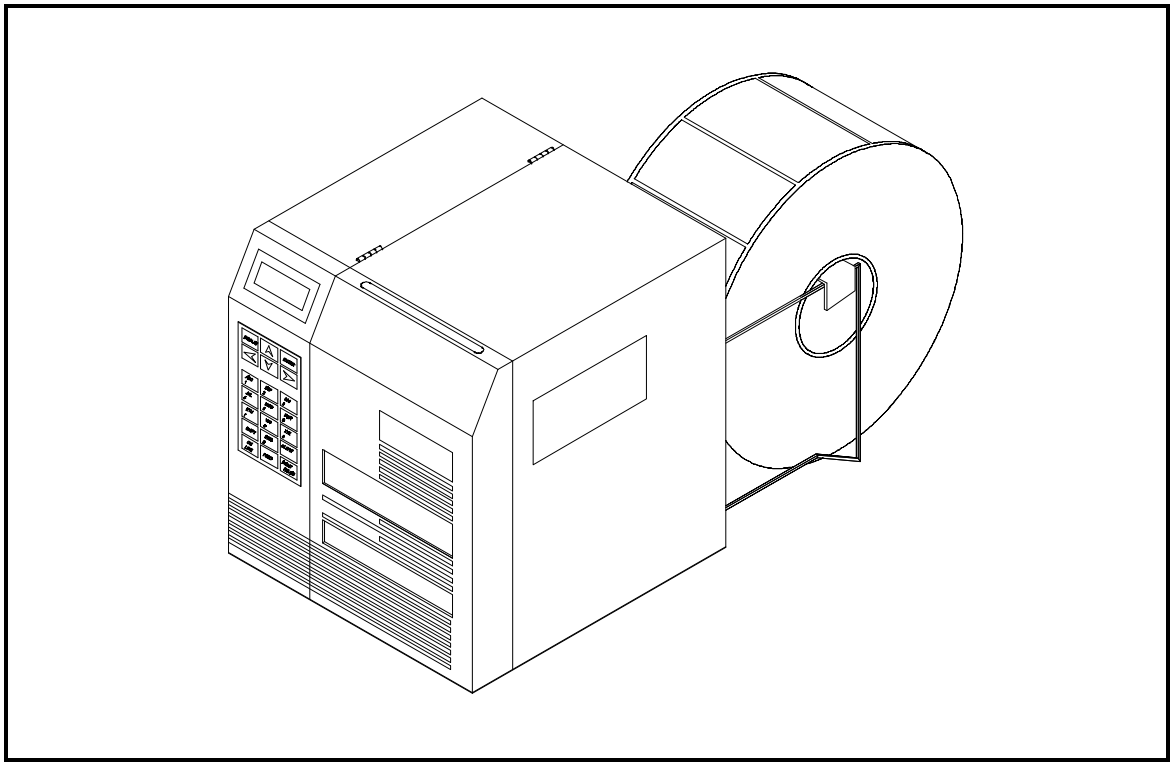
MICROCOM CORPORATION

MODEL 470

DIRECT THERMAL / THERMAL TRANSFER PRINTER

OPERATOR'S MANUAL

Part Number 880010-0317



October 1995 Software Version 3.17

Operator's Manual

470 Direct Thermal/Thermal Transfer Printer
- Revised 10/10/95 MSG -

Printed in the U.S.A.

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Introduction

The Microcom 470 is a Direct Thermal or Thermal Transfer label printer with a high resolution (832 dots or 8 dots/mm), 4.09 inch wide print head. Through the use of dual high speed processors, the printer has the 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 kerning. It offers virtually unlimited text 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. To offer even more flexibility, our new scaleable or "Vector" fonts and lines can be rotated in one degree increments. Once the labels are designed, they can be stored in the 470's memory for high speed printer access.

The 470 is capable of printing on most types of label stock or fax paper. It offers operation in a tag/tear, peel-and-dispense, batch mode, and user-defined advance mode. It can handle blow-hole, black-line, label gap, and continuous stock.

Many printer applications use the same label format, but change the data on every label. This is not a problem for the Microcom 470 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 also offers a complete line of software packages which allow quick and easy on-screen label designing, along with complete database capabilities.

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CHAPTER 1: FEATURES AND SPECIFICATIONS

The Microcom 470 Direct Thermal/Thermal Transfer printer is designed with many standard features that are unique when compared to other printers. The 470 is built to meet the demands of complicated applications and rigorous use. A guarantee of excellence in engineering is provided by fulfilling the requirements for approval by UL, CSA and the FCC.

1.1 SPECIAL FEATURES

- **!** Historical Dot Control provides increased print quality up to 4.5 ips.
- **!** Menu Driven Printer Control with LCD Display and Keypad
- **!** Operates as tag or ticket feed
- **!** Resolution of 8 dots/mm (.0049" per dot) and a print width of 832 dots (4.09")
- **!** WYSIWYG software compatible
- **!** Prints at speeds up to 8 ips (reduced roll diameter may be necessary above 6 ips)
- **!** Large media supply rack allows roll size up to 10 inches OD
- **!** Prints on die-cut, continuous, fax, or preprinted labels
- **!** Prints on tag stock up to 6.0 mil thickness or 9.0 mill with factory adjustment
- **!** Software-controlled contrast adjustment
- **!** Standard memory of 512Kbytes ROM, 256Kbytes SRAM, and 2Mbytes DRAM
- **!** Internal date and time keeping
- **!** Easy to load label path to prevent label jams or misfeeds
- **!** Detects label gap, black line, or blow-hole stock
- **!** Internal statistical counter for inches and labels printed
- **!** Downloadable Fonts and Graphics capability
- **!** Incrementing and decrementing fields
- **!** Machine state enquiries for security and maintenance

1.2 BAR CODES

- Code 39, Interleaved 2 of 5, CODABAR, Code 128, Code 93, Plessey, Modified Plessey, UPC-A, UPC-E, EAN-8, EAN-13, Postnet, and selectable ratios for producing HIBC, AIAG, and Logmars
- Bar codes may be printed in 0, 90, 180, and 270 degree rotations

1.3 FONTS

- Vector fonts, converted HP LaserJet II™ font compatibility and 18 resident bit mapped font styles, including OCR-A
- All Bit Mapped fonts expandable in height and width up to 8 times
- Rotated Vector fonts adjustable from 0 to 360 degrees
  (Bit Mapped fonts and bar codes in 0, 90, 180, and 270 degrees)

1.4 PRINTING

- Peel function strips label off of backing
- Tag/tear mode advances label to the tear bar
- Batch mode printing
- User defined label advancement for special stock or application
- Label-presence sensor allows printer to dispense at the operator's pace
- Label back-up prevents wasted media in tag/tear and peel modes
- "Epson® Similar" text emulation mode

1.5 INTERFACE COMMUNICATIONS

- Serial: RS-232C, 25-pin female D-Sub connector (DCE) and 2Kbytes buffer
  - -Flow control: XON/XOFF, CTS
  - -Baud rate: 300 to 38400, user-selectable
  - -Parity: odd, even or none
  - -Data bits: 7 or 8
- Parallel: 36-pin female Centronics® connector and 2Kbytes buffer

1.6 PHYSICAL

- **!** Construction: Rigid painted steel with high impact molded front panel
- **!** Height: 11.00" (279.4mm)
- **!** Width: 10.125" (257.2mm)
- **!** Depth: 10.10" (256.5mm)
- **!** Weight: 35 LBS (15.89 K/g)

1.7 ENVIRONMENT

- **!** Temperature: 0¨ C to 40¨ C operating
- **!** Humidity: 10-90% non-condensing

1.8 ELECTRICAL

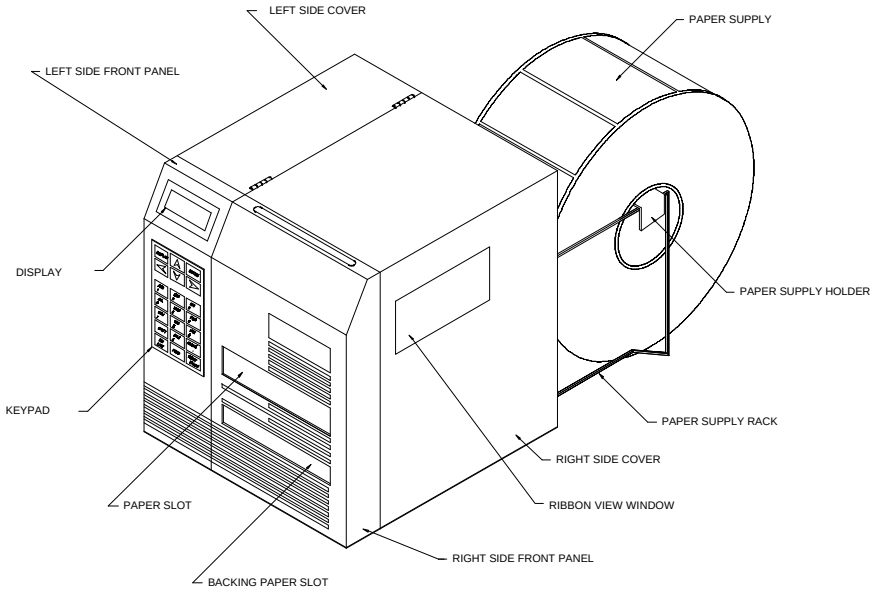
- **!** Voltage: Switchable 100,110,120,220,240VAC nom., 50-60 Hz.
- **!** Current: 3 Amps maximum (100VAC)

1.9 OPTIONS

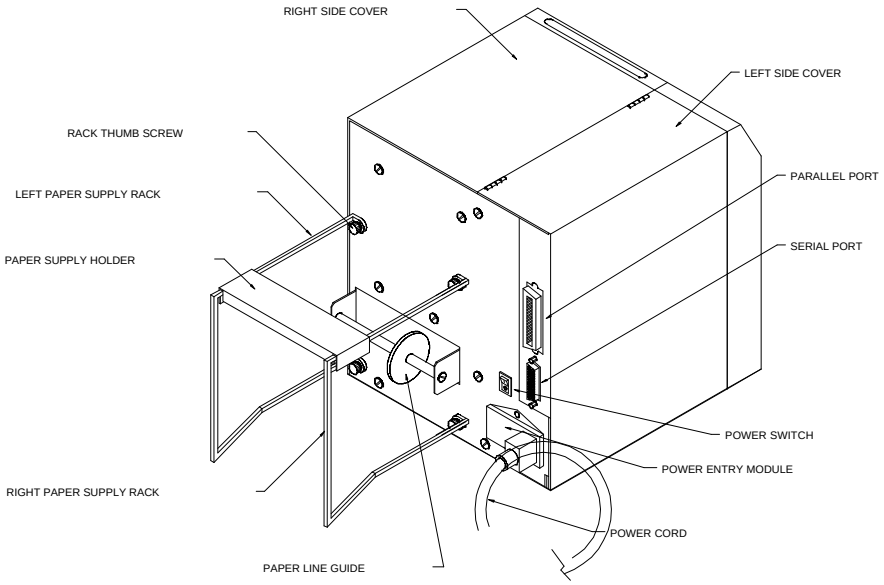
- **!** Cleaning Kit
- **!** Assorted Printer Cables
- **!** On-screen label design PC software packages
- **!** PCX to printer graphics conversion PC software
- **!** PCX to downloadable bitmap PC software
- **!** Downloadable fonts

1.10 APPROVALS

- **!** UL, CSA, Complies with FCC, Class A



Microcom 470 Printer
Front View
Figure 1

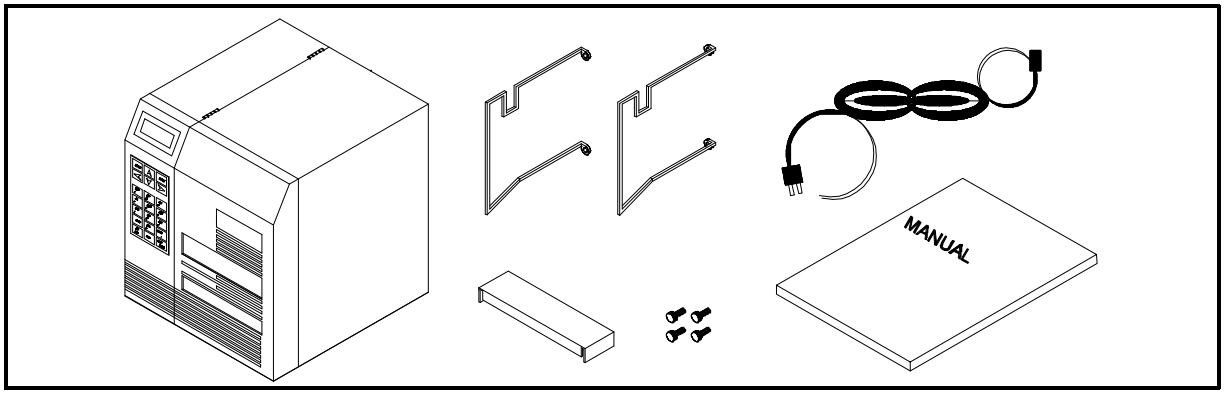


Microcom 470 Printer
Rear View
Figure 2

CHAPTER 2: BASIC OPERATION

2.1 UNPACKING THE 470 PRINTER

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



Printer Parts figure 3

2.2 MOUNTING THE LABEL SUPPLY RACKS

Position the printer so that the rear is assessable. Refer to Figure 2 and note the mounting positions of each rack. Notice that the bent flanges point inward. Using the thumbscrews provided, attach the racks to the printer.

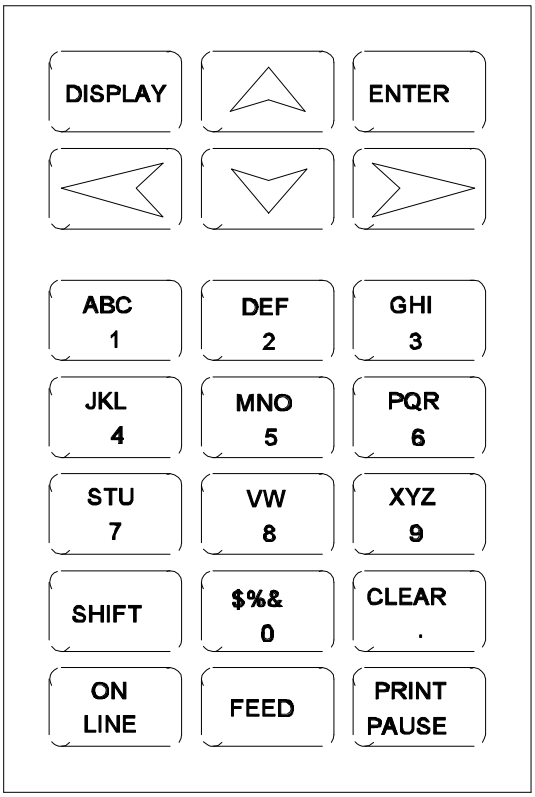
2.3 INITIAL POWER UP

Before connecting the printer to a power source, verify that the voltage selector, located on the rear of the printer, is set correctly. If not, open the selection door and rotate the cylinder until the correct voltage is shown.

Plug the printer in and turn the power switch on. The back lighted LCD should illuminate and temporarily display 'ASSUMING DIRECT THERMAL' or 'ASSUMING THERMAL TRANSFER'. If this does not occur, check the power source and if necessary call your service organization.

2.4 FRONT PANEL KEYPAD AND STATUS DISPLAY

The front panel contains a 21-key, alphanumeric, keypad and a two-line, back lighted, LCD display. Through the use of the keypad and display, many printer commands can be directly entered or modified.



Keypad Layout
Figure 4

2.4.1 PRINT/PAUSE KEY

The front panel keypad (see Figure 4) contains a label 'PRINT/PAUSE' key. If this key is pressed the unit will print the currently loaded label format or the default label if no format has been loaded. If the printer is in the process of printing a predetermined quantity of labels (see ^D73, section 5.3), pressing the 'PRINT/PAUSE' key will pause the printer. Pressing the key again will allow the printer to continue the batch.

If the 'PRINT/PAUSE' key is depressed when the power is turned on, the printer is put into test mode and a statistics and test label will be printed (see ^D29 chapter 5.3.10).

2.4.2 FEED KEY

Pressing and holding the 'FEED' key will cause the printer to advance until released. This key can be use to load and align paper stock.

2.4.3 ON-LINE KEY

Pressing the 'ON-LINE' key causes the printer to suspend the processing of characters through the communication ports and display the message OFF-LINE. If a character is sent to the printer when communicating serially, the printer will accept the character and send an X-OFF (assuming X-OFF has been enabled). The printer will continue to receive characters until the buffer is full, at which time any further characters will be ignored. The Clear to Send signal is always low when OFF-LINE.

2.4.4 ALPHA-NUMERIC KEYS

The Alpha Numeric keys are used to modify formats and input variable data into the printer. The unshifted characters are 0 through 9 and the period. The shift key is pressed once for the characters ADGJMPSVX$ and the clear key, twice for BEHKNQTWZ%, and three times for CFILORUZ&.

2.5 MENU OPERATION

General Operation

Press [DISPLAY] to access the menu screen.

Press [▲] or [▼] to scroll through options.

Press [ENTER] to accept current option.

Press [DISPLAY] to exit/cancel current menu/option.

Press [PRINT PAUSE] to print current label.

Press [FEED] to advance paper and ribbon (if in transfer mode).

Variable Data Entry

Press [ABC 1] to input a 1.

Press [SHIFT] then [ABC 1] to input an A.

Press [SHIFT] then [SHIFT] then [ABC 1] to input a B.

Press [SHIFT] then [SHIFT] then [SHIFT] then [ABC 1] to input a C.

Press [SHIFT] then [CLEAR .] to input a space.

Press [◄] or [►] to scroll left or right through entry.

2.6 LOADING MEDIA

The following two sections explain the dispensing modes and printing methods. Refer to figures 2 and 5 for the printer components. If narrow stock is used (3.5 inches wide or less), it may be necessary to adjust the printhead support screw (see section 2.8).

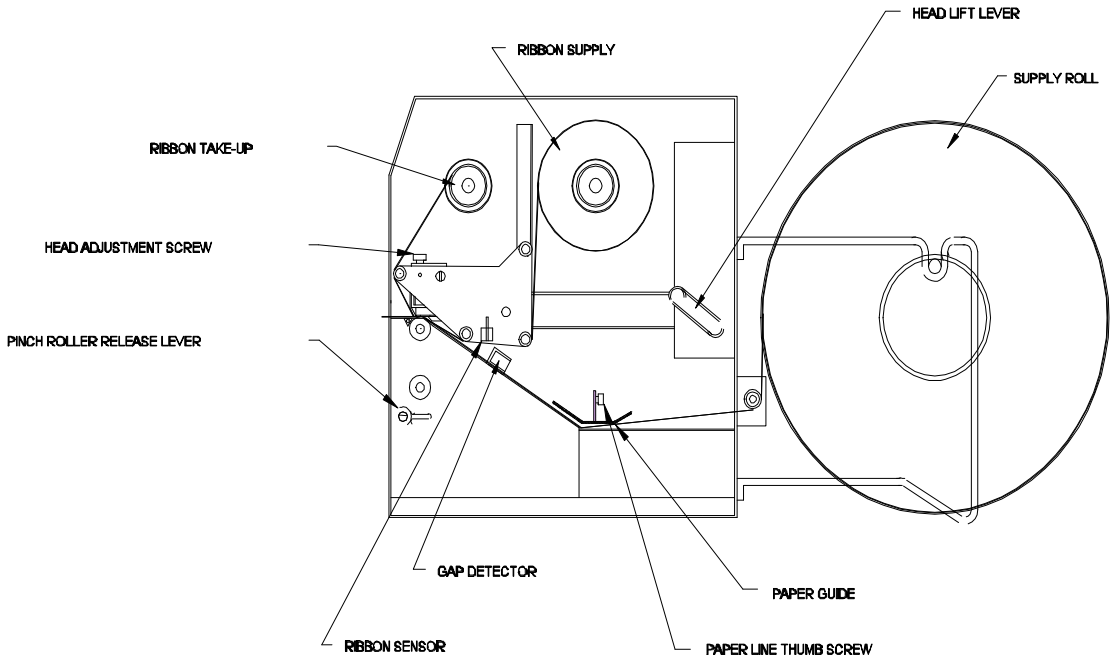
Thermal Transfer Note:
The 470 will, on **power-up**, automatically sense a loaded ribbon and select thermal transfer mode. Please note that the printer will not select thermal transfer mode if the ribbon is loaded after the printer is turned on. To correct the situation simply cycle the power once the ribbon has been loaded.

2.6.1 NORMAL AND TAG/TEAR MODES

Place the label supply shaft and stock onto the wire rack. Raise the print head with the lift lever and insert the paper with the thermally sensitive side up. Follow the loading diagram and thread the paper through the printer and under the print head. Lower the head lift lever and you are ready to print.

2.6.2 PEEL-AND-DISPENSE MODE

Follow the paper loading in the normal and tag mode directions. Pull out several inches of paper and remove the labels. Be sure the leading edge of the stock is flat and square. Rotate the pinch roller release knob and insert the paper between the black drive roller and the white pinch roller. Remove the slack and release the pressure on the pinch roller by turning the release knob.



Printer Feed Mechanism
Figure 5

2.7 RIBBON SELECTION

Many different ribbons can be used with the 470. However, to extend printhead life and achieve quality results, it is necessary to correctly match the ribbon to the receiver stock. Incorrect matching can cause premature printhead failure. Please contact Microcom concerning recommended media and compatibility.

2.8 PRINTHEAD SUPPORT ADJUSTMENT

When using narrow media, less than 3.5" wide, it is possible to increase print quality and prevent premature drive roller wear by correctly adjusting the printhead support screw. To make the adjustment, simply turn the head adjustment screw (see figure 5) clockwise until the printhead is slightly lifted from the drive roller. Once the head has been lifted from the roller, verify that the print head has not been lifted too far by printing a test label. If the print quality on the right side of the label appears weak, then lower the printhead by turning the thumb screw counter clockwise until the print quality is corrected. If the quality problem appears on the left side, turn the screw clockwise until the print quality is corrected.

2.9 CLEANING INSTRUCTIONS

The 470 printer and printhead should be cleaned approximately every 7,500 inches or every two weeks whichever occurs first. The printer should also be cleaned whenever you run out of label stock. Proper cleaning assures that any adhesive that may come off the end of the previous roll, is removed. A Microcom cleaning kit (part #040005) should be used for cleaning and maintaining a Microcom printer product. It is important to note that optimum printhead life is achieved by cleaning the printer and printhead.

To clean your Microcom 470 printer:

1) Turn the printer off.

2) Lift the printhead using the lift lever at the rear of the printer and remove any label stock that remains inside the head mechanism.

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

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

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

6) Moisten the felt side of a cleaning card with the cleaning solution. Raise the print head and insert the cleaning card under print head with the felt side facing up. Lower the print head and press the feed key to feed the card through the printer. Allow the printhead to ride on the cleaning card. Repeat the process if needed. The cleaning card may be used once at each end.

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

CHAPTER 3: COMMUNICATIONS

The 470 is very versatile. It can be interfaced to PC's, mini-computers, main frames, and special purpose machines. It is capable of serial RS-232-C, Centronics® parallel, and optionally RS-422/485 serial communication. The following sections explain the communication interfaces.

Out of the box, unless otherwise requested, the Microcom 470 communicates using serial RS-232-C at 9600 baud, 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 1 shows the signals of the 470's 25-pin RS-232 serial port and table 2 shows the parallel port configuration.

If serial RS-232-C communication is selected and XON/XOFF hand shaking is used, the only signals the 470 requires are the RXD, TXD, and GND signals. If hardware (CTS) hand shaking is used, a CTS signal is provided and an RTS signal is required. 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 these signals.

Serial Port Configuration

25 TO 9 PIN

State	470	Direction	PC
HI	8	DCD---->---- DCD	1
XX	3	TXD---->---- RXD	2
XX	2	RXD----<---- TXD	3
HI	20	DTR---->---- DSR	4
LO	7	GND—<->--- GND	5
HI	6	DSR---->---- DTR	6
DC	4	RTS----<---- CTS	7
XX	5	CTS---->---- RTS	8
HI	18	5V	

DB-25 DE-9

DC = Do Not Care
XX = Indeterminate

25 TO 25 PIN

State	470	Direction	PC
XX	3	TXD---->---- RXD	3
XX	2	RXD----<---- TXD	2
HI	20	DTR---->---- DSR	6-8
LO	7	GND—<->--- GND	7
HI	6-8	DSR---->---- DTR	20
DC	4	RTS----<---- CTS	4
XX	5	CTS---->---- RTS	5
HI	18	+5V---->---- +5V	18

DB-25 DB-25

DC = Do Not Care
XX = Indeterminate

Table 1

Parallel Port Configuration	
1 = /STROBE	12 = PAPER OUT
2 = D0	13 = SCLT
3 = D1	14 = NC
4 = D2	15 = NC
5 = D3	16 = LOGIC GND
6 = D4	17-18 = NC
7 = D5	19-30 = LOGIC GND
8 = D6	31 = /INIT
9 = D7	32 = /ERROR
10 = /ACK	33 = LOGIC GND
11 = BUSY	34-36 = NC
(36 PIN CENTRONICS®)	

Table 2

3.2 PRINTER CABLES

For parallel connection: Use a standard 36 pin male Centronics® to 25 pin male cable, connected from the desired parallel port of the host computer to the 36 pin connector on the 470.

For serial connection: If your host computer has a...

9 pin serial com port - Use a 9 pin female to 9 pin male video extension cable. (pin #1 to pin #1...)

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

Note: NULL modem cable adapters are not necessary since the printer is DCE equipment.

CHAPTER 4: DESIGNING LABELS USING LDS

Label Design Software (LDS) refers to the software resident in the printer used to decipher label formats sent by the host computer. All fonts, character sets and bar codes symbologies are resident in the printer.

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

1: Control commands to define printer operation
2: A header to define label height, width, print speed, etc..
3: Field data to define placement of text, bar code, graphic or line
4: Actual text data to place in the above text or bar code fields
5: Control commands to initiate printing

4.1 CONTROL CHARACTERS

Throughout this manual there are references to control characters. In order to print them in this manual, they have been written using standard characters and icons. Escape characters are represented by <ESC> and a carriage return is represented by the ↩ symbol. It is important to note that all printer functions, unless otherwise noted, must be followed with a carriage return↩.

4.2 GETTING STARTED

There are many different machines that can send information to the 470 printer: For example - main frames, mini-computers, special purpose computers and PC's. However, if you are using the printer for the first time, the easiest way to start is with a PC and a terminal emulation software program. This will allow two-way, serial communication with the printer. You will be able to quickly upload files and access label-sizing and other features that will help considerably in formatting your first labels.

4.2.1 PC CONNECTION (SERIAL)

Items required:

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

Note: This communications test assumes that you have a standard serial 470 printer.
Set the communication parameters in the PC terminal software program to 9600 baud, no parity, 8 data bits and 1 stop bit. Unless modified by the user, this is the printers' communication configuration out of the box. Depress ^C (ASCII or control code) on the PC keyboard. If the printer prints a label, proper PC to printer communications have been confirmed. Depress ^E to verify printer to PC communication. You will receive a text response from the printer.

If a terminal program is not available, it is possible to send files to the printer using the DOS COPY command. To do this you must first create a text file containing the information to be sent (i.e. ^C). You may use any text editor that **does not** add its own formatting characters (QEDIT, Wordstar non-document mode, DOS 5.0 EDIT, EDLIN...).

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

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

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

C:>COPY FILENAME COM1

4.2.2 PC CONNECTION (PARALLEL)

Items required:

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

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

^C

You may use any text editor that does not add its own formatting characters (QEDIT, Wordstar non-document mode, DOS 5.0 EDIT, EDLIN...). Send the file to the printer using the following DOS command. Note: LPT1 may be any available printer port on your PC.

C:>COPY FILENAME LPT1

4.2.3 LEARNING LDS

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

There are some special features offered by the 470 printer that will aid in label design. For example, the autosize command (^A2^D39↵) will provide most of the header format information needed to define the different properties of label stock. The state of the machine is accessed through the enquiry command (^D5↵ or ^E). The statistical printer information is made available through the ^A0^D29↵ command.

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

4.3 FORMATTING LABELS: AN OVERVIEW

A label format consists of a header record and field records, followed by the text data to be printed. The records describe how the label is to be printed. The header contains information about the label itself such as label height, width, print speed, etc. The field records refer to the

data section and contain information about positioning coordinates, the type of character generators or bar codes to use, etc.. Below is a sample label format. We will refer to this format as we break down the components of its structure.

(See Figure 6)

^D57↵	A label format is coming
4,812,609,,20↵	Header information
1,100, 40, 4, 1,4↵	Field #1 information
2,100, 60,17, 1,4↵	Field #2 information
3,100,100, 5, 1,6↵	Field #3 information
3,100,150, 5,16,2,,,,30↵	Field #4 information
^D56↵	Select RAM Format
^D2↵	Text Data is Coming
EASY↵	Text String #1
MICROCOM MAKES IT↵	Text String #2
HELLO↵	Text String #3
^D3↵	Print Label 1

Microcom Label
Figure 6

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

The next line is the header information: sizing the label (812 dots wide 609 dots high).

The next four 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 #3 is accessed twice. The format will print the word 'EASY' and then the bar code equivalent.

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

4.4 LABEL HEADER

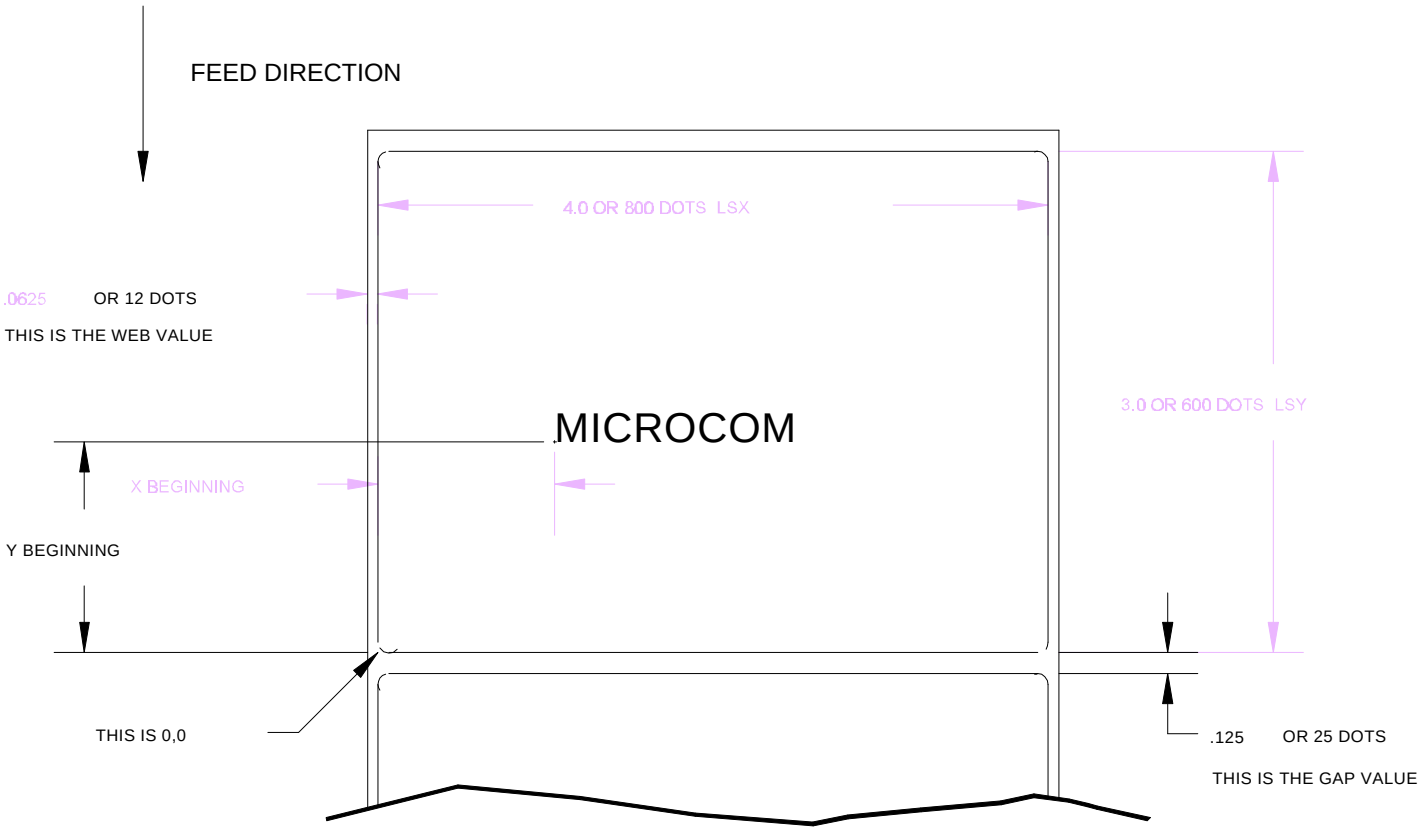
The header consist of eleven parameters. These parameters contain information about the label. It is not necessary to enter information for all of the parameters: If a parameter is left blank, then the default value will be used. A carriage return must follow the label header parameters.

The value of measurement for many of the header elements is the dot. There are 203 dots per inch on a 470 print head (8 dots/mm). There is a maximum 832 dots in the X direction (width). The Y direction (length) is 4060 dots or 20 inches long. (The print length is virtually unlimited in Epson® mode).

Most header parameters can be supplied using the autosize 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, 443,  10,  10,  48,   0,   1, 535,   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. (maximum of 4020 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. Autosizing (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 3.2 inches per second (DPS value = 48). 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
0	203.2	8.0	480
1	200.7	7.9	474
2	198.1	7.8	468
3	195.6	7.7	462
4	193.0	7.6	456
5	190.5	7.5	450
6	188.0	7.4	440
7	185.4	7.3	438
8	182.9	7.2	432
9	180.3	7.1	426
10	177.8	7.0	420
11	175.3	6.9	414
12	172.7	6.8	408
13	170.2	6.7	402
14	167.6	6.6	396
15	165.1	6.5	390
16	162.6	6.4	384
17	160.0	6.3	378
18	157.5	6.2	372
19	154.9	6.1	366
20	152.4	6.0	360
21	149.9	5.9	354
22	147.3	5.8	348
23	144.8	5.7	342
24	142.2	5.6	336
25	139.7	5.5	330
26	137.2	5.4	324
27	134.6	5.3	318
28	132.1	5.2	312
29	129.5	5.1	306
30	127.0	5.0	300
31	124.5	4.9	294
32	121.9	4.8	288
33	119.4	4.7	282
34	116.8	4.6	276
35	114.3	4.5	270
36	111.8	4.4	264
37	109.2	4.3	258
38	106.7	4.2	252
39	104.1	4.1	246
40	101.6	4.0	240
41	99.1	3.9	234
42	96.5	3.8	228
43	94.0	3.7	222
44	91.4	3.6	216
45	88.9	3.5	204
46	86.4	3.4	204
47	83.8	3.3	198
48	81.3	3.2	192
49	78.7	3.1	186
50	76.2	3.0	180
51	73.7	2.9	174
52	71.7	2.8	168
53	68.6	2.7	162
54	66.0	2.6	156
55	63.5	2.5	150
56	61.0	2.4	144
57	58.4	2.3	138
58	55.9	2.2	132
59	53.3	2.1	126
60	50.8	2.0	120

Table 3

LCB LABEL CONTROL BYTE

This parameter selects between the various gap detection methods.

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

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

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

Blow Hole Stock (Slot-Cut): 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).

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 autosizing (See 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 470 uses the following formula to determine the SPG setting:

If label height is greater than or equal to 580, then SPG=580

If label height is less than 580, subtract (LSY+GAP) from 580 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.

4,812,609,,20,48,,,↵

4 - 4 fields following the header

812 - Label width (LSX) of 812 (812/203 = 4 inches).

609 - Label length (LSY) of 406 (609/203 = 3 inches).

- The WEB parameter can be defaulted.

20 - A GAP between labels of 20 (20/203 = 0.10 inch).

48 - Label print speed (DPS) of 48 = 3.2 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 autosize command.

- SPG could be defaulted. This value was confirmed using the auto-size function.

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

Note: Defaulted fields must be separated by commas.

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 AND Bar code 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, PS
  1,  0,  0,  *,  1, **,***,  0,   1,  1,  *,   1,  0, 0
```

***** The default depends on the character generator (CGN) used.
****** The default depends on the TCI used.
******* The default for circular bar codes is 80. Everything else is 0.

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.

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.

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   Text (ASCII)
 2   Text Surrounded by Asterisks (Code 3 of 9)
 3   Text with UPC-A/UPC-E Checksum Digit Printed
 8   Non-Volatile Downloadable Fonts
 11  Volatile Downloadable Fonts
 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
 40  Code 128 bar code (Automatic Compression)
 41  Code 128 bar code (No Compression)
 42  Codabar bar code
 43  Code 93 bar code
 44  AS-10 bar code
```

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

Example: For the string - **1234567**
A TCI of 1 would print ASCII text.
A TCI of 42 would print a Codabar bar code.

CGN CHARACTER GENERATOR NUMBER

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

The generator numbers and the specifications for the various fonts, bar codes, and graphics are shown below. Remember, there are 203 dots per inch.

Key For Tables:

CGN - Character Generator Number
FO - Field Orientation
Height - Y Direction, in Dots
Width - X Direction, in Dots
Spacing - Default Spacing Between Characters, in Dots
Font Type - Font Descriptor
'-' - Not Used

Bitmapped Font Descriptions					
CGN	Height	Decender	Width	Spacing	Font Type
1	5	-	3	1	Standard
2	7	9	5	1	Lower Case
3	7	-	7	1	Bold
4	9	-	5	1	Standard
5	9	12	7	2	Lower Case
6	12	15	9	2	Lower Case
7	16	-	10	2	OCR-A
8	15	20	12	2	Lower Case
9	18	-	10	2	Standard
10	19	25	15	3	Lower Case
11	19	25	15	3	Lower/Bold
12	27	35	21	3	Lower Case
13	27	35	21	3	Lower/Thin
14	38	30	30	3	Lower/Fancy
15	38	30	30	4	Lower/Bold
16	40	-	20	4	Standard

Table 4

Table 5 constitutes the bar codes available on the 470 printer. Some bar codes offer different ratios to accommodate different applications. See Section 7.1 for more information on designing with bar codes.

Bar code Symbologies					
Bar code	CGN	Ratio	Height	Spacing	FO
Code 3 of 9	2	2:1	1	-	0123
	3	3:1	1	-	0123
	4	3:1 wide	1	-	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	-	40%	1	-	0123
Codabar	2	2:1	1	-	0123
	3	3:1	1	-	0123
Code 93	-	2:1	1	-	0123
AS-10	-	2:1	1	-	0123
MSI (Plessy)	-	1:1	1	-	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. (If referencing a circular bar code field, this parameter is used to define the inside white space diameter of the bar code.)

- **0** 0 degrees (normal rotation).
- **90** 90 degrees (left rotation).
- **180** 180 degrees (upside-down rotation).
- **270** 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. A 5 high by 3 wide character with a CMX of 2 would produce a 5 high by 6 wide character.

CMY CHARACTER MULTIPLIER Y DIRECTION
This parameter multiplies each character in the Y direction. A 5 high by 3 wide character with a CMY of 2 would produce a 10 high by 3 wide character.

CS CHARACTER SPACING
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. 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.

AN ATTRIBUTE NUMBER

If this parameter is set to a value of 1, the image will be printed as if reflected in a mirror. If set to a 2, the field can be printed white on black. If set to a 3, both mirror and white on black options will be selected. A value of 0 is normal. Bar codes can also be printed in a circular pattern by setting the value as follows:

TCI Value	Effect
8	Full Circle
9	Upper Half
10	Right Half
11	Lower Half
12	Left Half

Circular Bar code Attribute Numbers
Table 7

PS PROPORTIONAL SPACING (Text Only)

If this parameter is set to a value of 1, text characters will be proportionally spaced. If set to a 1, they will be non-proportionally spaced.

4.5.2 VECTOR FONTS

The following is a list of vector font field element mnemonics and their default values:

```
TSN, XB, YB, CC,TCI,CGN, FO, FJ, CWX,CWY, CS, TSP, AN,STK
  1,  0,  0,  1,  4,  1,  0,  0,   0,  0,  *,   1,  0,  1
```

***** The default depends on the size of the characters (CWX,CWY).

Note: All values must be positive integers.

TSN TEXT STRING NUMBER

This parameter 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.

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 co-ordinate 1. There is no X co-ordinate 0. The X coordinate increases in size from left to right (See Figure 7). An XB of 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 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 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.

TCI TEXT CONVERSION IDENTIFIER

Always set this parameter to a value of 4.

CGN CHARACTER GENERATOR NUMBER
The generator numbers and specifications are shown below.

Vector Font Descriptions	
CGN	Font Type
1	Standard ASCII (characters up to 7F hex)
2	Extended ASCII (characters up to FF hex)

Table 8

FO FIELD ORIENTATION
This parameter defines field rotation and has a value between 0 and 359. A value of 0 is normal and a value of 180 is upside down. The point of rotation is determined from the field justification. The positioning of data relative to field orientation and field justification can sometimes be confusing. Refer to Table 6 for more detailed information on field orientation and field justification interaction.

FJ FIELD JUSTIFICATION
This parameter defines the justification of each field on the label. (VECTOR FONT FIELD JUSTIFICATION IS NOT AVAILABLE AT THIS TIME)

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.

CWX CHARACTER WIDTH X DIRECTION
This parameter sets the width of each character in the X direction. A value of 203 would produce a character approximately 1 inch wide.

CWY CHARACTER HEIGHT Y DIRECTION
This parameter sets the width of each character in the Y direction. A value of 203 would produce a character approximately 1 inch high.

CS CHARACTER SPACING
This parameter defines the spacing between each character. If this parameter is not used, a proper default spacing will be selected according to the characters size selected. Values 0 to 255 are positive space kerning and 256 to 512 are negative space kerning. For example, a value of 2 would add 2 dots between each character and a value of 257 would subtract 2 spaces from each character.

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.

AN ATTRIBUTE NUMBER

If this parameter is set to a value of 1, the image will be printed as if reflected in a mirror. If set to a 2, the field can be printed white on black. If set to a 3, both mirror and white on black options will be selected. A value of 0 is normal.

STK PEN WIDTH

This parameter sets the width of the pen used to draw each character. An increased pen width will cause characters to appear more bold.

4.5.3 GRAPHIC IMAGE FIELDS

A graphic field is broken down into six different parameters. The first two are the start coordinates, the next two control the image size. If the image size is omitted, the image printed will represent a true proportioned image. If not, the printed image will be stretched/compressed to "fit in frame". The fields to be defaulted must be separated by commas, and a carriage return must follow each graphic field definition.

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

```
XB, YB, GW, GH,TCI,CGN,,,,,,AN
 1,  1,  *,  *,  7,  1,,,,,,, 0
```

***** The default depends on the original image size.

Note: All values must be positive integers.

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 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 text one inch from the bottom of the label.

GW GRAPHIC WIDTH

If this parameter is omitted, the width of the graphic image will not be modified. If this field is used the printer will expand or shrink the X dimension of the image to "fit in frame".

GH GRAPHIC HEIGHT

If this parameter is omitted, the height of the graphic image will not be modified. If this field is used the printer will expand or shrink the Y dimension of the image to "fit in frame".

TCI TEXT CONVERSION IDENTIFIER

Always set to 7.

CGN CHARACTER GENERATOR NUMBER
This value selects the stored graphic image to be printed (0-16).

AN ATTRIBUTE NUMBER
If this parameter is set to a value of 2, the field can be printed white on black. A value of 0 is normal.

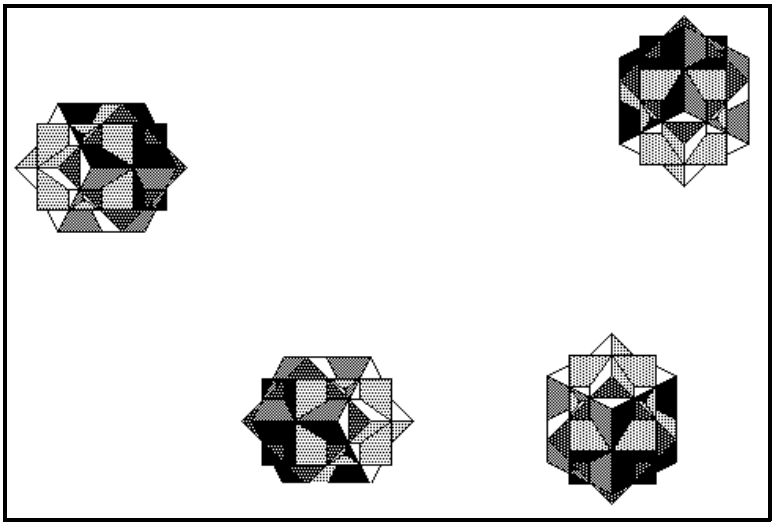
Sample Format File to Access Stored Graphic Images

The following format will illustrate the use of a graphic image field. (See Figure 8)

```
^D57↵
2,831,1400↵                    ;Header
1,1,400,300,7,1↵                    ;Graphic #1 is 400 wide and 300 high
1,500,,,7,2↵                   ;Graphic #2 uses default width and height
^D56↵
^D3↵                                ;Print
```

Please note that the above format references two graphic images which have previously been sent and stored in the printer. See Chapter 6 for information on loading graphics.

```
^D57↵
1,831,1400↵
355,20,,,7,1↵
355,400,,,7,2↵
100,20,,,7,3↵
150,270,,,7,4↵
^D56↵
^D3↵
```



Four Graphic Images - Four Rotations
Figure 8

4.5.4 LINES

A line field is broken down into six different parameters. The first two are the start coordinates, the next two are the end coordinates. The fields to be 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:

```
XB, YB, XE, YE,TCI,WID
 1,  1,  1,  1, **,  1
```

****** The value should be 5 for round line ends or 6 for square line ends.

Note: All values must be positive integers.

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 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 text one inch from the bottom of the label.

XE X END 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.

YE Y END COORDINATE

The Y coordinate of the field is measured in dots. A YE of one would be specified as the first edge of the label coming out of the front of the printer during a label print.

TCI TEXT CONVERSION IDENTIFIER

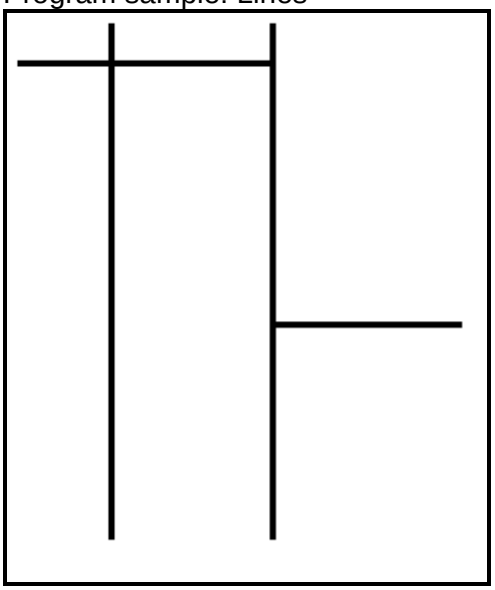
A value of 5 will produce round line ends and a value of 6 will produce square line ends.

WID PEN WIDTH

This parameter will set the width of the pen used to draw the line.

MAKING LINES

Program sample: Lines



```
^D57↵
4↵
50,500,250,500,6,20↵
100,50,100,550,6,20↵
250,50,250,550,6,20↵
250,250,150,250,6,20↵
^D56↵
^D3↵
```

Lines
Figure 9

4.5.5 FILLED RECTANGLE

A filled rectangle field is broken down into five different parameters. The first two are the start coordinates, the next two are the length and width. The fields to be defaulted must be separated by commas and a carriage return must follow each graphic field definition.

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

```
XB, YB, RW, RH,TCI,,,,,,,AN
 1,  1,  1,  1,  9,,,,,,,, 0
```

Note: All values must be positive integers.

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 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 text one inch from the bottom of the label.

RW RECTANGLE WIDTH

The width of the rectangle (measured in dots).

RH RECTANGLE HEIGHT

The height of the rectangle (measured in dots).

TCI TEXT CONVERSION IDENTIFIER

Always set to a value of 9.

AN ATTRIBUTE NUMBER

If this parameter is set to a value of 2, the field can be printed white on black. A value of 0 is normal.

4.5.6 FILLED OVAL

A filled oval field is broken down into five different parameters. The first two mark the center point, the next two define the radius width (X) and height (Y). The fields to be defaulted must be separated by commas and a carriage return must follow each field definition.

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

```
XC, YC, RX, RY,TCI,,,,,,, AN
 1,  1,  1,  1, 18,,,,,,,  0
```

Note: All values must be positive integers.

XC X CENTER 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.

YC Y CENTER 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 text one inch from the bottom of the label.

RX RADIUS WIDTH

The width of the rectangle (measured in dots).

RY RADIUS HEIGHT

The height of the rectangle (measured in dots).

TCI TEXT CONVERSION IDENTIFIER

Always set to a value of 18.

AN ATTRIBUTE NUMBER

If this parameter is set to a value of 2, the field can be printed white on black. A value of 0 is normal.

4.5.7 FRAMED OVAL

A framed oval field is broken down into seven different parameters. The first two mark the center point, the next two define the radius width (X) and height (Y), and the last two set the frame width and height. The fields to be defaulted must be separated by commas and a carriage return must follow each field definition.

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

```
XC, YC, RX, RY,TCI, FX, FY,,,,,, AN
 1,  1,  1,  1, 19,  1,  1,,,,,,  0
```

Note: All values must be positive integers.

XC X CENTER 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.

YC Y CENTER 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 text one inch from the bottom of the label.

RX RADIUS WIDTH

The width of the rectangle (measured in dots).

RY RADIUS HEIGHT

The height of the rectangle (measured in dots).

TCI TEXT CONVERSION IDENTIFIER

Always set to a value of 19.

FX FRAME THICKNESS (X)

The X dimension width of the frame (measured in dots).

FY FRAME THICKNESS (Y)

The Y dimension width of the frame (measured in dots).

AN ATTRIBUTE NUMBER

If this parameter is set to a value of 2, the field can be printed white on black. A value of 0 is normal.

4.5.8 A SAMPLE SESSION (FIELDS)

Looking at the sample label...

```
^D57↵                                   A label format is coming
4,812,609,,20,48,,,↵                    Header Information
1,100, 40, 4, 1,4↵                      Field #1 information
2,100, 60,17, 1,4↵                      Field #2 information
3,100,100, 5, 1,6↵                      Field #3 information
3,100,150, 5,16,2,,,,30↵                Field #4 information
^D56↵                                   Select RAM Format
^D2↵                                    Text Data is Coming
EASY↵                                   Text String #1
MICROCOM MAKES IT↵                      Text String #2
HELLO↵                                  Text String #3
^D3↵                                    Print Label
```

... and referring to Field #1.

1,100, 40, 4, 1,4↵

1 - Field refers to text string #1 - **EASY**. This field could have referred to **HELLO**, if it had a TSN of 3. The fields do not have to be in any kind of order with respect to the data fields.

100 - X beginning (XB) 100 dots from left side of label.

40 - Y beginning (YB) 40 dots from bottom of label.

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

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

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

↵ - 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 470 printer has a large and versatile collection of command 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 470 will recognize either the one-character control character or the two-character caret and alpha character sequence. In other words, for a PC keyboard, 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 position 3 (^D21) or command ^A1^D93↩.

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

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

5.1 SPECIAL PRINTER CONTROL CODES

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

^A **Accumulator Mode:** Used to supply parameters for ^D commands. These parameters must be positive integers and are generally decimal numbers but they can be binary if preceded by a ASCII B. (i.e., ^AB00000001^D21↩ equals ^A1^D21↩)

^B **Text Entry Mode:** Instructs the printer to enter text entry mode. This command (or ^D2↩) must be sent before the text information. This command is equivalent to ^D2↩ but does not require a ↩ after it (i.e. ^Btext data string↩). Because control B is shorter than ^D2↩, 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:** Prints a single label or starts printing a batch of labels. 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).

^E **Printer Enquiry:** See section 5.2 for more details (equivalent to ^D5↩ but does not require a ↩ after it). Because Control E is shorter than ^D3↩, it is easier to use in direct terminal mode. In general, it is better to use ^D5↩ inside a file or program.

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

^H **Deletes The Last Printable Character Entered:** This is used only when communicating to the printer through the keyboard. (Same as Delete key on computer 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 printhead (equivalent to ^D11↩).

^L **Print Blank Label:** (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 can also be used to adjust the pace of the printer with that of the operator.

The 470 printer is capable of returning responses to enquiries in three different ways depending on how the machine is programmed. (see software dip switch #1 position 1 and 2, ^D21, Section 5.3.) The text equivalent response returns a text string, giving the state of the machine. The ^ equivalent returns an ASCII '^' response followed by the defining alpha character. The control code equivalent returns an actual control code.

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

Enquiry Responses		
TEXT	^ALPHA or CONTROL CODE	DEFINITION
>RESTARTED<	^Z	Software has restarted
>READY<	^F	Printer is ready to process
>DATA ERROR<	^U	Serial I/O error
>LOW STOCK<	^Y	Out of labels
>LOW TEMP<	^^	Head temperature is low
>OVER TEMP<	^[	Head temperature is high
>OVER VDD<	^\	VDD voltage is high
>TAKE LABEL<	^V	Printer senses a label is present of the printer

Table 9

5.3 SENDING ^D PRINTER COMMANDS

Unless otherwise specified, these commands are entered by sending a ^DXX, where XX is the command number. It is followed by a carriage return or another control code. Some commands load data or control numbers and are preceded by a ^AXX, where XX represents the data or control number. Unless otherwise specified, command codes should appear first in the label format, if a label format is being sent.

Unless stored in a non-volatile user memory, all commands not listed in 5.3.1 (the Battery Backed RAM and software switch section) are not retained when the printer is turned off and, if desired, must be sent again upon power-up.

When possible, the following commands are grouped by function. See the Quick Reference Command Summary in Appendix D for a listing by number.

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

Example of command usage:

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

5.3.1 SOFTWARE SWITCHES/BATTERY BACKED COMMANDS

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

Verify the new dip switch settings by either sending ^D29 to the printer (switch settings will be sent back to the computer) or place the printer in 'test mode' by turning on the printer with the PRINT/PAUSE button pressed (this will print a label with switch statistics). **Note: Turn the printer off and back on to clear this test mode.**

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

21 **Change SW1:** Software dip switch #1. The dip switches are the only commands that use binary input. They can use a ^AB sequence followed by an 8 digit 0 or 1 code.

For example: ^AB10000011^D21↵ will configure the printer for a text equivalent enquiry response, accept control codes, scanner input off, disable displayed enquiry, disable echo, 8 data bits, and enable XON/XOFF flow control.

```
   12345678
^ABxxxxxxxx
   *******. 1=XON/XOFF Enable,  0=Disable
   ******.) 1=Menu System Disable, 0=Enable
   *****.)) 1=Echo Enable, 0=Disable
   ****.))) 1=Disable Copies Count Prompt, 0=Enable
   ***.)))) Not Used
   **.)))))) 1=Ignore Control Codes, 0=Accept
   *.)))))))),
   .)))))))),*Enquiry Response
             00=Control Codes
             10=Text Equivalent
             11=^Equivalent
```

Position:

1,2 **Enquiry Response:** This determines what the printer will send back in response to an enquiry. See chapter 5, Table 9 for more details.

3 **Control Codes:** It is not acceptable in some applications to allow the printer to accept control codes (ASCII characters below 20 hex), because of the way the host computer interacts with the machine. This switch setting will allow or disallow printer response to control code use.

4 **Not Used**

5 **Copies Count Prompt:** If this is set to a 1, the printer will not request a copies count after a label is selected through the front panel.

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

7 **Menu System:** If disabled, the 'DISPLAY' and 'ENTER' keys will not respond. All other keys function normally.

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

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

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

```
   12345678
^ABxxxxxxxx
   *******.)))),
   ******.)))),*
   *****.)))),** Power-up Label Format
   *****     000=ROM Format File 1
   *****     001=ROM or Non-Volatile User Format File 1
   *****     010=ROM or Non-Volatile User Format File 2
   *****     011=ROM or Non-Volatile User Format File 3
   *****     100=ROM or Non-Volatile User Format File 4
   *****     101=ROM or Non-Volatile User Format File 5
   *****     110=ROM or Non-Volatile User Format File 6
   *****     111=ROM or Non-Volatile User Format File 7
   ****.)))) 1=Use Non-Volatile User Format File, 0=ROM
   ***.)))))  1=Print Button Enable, 0=Disable
   **.))))))  1=Line Feed Button Disable, 0=Enable
   *.)))))))  1=>RESTARTED< Response Enable, 0=Disable
   .)))))))) 1=Clear Text Enable, 0=Disable
```

Position:

1 **Clear Text:** If enabled, all variable text will be erased when a ^D2↩ or ^B is processed.

2 **>RESTARTED< Response:** If the printer has been reset and this switch has been enabled, the printer will respond to the first poll by sending the >RESTARTED< message. If additional enquiries are made, the printer will respond normally. The >RESTARTED< response is only issued once after reset.

3 **Line Feed Button:** Set to 1, the printer will not allow keypad use, even for paper feed.

4 **Print Button:** If this is 0, the 'PRINT' key acts like a Form Feed and printing will occur. All other keypad functions respond normally.

5 **Power-up Format Type:** This parameter determines whether to use a user loadable non-volatile format file or a ROM format for the power-up label (defined by positions 6, 7, and 8). See section 5.3.6 for more information on saving format files in non-volatile memory. Please contact your service organization if changes or additions need to be made to the ROM formats (i.e., the standard power-up label).

6,7,8 **Power-up Format Selection:** These switches decide which format to use as a power-up label.

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

```
   12345678
^ABxxxxxxxx
   *******. Not Used
   ******.) 1=Temp in Fahrenheit, 0=Celsius
   *****.)) 1=Ribbon Break Sensor Disable, 0=Enable
   ****.))) 1=Pulse Tone On Piezo, 0=Continuous
   ***.)))) 1=Head Up Error Disable, 0=Enable
   **.)))))) 1=Response After Print Enable, 0=Disable
   *.)))))) 1=User Display Enable, 0=Disable
   .)))))))) 1=Piezo Sound Disable, 0=Enable
```

Position:

- **1** **Piezo Sound:** If set to 1, the piezo is disabled.
- **2** **User Display:** If enabled, the printer will display a programmable message instead of the factory default (see ^D77).
- **3** **Response After Print:** If enabled, an enquiry response will be sent back through the communications port after every print.
- **4** **Head Up Error:** If set to 1, head up error checking is disabled.
- **5** **Pulse Tone On Piezo:** If set to 1, the piezo is disabled.
- **6** **Ribbon Break Sensor:** If disabled, no error will occur if ribbon is out.
- **7** **Temp Display Selection:** If set to 1, temperature will be displayed in Fahrenheit degrees instead of Celsius.
- **8** **Not Used**

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

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

```
   12345678
```

^ABxxxxxxxx

```
   *******.) Not Used
   ******.)) Not Used
   *****.))) Not Used
   ****.)))) 1=Pass ASCII over 7F, 0=Less than 80 only
   ***.))))) 1=Auto-size on Power-up Enable, 0=Disable
   **.)))))) 1=Blow-hole Stock Enable, 0=Disable
   *.))))))) 1=2" Epson® Emulation Enable, 0=Disable
   .))))))))) 1=4" Epson® Emulation Enable, 0=Disable
```

Position:

1 **4" Epson® Similar Emulation:** When set, the printer operates similar to an Epson® printer with an 80 column format. This parameter enables the emulation on printer power-up (Also see the ^A1^D38 command in section 5.3).

2 **2" Epson® Similar Emulation:** Same as position 2, but prints in a 40 column format. (Also see the ^A2^D38 command in section 5.3.)

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 **Pass ASCII Text Over 7F:** If set to 1, the printer will process characters over 7F hex.

6 **European Configuration**

7 **European Configuration**

8 **European Configuration**

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

25 **Change SW5:** Change software dip switch #5. Below is the ^AB sequence:

```
    12345678
^ABxxxxxxxx
    *******.) Not Used
    ******.)) 1=Enable Auto Error Message Transmission
    *****.))) Not Used
    ****.)))) Not Used
    ***.)))))) Auto Adjust for Black Line Darkness
    **.)))))) Not Used
    *.)))))) Not Used
    .)))))))) 1=Disable Name/Time When Idle, 0=Enable
```

Position:

1 **Name/Time when idle:** When set to 0, the printer will display the default or programmable message (^D78) on the first LCD line and the current time on the second LCD line.

2 **Not Used**

3 **Not Used**

4 **Auto Adjust for Black Line Darkness:** When set to 1, the 470 will automatically adjust the D91 setting to the correct value on power-up.

5 **Not Used**

6 **Not Used**

7 **Auto Error Message Transmission:** When set to 1, all catastrophic error messages will automatically be sent to the serial port. (see Table 9)

8 **Not Used**

26 **Change SW6:** Change software dip switch #6. Below is the ^AB sequence:

```
    12345678
^ABxxxxxxxx
    *******.) Not Used
    ******.)) Not Used
    *****.))) Not Used
    ****.)))) Not Used
    ***.)))))) Not Used
    **.)))))) Not Used
    *.)))))) Not Used
    .)))))))) Not Used
```

Position:

1 **Not Used**

2 **Not Used**

3 **Not Used**

4 **Not Used**

5 **Not Used**

6 **Not Used**

7 **Not Used**

8 **Not Used**

^A	^D	Command
XX	**36**	**Adjust Contrast Base:** Use this command to adjust/calibrate the default contrast. Since the non-permanent ^D35 command is used to control the darkness in a format file, the ^D36 command is offered to correct any contrast differences that may exist between different printers while using the same format file. This command is non-volatile and only needs to be sent once. Do not include this command inside a format file as it will also change the base print contrast of every other format printed. Use the ^D35 command to make temporary adjustments inside a format file. This command has a range of 10 to 200 in increments of 1.

5.3.2 PRINTING COMMANDS

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

^A	^D	Command
	3	**Print Command:** Prints a single label or starts the printing of a batch of labels. This is usually the last command in a format file. (Equivalent to ^C)
	11	**Print a Test Label:** Prints a label with diagonal lines that is useful in determining the condition of wear of the print head. (Equivalent to ^K)
	12	**Print a Blank Label:** (Equivalent to ^L)
XX	**73**	**Load copies count:** Tells the printer to print a group of labels. Will not increment serial numbers (use a ^D75). This can, however, be used in conjunction with ^D75 (load label count) to allow duplicate labels to be made inside a batch. For example, to make a batch of three serial number labels before incrementing the serial number. The batch of labels will be printed when a ^D3 is executed. Therefore, this must precede a ^D3 command. Example usage: ^A20^D73^D3↵ - Prints 20 identical labels.
1	**74**	**Infinity Print:** Prints a batch of labels but will continue to print until the printer is turned off or paused. 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 is turned off or paused.

^A	^D	Command
XX	75	**Load Label Count:** Tells the printer to print a batch of labels using the serial number function if enabled. Can be used in conjunction with load copies count (^D73). The batch of labels will be printed when a ^D3↵ is executed. Therefore, this must precede a ^D3 command. The only difference between this command and ^D73 is in the ability of this command to increment and decrement sequential numbers in the batch. (see Section 5.3) Example usage: ^A20^D74^D3↵ - Prints 20 serial number labels.
XX	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 AUTOSIZING AND VALID GAP COMMANDS

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

To autosize labels that use a black line instead of a gap, execute a ^A1^D47↵ to put the printer in black line mode.

To autosize blow-hole stock, set software dip switch 4 for blow-hole stock (see Section 4.4) and then autosize.

There is also a power-up autosize feature as defined in section 5.3, ^D24.

^A	^D	Command
	39	**Autosize Label:**
0		Clears the use of autosize 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.

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

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 = minutes
SS = seconds

MM = month
DD = day of month
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 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 10

A sample program using the clock function:

```
^D57↵
2,,609↵
0,320,40,8,16,2,,4,2,60,,10↵
0,320,20,8,1,10,,4,,,,10↵
^D56↵
^D3↵


^D57↵
3,,609↵
0,320,40,12,16,2,,4,2,60,2,23↵
0,320,20,12,1,10,,4,,,,23↵
1,320,110,20,1,11,,4↵
^D56↵
^D2↵
EUROPEAN DATE FORMAT↵
^D3↵


^D57↵
3,,609↵
0,320,40,12,16,2,,4,2,60,2,10↵
0,320,20,12,1,10,,4,,,,10↵
1,320,110,20,1,11,,4↵
^D56↵
^D2↵
US DATE FORMAT↵
^D3↵


^D57↵
3,,609↵
0,320,20,34,1,10,,4↵
0,550,80,8,1,10,3,4↵
1,320,60,18,1,13,,4↵
^D56↵
^D3↵
```

5.3.5 SERIAL NUMBER COMMANDS

The following commands, ^D80 through ^D89, refer to the serial numbering functions of the 470 printer. The 470 can increment or decrement any single serial number by any amount.

^A	^D	Command
	80	Disable all serial numbering.
XX	**81**	**Disable Single Serial Number Field:** Will disable an individual serial number field.
XX	**82**	**Enable Single Serial Number Field:** Will recall a stored serial number (1-16) and place it into an individual serial number field on the label. XX determines the stored serial number slot to be recalled. The TSN (Text String Number) is selected by following the ^AXX^D82↵ with the TSN surrounded by quotes ("TSN"↵). This command is not stored between labels, it must be sent each time a format is sent and must be located after the ^D57 command and format information.
XX	**83**	**Select Stored Serial Number to increment:** Tells the printer which stored serial number to increment. See section 4.5 on text string numbers. The ^A value states which serial number is selected.
XX	**84**	**Select Stored Serial Number to decrement:** Tells the printer which stored serial number to decrement. See section 4.5 on text string numbers. The ^A value states which serial number is selected.
	85	**Clear All Stored Serial Numbers:** This function will erase any serial numbers stored in memory.
XX	**86**	**Load New Serial Number Into Memory:** This command loads a serial number into non-volatile user memory. XX is used to select the serial number slot (1-16). The actual serial number, up to 9 characters, is placed in quotes and follows the ^AXX^D86↵.
XX	**87**	**Load Increment/Decrement Value Into Non-Volatile User Memory:** Will load and store a step value into non-volatile user memory. The stored serial number to be affected is chosen with the XX variable and the actual step value, up to 9 characters, is entered by following the ^AXX^D87↵ with the step value surrounded by quotes.
XX	**88**	**Send Serial Number To Serial Port:** ^A specifies which stored serial number (1-16) to send.
XX	**89**	**Send Increment/Decrement Value To Serial Port**: ^A specifies which stored increment/decrement value (1-16) to send.

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

A sample program using a single serial number:

```
^A1^D86↵                        ;Load 1000 into serial number slot 1
"1000"
^A1^D87↵                        ;Load step value of 50 for slot 1
"50"
^A1^D83↵                        ;Tell printer to increment slot 1
^D57↵
1,812,609↵                      ;Header
1,435,24,4,1,14,0,,1,1,3↵       ;Field definition
^D56^D2↵
↵                               ;Reserve a space for the serialized field
^A1^D82↵                        ;Tell printer to use slot 1 on TSN 1
"1"
^D3↵                            ;Print
```

A sample program using multiple serial numbers:

```
^A1^D86↵                        ;Load 1000 into serial number slot 1
"1000"
^A2^D86↵                        ;Load 2000 into serial number slot 2
"2000"
^A1^D87↵                        ;Load step value of 50 for slot 1
"50"
^A2^D87↵                        ;Load step value of 25 for slot 2
"1"
^A1^D83↵                        ;Tell printer to increment slot 1
^A2^D83↵                        ;Tell printer to increment slot 2
^D57↵
2,812,609↵                      ;Header
1,100,20,4,1,11↵                ;Field definition
2,100,40,4,1,11↵                ;Field definition
^D56^D2↵
↵                               ;Reserve a space for serialized field 1
↵                               ;Reserve a space for serialized field 2
^A1^D82↵                        ;Tell printer to use slot 1 on TSN 1
"1"
^A2^D82↵                        ;Tell printer to use slot 2 on TSN 2
"2"
^D3↵                            ;Print
```

5.3.6 LABEL HEADER COMMANDS

The following ^D commands, 41 - 51, all refer to label header values. They are provided to allow single element modification without having to send the entire label header. The printer will use these values for all subsequent label formats unless a ^D40 is executed, the machine is powered off, or a replacement value is sent or included in a new label header.

More information on what these label header values mean can be found in section 4.4.

Example usage: ^A1015^D43↵ - Sets the label height for all following formats to 5 inches.

^A	^D	Command
	40	**Clear Commands 41-51.** (Returns header values to default.)
XX	41	**Load number of fields in layout (HFM):** ^A determines number of fields.
XX	42	**Load label width in dots (LSX):** ^A indicates the width.
XX	43	**Load label height in dots (LSY):** ^A defines the height.
XX	44	**Load web size in dots (WEB):** ^A specifies the web size.
XX	45	**Load gap size in dots (GAP):** ^A denotes the gap size.
XX	46	**Load print speed (DPS):** ^A designates the print speed. (See Table 3 for speed values.)
XX	47	**Load label control byte number (LCB):** ^A specifies the method of gap detection.
XX	48	**Load number of steps to activate gap detector (AGD):** ^A determines the number of steps.
XX	49	**Load number of steps past gap (SPG):** ^A designates the number of steps.

XX 50 Load X direction offset (OFX): ^A indicates the X offset.

XX 51 Load Y direction offset (OFY): ^A denotes the Y offset.

5.3.7 SAVED FORMAT FILE COMMANDS

The printer has the capability to store format files to RAM without processing them. Later, these format files can be accessed repeatedly at very high speeds, because access to the formats are now a direct memory fetch. With the use of battery backed RAM the printer will retain these format files after removal of power. The printer can be configured through software dip switch 2 (see section 5.3) to use one of these formats as the power-up label.

^A	^D	Command
XX	54	**Send Single Format File from Non-Volatile User Memory to Serial Port:** ^A selects which one (1-32).
XX	58	**Process Single Format File from Non-Volatile User Memory:** ^A selects which previously stored format file (1-32) to load.
XX	59	**Store Single Format File in Non-Volatile User Memory:** ^A selects which slot (1-32) in which the user entered format is to be placed. The format file must be terminated by an escape (1B hex) character.
XX	66	**Clear Single Format File from Non-Volatile User Memory:** This command will clear a single non-volatile format (1-32) and open the slot for a new file. Section 5.3.8.

USAGE:

To save a file in memory, first send the ^D59 command. This indicates to the printer that a format file is following and should be placed in the first available slot. (Note: If the slot number of the format is critical, the printer can be instructed to put the format in a specific slot be sending ^A(slot #)^D59↵.) After the ^D59 command, an optional text string may follow. When the appropriate format is selected this text string will appear on the printer display. This feature will allow the use to select a format based on the name rather than the number.

The final step is to send the label format. The format file must be terminated with an ESCAPE character (1B hex) so that the printer knows that the complete file has been sent. The printer will not accept an ASCII representation of the ESCAPE character.

To access the stored file, serially send the ^A(slot #)^D58↵ command. The printer will now process the stored file.

Additional files may be saved in the same manner by simply following the above instructions and substituting a new (slot #). Remember the printer has 32 slots available to store different label formats.

It is important to note that the saved format file mode works very well with variable data. Configure the format file with all the positioning and header information. Follow this

information with all the fixed text data. Terminate the file with an ESCAPE character. Now the variable data may serially be sent to the file. It may be the difference between sending two lines of data versus the full 120 lines of the file! Access is very fast.

To read a file that has previously been sent to the printer, use the ^AX^D54↵ command, where ^AX denotes the file (slot #) to be read. The printer will send the file to the serial port. If you are using a terminal or terminal utility, the file will be sent to your screen.

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. The data and processing commands for file #3 are contained in file #4.

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

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

File #2
^A1^D58↵
^D2↵
24 PRINTS $ 3.79 20496340379↵
^D3↵

File #3
^A2^D59↵
"sample 2"
^D57↵
4,620,161,,18,35,,73,3↵
1,120,110,50,1,11↵
2,120, 80,70,1,10↵
3,120, 60,70,1,10↵
4,120, 40,70,1,10↵
^D56↵
<ESC>

File #4
^A2^D58↵
^D2↵
MICROCOM CORPORATION↵
8333-A GREEN MEADOWS DR., N.↵
WESTERVILLE, OH 43081↵
(614) 548-6262↵
^D3↵

5.3.8 LABEL PRESENCE SENSOR CONTROL

The label presence sensor instructs the printer to dispense labels at the operators pace. If a label has been printed but not removed, the printer will wait until the label is removed before allowing another label to be printed. The following modes define its operation.

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

^A	^D	Command
	98	**Peel-and-Dispense Mode:** A method of dispensing a label, where the backing paper is automatically peeled away from the label. It allows the operator to take the label and apply it to an object without having to peel the label off the backing paper. The printer will advance the label so that it is still hanging off the tear bar. This will make it easier for the operator to take the label. Once the label is taken, the printer will back the paper into the printer so as not to waste label stock. Larger labels may require the use of the front label support rack (see chapter 9). This will prevent the label from falling off and sticking to the front of the printer. The distance of advancement can also be user defined by the ^D95 command.
	0	Turn off peel-and-dispense mode with ^D98.
	1	Turn on peel-and dispense mode.
XX	**95**	**Load User Defined Steps for Label to Advance:** Used in conjunction with tag/tear and peel-and-dispense mode. This value, after print, will advance the label a user defined distance instead of defaulting to the measure specified by the peel-and-dispense and tag/tear modes. This printer feature accommodates special stock and special circumstances (very small labels, label applicator, etc.). While the user may specify 64,000 steps, it is not recommended that the number of steps create a situation where the entire label is back fed into the printer. This may create labels jamming in the printer when the back edge of the label meets the print head unit.

5.3.9 TEXT STRINGS COMMANDS

The following commands support special editing features that allows the positioning of new text, protects existing text, and enters text without using the ^D2↵ delimiter. These commands are generally used when there is a format file already in RAM (a format file previously sent to the printer, not necessarily a saved format file). They are used to edit that file in order to print variations of a label, often only the text in one field.

^A	^D	Command
	60	Clears command 61
XX	**61**	**Mark Text Starting Position:** ^A designates which text field to start entering new data. This is useful for creating variable data fields after a string of fixed data fields. ^AXX^D61↵ 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 sent after text that is to appear at the beginning of each field. Text sent after this command will be appended to the pre-padded text. This is useful, for example, if the first two numbers of a bar code are always constant and only the new bar code numbers need to be sent.

The printer would automatically update the new bar code with the two fixed numbers.

^D62↩ protects existing text and appends new text. A ^D62↩ prevents existing text lines from being over-written. Any new text entered after a ^D2↩ will be appended to the existing lines.

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

0 Disable 1 & 2.

1 Enable auto-print mode: New text entered after this command are recognized as text lines and will overwrite existing text. The ^D2↩ is not needed to enter text entry mode.

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).

3 Enable 1 & 2.

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

When the printer is put in auto-print mode, it is not necessary to send a ^D2↩ to inform the printer that text is coming or send a ^D3↩ to tell the printer to print a label. The printer will accept all incoming data as text strings (except control codes) and will print a label as soon as the number of strings equals the amount specified by the ^D64 command. At this point, the printer will print a label and continue to accept data. This mode is useful for interfacing to a device that transmits raw data, such as a scale or meter.

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

```
^A0^D64↵                                        ;clear any old settings
^A55^D91↵                                       ;clear any old settings
^A1^D65↵                                        ;center label on print head
^D57↵                                           ;load new format mode
12,640,400,,20,36,,1,412↵                       ;header
 1,320,270, 3, 7, 1,,4,205, 3,,,1,1↵           ;format file info
 1, 35,325,10, 1, 6,, ,   ,  2↵                ;format file info
 2,320,325,20, 1,10,,4↵                        ;format file info
 3,320,305,25, 1,10,,4↵                        ;format file info
 4,320,285,25, 1,10,,4↵                        ;format file info
 5, 35,250,10, 1, 6,, ,   ,  2↵                ;format file info
 6,230,355,30, 1,12↵                           ;format file info
 7, 75,133,29, 1,13↵                           ;format file info
 7,320,185,20,16, 2,,4,  2, 50,2↵              ;format file info
 8, 75,089,29, 1,13↵                           ;format file info
 9, 75,045,29, 1,13↵                           ;format file info
10, 75,001,29, 1,13↵                           ;format file info
^D56↵                                           ;select RAM format
^D2↵                                            ;begin text entry mode
SHIP FROM:↵                                     ;data line 01 (protected)
MICROCOM CORPORATION↵                           ;data line 02 (protected)
8333-A GREEN MEADOWS DR., N.↵                   ;data line 03 (protected)
WESTERVILLE, OH  43081↵                         ;data line 04 (protected)
SHIP TO:↵                                       ;data line 05 (protected)
             Order No:     XXX↵                 ;data line 06
77777777777777777777777777777777777↵           ;data line 07
88888888888888888888888888888888888↵           ;data line 08
99999999999999999999999999999999999↵           ;data line 09
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA↵           ;data line 10
^A3^D63↵                                        ;enable auto print and clear text
^A5^D64↵                                        ;tell printer to print after 6 (CR)
^A6^D61↵                                        ;tell printer to start new data entry
                                                 at data line 6 instead of 1
```

5.3.10 MISCELLANEOUS PRINTER COMMANDS

^A	^D	Command
	2	**Text string entry mode:** Begin text entry mode. This command must be sent before the printer will accept text or bar code information. (Equivalent to ^B)
	5	**Send Printer Status:** See section 5.3 (Equivalent to ^E)
	29	**Printer Statistics:** ^A selects the mode.
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

Note: The printed labels counter shows the number of labels printed since the last reset and the total labels indicates the total number of prints since the manufactured date. The printed labels and printed inches counters are user resetable while the total labels and total inches counters are not. Printed inches and printed labels are reset using the ^D29 command (see section 5.3). The power-up label contains other useful information including the unit serial number, power-on hours, previous serial parameters (not the default parameters caused by executing creating a status label), and the software revision number.

The switch bank settings reflect the contents of the six software and the two hardware dip switch banks that configure the operation of the printer.

```
    PRINTER SERIAL #:  0-1234
      PRINTED LABELS:  83097
        TOTAL LABELS:  114937
      PRINTED INCHES:  207150
        TOTAL INCHES:  341885
      POWER ON HOURS:  8353
HARD SWITCH BANK 1:  10100000
HARD SWITCH BANK 2:  00000000
SOFT SWITCH BANK 1:  10000001
SOFT SWITCH BANK 2:  01010001
SOFT SWITCH BANK 3:  00000000
SOFT SWITCH BANK 4:  00000000
SOFT SWITCH BANK 5:  00000000
SOFT SWITCH BANK 6:  00000000
 SERIAL PARAMETERS:  9600-N-8-1

LDS 470 REV 2.3   03/26/93
```

Status Label
Figure 10

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

32 **Reset Machine:** Restores printer to power-up settings.

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

35 **Contrast Window Adjust:** Adjusts to a percentage of current contrast base. Used for temporary variations in paper and should be lowered for ladder style (vertical) bar codes. This command should be placed directly before the ^D57 command in a format file. This adjustment has a range from 60% to 140% in 1 % increments. The sequence ^A110^D35↵ will set the print contrast 10% darker than standard. ("Standard" is determined and visually calibrated by adjusting the permanent ^D36 command.)

38 **Epson® Similar Emulation:** This command instructs the printer to operate similar to an Epson® printer with an 80 column format. There is also an Epson® similar emulation on power-up feature as explained in section 5.3.1. The following ^A parameters define mode of operation.

1 40 column Epson® similar emulation
2 80 column Epson® similar emulation

The following commands function as defined by the Epson® FX-86e" printer specifications. All other commands are ignored at this time.

<ESC> W	-	Select / Cancel 2x Width
<ESC> @	-	Leave / Initialize Epson® Mode
<ESC> Q	-	Set Right Margin
<ESC> l	-	Set Left Margin
<ESC> T	-	Cancel Super / Subscript
<ESC> S	-	Set Super / Subscript
<ESC> 8	-	Disable Paper Out
<ESC> 9	-	Enable Paper Out
<ESC> K	-	Select Single Density Graphics
<ESC> L	-	Select Low Speed Double Density Graphics
<ESC> Y	-	Select High Speed Double Density Graphics
<ESC> *	-	Select Graphics Mode
CR	-	Carriage Return
LF	-	Line Feed
FF	-	Form Feed
HT	-	Hard Tab
BS	-	Back Space
DEL	-	Delete
SO	-	Shift Out
DC4	-	Device Control 4

^A	^D	Command
XX	**55**	**Select Default Label Layout:** Select from the ROM power-up label layout. Only used if you have a special lay-out burned into the ROM by Microcom. ^A selects which one (1-8), if more than one are present.
	56	**End User Defined Field Definitions:** Tells the printer that all field definitions are complete.
	57	**Enter Label Format Mode:** This tells the printer that information for a label is following
	93	**Load Control Code Recognition Status:** Some mainframe, mini-computer, and special-purpose computers cannot send ASCII characters under 20 hex or send these numbers for reasons other than 470 operation (spooler initialization, etc). In order to maintain proper flow control, the 470 printer will ignore everything under 20 hex if so directed. There is also an battery backed ram dip switch (see section 5.3) that will enable the printer to enter this mode upon power-up. (Note: if control code recognition is disabled, the printer will not process the 1B hex (ESC) character and therefore will not be able to store data streams.)
0		Enable control code recognition.
1		Disable control code recognition.

CHAPTER 6: LOADING GRAPHIC IMAGES

The Microcom 470 printer is capable of storing multiple graphic images. You may either use the Microcom "PCX2470" software to create a PGS or PGV file from a PCX or PCC file, or use your own software to format a graphics file into a form that the printer can understand.

METHOD #1: Create your own software to manipulate graphic files into the 470 format.
METHOD #2: Use the "PCX2470" software to turn your PCX file into the 470 format.
METHOD #3: Use a WYSIWYG on-screen label design package to convert the PCX file.

6.1 PROCEDURE FOR USING PCX2470 SOFTWARE

To Create Graphic Images Using the "PCX2470" Software.

A) Type at DOS prompt - PCX2470 filename.ext
B) Follow the on screen instructions and note the slot # the image was placed in.
C) Down-load resulting file (filename.pgs or filename.pgv) file to printer
D) Section 4.5.3 explains how to access loaded images.

6.2 FORMAT OF GRAPHICS FILES

This information is made available to companies that may need to convert other graphic formats to the 470 format.

A compressed image consists of an "Image Descriptor Block" followed by the "Modified-Hamming encoded image.

Image Descriptor Block
Encoding Method (word) - 1 for Modified-Hamming
Width (word) - width of image in dots
Height (word) - height of image in dots
Length (word) - length of encoded image in 16 bit words

The compressed image is a packed array (packed in words, low byte followed by high byte) of variable width codes representing a run of either black or white dots. Different codes are used for white and black runs. The first run of each encoded row is white. If the first pixel of the image row is black, encode a white run of zero length. Each run consist either of a terminating code (if the length of the run is less than 64) or a make-up code followed by a terminating code (if the length of the run is 64 or more). The end of each row of the image is indicated by the 12 bit end of line code: 000000000001. Pixels right of the receipt of the EOL code are white. The following page contains a list of the terminating codes.

Run Length	White Code	Black Code	Run Length	White Code	Black Code
0	00110101	0000110111	32	00010011	000001101010
1	000111	010	33	00010010	000001101011
2	0111	11	34	00010011	000011010010
3	1000	10	35	00010100	000011010011
4	1011	011	36	00010101	000011010100
5	1100	0011	37	00010110	000011010101
6	1110	0010	38	00010111	000011010110
7	1111	00011	39	00101000	000011010111
8	10011	000101	40	00101001	000001101100
9	10100	000100	41	00101010	000001101101
10	00111	0000100	42	00101011	000011011010
11	01000	0000101	43	00101100	000011011011
12	001000	0000111	44	00101101	000001010100
13	000011	00000100	45	00000100	000001010101
14	110100	00000111	46	00000101	000001010110
15	110101	000011000	47	00001010	000001010111
16	101010	0000010111	48	00001011	000001100100
17	101011	0000011000	49	01010010	000001100101
18	0100111	0000001000	50	01010011	000001010010
19	0001100	00001100111	51	01010100	000001010011
20	0001000	00001101000	52	01010101	000000100100
21	0010111	00001101100	53	00100100	000000110111
22	0000011	00000110111	54	00100101	000000111000
23	0000100	00000101000	55	01011000	000000100111
24	0101000	00000010111	56	01011001	000000101000
25	0101011	00000011000	57	01011010	000001011000
26	0010011	000011001010	58	01011011	000001011001
27	0100100	000011001011	59	01001010	000000101011
28	0011000	000011001100	60	01001011	000000101100
29	00000010	000011001101	61	00110010	000001011010
30	00000011	000001101000	62	00110011	000001100110
31	00011010	000001101001	63	00110100	000001100111

Run Length	White Code	Black Code	Run Length	White Code	Black Code
64	11011	0000001111	1344	011011010	0000001010011
128	10010	000011001000	1408	011011011	0000001010100
192	010111	000011001001	1472	010011000	0000001010101
256	0110111	000001011011	1536	010011001	0000001011010
320	00110110	000000110011	1600	010011010	0000001011011
384	00110111	000000110100	1664	011000	0000001100100
448	01100100	000000110101	1728	010011011	0000001100101
512	01100101	0000001101100	1792	00000001000	00000001000
576	01101000	0000001101101	1856	00000001100	00000001100
640	01100111	0000001001010	1920	00000001101	00000001101
704	011001100	0000001001011	1984	000000010010	000000010010
768	011001101	0000001001100	2048	000000010011	000000010011
832	011010010	0000001001101	2112	000000010100	000000010100
896	011010011	0000001110010	2176	000000010101	000000010101
960	011010100	0000001110011	2240	000000010110	000000010110
1024	011010101	0000001110100	2304	000000010111	000000010111
1088	011010110	0000001110101	2368	000000011100	000000011100
1152	011010111	0000001110110	2432	000000011101	000000011101
1216	011011000	0000001110111	2496	000000011110	000000011110
1280	011011001	0000001010010	2560	000000011111	000000011111

Graphic Terminating Codes
Table 11

The following is a sample graphics file and the image it produces. (magnified)

```
^A01^D101"MicroLogo       "010028001E005200037EE0380036E80D3A0036180E060036AC
0060C30A00B6091306C03661C200D8264C1800DB84090360BBDD6EB701B0DD6EB7DB00D86EB7DB
6D006CB7DBED3600B6DBED761B00DBED76BB0D80ED76BBDD06C076BBDD6E0360BBDD6EB701B0DD
6EB7DB00D86EB7DB6D006CB7DBED3600B6DBED761B00DBED76BB0D80ED76BBDD06C076BBDD6E03
60BBDD6EB701B0DD6EB7DB00D86
EB7DB6D006CB7DBED3600CEF77D
DF3800
```

6.3 GRAPHIC IMAGE COMMAND SUMMARY

The following commands refer to the use of graphic images:

^A	^D	Command
XX	**71**	**Clear Single Non-Volatile Graphic Image from Non-Volatile User Memory:** This command will clear a single non-volatile saved graphic file (1-16) and open the slot for a new graphic.
XX	**101**	**Load Graphic Image into Non-Volatile User Memory:** ^A select which volatile slot to place the image in (1-16).
XX	**102**	**Load Graphic Image into Volatile User Memory:** ^A select which volatile slot to place the image in (1-16).
XX	**109**	**Delete Single Graphic Image from Volatile User Memory:** ^A selects which slot (1-16) to erase.
	116	**Send Volatile User Memory Available:** The printer will send the number of free bytes to the serial port (i.e. >327680<).
	117	**Clear Volatile User Memory:** ^A selects which sections of memory to clear.
0		Clear all volatile user memory
1		Clear only graphic images in volatile user memory
2		Clear only downloadable fonts in volatile user memory
	118	**Read Volatile User Memory:** The 470 will send the contents of the volatile (320KB) user memory to the serial port.
0		Send list of graphic images and downloadable fonts in volatile user memory
1		Send list of graphic images in volatile user memory
2		Send list of downloadable fonts in volatile user memory
	119	**Read Non-Volatile User Memory:** The 470 will send the contents of non-volatile 192KB user memory to the serial port.
0		List format files, graphics images and fonts in non-volatile user memory.
1		List format files in non-volatile user memory
2		List graphic images in non-volatile user memory
3		List downloadable fonts stored in non-volatile user memory

CHAPTER 7: 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.

7.1 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 470 must be provided at least 11 digits in order to print a scanable bar code. The 12th digit may be omitted because the printer will automatically insert the correct check sum value. 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.

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

NS=0

Table 12

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.

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 the most 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 self 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.

Code 128 (Automatic Compression), TCI=40
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 numeric portions of the bar code to consume half as much space as they would using Subsets A or B. If TCI 40 is selected, the printer will automatically decide which subset is most efficient and insert the appropriate shift character.

Code 128 (Manual Compression), TCI=41
This selection is the same as above TCI 40, except that the printer will not automatically select the most efficient mode. This mode is necessary when to comply with certain industry specifications that call for a specific subset to be used.

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 13

For example: The UCC-128 shipping container specification requires the 128 bar code to start in subset C and contain the character function 1. The following format example illustrates how this is done.

^D57↵
1,832↵
1,100,200,30,41,,,,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.

7.2 DESIGNING WITH BAR CODES

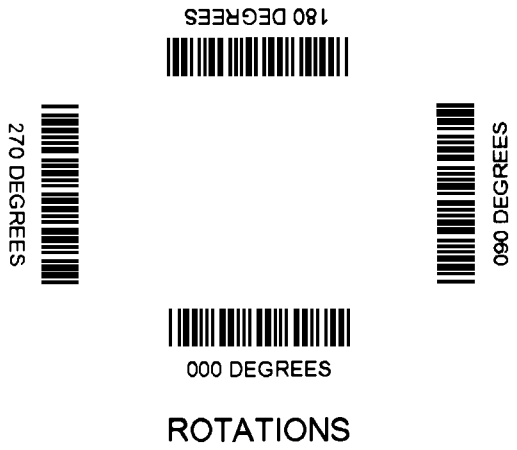
When 0 and 180 degree bar codes are X multiplied (CMX), the space between characters is also multiplied to maintain the correct ratios. The printer will do this internally. Therefore, when multiplying bar codes, use the default value for the spacing element (SP) in the field parameters. On some bar codes (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 11)

```
^D57↵
9,814,609↵
1,320,30,11,1,10,,4↵
2,320,120,11,1,10,,4↵
2,320,137,1,16,2,,4,2,40,2↵
3,487,254,11,1,10,3,4↵
3,470,254,2,16,2,3,4,40,2,2↵
4,320,387,11,1,10,1,4↵
4,320,370,3,16,2,1,4,2,40,2↵
5,160,254,11,1,10,2,4↵
5,177,254,3,16,2,2,4,40,2,2↵
^D56↵
^D2↵
ROTATIONS↵
0 DEGREES↵
90 DEGREES↵
180 DEGREES↵
270 DEGREES↵
^D3↵
```



Bar code Rotations
Figure 11

7.2.1 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 them be lined up with the upper to create a correct UPC-A bar code. (See Figure 12)

UPC-A Bar code
Figure 12

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.

Format sample: Bar codes with human readables (See Figure 13)

```
^D57↵
16,814,609↵
1,100,20,17,1,10↵
3,60,37,11,32,,,,2,2↵
3,82,55,11,12,,,,2,60↵
2,375,20,19,1,10↵
3,350,37,11,33,,,,2,2↵
3,372,55,11,12,,,,2,60↵
4,80,150,19,1,10↵
4,65,167,12,20,,,,2,60,,8↵
5,408,150,14,1,10↵
5,395,167,7,21,,,,2,60,,7
6,110,270,5,1,10↵
6,120,287,12,13,,,,2,60,,8↵
9,180,270,8,3,10↵
7,400,270,5,1,10↵
7,470,287,12,13,,,,2,60,,8↵
8,460,270,8,3,10↵
^D56↵
^D2↵
UPC-A HR W/CHKSUM↵
```

Bar code Human Readables
Figure 13

))

UPC-A HR W/O CHKSUM↵
01234567890↵
EAN13 012345678901↵
EAN8 0123456↵
UPC-E 00123400005↵
UPC-E 10123400005↵
^D3↵

))

CHAPTER 8: SPECIAL EFFECTS

8.1 REVERSED PRINT (WHITE TEXT OVER BLACK)

The 470 has the ability to print white text on a user definable black background. The black background can be automatically added by using an AN of 4. If this method is used, the size of the black background will automatically be adjusted to match the amount of text entered. The amount of bottom border can be increased by sending the ^AXXX^D139 command (XXX = 0 to 255 dots).

Reverse video text can also be produced by manually placing a black box under the text field by using the line, filled rectangle, or any other image (Note: text can be printed over text to produce some interesting effects as shown below). If text is printed on top of the black background, and the white on black option in the text field descriptor is set, the text placed within the black area will be reversed. 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.

Program sample: Reverse Imaging (See Figure 14)

```
^A75^D95^A1^D98↵
^D57↵
12,831,1350,,,41↵
1,20,780,9,4,1,0,0,90,100,9,1,0,20↵      ;Normal field using 20dot wide pen
1,20,780,9,4,1,0,0,90,100,9,1,2,15↵      ;Overprint above with 15dot pen and AN=2
1,20,630,9,4,1,0,0,90,100,9,1,0,20↵      ;Use the same method as above to
1,20,630,9,4,1,0,0,90,100,9,1,2,10↵      ;print the remaining hollow and shadow
1,20,480,9,4,1,0,0,90,100,9,1,0,20↵      ;fields (Note: shadowed fields are the
1,20,480,9,4,1,0,0,90,100,9,1,2,05↵      ;same as hollowed simply shifted X&Y.
2,20,330,9,4,1,0,0,90,100,9,1,0,22↵      ;SHADOW using 22dot wide pen
2,18,332,9,4,1,0,0,90,100,9,1,2,14↵      ;SHADOW using 14 dot wide pen and AN=2
2,20,180,9,4,1,0,0,90,100,9,1,0,24↵      ;Note the shifted X&Y coordinates above
2,17,183,9,4,1,0,0,90,100,9,1,2,12↵
1,150,790,143,9↵                         ;Print a large black rectangle
3,20,030,9,4,1,0,0,90,100,9,1,2,20↵      ;Place the word REVERSED on top and AN=2
^D56↵
^D2↵
HOLLOWED↵
SHADOWED↵
REVERSED↵
^D3↵
```

CHAPTER 9: DOWNLOADABLE FONTS

The 470 is capable of storing up to 8 downloadable fonts in non-volatile user memory (192KB) and up to 16 downloadable fonts in volatile DRAM (320KB). The printer treats downloadable fonts just like the standard bit mapped fonts mentioned in chapter 4.5.1. Since the printer has the ability to rotate characters, only the Portrait or 0 degree rotation is required. You may either purchase downloadable fonts from Microcom (see section 11.3) or use the Microcom "JET2MSF" software utility to create an MSF file from your own collection of LaserJet II™ compatible fonts.

9.1 DOWNLOADABLE FONT COMMANDS

Downloadable Font fields use the same structure as bit mapped fields. The only difference is that the TCI must be 8 for non-volatile downloadable fonts and 11 for volatile downloadable fonts. The CGN refers to the actual downloaded font to be used (either 1-8 or 1-16).

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

^A	^D	Command
XX	**110**	**Clear Single Non-Volatile Downloadable Font:** ^A select which font will be erased (1-8).
XX	**111**	**Load Non-Volatile Downloadable Font:** ^A selects which slot (1-8) to place the font in. ^A0 selects the next available slot.
XX	**112**	**Load Volatile Downloadable Font:** ^A select which volatile slot to place the font in (1-16).
XX	**115**	**Delete Single Volatile Downloadable Font:** ^A selects which slot (1-16) to erase.
	116	**Send Volatile User Memory Available:** The printer will send the number of free bytes to the serial port (i.e. >327680<).
	117	**Clear Volatile User Memory:** ^A selects which sections of memory to clear.
0		Clear all volatile user memory
1		Clear only graphic images in volatile user memory
2		Clear only downloadable fonts in volatile user memory

^A	^D	Command
	118	**Read Volatile User Memory:** The 470 will send the contents of the volatile (320KB) user memory to the serial port.
0		List volatile graphic images and downloadable fonts
1		List volatile graphic images
2		List volatile downloadable fonts
	119	**Read Non-Volatile User Memory:** The 470 will send the contents of non-volatile 192KB user memory to the serial port.
0		List non-volatile labels, graphics images and downloadable fonts.
1		List non-volatile labels
2		List non-volatile graphic images
3		List non-volatile downloadable fonts

9.2 DOWNLOADABLE FONT STRUCTURE

A downloadable font consists of a font descriptor block (header), a proportional character array pointer table, a non-proportional character array pointer table, and the character pixel array.

NOTES:
- All words are in low-byte, high byte format.
- The maximum (before ASCII-HEX encryption) size is 128K bytes.

Character Header:

PARAMETER		SIZE	DESCRIPTION
Font name	-	18chr	Text surrounded by quotes ex. "Marin 12x8 " All data following the font name should be in ASCII-HEX format.
Words -	word	Number of words following this element. This is the word size of the following data BEFORE it is encrypted into the ASCII-HEX format.	
First Char	-	byte	First character in font, ex. 20h
Last Char	-	byte	Last character in font, ex. 7Fh
Pitch	-	word	Pitch of packed characters, size of character pixel array piers (see below)
Cell Height	-	word	Cell height of font

Default Char	-	byte	Default character to be imaged if character code is less than first character or larger than last character
Filler	-	byte	Always 0
LLC	-	word	Offset to the first character tier, from the start of the first character in words. This is the lower left hand corner of the first character. This pier is the ((cell height-1) * pier size)
NonPropOff	-	word	Offset, in words, to the non-proportional character pointer table. If there is no non-proportional pointer table, then point to the proportional pointer table, (which is always 0 offset from this point in the structure)

Character Pointer Table:
For each character from First Character to Last Character there is a pointer entry. If that character image does not exist, use the same values in the table as the default characters pointer entry. Likewise, if no lower case characters exist, you can substitute in the upper case character pointer array values.

Character Pointer Table:

PARAMETER		**SIZE**	**DESCRIPTION**
Pier Offset	-	word	Offset, in bits, from the start of a pier to the character data
Kerning	-	byte	Offset, in dots, from the left edge of the cell to the left edge of the character image
Descent	-	byte	Offset, in dots, from the bottom of the character cell in the font to the baseline of the destination character cell
Image Width	-	byte	Width of the character image
Cell Width	-	byte	Cell width of the character

If the font has a non-proportional character table, it would follow the proportional character table.

Character Pixel Array:
The character pixel array is a system of tiers of character image widths with no white space between them. If, for example, the character height is 20 dots, there would be 20 tiers. Therefore, each tier represents a scanline of the characters.

The lower left hand corner of the character data is the last encoded pier. The data in a byte of the pixel array may contain the image data of more than one character.

The size of a tier should always be an integral of 32, even if filler must be added to the data.

Sample 'C' structure of a Microcom Downloadable Font

```
/* Microcom Downloadable Font Structure */
/* header data */
typedef struct _Mic_ras
{
                    char    font_name_2[18];    /* font name surrounded by asterisk's */
        unsigned    short   size_of;            /* number of words following */
        unsigned    char    first_char;         /* first character in font */
        unsigned    char    last_char;          /* last character in font */
        unsigned    short   pitch;              /* pitch of packed characters */
        unsigned    short   cell_hgt;           /* cell height of font */
        unsigned    char    def_char;           /* default character - ex. (' ') */
        unsigned    char    fill;               /* filler byte, always 0 */
        unsigned    short   LCC;                /* offset to first character tier */
        unsigned    short   noff;               /* offset to nonproportional pointer tbl */
}
Mic_ras;

/* Pointer table */
typedef struct _Mic_pnt
{
        unsigned    short   LLC0;               /* bit offset from LCC to character */
                    char    kerning;            /* character kerning */
        unsigned    char    descent;            /* baseline descent */
        unsigned    char    im_wid;             /* image width */
        unsigned    char    cell_wid;           /* cell width */
}
Mic_pnt;
```

CHAPTER 10: PROMPTING

To expand the versatility of the 470 printer, Microcom has added self prompting to the list of features. The prompting software can be configured to run through a preset series of prompts (Buffer Mode), or it can be controlled by a host computer (Slave Mode). The following sections explain how to use these two modes.

PROMPTING ARCHITECTURE:
To Increase the versatility of the 470, text segments and a operational buffer have been added. Text segments are strings of 32 or less characters. There are 32 text segments. Text segments can be transferred to the operational buffer and used for mathematical operations. They can also be used for temporary data storage.

The operational buffer is where all mathematical instructions and data analysis are performed. It is also 32 characters long.

Display and output operations are done on specified text segments and fields. Therefore ^AX^D61 and ^AX^D65 are important commands to point out to the appropriate field or text segments before performing operations.

10.1 SEGMENT, FIELD, AND OP BUFFER COMMANDS

^A	^D	Command
XX	65	**Load Text Segment Number:** Valid range is 1 to 32.
	140	**Load Immediate Data to Text Segment:** Data must be surrounded by quotation marks. (Example form ^D140↩ "string"↩)
	141	**Append Immediate Data to Field:** Data must be surrounded by quotation marks. (Example form ^D141↩ "string"↩)
	142	**Load Immediate Data to Operational Buffer:** Data must be surrounded by quotation marks. (Example form ^D142↩ "string"↩)
	143	**Load Field to Operational Buffer:**
	144	**Load Text Segment to Operational Buffer:**
	145	**Append Operational Buffer to Field:**
	146	**Load Operational Buffer to Text Segment:**

Note: There is no text segment to field command. This can be achieved by transferring the text segment to the operational buffer and then transferring the operational buffer to the field.

Since all transfers to fields are appends, it may be necessary to clear field data prior to a transfer.

^A	^D	Command
	148	**Clear Operational Buffer Data:**
	149	**Clear Field Data:**
	150	**Clear Text Segment Data:**

10.2 PROMPTING COMMANDS

^A	^D	Command
XX...	120	**Load Prompt Control Word #1:** XX is the data for the prompt status word. The format is ^AB1111111111111111^D120↵.
XX...	124	**Load Prompt Control Word #2:** XX is the data for prompt status word 2. The format is ^AB1111111111111111^D124↵.
	121	**Prompt First Line of Display:** This command is usually sent after the status word. It displays a string in the first line of the LCD display. The input accepted is determined by the status word. To use this function send ^D121↵"STRING"↵.
	122	**Buffer Prompt:** Load buffer mode prompting information. This data must be terminated by a ^W.
XX	123	**Load Number of Times:** XX is the number of iterations of the prompting cycle.

Special Notes about prompting:

* While in prompt mode, press <SHIFT> <SHIFT> <SHIFT> <CLEAR> to erase any text on the 2nd LCD line.
* The 470 will start at the beginning of a prompt list and execute each command in sequence. This prompt list is stored using ^D122↵ followed by the prompt list and ending with a ^W.
* There is a 40 character text limit on keyboard entry.
* Label field length should be set appropriately to avoid incorrect print.

Commands ^D120 and ^D124 refer to status words. The following is a breakdown of the two status words.

STATUS WORD #1:

```
    1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
^ABxxxxxxxxxxxxxxxx
   ***************. 1=Send prompt response to serial port
   **************.) 1=Blow Piezo after receiving serial data.
   *************.)) 1=Display selected field in 2nd line of LCD
   ************.))) 1=Sound piezo when new prompt is displayed
   ***********.)))) 1=Allow PRINT key to function during prompts
   **********.))))) 1=Keypad input only, 0=Serial input only
   *********.)))))) 1=Allow both keyboard and serial input
   ********.)))))))  1=Allow early exit from prompting system
   *******.)))))))   1=Pass messages to host computer
   ******.)))))))    1=Enter or remain in prompt mode, 0=Exit
   *****.)))))))     0=Place keyboard entry in current text field
   ****.)))))))      Not Used
   ***.)))))))       1=Exit prompt mode when done
   **.)))))))        1=Print after current prompt is processed
   *.)))))))         1=Load keyboard input into copies count.
   .)))))))          Not Used
```

STATUS WORD #2:

```
    1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
^ABxxxxxxxxxxxxxxxx
   ***************. 1=Blank display after 1st keyboard character
   **************.) 1=Displays preprogrammed Redo label/New Label
   *************.)) 1=Request input for serial number field
   ************.))) 1=Exit prompting mode after one cycle
   ***********.)))) 1=Check if imputed data is within valid range
   **********.))))) 1=Check database
   *********.)))))) 1=Recycle if false
   ********.)))))))  1=Text Segment, 0=Field
   *******.)))))))   Not Used
   ******.)))))))    Not Used
   *****.)))))))     1=Enable case sensitivity
   ****.)))))))      1=Numeric entry only
   ***.)))))))       >  Text Starting Position:
   **.)))))))        >  1  2  3  4
   *.)))))))         >  0  0  0  1  =  1st
   .)))))))          >  0  0  1  0  =  2nd...
```

SPECIAL CODES:

Serial characters (decimal values)

27 - Exits prompting during text entry.

26 - Accepts current text string without modification (<CR> does this also)

Keyboard
SHIFT, SHIFT, SHIFT, CLEAR - Clears current text in 2nd line of display

Miscellaneous Notes:
- There is a 40 character text limit on keyboard entry.
- The label field character count should be set to match the largest field.

10.3 CALCULATOR COMMANDS

All Calculator functions are performed on the operational buffer. Legitimate input are floating point strings with up to 9 digit whole numbers and 9 digit fractions. Calculations are not guaranteed beyond this limit. Calculator fractions, if beyond the 9 digit limit, are rounded to the 9th digit before calculations occur. If the whole number string is beyond 9 digits, the leading digits are stripped before calculation.

Example: 9987654321.1234567899 would be redefined to 987654321.123456790 before any calculation is performed.

The 470 floating point calculator does accept signed entry. Example: -23.45

In multiplication, if the answer overflows the 9 digit maximum on whole numbers and fractions, the answer is indeterminate.

Division will round all fractional answers to 9 places if necessary.

All calculator operations are performed on the operational buffer by a text segment or field. The following illustrates the calculator format:
Subtraction: (Operational Buffer) - (Text or Field)
Division: (Operational Buffer) / (Text or Field)
Multiplication: Don't care
Addition: Don't care

The results of all calculations reside in the operational buffer which can be transferred to a text segment or field.

^A	^D	Command
X	**154**	**Do Addition on Operational Buffer:**
X	**155**	**Do Subtraction on Operational Buffer:**
X	**156**	**Do Multiplication on Operational Buffer:**
X	**157**	**Do Division on Operational Buffer:**

'X', in all cases, specifies whether the operation is performed on a text segment (1) or a field (0).

Additional commands control the format of the output data. The following operations are performed on the operational buffer.

^A	**^D**	**Command**
X	**153**	**Round/Expand Floating Point Fraction:** This command will round or expand the Floating Point Fraction to the desired number of decimal places. If the decimal places specified by 'X' is equal to the current decimal place, no operation is performed. If larger than the current decimal place, trailing 0's are added to the fraction. If smaller than the current decimal place, the fraction is rounded to the desired decimal place.
X	**158**	**Pad Floating Point Whole Number:** This command will pad the floating point whole number with 0's until the length is equal to the length specified by the 'X' value. If the number of characters is less than or equal to 'X', no operation will be performed.

LOW AND HIGH RANGE COMPARES:
The 470 has the capability to check an imputed floating point integer against low and high ranges. If the floating point input is within or equal to the range, prompting continues. If the number is below or above the range, the prompt is recycled. Range checking can be performed on signed numbers.

A range must be loaded into a range buffer and the prompt status word #2, bit position 12, must be set to a one to activate range checking.

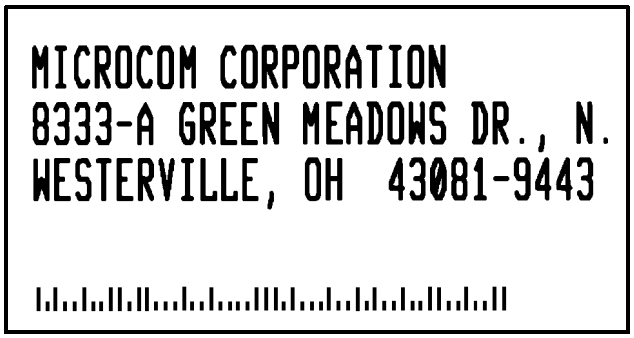
^A	**^D**	**Command**
	152	**Load Range into Range Buffer:** The floating point low range and high range must be separated by a colon. (Example: To load a range between -100 and +200, send the following ^D152↩ "-100:200"↩)

DATABASE SUBSTITUTIONS:
The 470 has a 1024 byte database buffer to check the integrity of imputed data. Once the data is checked, new data can be substituted. Case sensitivity can be enabled on the data checks by setting prompt status word #2, bit position 6, to a one. If the string is found in the database, the recycling of the prompt can be enabled by setting prompt status word #2, bit position 10, to a one.

^A	**^D**	**Command**
	151	**Load Database with Strings:** Data should be entered in the following format: ^D151↩"data1:dataA,data2:dataB..."↩ The data to be matched is represented by 'data1' and the 'data2'. The data that will replace the string is represented by 'dataA' and 'dataB'. All line feeds and carriage returns within the quotations are ignored. Colons must separate string matches and string replacements. Commas must separate entries in the database.

Program sample: Prompting (See Figure 15)

```
^A7^d123↩                          ;Set the number of passes to 7
^D57↩                          ;Set up normal label...
4,831,600,,18,50↩
1,60,320,50,4,,,,15,40,8,,,5↩
2,60,260,50,4,,,,15,40,8,,,5↩
3,60,200,50,4,,,,15,40,8,,,5↩
3,60, 80,50,36↩
^D56↩
^D2↩                               ;Begin text entry
MICROCOM CORPORATION↩              ;Text field 1
8333-A GREEN MEADOWS DR., N.↩      ;Text field 2
WESTERVILLE, OH  43081-9443↩       ;Text field 3
^D122↩                             ;Select Buffer Prompt mode
^A1^D61↩                           ;Select text field 1 (MICRO...)
^AB0000101011011111^D120↩          ;Set up Control Word 1
^AB0000000000000001^D124↩          ;Set up Control Word 2
^D121↩                             ;This command loads prompt in line1
"Enter COMPANY   "↩                ;This is the actual prompt string
^A2^D61↩                           ;Start of 2nd prompt
^AB0000101011011111^D120↩          ;The following is in the same
^AB0000000000000001^D124↩          ;format as the above. The only
^D121↩                             ;difference is the selected text
"Enter ADDRESS   "↩                        ;field.
^A3^D61↩                           ;Start of 3rd prompt
^AB0000101011011111^D120↩
^AB0000000000000001^D124↩
^D121↩
"Enter CITY      "↩
^AB0110111001001111^D120↩          ;Start of last prompt
^AB0000000000000010^D124↩          ;Note that is no text field
^D121↩                             ;selected. There is only a
"Enter COPIES    "↩                ;prompt.
^W                                 ;Terminate Buffer Prompt mode
```



Prompting Sample
Figure 15

CHAPTER 11: OPTIONS

The 470 printer has many options available to enhance the performance of the printer. Contact your sales representative for more information on these features.

11.1MICROCOM GRAPHICS CONVERSION UTILITIES

PCX2470.EXE
This PC software program decodes PCX files and converts them to the Microcom 470 format which can be stored in the 470 printer. It supports all 470 graphics features. See chapter 4.5.3 and 6 for more information about printing graphic images.

PCX2BIT.EXE
This PC software program decodes PCX files and converts them to a bitmap that can be directly downloaded and printed on the 470 printer. See chapter 4.5.3 and 6 for more information about printing graphic images.

11.2 MICROCOM DOWNLOADABLE FONT UTILITY

JET2470.EXE
This PC software program converts LaserJet II™ compatible fonts to the Microcom MSF format. Converted fonts may be stored in volatile or non-volatile memory for future use. See chapter 9 for more information on downloadable fonts.

11.3 ADDITIONAL DOWNLOADABLE FONTS

Microcom caries a full line of typefaces which can easily be downloaded by the user. Up to 8 fonts may be stored in permanent battery backed memory and up to 16 may be stored in temporary memory. Contact Microcom for a complete list of available typefaces and point sizes.

11.4 WYSIWYG SOFTWARE PACKAGES

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

11.5 CLEANING KIT

An approved cleaning kit is offered for the 470 printer. A Microcom cleaning kit must be purchased to validate warranty. It is suggested the printer be cleaned once every two weeks, every 5,000 labels, or whenever label stock is replaced.

APPENDIX A: WARRANTY AND REPAIR PROCEDURES

LIMITED WARRANTY

A Microcom cleaning kit must be purchased with each printer to validate warranty.

For a period of 12 months Microcom warrants its products against defects in materials and workmanship.

The thermal print head is warranted for a period of three months or 500,000 linear inches to be free from defects in material of workmanship. Determination of such print head failure shall be determined by the print head manufacturer or Microcom.

Warranty will not apply to malfunctions arising from connection or interfacing to any other equipment or to failures or malfunctions caused by operation in hostile environments or the use of supplies, such as non-approved label stock and cleaning solutions.

Except for the express warranties stated above, seller 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 the seller for Any damages, including, but not limited to special, indirect or consequential damages arising out of or in connection with the sale, use, or performance of the products.

PRINTER REPAIR

In the unlikely event that your printer needs repaired, upgraded or reconfigured, call your service representative and ask for the service department. Please have the model number, serial number, and LDS code revision number ready. You will need to give a statement of the needed service. If you are contacting Microcom direct, you will be issued an RMA number. Do not return the printer to Microcom without first receiving an RMA number. The RMA number should appear on the shipping carton.

Once an RMA number is secured, return the printer, freight and insurance prepaid.

To insure proper warranty coverage, please return printer in original shipping carton.

APPENDIX B: LABEL SAMPLES

POWER-UP

```
^D57↵
43,808,592,20,10,48,0,1,535↵
 1, 45, 38,19,16,3,  0,0, 2,70↵
 1,170, 10,19, 4,1,  0,0,20,20,5,1,0,4↵
 2,744,350, 8,15,3,270,1, 3,80↵
 2,772,355, 8, 4,1,270,0,20,20,4,1,0,4↵
 3, 50,245,10, 4,1,  0,0,36,50,5,1,0,8↵
 4,105,180,10, 4,1,  0,0,70,50,7,1,0,7↵
 5, 75,530,19, 4,1,  0,0,12,17,2,1,0,3↵
 6, 98,505,19, 4,1, 31,0,12,17,2,1,0,3↵
 7, 69,478,19, 4,1, 58,0,12,17,2,1,0,3↵
 8, 46,510,19, 4,1, 90,0,12,17,2,1,0,3↵
 9,420,240,19, 4,1,180,0,23,45,4,1,1,3↵
 9,420,238,19, 4,1,  0,0,23,45,4,1,0,3↵
10,320,475,19, 4,1,  0,0,15,15,4,1,0,3↵
11,360,450,19, 4,1,  0,0,15,15,4,1,0,2↵
12,290,320,19, 4,1,  0,0,30,50,4,1,0,2↵
13, 50,120,50, 4,1,  0,0,15,20,4,1,0,2↵
14,210,120,50, 4,1,  0,0,40,30,4,1,0,4↵
15,380,120,50, 4,1,  0,0,15,20,4,1,0,2↵
16,450,120,50, 4,1,  0,0,15,20,4,1,0,4↵
17,610,120, 1, 4,1,  0,0,15,20,4,1,0,2↵
18,630,120, 1, 4,1,  0,0,15,30,4,1,0,2↵
19,650,120, 1, 4,1,  0,0,15,40,4,1,0,2↵
20,670,120, 1, 4,1,  0,0,15,50,4,1,0,2↵
21,690,120, 1, 4,1,  0,0,15,40,4,1,0,2↵
22,710,120, 1, 4,1,  0,0,15,30,4,1,0,2↵
23,730,120, 2, 4,1,  0,0,15,20,4,1,0,2↵
055,530,225,360,5, 7↵
400,180,772,180,6, 3↵
400,300,772,300,6, 3↵
400,180,400,300,6, 3↵
772,180,772,300,6, 3↵
350,525,400,525,5,25↵
500,537,550,537,6,24↵
369,383,313,401,6, 2↵
391,389,343,414,6, 2↵
413,393,379,421,6, 2↵
435,396,415,428,6, 2↵
457,398,451,435,6, 2↵
478,398,484,435,6, 2↵
500,396,525,428,6, 2↵
522,393,561,421,6, 2↵
544,389,597,414,6, 2↵
566,383,627,401,6, 2↵
^D56^D2↵
0123456789ABCDEFGHI↵
04312512↵
MICROCOM↵
470↵
0 deg rotation↵
31 deg rotation↵
58 deg rotation↵
90 deg rotation↵
MIRROR IMAGES↵
ROUND OR SQUARE↵
PEN SHAPE↵
VECTOR TEXT↵
COMPLETE↵
FONT↵
AND↵
PEN SIZE↵
C↵
O↵
N↵
T↵
R↵
O↵
L↵
^D3↵
```

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LINES

```
^D57↩
29,800,600,,,16,0,,560,0,0↩
 1,200,450,11,4, 1,0,0,27,30,3,1,0,5↩
 2,200,290,12,4, 1,0,0,27,30,3,1,0,5↩
 3,200, 50,14,4, 1,0,0,27,30,3,1,0,5↩
 4,677,518, 1,1,14,0,0, 1, 1,1,1,0↩
 5,730,403, 1,1,14,0,0, 1, 1,1,1,0↩
 6,730,323, 1,1,14,0,0, 1, 1,1,1,0↩
 7,730,243, 1,1,14,0,0, 1, 1,1,1,0↩
 8,680,462, 1,1,14,0,0, 1, 1,1,1,0↩
 9,680,403, 1,1,14,0,0, 1, 1,1,1,0↩
10,680,343, 1,1,14,0,0, 1, 1,1,1,0↩
11,680,283, 1,1,14,0,0, 1, 1,1,1,0↩
12,680,223, 1,1,14,0,0, 1, 1,1,1,0↩
13,680,163, 1,1,14,0,0, 1, 1,1,1,0↩
14,680,103, 1,1,14,0,0, 1, 1,1,1,0↩
 4, 30,518, 1,1,14,0,0, 1, 1,1,1,0↩
 5, 83,403, 1,1,14,0,0, 1, 1,1,1,0↩
 6, 83,323, 1,1,14,0,0, 1, 1,1,1,0↩
 7, 83,243, 1,1,14,0,0, 1, 1,1,1,0↩
 8, 30,462, 1,1,14,0,0, 1, 1,1,1,0↩
 9, 30,403, 1,1,14,0,0, 1, 1,1,1,0↩
10, 30,343, 1,1,14,0,0, 1, 1,1,1,0↩
11, 30,283, 1,1,14,0,0, 1, 1,1,1,0↩
12, 30,223, 1,1,14,0,0, 1, 1,1,1,0↩
13, 30,163, 1,1,14,0,0, 1, 1,1,1,0↩
14, 30,103, 1,1,14,0,0, 1, 1,1,1,0↩
200,550,500,550,5,20↩
220,410,520,410,6,20↩
200,100,500,260,5,15↩
220,260,520,100,5,15↩
^D56^D2↩
ROUND LINES↩
SQUARE LINES↩
DIAGONAL LINES↩
M↩
4↩
7↩
0↩
I↩
C↩
R↩
O↩
C↩
O↩
M↩
^D3↩
```

POSTNET

```
^D57↩
4,831,600,,18,20↩
1,60,320,50,4,,,,25,55,8,,,7↩
2,60,260,50,4,,,,15,40,8,,,5↩
3,60,200,50,4,,,,15,40,8,,,5↩
3,60, 80,50,36↩
^D56↩
^D2↩
MICROCOM CORPORATION↩
8333-A GREEN MEADOWS DR., N.↩
WESTERVILLE, OH  43081-9443↩
^D3↩
```

BAR CODES

```
^D57↩
3,800,200,,,18,0,, 80, 0,0↩
1,300, 30,5, 4, 1,0,0,27,30,3,1,0,5↩
2,268,100,8,21, 2,0,0, 3,80↩
2,296, 71,8, 1,10,0,0, 1, 1↩
^D56^D2↩
EAN-8↩
12345678↩
```

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))

```
^D3↩

^D57↩
3,800,200,,,18,0,, 80, 0,0↩
1,300,25, 6, 4, 1,0,0,27,30,3,1,0,5↩
2,243,90,13,20, 2,0,0, 3,80↩
2,281,65,13, 1,10,0,0, 1, 1↩
^D56^D2↩
EAN-13↩
1234567891234↩
^D3↩

^D57↩
3,800,200,,,18,0,, 80,0,0↩
1,287,26,7, 4, 1,0,0,27,30,3,1,0,5↩
2,164,92,9,42, 3,0,0, 3,80,3↩
2,309,68,9, 1,10,0,0, 1, 1↩
^D56^D2↩
CODABAR↩
123456789↩
^D3↩

^D57↩
3,800,200,,,18,0,, 80,0,0↩
1,290, 30,7, 4, 1,0,0,27,30,3,1,0,5↩
2,205,100,9,43, 2,0,0, 3,80↩
2,317, 71,9, 1,10,0,0, 1, 1↩
^D56^D2↩
CODE 93↩
123456789↩
^D3↩

^D57↩
3,800,200,,,18,0,, 80,0,0↩
1,110, 20,18, 4, 1,0,0,27,30,3,1,0,5↩
2,245,100,10,15, 3,0,0, 3,80↩
2,291, 65,10, 1,10,0,0, 1, 1↩
^D56^D2↩
INTERLEAVED 2 OF 5↩
123456789↩
^D3↩

^D57↩
3,800,200,,,18,0,, 80,0,0↩
1,230,20,10, 4, 1,0,0,27,30,3,1,0,5↩
2,250,90,10,15, 3,0,0, 3,80↩
2,277,65,10, 1,10,0,0, 1, 1↩
^D56^D2↩
I25 MOD 10↩
1234567890↩
^D3↩

^D57↩
3,800,200,,,18,0,, 80,0,0↩
1,260, 30, 8, 4, 1,0,0,27,30,3,1,0,5↩
2,213,100,11,40, 2,0,0, 3,80↩
2,298, 71, 9, 1,10,0,0, 1, 1↩
^D56^D2↩
CODE 128↩
123456789↩
^D3↩
```

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```
^D57↵
3,800,200,,,18,0,, 80,0,0↵
1,290, 38, 5, 4,1,0,0,27,30,3,1,0,5↵
2,218,100,11,12,2,0,0, 3,80↵
2,185, 81,11,32,2,0,0, 3, 2↵
^D56^D2↵
UPC-A↵
123456789012↵
^D3↵

^D57↵
3,800,200,,,18,0,, 80,0,0↵
1,290, 28, 5, 4, 1,0,0,27,30,3,1,0,5↵
2,280,100,  ,13, 2,0,0, 3,80↵
3,290, 71,11, 1,10,0,0, 1, 1↵
^D56^D2↵
UPC-E↵
07040200008↵
0704028↵
^D3↵

^D57↵
3,800,200,,,18,0,, 80,0,0↵
1,290, 28, 5, 4, 1,0,0,27,30,3,1,0,5↵
2,201,100,11,44, 2,0,0, 3,80↵
2,278, 71,10, 1,10,0,0, 1, 1↵
^D56^D2↵
AS-10↵
12345678901↵
^D3↵

^D57↵
3,800,200,,,18,0,, 80,0,0↵
1,212, 28,15, 4, 1,0,0,27,30,3,1,0,5↵
2,212,100,11,24, 2,0,0, 1,80↵
2,281, 71,20, 1,10,0,0, 1, 1↵
^D56^D2↵
MSI-PLESSEY↵
12345678901↵
^D3↵

^D57↵
3,800,200,,,18,0,, 80,0,0↵
1,288, 31, 8, 4, 1,0,0,27,30,3,1,0,5↵
2,160,100,11,36, 2,0,0, 2,80↵
2,290, 71,10, 1,10,0,0, 1, 1↵
^D56^D2↵
POSTNET↵
430819443↵
^D3↵
```

MIRROR

```
^D57↵
9,831,650↵
7,256,560,30,4,1,  0,0,35,50,1,1,0, 5↵
7,256,560,30,4,1,180,0,35,50,1,1,1, 5↵
1, 21,380,30,4,1,  0,0,70,80,1,1,0,12↵
1, 21,380,30,4,1,180,0,70,80,1,1,1,12↵
2,771, 35,30,4,1,240,0,25,25,1,1,0, 3↵
3,571,270,30,4,1,120,0,25,25,1,1,0, 3↵
4,371, 30,30,4,1,270,0,25,25,1,1,0, 3↵
5,171,270,30,4,1, 65,0,25,25,1,1,0, 3↵
6,151,230,30,4,1,140,0,25,25,1,1,0, 3↵
^D56↵
^D2↵
VECTOR TEXT↵
MICROCOM↵
CORPORATION↵
MICROCOM↵
CORPORATION↵
!!!!!!!!↵
MIRRORED↵
^D3↵
```

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REVERSED PRINTING

```
^D57↵
11,800,600,,,31,0,,560,0,0↵
494,530,284,530,6,60↵
133,230,133,454,6,60↵
355,389,125,175,9↵
685,218,685,476,6,60↵
504,133,268,133,6,60↵
1,240,483,8,1,14,  0,0,1,1,1,1,2↵
2,640,443,8,1,14, 90,0,1,1,1,1,2↵
3,117,198,8,1,14,270,0,1,1,1,1,2↵
4,482,120,8,1,14,180,0,1,1,1,1,2↵
5,240,325,7,1,11,  0,0,2,2,2,1,2↵
6,280,245,5,1,11,  0,0,2,2,2,1,2↵
^D56^D2↵
MICROCOM↵
Microcom↵
Microcom↵
MICROCOM↵
REVERSE↵
VIDEO↵
^D3↵
```

ROTATIONS

```
^D57↵
17,808,592,20,10,16,0,1,560,125↵
1,107,361,10,4,1,  0,0,15,20,3,1,0,4↵
1,114,433,10,4,1, 22,0,15,20,3,1,0,4↵
1,152,497,10,4,1, 45,0,15,20,3,1,0,4↵
1,214,544,10,4,1, 68,0,15,20,3,1,0,4↵
1,282,559,10,4,1, 90,0,15,20,3,1,0,4↵
1,364,550,10,4,1,113,0,15,20,3,1,0,4↵
1,420,510,10,4,1,135,0,15,20,3,1,0,4↵
1,465,457,10,4,1,157,0,15,20,3,1,0,4↵
1,481,387,10,4,1,180,0,15,20,3,1,0,4↵
1,472,305,10,4,1,203,0,15,20,3,1,0,4↵
1,433,244,10,4,1,225,0,15,20,3,1,0,4↵
1,375,200,10,4,1,248,0,15,20,3,1,0,4↵
1,302,185,10,4,1,270,0,15,20,3,1,0,4↵
1,227,191,10,4,1,293,0,15,20,3,1,0,4↵
1,169,231,10,4,1,315,0,15,20,3,1,0,4↵
1,123,288,10,4,1,338,0,15,20,3,1,0,4↵
2,100, 75,20,4,1,  0,0,15,30,6,1,0,5↵
^D56↵
^D2↵
MICROCOM↵
360 DEGREE ROTATIONS↵
^D3↵
```

FONTS 470

```
^D57↵
15,620,441↵
 1, 40,420,14,1, 1↵
 2, 40,405,14,1, 2↵
 3, 40,389,14,1, 3↵
 4, 40,372,14,1, 4↵
 5, 40,355,14,1, 5↵
 6, 40,338,14,1, 6↵
 7, 40,320,14,1, 7↵
 8, 40,301,14,1, 8↵
 9, 40,282,14,1, 9↵
10, 40,260,14,1,10↵
11, 40,235,14,1,11↵
12, 40,207,14,1,12↵
13, 40,157,14,1,13↵
14, 40,107,14,1,14↵
15, 40, 62,14,1,19↵
^D56↵
^D2↵
FONT  1:  5X3↵
FONT  2:  5X5↵
```

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))

```
FONT  3:  6X5↩
FONT  4:  7X5↩
FONT  5:  7X7↩
FONT  6:  7X7↩
FONT  7:  8X5↩
FONT  8:  9X5↩
FONT  9:  9X7↩
FONT 10: 12X8↩
FONT 11: 15X12↩
FONT 12: 18X10↩
FONT 13: 40X15↩
FONT 14: 40X20↩
FONT 19: OCR A↩
^D3↩

^D57↩
5,620,441↩
1,100, 40,12, 1,10↩
5,100, 62, 3, 1,10,,,8↩
4,100, 84, 3, 1,10,,,4↩
3,100,106, 3, 1,10,,,2↩
2,100,128, 3, 1,10↩
^D56↩
^D2↩
X MULTIPLIER↩
1X↩
2X↩
4X↩
8X↩
^D3↩

^D57↩
5,620,441↩
1,100, 40,12, 1,10↩
5,100, 62, 3, 1,10,,,, 8↩
4,100,168, 3, 1,10,,,, 4↩
3,100,226, 3, 1,10,,,, 2↩
2,100,260, 3, 1,10↩
^D56↩
^D2↩
Y MULTIPLIER↩
1Y↩
2Y↩
4Y↩
8Y↩
^D3↩
```

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))

```
^D57↩
5,620,441↩
1,100, 40,14, 1,10↩
5,100, 62, 3, 1,10,,,8,8↩
4,100,168, 3, 1,10,,,4,4↩
3,100,226, 3, 1,10,,,2,2↩
2,100,260, 3, 1,10↩
^D56↩
^D2↩
XY MULTIPLIER↩
1XY↩
2XY↩
4XY↩
8XY↩
^D3↩

^D57↩
4,620,441↩
4, 50,100,23,1,10,,,,,20↩
3, 50,122,23,1,10,,,,,10↩
2, 50,144,23,1,10,,,,, 5↩
1, 50,166,23,1,10,,,,, 1↩
^D56↩
^D2↩
CHARACTER SPACING 1↩
CHARACTER SPACING 5↩
CHARACTER SPACING 10↩
CHARACTER SPACING 20↩
^D3↩

^D57↩
9,620,441↩
1,320, 30,11, 1,10, ,4↩
2,320,120,11, 1,10, ,4↩
2,320,137, 1,16, 2, ,4, 2,40,2↩
3,487,254,11, 1,10,3,4↩
3,470,254, 2,16, 2,3,4,40, 2,2↩
4,320,387,11, 1,10,1,4↩
4,320,370, 3,16, 2,1,4, 2,40,2↩
5,160,254,11, 1,10,2,4↩
5,177,254, 3,16, 2,2,4,40, 2,2↩
^D56↩
^D2↩
ROTATIONS↩
0 DEGREES↩
90 DEGREES↩
180 DEGREES↩
270 DEGREES↩
^D3↩

^D57↩
1,620,441,,,,,,100↩
1,100,100,13,1,13↩
^D56↩
^D2↩
X OFFSET OF 0↩
^D3↩

^D57↩
1,620,441,,,,,,,100↩
1,100,100,15,1,13↩
^D56↩
^D2↩
X OFFSET OF 100↩
^D3↩

^D57↩
1,620,441↩
1,100,100,13,1,13↩
^D56↩
^D2↩
Y OFFSET OF 0↩
^D3↩
```

))

))

```
^D57↩
1,620,441,,,,,,,,100↩
1,100,100,15,1,13↩
^D56↩
^D2↩
Y OFFSET OF 100↩
^D3↩
```

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 470 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
200 SYSTEM
```

APPENDIX D: QUICK REFERENCE COMMAND SUMMARY

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

```
HFM, LSX, LSY, WEB, GAP, DPS, LCB, AGD, SPG, OFX, OFY
  0, 832, 443,  10,  10,  48,   0,   1, 535,   0,   0
```

The following is a list of **BIT MAPPED** field mnemonics and their default values:

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

The following is a list of **VECTOR** font field mnemonics and their default values:

```
TSN, XB, YB, CC,TCI,CGN, FO, FJ,CWX,CWY, CS,TSP, AN,STK
  1,  0,  0,  1,  4,  1,  0,  0,  0,  0,  *,  1,  0,  1
```

The following is a list of **GRAPHIC IMAGE** field mnemonics and their default values:

```
XB, YB, GW, GH,TCI,CGN
 1,  1,  *,  *,  7, **
```

The following is a list of **ROUND LINE** field mnemonics and their default values:

```
XB, YB, XE, YE,TCI,WID
 1,  1,  1,  1,  5,  1
```

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

```
XB, YB, XE, YE,TCI,WID
 1,  1,  1,  1,  6,  1
```

The following is a list of **FILLED RECTANGLE** field mnemonics and their default values:

```
XB, YB, RW, RH,TCI
 1,  1,  1,  1,  9
```

The following is a list of **FILLED OVAL** field mnemonics and their default values:

```
XC, YC, RX, RY,TCI
 1,  1,  1,  1, 18
```

The following is a list of **FRAMED OVAL** field mnemonics and their default values:

```
XC, YC, RX, RY,TCI, FX, FY
 1,  1,  1,  1, 19,  1,  1
```

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

1	Text
2	Text Surrounded by Asterisks (Code 3 of 9)
3	Text with UPC-A/UPC-E Checksum Digit Printed
4	Vector Text
5	Round Line
6	Square Line
7	Graphics (ROM and RAM)
8	Non-Volatile downloadable fonts
9	Fill Rectangle
10	Volatile Graphics
11	Volatile downloadable fonts
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
18	Filled Oval
19	Framed Oval
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
40	Code 128 bar code (Automatic Compression)
41	Code 128 bar code (No Compression)
42	Codabar bar code
43	Code 93 bar code
44	AS-10 bar code

^A	^D	Command
	2	**Text string entry mode:** Precedes the text strings that are supplied to the various fields in the label (Equivalent to ^B).
	3	**Print Command:** Prints a single label or starts the printing of a batch of labels. (Equivalent to ^C)
	5	**Send Printer Status:** (Equivalent to ^E)
	11	**Print a Test Label:** (Equivalent to ^K)
	12	**Print a Blank Label:** (Equivalent to ^L)
	16	**Clear Non-Volatile User Memory:**
0		Clear ALL non-volatile user memory
1		Clear ALL non-volatile format files
2		Clear ALL non-volatile graphics files
3		Clear ALL non-volatile downloadable fonts
	21	**Change SW1:** Software dip switch #1. Below is the ^AB sequence.

```
   12345678
^ABxxxxxxxx
   *******. 1=XON/XOFF Enable,  0=Disable
   ******.) 1=Menu System Disable, 0=Enable
   *****.)) 1=Echo Enable, 0=Disable
   ****.))) 1=Disable Copies Count Prompt, 0=Enable
   ***.)))) Not Used
   **.)))))) 1=Ignore Control Codes, 0=Accept
   *.)))))))),
   .)))))))),*Enquiry Response
             00=Control Codes
             10=Text Equivalent
             11=^Equivalent
```

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

```
   12345678
^ABxxxxxxxx
   *******.)))),
   ******.)))),*
   *****.)))),** Power-up Label Format
   *****     000=ROM Format File 1
   *****     001=ROM or Non-Volatile User Format File 1
   *****     010=ROM or Non-Volatile User Format File 2
   *****     011=ROM or Non-Volatile User Format File 3
   *****     100=ROM or Non-Volatile User Format File 4
   *****     101=ROM or Non-Volatile User Format File 5
   *****     110=ROM or Non-Volatile User Format File 6
   *****     111=ROM or Non-Volatile User Format File 7
   ****.)))) 1=Use Non-Volatile User Format File, 0=ROM
   ***.)))))) 1=Print Button Enable, 0=Disable
   **.)))))) 1=Line Feed Button Disable, 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
^ABxxxxxxxx
   *******.) Not Used
   ******.)) 1=Temp in Fahrenheit, 0=Celsius
   *****.))) 1=Ribbon Break Sensor Disable, 0=Enable
   ****.)))) 1=Pulse Tone On Piezo, 0=Continuous
   ***.))))) 1=Head Up Error Disable, 0=Enable
   **.)))))) 1=Response After Print Enable, 0=Disable
   *.)))))) 1=User Display Enable, 0=Disable
   .)))))))) 1=Piezo Sound Disable, 0=Enable
```

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

```
   12345678
^ABxxxxxxxx
   *******.) Not Used
   ******.)) Not Used
   *****.))) Not Used
   ****.)))) 1=Pass ASCII over 7F, 0=Less than 80 only
   ***.))))) 1=Auto-size on Power-up Enable, 0=Disable
   **.)))))) 1=Blow-hole Stock Enable, 0=Disable
   *.)))))) 1=2" Epson® Emulation Enable, 0=Disable
   .)))))))) 1=4" Epson® Emulation Enable, 0=Disable
```

25 **Change SW5:** Software dip switch #5. Below is the ^AB sequence.

```
   12345678
^ABxxxxxxxx
   *******.) Not Used
   ******.)) 1=Enable Auto Error Message Transmission
   *****.))) Not Used
   ****.)))) Not Used
   ***.)))))) Auto Adjust for Black Line Darkness
   **.)))))) Not Used
   *.)))))) Not Used
   .)))))))) 1=Disable Name/Time When Idle, 0=Enable
```

26 **Change SW6:** Software dip switch #6. Below is the ^AB sequence.

```
   12345678
^ABxxxxxxxx
   *******.) Not Used
   ******.)) Not Used
   *****.))) Not Used
   ****.)))) Not Used
   ***.)))))) Not Used
   **.)))))) Not Used
   *.)))))) Not Used
   .)))))))) Not Used
```

28 **Show Head Size:** This function will send the print head dot count to the communications port. The output is in standard ASCII and will be 640, 768, or 832.

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 time:** The printer will respond by sending the current time to the communications port. The output is standard ASCII and in the format; Hours,Min,Sec.
For example: 12:38:59

32 **Soft Reset:** Restores printer to power-up settings. Also used to set the battery backed ram fields in memory. Section 5.3.

33 **Display Model and Revision Number.**

34 **Automatic Daylight Savings Time Adjustment:**
0 Disable
1 Enable

35 **Contrast Window Adjust:** A value from 60 to 140 in increments of 1.

XX **36** **Adjust Contrast Base:** A battery backed ram command. The ^AXX is between 10 and 200%. Section 5.3. This command should only be used to adjust/calibrate head base contrast differences between printers. Use ^D35 in normal use.

37 **Check Voltages:** This command will send the current power supply voltages and head temperature measurements to the communications port.

38 **Epson® Similar Emulation:**
1 40 column Epson® similar emulation (2 inch)
2 80 column Epson® similar emulation (4 inch)

	39	**Auto-Size Label:** Section 5.3.3.
0		Clears the use of auto-size values set by ^A1^D39.
1		Uses the values obtained instead of those in the format file.
2		Automatically sizes the label and send the results out the serial port.
3		Same as ^A2^D39, but prints the values on a label, instead of on the screen.
	40	Clear Commands 41-51.
XX	**41**	**Load number of fields in layout (HFM):** Preceded by ^A.
XX	**42**	**Load label width in dots (LSX):** 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 Non-Volatile Format File to Serial Port:** ^A selects which the file to be sent (1-32). Section 5.3.6.
XX	**55**	**Select Default Label Layout:** Select from the ROM power-up layouts. ^AXX ranges from 1 to 8.
	56	**End User Defined Field Definitions:** Tells the printer that all field definitions are complete.
	57	**Enter Label Format Mode:** This tells the printer that information for a label is following.
XX	**58**	**Process Non-Volatile Format:** ^A selects which one (1-8). Section 5.3.6.
XX	**59**	**Save Format File:** ^A selects which one (1-8). Section 5.3.6.
	60	Clears command 61

XX	**61**	**Mark Text Starting Position:** ^A designates which text field to start entering new data. Section 5.3.8.
	62	**Pre-padded Text:** This command is sent after text that is to appear at the beginning of each field is sent.
	63	**Text Mode Control:** Section 5.3.8.
0		Disable 1 & 2.
1		Enable auto-print mode
2		Clear all previous text upon receiving new data.
3		Enable 1 & 2.
XX	**64**	**Auto Print String Count:** ^A tells the printer how many text strings to accept before printing. Section 5.3.
XX	**65**	**Load Text Segment Number:** Valid range is 1 to 32.
X	**66**	**Clear Single Non-Volatile Saved Format File:** This command will clear a single non-volatile saved format and open the slot for a new file. Section 5.3.8.
	67	**24 Hour Date Format:**
0		24 hour format.
1		12 hour format.
	70	**Clock Chip Initialization:** Non-Destructive initialization of battery backed clock functions. This command should be sent whenever the clock chip is replaced or erratic clock operation exist.
X	**71**	**Clear Single Non-Volatile Graphic:** This command will clear a single Non-Volatile graphic file and open the slot for a new file.
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	**User Display:** This command temporarily displays a user defined message in the printers first and/or second line of the LCD. This command must be enabled by dip switch #3 position 2. A carriage return must follow the ^D77 command. The message string must follow this command ,be surrounded by quotes and also terminate with a carriage return. (Example form ^A0^D78↩ "message line 1"↩)
0		First line of LCD (16 characters max).
1		Second line of LCD (16 characters max).
	78	**User String**: This command changes the default or programmable message on the first LCD line. A carriage return must follow the ^D78 command. The user string must follow this command ,be surrounded by quotes and also terminate with a carriage return. (Example form ^D78↩ "user string"↩)
	79	**OEM Number String on Power-up Label:** This Command will load a model number into non-volatile user memory. Soft switch 5 position 3 activates this feature. OEM name string function must also be activated. The sequence ^D79↩"12345"↩ will print 12345 in the model position of the power up label and lower line of LCD. Maximum of 5 characters allowed.
	80	Disable all serial numbering.
XX	**81**	**Disable Single Serial Number Field:** Will disable an individual serial number field.
XX	**82**	**Enable Single Serial Number Field:** Will recall a stored serial number (1-16) and place it into an individual serial number field on the label. XX determines the stored serial number slot to be recalled. The TSN (Text String Number) is selected by following the ^AXX^D82↩ with the TSN surrounded by quotes ("TSN"↩). This command is not stored between different labels, it must be sent each time a format is sent and must be located after the ^D57 command and format information.
XX	**83**	**Select Stored Serial Number to increment:** Tells the printer which stored serial number to increment. See section 4.5 on text string numbers. The ^A value states which serial number is selected.
XX	**84**	**Select Stored Serial Number to decrement:** Tells the printer which stored serial number to decrement. See section 4.5 on text string numbers. The ^A value states which serial number is selected.
	85	**Clear All Stored Serial Numbers:** This function will erase any serial numbers stored in memory.
XX	**86**	**Load New Serial Number Into Memory:** This command loads a serial number into non-volatile user memory. XX is used to select the serial number slot (1-16). The actual serial number, up to 9 characters, is placed in quotes and follows the ^AXX^D86↩.

XX	**87**	**Load Increment/Decrement Value Into Memory:** Will load and store a step value into non-volatile user memory. The stored serial number to be affected is chosen with the XX variable and the actual step value, up to 9 characters, is entered by following the ^AXX^D87↵ with the step value surrounded by quotes.
XX	**88**	**Send Serial Number To Serial Port:** ^A specifies which stored serial number (1-16) to send.
XX	**89**	**Send Increment/Decrement Value To Serial Port**: ^A specifies which stored increment/decrement value (1-16) to send.
XX	**90**	**Enter New Combination:** Uses user defined 4 digit combination to enter tech menu instead of default 9999.
XX	**91**	**Load Value for Printer to See Valid Gap.** Section 5.3.
	92	**Test Printer DRAM:** Printer will respond by sending a >PASS< or >FAIL< message out communications port.
	93	**Load Control Code Recognition Status:**
0		Enable control code recognition.
1		Disable control code recognition.
	94	**Send Non-Volatile User Memory Available:** The printer will send the number of free bytes to the serial port (i.e. >192480<).
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:** Section 2.6.1.
0		Turns off tag/tear operation.
1		Advance after every label.
2		Advance after copies count.
3		Advance when idle.
	98	**Peel-and-Dispense Mode:** Section 2.6.2.
0		Turn off peel-and-dispense mode.
1		Turn on peel-and dispense mode.
XX	**101**	**Load Graphic Image into Non-Volatile User Memory:** ^A select which volatile slot to place the image in (1-16).
XX	**102**	**Load Volatile Graphic Image:** ^A select which volatile slot to place the image in (1-16).

XX **109** **Delete Single Volatile Graphic Image:** ^A selects which slot (1-16) to erase.

XX **110** **Delete Single Non-Volatile Downloadable Font:** ^A select the font to erase (1-8).

XX **111** **Load Non-Volatile Downloadable Font:** ^A selects which slot (1-8) to place the font in. ^A0 selects the next available slot.

XX **112** **Load Volatile Downloadable Font:** ^A select which slot to place the font in (1-16).

XX **115** **Delete Single Volatile Soft Font:** ^A selects which slot (1-16) to erase.

116 **Send Volatile User Memory Available:** The printer will send the number of free bytes to the serial port (i.e. >327680<).

117 **Clear Volatile User Memory:** ^A selects which sections of memory to clear.

0 Clear all volatile user memory
1 Clear only graphic images in volatile user memory
2 Clear only downloadable fonts in volatile user memory

118 **Read Volatile User Memory:** The 470 will send the contents of the volatile (320KB) user memory to the serial port.

0 Send list of graphic images and downloadable fonts
1 Send list of graphic images
2 Send list of downloadable fonts

119 **Read Non-Volatile User Memory:** The 470 will list the contents of non-volatile 192KB user memory to the serial port.

0 List non-volatile labels, graphics images and downloadable fonts
1 List non-volatile label formats
2 List non-volatile graphic images
3 List non-volatile downloadable fonts

XX **120** **Load Prompt Control Word:** XX is the data for the prompt status word.

121 **Prompt First Line of Display:** This command is usually sent after the status word. It displays a string in the first line of the LCD display. The input accepted is then determined by the status word. To use this function send ^D121↵"STRING"↵.

122 **Buffer Prompt:** Load buffer mode prompting information. This data must be terminated by a ^W.

XX **123** **Load Number of Times:** XX is the number of iterations of the prompting cycle.

XX **124** **Load Prompt Control Word 2:** XX is the data for prompt status word 2.

XX 130 Load Database: Up to 2048 ASCII characters can be stored in the database. Storage is terminated by an ESC character or the 2048 limit.

XX 131 Read Database: The full string of 2048 characters is sent to the serial port.

XX 132 Clear Database:

XX 139 Adjust Size of Automatic Reverse Video Text Fields (AN=4): This command increases the size of all AUTOMATIC REVERSE VIDEO TEXT FIELDS. It will not effect any other type of reverse video. The ^A value increases the bottom border of the reverse video box in increments of 1 dot and must be between 0 and 255.

140 Load Immediate Data to Text Segment: Data must be surrounded by quotation marks. (Example form ^D140↩ "string"↩)

141 Append Immediate Data to Field: Data must be surrounded by quotation marks. (Example form ^D141↩ "string"↩)

142 Load Immediate Data to Operational Buffer: Data must be surrounded by quotation marks. (Example form ^D142↩ "string"↩)

143 Load Field to Operational Buffer:

144 Load Text Segment to Operational Buffer:

145 Append Operational Buffer to Text Segment:

146 Load Operational Buffer to Text Segment:

148 Clear Operational Buffer Data:

149 Clear Field Data:

150 Clear Text Segment Data:

151 Load Database with Strings: Data should be entered in the following format: ^D151↩"data1:dataA,data2:dataB..."↩ The data to be matched is represented by 'data1' and the 'data2'. The data that will replace the string is represented by 'dataA' and 'dataB'. All line feeds and carriage returns within the quotations are ignored. Colons must separate string matches and string replacements. Commas must separate entries in the database.

152 Load Range into Range Buffer: The floating point low range and high range must be separated by a colon. (Example: To load a range between -100 and +200, send the following ^D152↩ "-100:200"↩)

X 153 Round/Expand Floating Point Fraction: This command will round or expand the Floating Point Fraction to the desired number of decimal places. If the decimal places specified by 'X' is equal to the current decimal place, no operation is performed. If larger than the current decimal place, trailing 0's are added to the fraction. If smaller than the current decimal place, the fraction is rounded to the desired decimal place.

X 154 Do Addition on Operational Buffer:

X 155 Do Subtraction on Operational Buffer:

X 156 Do Multiplication on Operational Buffer:

X 157 Do Division on Operational Buffer:

X 158 Pad Floating Point Whole Number: This command will pad the floating point whole number with 0's until the length is equal to the length specified by the 'X' value. If the number of characters is less than or equal to 'X', no operation will be performed.

APPENDIX E: HARDWARE DIP SWITCHES (inside printer)

Hard Switch 1

```
12345678
xxxxxxxx
*******. 0=Serial, 1=Parallel
******.) 0=RS-232C, 1=422 or 485
*****.)) 0=No Parity, 1=Enable Parity
****.))) 0=Odd Parity, 1=Even Parity
***.)))) 0=8 Data Bits, 1=7 Data Bits
**.)))))))),
*.)))))))),*
.)))))))),**  Baud Rate Select
         000     300 Baud
         100     600 Baud
         010    1200 Baud
         110    2400 Baud
         001    4800 Baud
         101    9600 Baud
         011   19200 Baud
         111   38400 Baud
```

Hard Switch 2

```
12345678
xxxxxxxx
*******. 0=Normal, 1=Terminate Transmit Line
******.) 0=Normal, 1=Terminate Receive Line
*****.)) 0=485, 1=422
*****
****.))) 0=Address Bit 4
***.)))) 0=Address Bit 3
**.)))))) 0=Address Bit 2
*.)))))) 0=Address Bit 1
.)))))))) 0=Address Bit 0
```

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))

Notes