh bytes occurs, the byte-plus-count sequence may be repeated as often as necessary to incorporate all occurrences of the byte. For example, a string of 1132 FFh bytes in sequence can be encoded as:

```
FF FF FF FF FF FF FF FF 6B
```

The first four pairs of FFh each encode 256 bytes of FFh (one for the first byte and 255 copies), totaling 1024 bytes of FFh. The next FFh byte adds another, and the 6Bh adds 107 more copies. Thus, $(4 \times 256) + 1 + 107 = 1132$ FFh bytes.

6.2.2 UNCOMPRESSED IMAGE COMMAND (^D104)

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

The following is the format of ^D104 command when used with a graphic image file.

```
^A <slot number> ^D104←
<rotation> <count> <image data>
```

Where:

<slot number> is a slot number, 1 through 255 (in ASCII). Note: The 412 uses the same TCI for fonts and graphics. They are both accessed by using a TCI of 8. Therefore a font and a graphic cannot have the same CGN number.

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

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

<image data> is the graphic image data, described in section 6.3, which has been converted to ASCII-HEX. (The ASCII-HEX conversion is described below.)

ASCII-HEX Conversion

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

For example: To convert the byte 6C to ASCII-HEX, simply OR the first and second nibbles with 30h. This results in two bytes 36h and 3Ch. This conversion results in a file size that is twice as big as the source. The main advantage is that the file can be easily transmitted across a 7 bit data connection.

6.3 GRAPHIC IMAGE DATA FORMAT

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

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

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

The above method allows graphic images to span 64KB memory segments. When using graphics over 64KB, the printer will determine the number of 64KB slots required to store the entire graphic, and will split the large file into the correct number of smaller files internally. It will store these smaller files sequentially in the slots following the one specified in the command. Therefore, before sending a graphic file that is 64K or more bytes long (uncompressed size), make sure that the specified font slot and enough following slots to store the file are unoccupied.

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

6.3 DOWNLOADABLE GRAPHICS COMMAND SUMMARY

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

<u>^A</u>	<u>^D</u>	<u>Command</u>
	100	Clear User RAM: This command will clear all downloaded fonts, graphics, and stored label formats.
	101	List Memory Bytes Available: The printer will send a < character followed by the amount of bytes and finally a > character. (ie. >192680<)
XX	104	Load Graphic Image or Font into User Memory without Binary Compression: ^A select which slot to place the image/font in (1-255). This command should be used with an "ASCII-HEX" file that contains only printable characters less than 80h. This command supports graphics over 64KB.
XX	107	Load Graphic Image or Font into User Memory using Binary Compression: ^A select which slot to place the graphic/font in (1-255). This command will greatly reduce image download time and should be used whenever possible. <u>It can only be used on 8 bit data connections.</u>

CHAPTER 7: DOWNLOADABLE FONTS

The 412 is capable of storing up to 255 downloadable fonts or graphic images. The printer treats downloadable fonts just like the standard bit mapped fonts mentioned in chapter 4. Both LaserJet™ and TrueType® fonts can be converted using the "JET2412.EXE" or "TTF2MIC.EXE" software utilities. (Note: The "JET2412.EXE" program uses the Portrait or 0 degree source rotation for both normal and rotated fonts.) Downloadable font fields use the same structure as bit mapped fields. The only difference is that the TCI must be 8 for downloadable fonts. The CGN refers to the actual downloaded font to be used.

7.1 USING THE FONT CONVERSION UTILITIES

The following section details the process required to convert and download fonts. The conversion utilities may be downloaded at: <http://www.microcomcorp.com>. These 16 bit DOS utilities convert fonts from the LaserJet™ SFP or TrueType® TTF formats into a format suitable for downloading to the 412 printer.

7.1.1 SFP2MIC.EXE PROGRAM

- A) Run the program SFP2MIC
- B) Follow the on screen instructions and note the slot # the image was placed in.
- C) Make sure the slot is clear. Printer memory can be cleared using the ^D100 command.
- D) Download resulting file (filename.N12 or .R12) file to printer
- E) Section 4.5.3 explains how to access loaded images.

7.1.2 TTF2MIC16.EXE PROGRAM

- A) Run the program - TTF2MIC16
- B) Follow the on screen instructions and note the slot # the image was placed in.
- C) Make sure the slot is clear. Printer memory can be cleared using the ^D100 command.
- D) Download resulting file (filename.N12 or .R12) file to printer
- E) Section 4.5.3 explains how to access loaded images.

7.2 FONT DOWNLOAD METHODS

The model 412 supports compressed and uncompressed font and graphic image downloads. The compressed format (^D107) shortens download time by reducing the number of bytes sent to the printer. Please note that the compressed format is only usable on 8 bit data connections and will not function using a 7 bit connection. The uncompressed format (^D104) is usable on 7 or 8 bit data connections. This ^D104 method is more flexible but it encodes the image data using ASCII-HEX. This results in a much larger file size. Microcom Corporation recommends using the compressed format when possible.

7.2.1 COMPRESSED BINARY IMAGE COMMAND (^D107)

This command allows fonts or graphic images (fonts must be less than 64KB uncompressed) to be transmitted in binary, thereby cutting the number of bytes sent in half. Furthermore, this command allows for data compression by converting strings of 0h or FFh bytes to shorter byte-plus-count sequences. These sequences are expanded to the proper number of bytes within the printer. This command is only useable on data connections that support 8-bit data such as a serial port configured for 8 data bits and no parity, or a parallel port. This command will not function correctly with a serial port configured to 7 data bits.

The following is the format of ^D107 command when used with a graphic image file.

`^A <slot number> ^D107←
<rotation> <count> <image data>`

Where:

`<slot number>` is a slot number, 1 through 255 (in ASCII). Note: The 412 uses the same TCI for fonts and graphics. They are both accessed by using a TCI of 8. Therefore a font and a graphic cannot have the same CGN number.

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

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

`<image data>` are the compressed character images. Refer to section 7.3 for a detailed description of this data.

Compression Algorithm

The binary data that make up the image file is a run-length compressed version of the image data described in section 6.2. Bytes with a value of 0h or FFh are followed by another byte indicating the number of times that value is repeated.

For example, suppose the original (uncompressed) image file has a sequence of bytes like this: (all values are in hexadecimal)

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

The encoded result would look like this:

00 00 01 02 03 04 00 05 FF 00 FD FF 04 00 00 FF 00

Here's the interpretation:

00 - the first byte is 00
 00 - count of 0 - the previous 00 byte is not repeated
 01 - a 01 byte
 02 - a 02 byte
 03 - a 03 byte
 04 - a 04 byte
 00 - another 00 byte in the file
 05 - count of 5 - insert 5 more 00 bytes (total of 6 in sequence)
 FF - a FF byte
 00 - count of 0 - the previous FF byte is not repeated
 FD - a FD byte
 FF - another FF byte
 04 - count of 4 - insert 4 more FF bytes (total of 5 in sequence)
 00 - another 00 bytes
 00 - count of 0 - the previous 00 byte is not repeated
 FF - another FF byte
 00 - count of 0 - the previous FF byte is not repeated.

If a string of more than 255 0h or FFh bytes occurs, the byte-plus-count sequence may be repeated as often as necessary to incorporate all occurrences of the byte. For example, a string of 1132 FFh bytes in sequence can be encoded as:

```
FF FF FF FF FF FF FF FF FF 6B
```

The first four pairs of FFh each encode 256 bytes of FFh (one for the first byte and 255 copies), totaling 1024 bytes of FFh. The next FFh byte adds another, and the 6Bh adds 107 more copies. Thus, $(4 \times 256) + 1 + 107 = 1132$ FFh bytes.

7.2.2 UNCOMPRESSED IMAGE COMMAND (^D104)

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

The following is the format of ^D104 command when used with a graphic image file.

```
^A <slot number> ^D104←
<rotation> <count> <image data>
```

Where:

<slot number> is a slot number, 1 through 255 (in ASCII). Note: The 412 uses the same TCI for fonts and graphics. They are both accessed by using a TCI of 8. Therefore a font and a graphic cannot have the same CGN number.

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

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

<image data> is the character image data, described in section 7.3, which has been converted to ASCII-HEX. (The ASCII-HEX conversion is described below.)

ASCII-HEX Conversion

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

For example: To convert the byte 6C to ASCII-HEX, simply OR the first and second nibbles with 30h. This results in two bytes 36h and 3Ch. This conversion results in a file size that is twice as big as the source. The main advantage is that the file can be easily transmitted across a 7 bit data connection.

7.3 FONT STRUCTURE

The following font structure is offered to programmers who wish to use their own programs to convert fonts.

Note: The 412 does not differentiate between graphics and fonts. They both are accessed by using a TCI of 8. Therefore a font and a graphic cannot have the same CGN number.

The font structure consists of a set of data structures and location offsets to those structures. All data are stored in binary form. Multi-byte values are stored least-significant-byte first. A. Word is a 16-bit value, Byte is an 8-bit value, Label is a location within the file. The Model 412 can store a font of approximately 64KB or less in any one slot.

```

Label start:                ;the beginning of the file
Word lookup_table_offset   ;distance in bytes from start to beginning
                            ;of lookup_table
Word tallest_char          ;height of tallest char in font, in dots
Word widest_char           ;width of widest char in font, in dots
Byte default_spacing       ;default character spacing, usually 0
Byte byte_width            ;width of all char bitmaps, in bytes
Byte first_char            ;first char code in set - usually space (20h)
Byte last_char             ;last char in set
Byte default_char          ;what char to use if it isn't in the font
Label lookup_table         ;beginning of lookup table
Word char_offset[last_char-first_char] ;array of offsets, one for each character in font.
                            ;Each offset is the distance, in bytes, from start to
                            ;the beginning of the corresponding character's
                            ;data structure. The first word in this array is the
                            ;offset to the first character's data, the last word is
                            ;the offset to the last character's data.

Label first_char_data      ;the beginning of the first char's data structure
Word char_height           ;height of this char's bitmap in dots
Word char_width            ;width of this char's bitmap in dots (may be
                            ;narrower
                            ;than the width of the bitmap_data array)
Byte bitmap_data[char_height][byte_width] ;bitmap of char, 2d array
row                          ;The most significant bit of the first byte in each
the                           ;prints as the rightmost dot of the character, and
                               ;first row is the bottom row when printed.

Label second_char_data     ;the beginning of the second char's data structure
Word char_height           ;(same definition as for first char)
Word char_width            ;(same definition as for first char)
Byte bitmap_data[char_height][byte_width] ;(same definition as for first char)

...
(Repeat char_data structures as needed)
...

Label last_char_data       ;the beginning of the last char's data structure
Word char_height           ;(same definition as for first char)
Word char_width            ;(same definition as for first char)
Byte bitmap_data[char_height][byte_width] ;(same definition as for first char)

```


7.3 DOWNLOADABLE FONT COMMAND SUMMARY

The following is a list of commands referring to downloadable font functions.

<u>^A</u>	<u>^D</u>	<u>Command</u>
	100	Clear User RAM: This command will clear all downloaded fonts, graphics, and stored label formats.
	101	List Memory Bytes Available: The printer will send a < character followed by the amount of bytes and finally a > character. (ie. >192680<)
XX	104	Load Font or Graphic Image into User Memory without Compression: ^A select which slot to place the font/image in (1-255). This command should be used with an "ASCII-HEX" file that contains only printable characters less than 80h. This is useful when sending image data over a 7 bit connection.
XX	107	Load Font or Graphic Image into User Memory using Binary Compression: ^A select which slot to place the font or graphic in (1-255). This command will greatly reduce image download time and should be used whenever possible. <u>It can only be used on 8 bit data connections.</u>

CHAPTER 8: BAR CODES

Although bar codes are accessed in the same manner as text fields, bar codes often limit or expand the type of data that can be used. The purpose of this chapter is to explain and eliminate many of the questions that surface when dealing with bar codes for the first time.

8.1 TYPES OF BAR CODES

Universal Product Code - Version A (UPC-A), TCI=12

The UPC-A bar code is primarily used in the supermarket industry. It contains 11 numeric data characters and a single numeric check digit. The 412 must be provided 11 digits in order to print a scannable bar code. The first 6 digits are supplied by the UCC council and are the Manufacturer's ID number. The next 5 digits uniquely identify each of the Manufacturer's products and are assigned by the Manufacturer. The 12th digit is the checksum and should be omitted because the printer will automatically insert the correct value if a checksum is not sent (Caution: The printer will accept and print an invalid check digit if an incorrect check digit is provided). UPC-A bar codes do not use inter character spacing and therefore the character spacing element CS must be defaulted.

Universal Product Code - Version E (UPC-E, send 11 digits), TCI=13

The UPC-E bar code is primarily used in the supermarket industry to label small packages. The bar code algorithm uses a zero suppression routine to reduce certain 11 digit UPC-A bar codes to only 6 numeric digits and a conversion type numeric digit. The following chart illustrates how 11 digits are reduced to only 6. (Note: When using TCI 13, the printer requires the unconverted 11 digits.) UPC-E bar codes do not use inter character spacing and therefore the character spacing element CS must be defaulted. Note: The Manufacturer's ID number must begin with 0 in order to use UPC-E.

UPC Zero Reduction Format																
SYMBOL						DECODED NUMBER										
X1	X2	X3	X4	X5	0	NS	X1	X2	0	0	0	0	X3	X4	X5	
X1	X2	X3	X4	X5	1	NS	X1	X2	1	0	0	0	X3	X4	X5	
X1	X2	X3	X4	X5	2	NS	X1	X2	2	0	0	0	X3	X4	X5	
X1	X2	X3	X4	X5	3	NS	X1	X2	X3	0	0	0	0	X4	X5	
X1	X2	X3	X4	X5	4	NS	X1	X2	X3	X4	0	0	0	0	X5	
X1	X2	X3	X4	X5	5	NS	X1	X2	X3	X4	X5	0	0	0	0	5
X1	X2	X3	X4	X5	6	NS	X1	X2	X3	X4	X5	0	0	0	0	6
X1	X2	X3	X4	X5	7	NS	X1	X2	X3	X4	X5	0	0	0	0	7
X1	X2	X3	X4	X5	8	NS	X1	X2	X3	X4	X5	0	0	0	0	8
X1	X2	X3	X4	X5	9	NS	X1	X2	X3	X4	X5	0	0	0	0	9

Table 9

Universal Product Code - Version E (UPC-E, send 7 digits), TCI=13

TCI 13 is the same as TCI 12 except that only the actual 7 numeric digits are used to produce the bar code. (Caution: It is very important that the valid 7 digits are used. Failure to use valid numbers may result in incorrect bar codes.)

European Article Numbering System - Version 13 (EAN-13), TCI=20

EAN-13 is not generally used in the United States. It contains 13 digits and is constructed in the same manner as UPC-A.

European Article Numbering System - Version 8 (EAN-8), TCI=21

EAN-8 is not generally used in the United States. It contains 8 digits and is constructed in the same manner as EAN-13. Please note that EAN-8 does not use compression and is not a condensed version of EAN-13 (as with UPC-A and UPC-E).

Interleaved 2 of 5 TCI=15 (I2of5)

I2of5 is a high density, variable length, numeric bar code that is used mainly in the distribution industry. Although the data can be any length, there must always be an even number of characters. If an odd amount of characters is required, a 0 is normally padded at the beginning. I2of5 bar codes actually encode characters in the spaces as well as the bars. Therefore the character spacing element (CS) must be defaulted.

Code 3 of 9 (Code 39), TCI=16

Code 39 is one of the more popular variable length, alphanumeric, bar code in use today. It can encode numeric characters 0 through 9, all upper case letters, and the characters -.*\$/+%, and space. Although most specifications require a specific inter character spacing, Code 39 will allow custom inter character spacing as long as the maximum does not exceed the timeout zone of the intended scanning equipment.

Modified Plessey (MSI 1), TCI=24

MSI is primarily used on retail shelf labels. It is a low density and numeric only bar code due to the amount of space that each character consumes. MSI 2 and MSI 3 are variations which contain 1 or 2 check digits respectively.

Postnet, TCI=36

Postnet is a numeric only bar code that is used in postal applications to sort mail.

MaxiCode, TCI=38

Modes 2 through 6 of the AIM International MaxiCode specification are supported. Modes 0 and 1 are obsolete, and are not supported.

The format field to describe a MaxiCode label field shall have a TCI of 38 and a CGN with the desired Mode (2-6).

MaxiCode may encode non-printable characters, and Modes 2 and 3 require certain control characters for compatibility with transport industry standards. In order to specify a control character in a MaxiCode data string without causing printer difficulties, use the pound symbol (#) followed by two hexadecimal digits that give the value of the control character. For example, "#01" specifies Control-A (ASCII SOH) and "#1D" specifies Control-] (ASCII GS). In order to specify an actual pound symbol in the string, use "##". The following table shows all the "#" equivalents that may be used.

Data String	Control Equiv.	ASCII Name	Hex Value
#00	control-@	NUL	00
#01	control-A	SOH	01
#02	control-B	STX	02
#03	control-C	ETX	03
#04	control-D	EOT	04
#05	control-E	ENQ	05
#06	control-F	ACK	06
#07	control-G	BEL	07
#08	control-H	BS	08
#09	control-I	HT	09
#0A	control-J	LF	0A
#0B	control-K	VT	0B
#0C	control-L	FF	0C
#0D	control-M	CR	0D
#0E	control-N	SO	0E
#0F	control-O	SI	0F
#10	control-P	DLE	10
#11	control-Q	DC1	11
#12	control-R	DC2	12
#13	control-S	DC3	13
#14	control-T	DC4	14
#15	control-U	NAK	15
#16	control-V	SYN	16
#17	control-W	ETB	17
#18	control-X	CAN	18
#19	control-Y	EM	19
#1A	control-Z	SUB	1A
#1B	control-[ESC	1B
#1C	control-\	FS	1C
#1D	control-]	GS	1D
#1E	control-^	RS	1E
#1F	control-_ _	US	1F
##	(NA)	# (pound)	23

Control Code Equivalents for use in Data Strings
Table 10

The data string associated with a MaxiCode field shall be formatted according to the Mode selected:

Mode 2:

Mode 2 may have either of the following formats:

`]>#1e01#1dYYPPPPPPPP#1dCCC#1dSSS#1dA..A#1dB..B#1dC..C#1e#04`

Where:

- #1e is the ASCII RS character
- #1d is the ASCII GS character
- #04 is the ASCII EOT character
- YY is the two-digit numeric year

PPPPPPPP is the nine-digit numeric US Postal Code. (If using a 5-digit postal code, the last 4 digits must be 0.)

CCC is the three-digit numeric Country Code. (840 in the US)

SSS is the three-digit numeric Class of Service

A..A, B..B, C..C, etc. are variable-length alphanumeric fields separated by #1d. These fields are optional according to the MaxiCode specification, but may be required in certain applications.

PPPPPPPP#1dCCC#1dSSS#1dA..A#1dB..B#1dC..C#04

Where the fields are the same as those described above.

Mode 3:

Mode 3 may have either of the following formats:

[>#1e01#1dYYPPPPPP#1dCCC#1dSSS#1dA..A#1dB..B#1dC..C#1e#04

Where:

#1e is the ASCII RS character

#1d is the ASCII GS character

#04 is the ASCII EOT character

YY is the two-digit numeric year

PPPPPP is the six-character alphanumeric Postal Code.

CCC is the three-digit numeric Country Code.

SSS is the three-digit numeric Class of Service

A..A, B..B, C..C, etc. are variable-length alphanumeric fields separated by #1d. These fields are optional according to the MaxiCode specification, but may be required in certain applications.

PPPPPP#1dCCC#1dSSS#1dA..A#1dB..B#1dC..C#04

Mode 4:

Mode 4 may encode any string of up to 93 characters. Control characters are specified as described above, but occupy only 1 character in the encoded string.

Mode 5:

Mode 5 may encode any string of up to 77 characters. Control characters are specified as described above, but occupy only 1 character in the encoded string.

Mode 6:

Mode 6 may encode any string of up to 93 characters. Control characters are specified as described above, but occupy only 1 character in the encoded string.

Code 128, TCI=40 (Automatic Compression), TCI=41 (Manual Compression)

Code 128 is a very high density, variable length, full alphanumeric bar code. It contains 3 separate character sets (A, B, and C) and separate shift characters to access them in the same bar code. Subset C contains 99 matched numeric pairs, each encoded as a single character. The pairing of numeric characters allows the numeric portions of the bar code to consume half as much space as they would using subsets A or B. The printer will default to subset B if no start code is defined.

TCI 40 selects Automatic Compression. In this mode the printer will automatically decide which subset is most efficient and insert the appropriate shift character. It is also possible to insert function characters and force a subset change while in Automatic Compression mode. Please note that the printer will automatically switch to subset C if there are 6 or more numeric character in a row. Once the even number of numeric characters have been processed, the printer will default back to subset B. This can cause problems if a user selects subset A but sends 6 or more numeric digits. The user may wrongly assume that the printer has remained in subset A when it has actually switched to subset C and then to subset B.

TCI 41 is recommended for applications that require precise control of the subset switching. This TCI provides full control of the subsets. The printer will not try to compress the data unless the user manually enters subset C. Once in subset C, the user must send the appropriate # sequence to return to subset A or B. Remember, this mode assumes that the user will not violate the code 128 bar code rules by trying to use an odd number of digits or non-numeric characters with subset C. Doing so will cause an invalid bar code to be printed.

Code 128 Special Function Access				
#	Value	CODE A	CODE B	CODE C
#0	96	FNC3	FNC3	-----
#1	97	FNC2	FNC2	-----
#2	98	SHIFT	SHIFT	-----
#3	99	CODE C	CODE C	-----
#4	100	CODE B	FNC4	CODE B
#5	101	FNC4	CODE A	CODE A
#6	102	FNC1	FNC1	FNC1
#7	103	START	-----	-----
#8	104	-----	START	-----
#9	105	-----	-----	START
##	3	#	#	-----

Table 11

The following format will insert a Subset C start character followed by a function 1.

^D57←

1,832←

1,100,200,30,40,,,,,2,100←

^D56^D2←

#9#61234567890←

^D3←

Codabar (Rationalized Codabar), TCI=42

The Codabar bar code is typically used to identify air shipping containers, library items and blood information. It can encode the characters 0 through 9, -\$.+ABCD and four different start/stop characters.

Code 93, TCI=43

Code 93 is a high density, full alphanumeric, variable length, bar code. Through the use of reserved shift characters, it can encode all of the first 128 ASCII characters.

AS-10, TCI=44

AS-10 is not widely used. It is variable length and encodes the numeric values 1234567890 only.

PDF-417, TCI=46

PDF-417 is a two dimensional bar code.

Enter the following command before the label format:

```
:Text^[
number_of_rows<CR>
number_of_columns<CR>
rotation<CR>                ;in degrees (0, 90, 180, 270 only)
ECC_percent<CR>             ;error correction parameter
ECC_level<CR>               ;level of error correction
Aspect_ratio<CR>           ;must be in format of, ex., 2:3
```

(Where "Text" is the data to be encoded in the PDF-417 bar code. It may contain carriage returns and other control codes. It must be terminated by the characters "^[" (without quotes) which will not be printed.)

Enter a normal label format with a field specifying a TCI of 46 and a CC of 1.

The string associated with the field described above need contain only 1 character. It may be any printable character, and is used only as a placeholder. This character is not printed.

UCC/EAN-128, TCI=50 (TCI=51 is the text version)

UCC/EAN-128 bar codes are actually Code 128 bar codes that have a specific data format that contains multiple data subfields. Subfields are identified by application identifiers as specified in UCC/EAN-128 Application Identifier Standard (January 1993, revised and reprinted July 1995).

The UCC/EAN-128 bar code field has a TCI of 50. The CGN field is ignored.

The UCC/EAN-128 text field has a TCI of 51. The CGN selects the desired resident font for printing the text string. In other words, use the same CGN that would be used if printing the string with a regular resident font using a TCI of 1.

Data strings can contain one or more substrings appended onto one line. Each substring can consist of a 2-, 3-, or 4-digit Application Identifier immediately followed by a data string meeting the formatting requirements for that Application Identifier.

The following table is a list of supported Application Identifiers and their data format requirements. Use this legend when reading the data format requirements:

- a alphabetic character
- n numeric character
- an alphanumeric character
- a3 3 alphabetic characters, fixed length
- n3 3 numeric characters, fixed length
- an3 3 alphanumeric characters, fixed length
- a..3 variable length up to 3 alphabetic characters
- n..3 variable length up to 3 numeric characters
- an..3 variable length up to 3 alphanumeric characters

AI	Content	Format
00	SSCC-18	n2+n18
01	SCC-14	n2+n14
10	Batch or Lot Number	n2+an..20
11(*)	Production Date (YYMMDD)	n2+n6
13(*)	Packaging Date (YYMMDD)	n2+n6
15(*)	Sell By Date (Quality) (YYMMDD)	n2+n6
17(*)	Expiration Date (Safety) (YYMMDD)	n2+n6
20	Product Variant	n2+n2
21	Serial Number	n2+an..20
22	HIBCC - Quantity, Date, Batch and Link	n2+an..29
23(**)	Lot Number (Transitional Use)	n3+n..19
240	Additional Product Identification assigned by the Manufacturer	n3+an..30
250	Secondary Serial Number	n3+an..30
30	Quantity	n2+n..8
310(***)	Net Weight, Kilograms	n4+n6
311(***)	Length or 1st Dimension, Meters	n4+n6
312(***)	Width, Diameter or 2nd Dimension, Meters	n4+n6
313(***)	Depth, Thickness, Height or 3rd Dimension, Meters	n4+n6
314(***)	Area, Square Meters	n4+n6
315(***)	Volume, Liters	n4+n6
316(***)	Volume, Cubic Meters	n4+n6
320(***)	Net Weight, Pounds	n4+n6
321(***)	Length or 1st Dimension, Inches	n4+n6
322(***)	Length or 1st Dimension, Feet	n4+n6
323(***)	Length or 1st Dimension, Yards	n4+n6
324(***)	Width, Diameter, or 2nd Dimension, Inches	n4+n6
325(***)	Width, Diameter, or 2nd Dimension, Feet	n4+n6
326(***)	Width, Diameter, or 2nd Dimension, Yards	n4+n6
327(***)	Depth, Thickness, Height or 3rd Dimension, Inches	n4+n6
328(***)	Depth, Thickness, Height or 3rd Dimension, Feet	n4+n6
329(***)	Depth, Thickness, Height or 3rd Dimension, Yards	n4+n6
330(***)	Gross Weight, Kilograms	n4+n6
331(***)	Length or 1st Dimension, Meters, Logistics	n4+n6
332(***)	Width, Diameter or 2nd Dimension, Meters, Logistics	n4+n6
333(***)	Depth, Thickness, Height or 3rd Dimension, Meters, Logistics	n4+n6
334(***)	Area, Square Meters, Logistics	n4+n6

AI	Content	Format
335(***)	Gross Volume, Liters	n4+n6
336(***)	Gross Volume, Cubic Meters	n4+n6
340(***)	Gross Weight, Pounds	n4+n6
341(***)	Length or 1st Dimension, Inches, Logistics	n4+n6
342(***)	Length or 1st Dimension, Feet, Logistics	n4+n6
343(***)	Length or 1st Dimension, Yards, Logistics	n4+n6
344(***)	Width, Diameter or 2nd Dimension, Inches, Logistics	n4+n6
345(***)	Width, Diameter or 2nd Dimension, Feet, Logistics	n4+n6
346(***)	Width, Diameter or 2nd Dimension, Yards, Logistics	n4+n6
347(***)	Depth, Thickness, Height or 3rd Dimension, Inches, Logistics	n4+n6
348(***)	Depth, Thickness, Height or 3rd Dimension, Feet, Logistics	n4+n6
349(***)	Depth, Thickness, Height or 3rd Dimension, Yards, Logistics	n4+n6
350(***)	Area, Square Inches	n4+n6
351(***)	Area, Square Feet	n4+n6
352(***)	Area, Square Yards	n4+n6
353(***)	Area, Square Inches, Logistics	n4+n6
354(***)	Area, Square Feet, Logistics	n4+n6
355(***)	Area, Square Yards, Logistics	n4+n6
356(***)	Net Weight, Troy Ounce	n4+n6
360(***)	Volume, Quarts	n4+n6
361(***)	Volume, Gallons	n4+n6
362(***)	Gross Volume, Quarts	n4+n6
363(***)	Gross Volume, Gallons	n4+n6
364(***)	Volume, Cubic Inches	n4+n6
365(***)	Volume, Cubic Feet	n4+n6
366(***)	Volume, Cubic Yards	n4+n6
367(***)	Gross Volume, Cubic Inches	n4+n6
368(***)	Gross Volume, Cubic Feet	n4+n6
369(***)	Gross Volume, Cubic Yards	n4+n6
400	Customer's Purchase Order Number	n3+an..30
410	Ship To (Deliver To) Location Code Using EAN-13	n3+n13
411	Bill To (Invoice To) Location Code Using EAN-13	n3+n13
412	Purchase From (Location Code of Party from Whom Goods are Purchased)	n3+n13
414	EAN Location Code for Physical Identification	n3+n13
420	Ship To (Deliver To) Postal Code Within a Single Postal Authority	n3+an..9
421	Ship To (Deliver To) Postal Code With 3-Digit ISO Country Code Prefix	n3+n3+an..9
8001	Roll products - Width, Length, Core Diameter, Direction and Splices	n4+n14
8002	Electronic Serial Number for Cellular Mobile Telephones	n4+an..20
8003	UPC/EAN Number and Serial Number of Returnable Asset	n4+n14+an..16
8100	Coupon Extended Code - Number System Character and Offer	n4+n1+n5
8101	Coupon Extended Code - Number System Character, Offer, and End of Offer	n4+n1+n5+n4
8102	Coupon Extended Code - Number System Character preceded by zero	n4+n1+n1
90	Mutually Agreed, Between Trading Partners or FACT DIs	n2+an..30
91	Intra-Company (Internal)	n2+an..30

AI	Content	Format
92	Intra-Company (Internal)	n2+an..30
93	Intra-Company (Internal)	n2+an..30
94	Intra-Company (Internal)	n2+an..30
95	Internal-Carriers	n2+an..30
96	Internal-Carriers	n2+an..30
97	Intra-Company (Internal)	n2+an..30
98	Intra-Company (Internal)	n2+an..30
99	Internal	n2+an..30

UCC/EAN Application Identifiers
Table 12

(*) : To indicate only year and month, DD must be filled with "00"

(**) : Plus one digit for length indication

(***) : Plus one digit for decimal point indication

Each subfield's format is expressed as the format of the Application Identifier number + the format of the associated data. Each subfield must adhere to the format specified or else the printer will be unable to locate following subfields, causing errors in printing.

Any variable length subfield (unless it is the last subfield in a field) must be terminated by the characters "#6" (without quotes). These characters are translated to the Code 128 "FNC1" character, which is specified by UCC/EAN-128 as the variable-length field terminator. The "#6" is not printed.

When printing a UCC/EAN-128 text field, the printer automatically surrounds each application identifier number with parentheses, and follows the right parenthesis with a space character. Do not use parentheses or spaces when specifying an application identifier string.

Several application identifiers (00, 01, 22, 8003) specify fields that will have a check digit as part of their data. A character must be included in the check digit place (although it need not be the correct check digit.) This character is used only as a placeholder and will not be printed. The printer will calculate the correct check digit and replace the character already there.

```

^A3^D97^D57←
6,832,600,,,30←
1,50,100,80,40,,0,,2,100←
1,50,300,80,50,,0,,2,100←
1,50,500,80,51,5,0←
2,50,60,30,1,3←
3,50,260,30,1,3←
4,50,460,30,1,3←
^D56^D2←
011234567890123-420abcde#63101123456←
code128←
EAN128←
EAN128 Human Readable←
^D3←

```

8.2 DESIGNING WITH BAR CODES

When 0 and 180 degree bar codes are X multiplied (CMX), the space between characters is also multiplied to maintain the correct ratios. The printer will do this internally. Therefore, when multiplying bar codes, use the default value for the spacing element (SP) in the field parameters. On some bar codes (CODE 39 ...) you may choose a larger spacing than the printer default, but you may not use a smaller spacing.

If the Y multiplier (CMY) is not multiplied, a bar code 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 203 to create a one inch tall bar code.

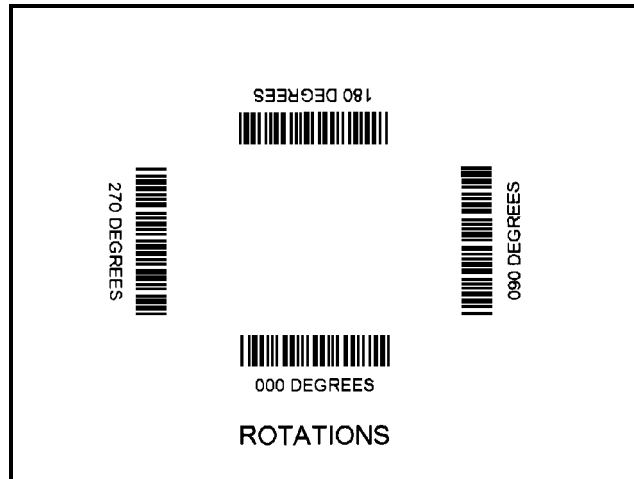
If the bar code is in a ladder (or vertical) orientation (90 and 270 degrees), multiply CMY for width, and CMX for bar code length. It may be necessary to slightly adjust the contrast window and/or adjust the print speed due to the "bleeding" effect caused by heat build up in the print head.

Program sample: Bar codes in four rotations (See Figure 12)

```

^D57←
9,814,609←
1,410,30,11,1,4,,4←
2,410,100,11,1,2,,4←
2,410,137,3,16,2,,4,3,40←
3,680,300,11,1,2,3,4←
3,640,300,3,16,2,3,4,40,3←
4,410,500,11,1,2,1,4←
4,410,465,3,16,2,1,4,3,40←
5,140,300,11,1,2,2,4←
5,180,300,3,16,2,2,4,40,3←
^D56^D2←
ROTATIONS←
000 DEGREES←
090 DEGREES←
180 DEGREES←
270 DEGREES←
^D3←

```



Bar Code Rotations
Figure 12

8.2.1 BAR CODE HUMAN READABLES

Text conversion identifiers (TCI position in field description) 32 and 33 refer to the human readable portion of UPC-A bar codes. They are designed to be used in conjunction with UPC-A bar codes. They only create the text equivalent of the UPC-A bar code and optionally add the extended portions of the bar code lines. This lower portion must then be lined up with the upper to create a correct UPC-A bar code. (See Figure 13)



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. 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.

^D57←
 16,814,609←
 1,100,20,17,1,1←
 3,60,37,11,32,,,2,2←
 3,82,55,11,12,,,2,60←
 2,375,20,19,1,1←
 3,350,37,11,33,,,2,2←
 3,372,55,11,12,,,2,60←
 4,80,150,19,1,1←
 4,65,167,12,20,,,2,60,,8←
 5,408,150,14,1,1←
 5,395,167,7,21,,,2,60,,7
 6,110,270,5,1,1←
 6,120,287,12,13,,,2,60,,8←
 9,180,270,8,3,1←
 7,400,270,5,1,1←
 7,470,287,12,13,,,2,60,,8←
 8,460,270,8,3,1←
 ^D56^D2←
 UPC-A HR W/CHKSUM←
 UPC-A HR W/O CHKSUM←
 01234567890←
 EAN13 012345678901←
 EAN8 0123456←
 UPC-E 00123400005←
 UPC-E 10123400005←
 ^D3←



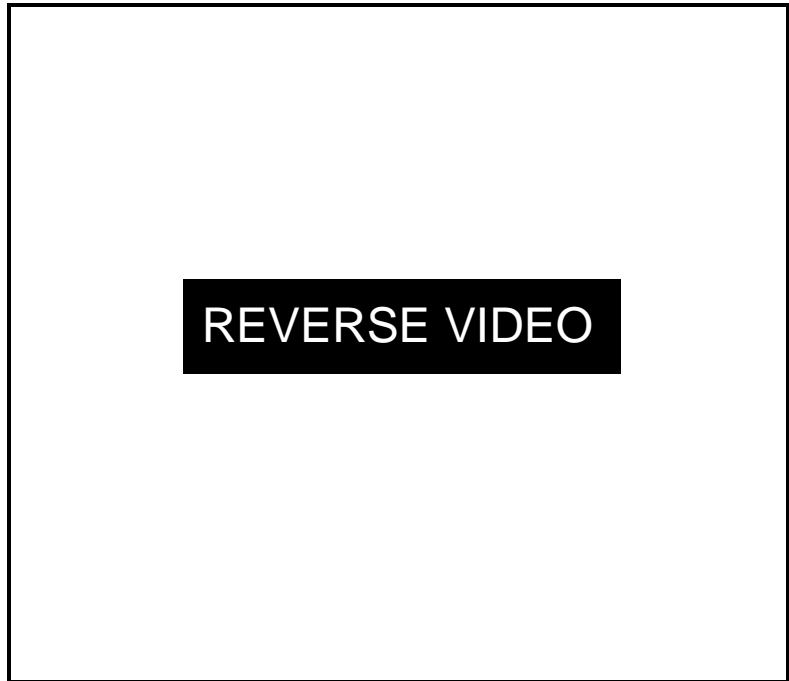
CHAPTER 9: SPECIAL EFFECTS

9.1 REVERSED PRINT (WHITE TEXT OVER BLACK)

The 412 has the ability to print white text on a user definable black background. Reversed text can be produced by manually placing a black box on top of an existing image by using the line command and setting the line and text field ANs (attribute numbers) to a value of 1. It should be noted that the above method produces a fixed background that will not automatically adjust to the amount of text printed on top.

Reverse video sample:

```
^D57←  
2,812,609←  
1,200,425,13,1,6,,,,,,,,,1←  
1,170,410,,6,,,450,90,,,,,,,,,1←  
^D56←  
^D2←  
REVERSE VIDEO←  
^D3←
```



Reverse Video Sample
Figure 15

CHAPTER 10: OPTIONS

The 412 printer has many options available to enhance the performance of the printer. Contact your sales representative for more information on these features.

10.1 MICROCOM GRAPHICS CONVERSION UTILITIES

PCX2MIC.EXE and BMP2MIC.EXE

This PC software program converts PCX or BMP to the 412 format. These converted images can be stored in the 412 printer. See chapter 4 and 6 for more information about printing graphic images.

10.2 MICROCOM DOWNLOADABLE FONT UTILITY

JET2412.EXE and TTF2MIC.EXE

These 16-bit PC software programs convert LaserJet II™ or TrueType™ compatible fonts to the Microcom format. Converted fonts may be stored in user RAM for future use. See chapter 9 for more information on downloadable fonts. Please note that the battery backup option is necessary to permanently store downloaded fonts.

10.3 WYSIWYG SOFTWARE PACKAGES

WYSIWYG Software packages offer a WYSIWYG (**W**hat **Y**ou **S**ee **I**s **W**hat **Y**ou **G**et) label design software package.

10.4 CLEANING KIT

An approved cleaning kit is offered for the 412 printer. It is suggested the printer be cleaned once every two weeks, every 5,000 labels, or whenever label stock is replaced.

10.5 WINDOWS DRIVER

Printer drivers are available for Windows 95, 98 and NT. Please contact Microcom Corporation for more information.

APPENDIX A: WARRANTY AND REPAIR PROCEDURES

LIMITED WARRANTY

Microcom Corporation printers, excluding thermal print heads which are warranted separately below, are warranted against defects in material and workmanship for twelve (12) months from the date of original shipment by Microcom Corporation. This warranty does not cover normal wear and tear and shall be null and void if the printer is modified, improperly installed or used, damaged by accident or neglect, or in the event any parts are improperly installed or replaced by the user.

The thermal print head is covered by a limited warranty of three (3) months or 500,00 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 to 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 >
8220 Green Meadows Dr. N.
Lewis Center, OH 43035 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 customer's expense.

APPENDIX B: LABEL SAMPLES

APPENDIX C: SAMPLE BASIC PROGRAM

This Basic program produces labels for computer diskettes. It is intended to show the simplicity that higher languages communicate with the 412 printer. Communication parameters may need to be changed for some computers.

```
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 C1 = LEN(C1$)
66 INPUT"Comment #2: ",C2$
67 C2$ = LEFT$(C2$,50)         :REM Limit comment to 50 characters
68 C2 = LEN(C2$)
84 PRINT#1,"^A3^D97"           : REM Tag mode #3
85 PRINT#1,"^D57"              : REM format following
90 PRINT#1,"6"                  : REM label header
95 PRINT#1,"1,150,5,";D;"1,6"   : REM fields
100 PRINT#1,"2,530,5,";ND;"1,6"
110 PRINT#1,"3,320,110,";DT;"1,13,,4"
115 PRINT#1,"4,50,5,";F;"1,6"
116 PRINT#1,"5,80,75,";C1;"1,10"
117 PRINT#1,"6,80,50,";C2;"1,10"
120 PRINT#1,"^D56^D2"          : REM select layout and
130 PRINT#1,D$                  : REM send text data
140 PRINT#1,ND$
150 PRINT#1,DT$
155 PRINT#1,F$
156 PRINT#1,C1$
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
```

APPENDIX D: QUICK REFERENCE COMMAND SUMMARY

The following is a list of **HEADER** element mnemonics and the default values:

HFM,LSX,LSY,WEB,GAP,DPS,LCB,AGD,SPG,OFX,OFY,,,FMT
0,832,443,10,10,48,0,1,478,0,0,,,0

The following is a list of **FONT, BAR CODE, AND GRAPHIC IMAGE** field mnemonics:

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

The following is a list of **SQUARE LINE** field mnemonics and the default values:

1,XB,YB,,6,,,,XS,YS,,,,AN
1,1,1,,6,,,,1,1,,,,0

The following is a combined list of all **TCI** (Text Conversion Identifier) numbers:

- 1 Text (standard)
- 2 Text Surrounded by Asterisks
- 3 Text with UPC-A/UPC-E Checksum Digit Added
- 6 Square Line/Box
- 8 Downloadable Fonts and Graphics
- 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
- 17 Text with UPC-E Checksum and Extended Bars Added
- 20 EAN-13 Bar Code
- 21 EAN-8 Bar Code
- 22 Text with EAN-13 Checksum and Extended Bars Added
- 23 Text with EAN-8 Checksum and Extended Bars Added
- 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
- 36 Postnet (Zip+4)
- 37 Postnet (Zip+6)
- 38 MaxiCode Bar Code
- 40 Code 128 Bar Code (Automatic Compression)
- 42 Codabar Bar Code
- 43 Code 93 Bar Code
- 44 AS-10 Bar Code
- 46 PDF417 Bar Code
- 50 EAN-128 Bar Code
- 51 Text with EAN-128 Information

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

```

12345678
^ABxxxxxxxxxx

```

Power-up Label Format

000=RESERVED
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
1=Use Saved Format File, 0=Rom Format
1=Print Button Enable, 0=Disable
1=Disable Button Use, 0=Enable
1=>RESTARTED< Response Enable, 0=Disable
1=Clear Text Enable, 0=Disable

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

```

12345678
^ABxxxxxxxxxx

```

1 Detect Black Line On Power-up
1=Enable Binary Compression, 0=Disable
Always 0
1=Enable "Head-up" switch, 0=Disable
Always 0
1=Send Response After Print (COM1)
0=No Response After Print
1=Invert >INPUT 1< Polarity, 0=Normal
1=Disable Extended ASCII, 0=Enable

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

	12345678	
	^ABxxxxxxxx	
		0000 = Not decoded (default)
		0001 = Danish
		0010 = 860
		0011 = Spanish
		0100 = 850
		0101 = German
		0110 = 865
		0111 = Swiss
		1000 = 852
		1001 = French
		1010 = 863
		1011 = Swedish
		1100 = 437
		1101 = Italian
		1110 = British
		1111 = US English
		1=Auto-size on Power-up, 0=Disable
		1=Blow-hole Sensing Enable, 0=Disable
		1=External Print Request Enable,
0=Disable		
		1=Enable Slashed Zeros, 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)

31 Show Clock: This command will send the date and time to the serial port.

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

33 Display Model and Revision Number.

X	35	Contrast Window Adjust: This is the temporary contrast adjustment. The ^AX is between 60 and 140%
1		60% of Base
2		70% of Base
3		80% of Base
4		90% of Base
5		100% of Base
6		110% of Base
7		120% of Base
8		130% of Base
9		140% of Base
XX	36	Adjust Contrast Base: Non-Volatile command. The ^AXX is between 10 and 200%. Section 5.3.
	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.
5		Diagnostic Mode
	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 (1-128). Section 5.3.6.
XX	55	Select Default Label Layout: Select from the ROM power-up layouts. ^AXX ranges from 1 to 8.
	56	Select User Defined Layout: Signals the end of the label field definition.
	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 (1-128). Section 5.3.6.
XX	59	Save Format File: ^A selects which one (1-128). 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.
XX	66	Clear Single Stored Label Format: ^A select which slot to clear (1-128).
	70	Clear commands 73-76.
	71	Load Maxicode Bar Code Data:
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.
	77	Load PDF-417 Bar Code Data:

	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 decreased by the value from ^D85.
	2	Enable decrement. The serial number will be decreased 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	Gap Detection Sensitivity: The proper value may be obtained using the auto-size (^D39) command. The ^A value sets the point (0-255) at which the printer detects a gap or black mark. This command is non-volatile and will default to 30 when using the transmissive sensor and 120 when using the reflective sensor. Although this default value should work properly with most media, it is a good idea to place this command at the beginning of all format files in order to guarantee that it has not been changed by another user or application. If this value is not correct, the printer may not detect the end of the label and may feed extra media or stop too soon.
XX	92	Load Value for Slices to Process: This command adjusts the number of slices generated before the drive motor starts moving. The default is 256 and the valid range is 1 to 366.
	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:**
- 0 Turn off peel-and-dispense mode.
- 1 Turn on peel-and dispense mode.
- 2 (Custom Applicator Mode - peel and dispense with no delay.)
- 99 Cutter Control:** This command will enable or disable full and/or partial cuts. Command 102 and 103 can be used to set the cut intervals. The Full Cut Interval (^D102) and the Partial Cut Interval (^D103) may be used at the same time but where a full and partial cut coincide, only the full cut will be preformed. (Partial cuts are only available if the full/partial cutter was installed. If this command is set to a value of 2, the printer will pause after the partial cut and wait for the user to take the label.)
- 0 Disable cutter.
- 1 Enable Full Cut
- 2 Enable Partial Cut
- 3 Enable Full and Partial Cut
- 100 Clear User RAM:** This command will clear all downloaded fonts, graphics, and stored label formats. See Section 5.3.8.
- 101 Send User RAM Available:** The printer will send the number of free bytes to the serial port (ie. >192480<).
- XX 102 Full Cut Interval:** This command tells the printer when to full cut. The default value is 1. If it is set to a value of 0 the printer will full cut whenever the copies count is reached (default copies count is 1). If this command is set higher than 0 (max 65536), the printer will full cut when that quantity is reached. This command will only function if the Cutter Control command (^D99) is set to allow full cuts. *(Please note that a full cut will override a partial cut. The following examples assume that the ^D99 command is set to a value of 3. Example #1: If the Full Cut Interval is set to a value of 5 and the Partial Cut Interval is also set to a value of 5, the printer will full cut. Example #2: If The Full Cut Interval is set to a value of 5 and the Partial Cut Interval is set to a value of 1, the printer will partial cut after labels 1 through 4 and full cut after label 5.)*
- XX 103 Partial Cut Interval:** This command tells the printer when partial cut. The default value is 1. If it is set to a value of 0, the printer will partial cut whenever the copies count is reached (default copies count is 1). If this command is set higher than 0 (max 65536), the printer will partial cut when that quantity is reached. This command will only function if the Cutter Control command (^D99) is set to allow partial cuts. *(Please note that a full cut will override a partial cut. The following examples assume that the ^D99 command is set to a value of 3. Example #1: If the Full Cut Interval is set to a value of 5 and the Partial Cut Interval is also set to a value of 5, the printer will full cut after label 5. Example #2: If The Full Cut Interval is set to a value of 5 and the Partial Cut Interval is set to a value of 1, the printer will partial cut after labels 1 through 4 and full cut after label 5.)*

-
- XX 104 Load Graphic Image or Font into User Memory without Compression:** Send graphic image or font using encoded 7bit ASCII hex. ^A select which slot to place the graphic image or font in (1-255). This command support graphics over 64KB and fonts 64 KB or less. Fonts cannot exceed 64KB in size.
- 0 105 Clear Fonts and Graphics:**
Clear all fonts and graphics.
- 1-255** Clear individual fonts and graphics. The value will determine which slot is cleared.
- 106 Load Font:** This method does not support compression. Fonts must be less than 64KB. This method is included for legacy support only. Microcom Corporation recommends either the ^D104 or ^D107 methods.
- XX 107 Load Graphic Image into User Memory using Binary Compression:** ^A select which slot to place the image/font in (1-255). This command support graphics over 64KB. It can only be used on 8 bit data connections. Because this command greatly reduces download time, use this command whenever possible. (Communications interface must pass 8 bit data. Parallel ports and serial ports set to 8 data bits, no parity are examples of 8 bit data connections.)
- XX 108 Sleep Mode:** If the ^A value is 0, all printers in multidrop mode will go to sleep. Otherwise, the ^A value represents a printers address. Only the printer with this address will go to sleep. (Printers power up in sleep mode.)
- XX 109 Wake Mode:** If the ^A value is 0, all printers in multidrop mode will wake up. Otherwise, the ^A value represents a printers address. Only the printer with this address will wake up. (Printers power up in sleep mode.)

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