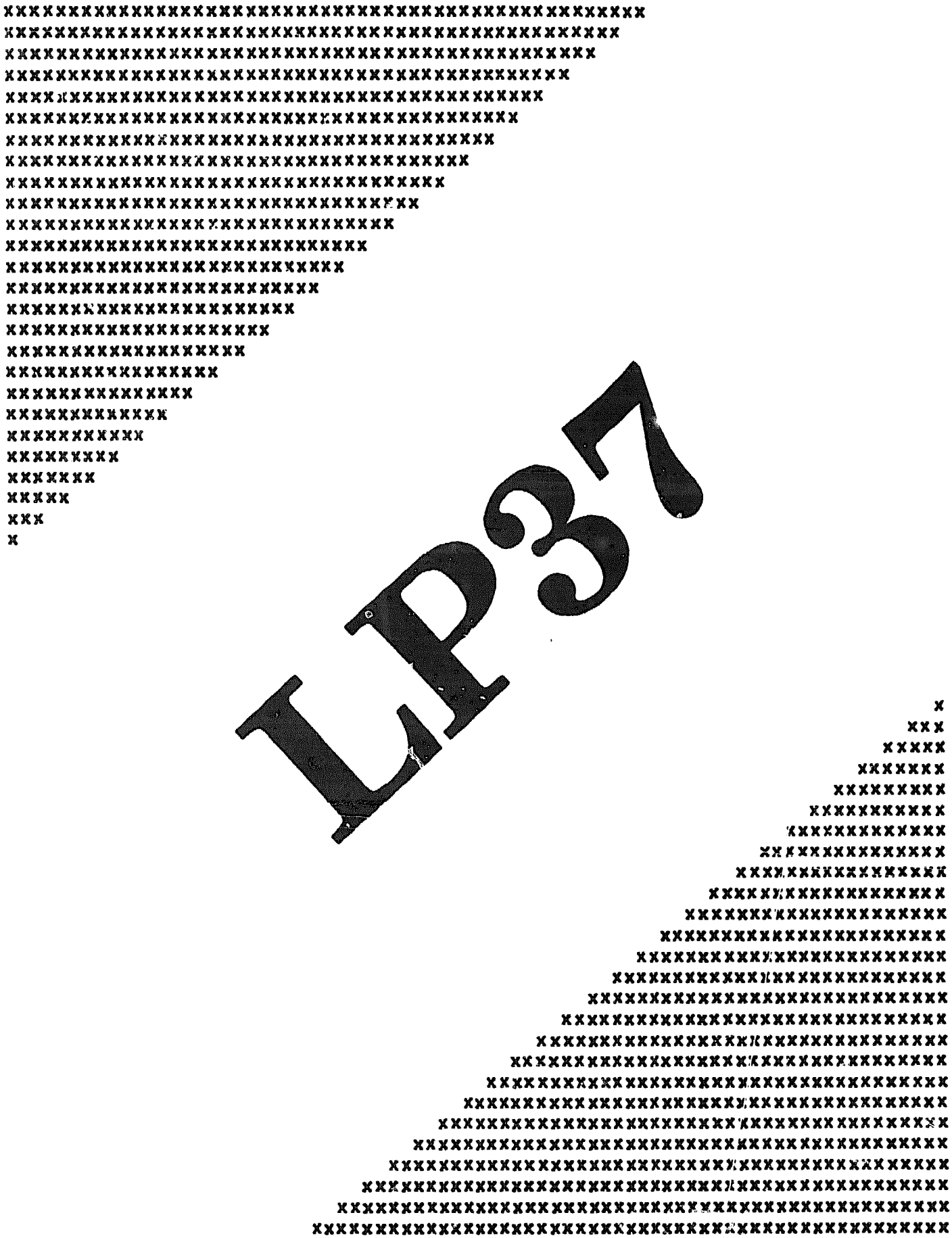
LP37

EK-OLP37-UG-001

LP37
Line Printer

User's Guide

Prepared by Educational Services
of
Digital Equipment Corporation

1st Edition, July 1989

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CONTENTS

CONTENTS (Cont)

CONTENTS (Cont)

FIGURES

FIGURES (Cont)

TABLES

TABLES (Cont)

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PREFACE

ABOUT THIS MANUAL

This manual provides both Digital customers and Digital Field Service personnel with the information necessary to operate the LP37 Line Printer.

This manual consists of the following:

- Chapter 1 – Introduction to the LP37 Line Printer that includes specifications, features, and options.
- Chapter 2 – Operation of the LP37 Line Printer that includes controls and indicators, loading paper, removing and replacing the ribbon and band, operating procedures, changing configuration, and executing self-tests.
- Chapter 3 – Troubleshooting and maintaining the LP37 Line Printer that includes basic troubleshooting, fault conditions, and maintenance procedures.
- Chapter 4 – Programming information for the LP37 Line Printer that allows paper motion and vertical pitch to be controlled from the user system.

RELATED DOCUMENTATION

The following documentation may be helpful in using the LP37 Line Printer:

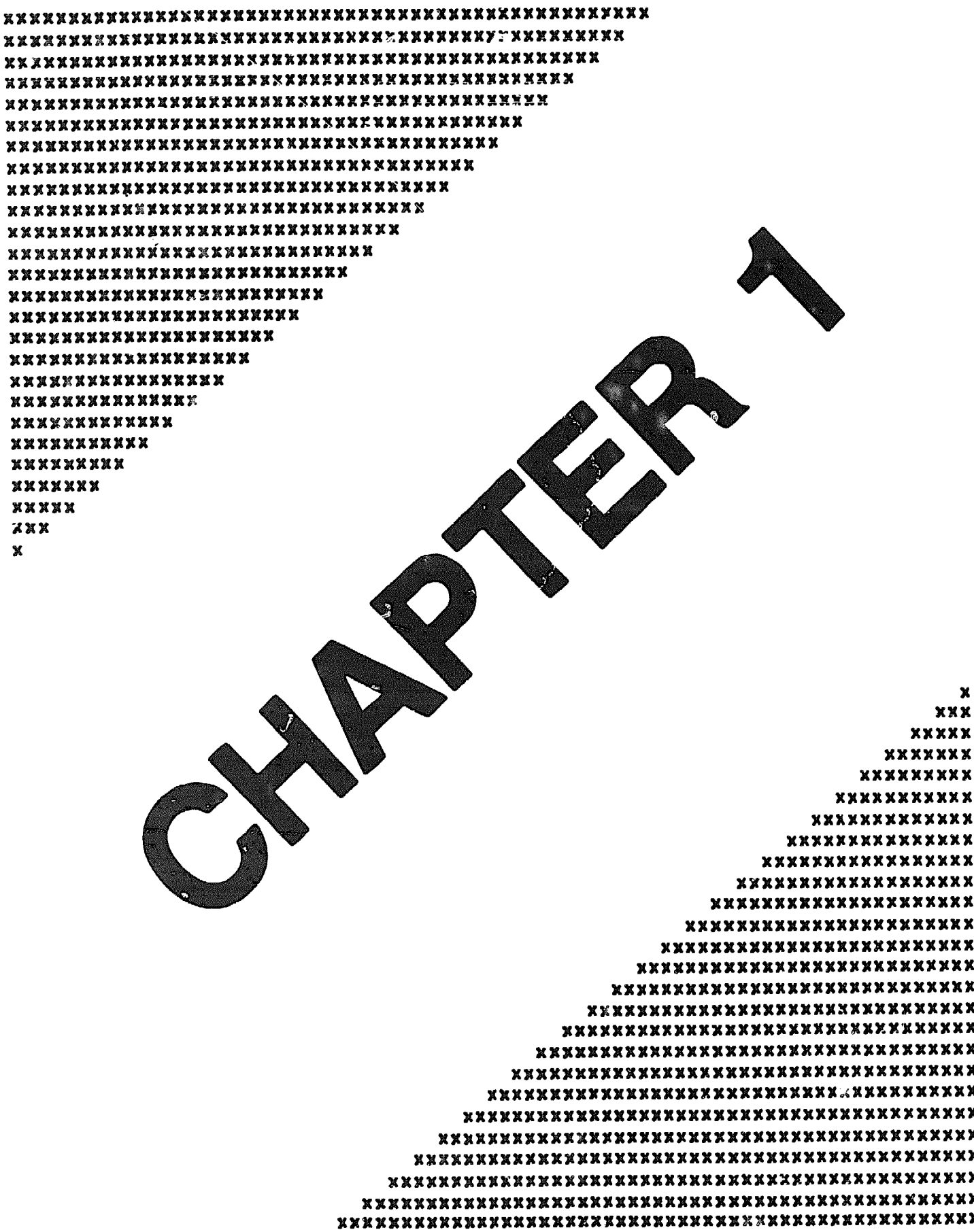
- *LP37 Line Printer User Video*
- *LP37 Line Printer Installation Guide* EK-OLP37-IG
- *LP37 Quick Reference* EK-OLP37-QR
- *LP37 Line Printer Service Manual* EK-OLP37-SV

- *LP11/LPV11 Controller Installation Manual* EK-LP11V-IN
- *DMB32 User's Guide* EK-DMB32-UG
- *DMF32 User's Guide* EK-DMF32-UG

CONVENTIONS

This section describes the special symbols used in this manual.

- **NOTE:** Calls attention to information in text that may be of special importance.
- **CAUTION:** Calls attention to information in text that is essential in avoiding system or equipment damage.
- **WARNING:** Calls attention to information in text that is essential to the safety of personnel.


CHAPTER 1

CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

This chapter contains an introduction to the LP37 Line Printer. It includes a brief description of the hardware and the equipment specifications. It also includes a summary of the LP37 Line Printer features and a list of the LP37 options and country kits.

1.2 GENERAL DESCRIPTION

The LP37 Line Printer (Figure 1-1) is a medium to high speed general-purpose printer designed to print fully formed characters by using various ASCII character bands. The LP37 Line Printer is a 132-column impact band printer that produces copies on 1- to 6-part continuous fan-fold pin-feed forms. The LP37 Line Printer comes with a paper puller and a power stacker installed. Horizontal character spacing is 10 characters per inch and line spacing is selectable at 6 or 8 lines per inch.

1.3 LP37 SPECIFICATIONS

The following sections contain the electrical, environmental, performance, and general specifications for the LP37 Line Printer.

1.3.1 Electrical Specifications

AC Line Power (Plug Selectable)	Nominal • 120 Vac • 220 to 240 Vac
Input Line Frequency	50 or 60 Hz, ± 1 Hz
Power Consumption	Standby Mode = 400 W, maximum Printing = 850 W, maximum

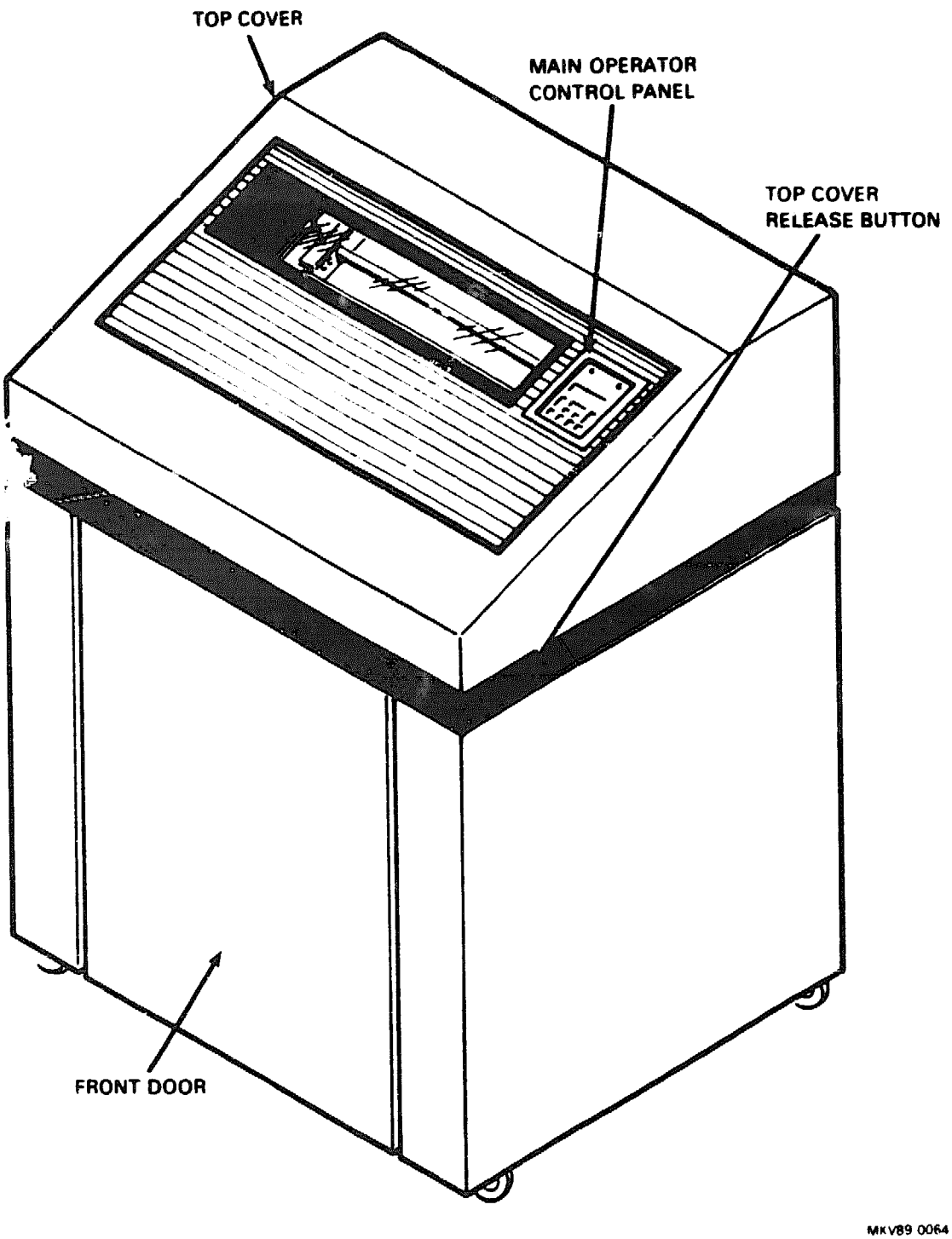


Figure 1-1 LP37 Line Printer

1.3.2 Environmental Specifications

Operating Environment

- Temperature — 10 to 40°C (50 to 104°F)
- Heat Dissipation — 2,900 Btu/hr maximum
- Relative Humidity — 20 to 80%, noncondensing
- Altitude — 2,438 m (8,000 ft)

Nonoperating Environment

- Temperature — -40 to 66°C (-40 to 151°F)
- Relative Humidity — 10 to 95%, noncondensing
- Altitude — 4,877 m (16,000 ft)

1.3.3 Performance Specifications

Print Speed

Character Set Size	Slow Speed	Normal Speed
• All 64-Character Bands	980 LPM	1200 LPM
• All 96-Character Bands	550 to 700 LPM	700 to 900 LPM
• 76-Character Italian Band	880 to 1100 LPM	880 to 1100 LPM
• 128-Character Katakana Band	520 to 570 LPM	670 to 730 LPM

Characters Per Line — 132

Character Spacing

• Horizontal	10 characters per inch
• Vertical	6 or 8 lines per inch selectable from the control panel or from the user system

Paper Advance

• Single Line Advance	14 ms at 6 or 8 lines per inch
• Slew Speed	33 inches per second

1.3.4 General Specifications

Height	110 cm (44 inches)
Width	78 cm (31 inches)
Depth	89 cm (35 inches)
Weight	159 kg (350 lb)

Ribbon

• LP37R-01	Reel-to-reel nylon ribbon
• LP37R-02	Special OCR ribbon

Forms Type	Tractor pin-feed, continuous fan-fold, 1-part up to 6-part forms
Forms Width	7.6 to 41 cm (3 to 16 inches)
Forms Length	7.6 to 36 cm (3 to 14 inches), 1 to 144 lines maximum

Forms Thickness	15 lb bond minimum to 125 lb card stock up to .020 inches thick
Bands	A high-grade stainless steel band with 528 characters etched along the center and perforations below each character for timing (see Table 1-3 for options)

1.4 LP37 FEATURES

Paper Puller and Power Stacker	A motorized assembly with paper guide to facilitate automatic stacking of the forms inside the cabinet.
Parallel Interface	DMB32, DMF32, LP11, LPV11, or LPV11-SA.
Interface Cables	BC27A-30, BC27L-30, or LLFO1 (cannot be used with DMF32)
Cabinet	The printer mechanics and electronics are enclosed inside a steel 55 dBA cabinet.
Digital Meter Package	Provides historical information by means of a 16-character alphanumeric display. This package contains:

- A power on and print time meter to display power on and print time in hours.
- A line counter to display the number of lines printed in one thousand line increments.
- A ribbon counter that can be preset to the number of lines to be printed on a ribbon. The printer will stop when the preset number of lines is reached and a RIBBON EXHAUSTED message will appear on the main operator control panel LCD (liquid crystal display).

Universal Power Supply	Selectable plugs on the power interconnect board allow the LP37 to operate with inputs of 120 Vac or 220 to 240 Vac at 50 Hz or 60 Hz.
VFU	The vertical format unit (VFU) allows vertical format and paper movement to be initiated by the user system.
Main Operator Control Panel	Contains 12 externally and 4 internally accessible membrane keys that control and configure the LP37 printer, 6 LED indicators that monitor major printer functions, and a 16-character alphanumeric LCD that displays status and fault messages in English, French, German, or Spanish. It also contains an internally accessible mode switch for selecting normal or configuration mode.
Rear Control Panel	Contains a TOP OF FORM key and an ON/OFF LINE key for operator convenience when removing hard copy from the stacker area.

1.5 LP37 OPTIONS

The following sections contain tables listing the LP37 Line Printer options, the LP37 band options, the available country kit options, and the LP37 ribbon options.

1.5.1 LP37 Line Printer Options

Table 1-1 lists and describes the LP37 Line Printer options.

Table 1-1 LP37 Line Printer Options

Option	Description
LP37-AA	LP37 Line Printer (120 Vac, 60 Hz) with a 64- character U.S. band, an LP37 Quick Reference chart, and an English touch panel assembly installed. Also includes a shipaway kit containing a 96-character U.S. band, a U.S. power cord with NEMA[1] 5-15P type connector, a reel-to-reel nylon ribbon, a 1-part and 6-part print sample, a 1-inch stack of paper, a metal paper shelf, an *LP37 Line Printer User Video*, an *LP37 Line Printer User's Guide* (EK-OLP37-UG), and an *LP37 Line Printer Installation Guide (EK-OLP37-IG).*
LP37-A3	LP37 Line Printer (240 Vac, 50 Hz) with a 64- character U.S. band and an LP37 Quick Reference chart installed. Also includes a shipaway kit containing a reel-to-reel nylon ribbon, a 1-part and 6-part print sample, a 1-inch stack of paper, and a metal paper shelf. This option also requires ordering a separate country kit. See Table 1-2 for the country kit options and descriptions.
LP37-QA	LP37-AA option with an LPV11 Q-BUS controller and a 30-ft BC27A-30 data cable.
LP37-Q3	LP37-A3 option with an LPV11 Q-BUS controller and a 30-ft BC27A-30 data cable.
LP37-SA	LP37-AA option with an LPV11-SA Q-BUS controller and a 30-ft BC27L-30 data cable.
LP37-S3	LP37-A3 option with an LPV11-SA Q-BUS controller and a 30-ft BC27L-30 data cable.
LP37-UA	LP37-AA option with an LP11 UNIBUS controller and a 30-ft BC27A-30 data cable.

Table 1-1 LP37 Line Printer Options (Cont)

Option	Description
LP37-U3	LP37-A3 option with an LP11 UNIBUS controller and a 30-ft BC27A-30 data cable.
LP37-VA	LP37-AA option with a 30-ft BC27A-30 (DMF32/DMB32) data cable.
LP37-V3	LP37-A3 option with a 30-ft BC27A-30 (DMF32/DMB32) data cable.

[1]NEMA (National Electrical Manufacturing Association).

1.5.2 LP37 Country Kits

Table 1-2 lists and describes the available LP37 country kits.

Table 1-2 LP37 Country Kits

Option	Country	Description
LP37K-AD	Denmark	Contains a power cord (P/N 17-00310-01), an English touch panel assembly, a 64-character Danish band, a 96-character Danish band, an *LP37 Line Printer User's Guide*, and an *LP37 Line Printer Installation Guide*.
LP37K-AE	United Kingdom	Contains a power cord (P/N 17-00209-00), an English touch panel assembly, a 64-character United Kingdom band, a 96-character United Kingdom band, an *LP37 Line Printer User's Guide*, and an *LP37 Line Printer Installation Guide*.

Table 1-2 LP37 Country Kits (Cont)

Option	Country	Description
LP37K-AG	Germany	Contains a power cord (P/N 17-00199-00), a German touch panel assembly, a 64-character German band, a 96-character German band, an *LP37 Line Printer User's Guide*, and an *LP37 Line Printer Installation Guide*.
LP37K-AI	Italy	Contains a power cord (P/N 17-00364-01), an English touch panel assembly, a 76-character Italian band, a 96-character Italian band, an *LP37 Line Printer User's Guide*, and an *LP37 Line Printer Installation Guide*.
LP37K-AJ	Japan	Contains a power cord (P/N 17-00063-10), an English touch panel assembly, a 128-character Katakana band, a 96-character U.S. band, an *LP37 Line Printer User's Guide*, and an *LP37 Line Printer Installation Guide*.
LP37K-AM	Sweden	Contains a power cord (P/N 17-00199-00), an English touch panel assembly, a 64-character Swedish band, a 96-character Swedish band, an *LP37 Line Printer User's Guide*, and an *LP37 Line Printer Installation Guide*.
LP37K-AP	France	Contains a power cord (P/N 17-00199-00), a French touch panel assembly, a 64-character French band, a 96-character French band, an *LP37 Line Printer User's Guide*, and an *LP37 Line Printer Installation Guide*.

Table 1-2 LP37 Country Kits (Cont)

Option	Country	Description
LP37K-AS	Spain	Contains a power cord (P/N 17-00199-00), a Spanish touch panel assembly, a 64-character Spanish band, a 96-character Spanish band, an *LP37 Line Printer User's Guide*, and an *LP37 Line Printer Installation Guide*.
LP37K-AV	Portugal	Contains a power cord (P/N 17-00199-00), an English touch panel assembly, a 64-character Portuguese band, a 96-character Portuguese band, an *LP37 Line Printer User's Guide*, and an *LP37 Line Printer Installation Guide*.

1.5.3 LP37 Band Options

Table 1-3 lists and describes the LP37 band options.

Table 1-3 LP37 Band Options

Option	Description
LP37X-AA	U.S. 64-character band
LP37X-AC	U.S. 96-character band
LP37X-BA	U.S. 64-character OCR-B band
LP37X-BC	U.S. 96-character OCR-B band
LP37X-BD	U.S. 96-character OCR-A band
LP37X-DA	Danish 64-character band
LP37X-DC	Danish 96-character band

Table 1-3 LP37 Band Options (Cont)

Option	Description
LP37X-EA	United Kingdom 64-character band
LP37X-EC	United Kingdom 96-character band
LP37X-GA	German 64-character band
LP37X-GC	German 96-character band
LP37X-IA	Italian 76-character band
LP37X-IC	Italian 96-character band
LP37X-JA	Katakana (Japanese) 128-character band
LP37X-MA	Swedish 64-character band
LP37X-MC	Swedish 96-character band
LP37X-PA	French 64-character band
LP37X-PC	French 96-character band
LP37X-SA	Spanish 64-character band
LP37X-SC	Spanish 96-character band
LP37X-VA	Portuguese 64-character band
LP37X-VC	Portuguese 96-character band

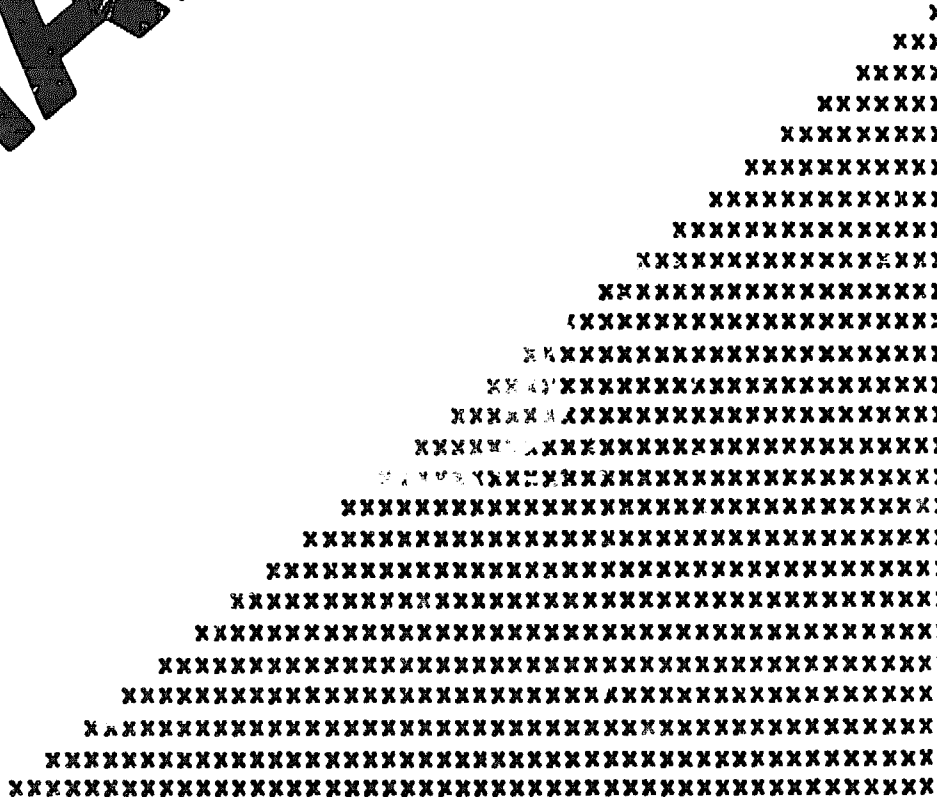
1.5.4 LP37 Ribbon Options

Table 1-4 lists and describes the LP37 ribbon options.

Table 1-4 LP37 Ribbon Options

Option	Description
LP37R-01	A standard reel-to-reel nylon ribbon (6-pack)
LP37R-02	A special OCR ribbon (6-pack)

CHAPTER 2



CHAPTER 2
OPERATION

2.1 INTRODUCTION

This chapter familiarizes the operator with the controls and indicators on the LP37 Line Printer. It provides instructions for loading the paper, adjusting the paper controls, installing the ribbon, removing and replacing the band, changing the configuration of the LP37 Line Printer, and running self-tests.

The LP37 Line Printer has two self-tests that the operator can run from the main operator control panel. These self-tests generate patterns that show the print quality of the page with the current printer settings. A printer configuration printout can be generated to list the present configuration, and includes the following:

- Automatic Foldover
- Band Time Out
- Paper Scroll
- 80-Column Self-Test
- Print Columns
- Data Parity
- Perforation Skipover
- Line Feed on Carriage Return
- Auto Print
- Max Overprint
- VFU Skipover
- Data Interface
- Paper Instruction
- Step Count Truncate
- Control Panel Language
- Character Band Identification
- VFU Memory Image

It is recommended that the self-tests be run after installation and after changing the paper, the ribbon, or the band. The configuration printout should be run after any configuration changes are made to verify that the desired configuration has been obtained.

2.2 LP37 LINE PRINTER CONTROLS AND INDICATORS

The LP37 Line Printer controls and indicators are described in the following sections.

2.2.1 Power Switch

The power switch is located on the rear of the LP37 Line Printer (Figure 2-1). Reach over the left side of the LP37 Line Printer to power up the printer.

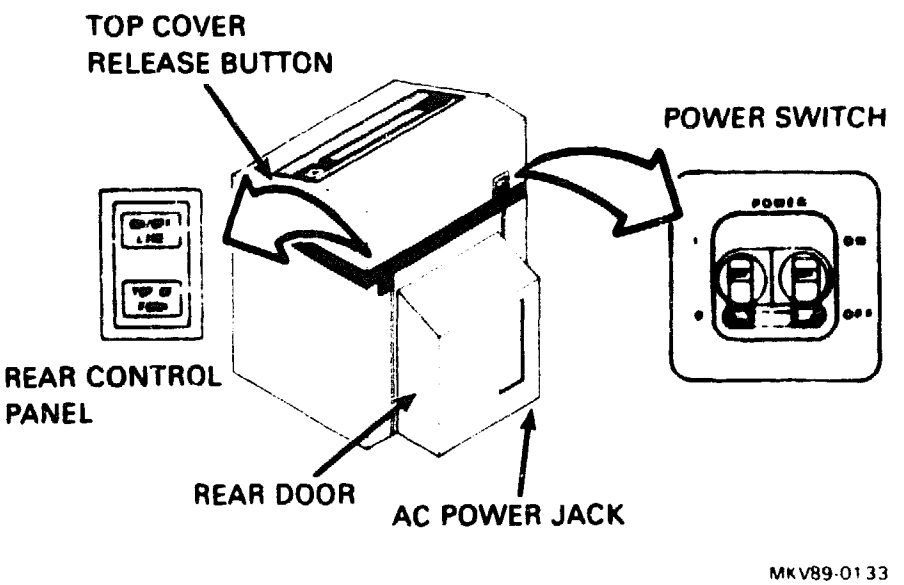


Figure 2-1 Printer Controls and Indicators

2.2.2 LP37 Control Panels

The LP37 Line Printer has two control panels. The main operat control panel is located on the top of the printer (Figure 1-1). The rear control panel is located on the rear of the printer (Figure 2-1).

2.2.2.1 Main Operator Control Panel – The main operator control panel (Figure 2-2) contains 16 membrane keys, a 16-character alphanumeric LCD display, 6 LED indicators, and a Mode toggle switch. With the top cover closed, 12 of the membrane keys, the 16-character LCD display, and the 6 LED indicators are externally accessible. The other 4 membrane keys and the Mode toggle switch are internally accessible and require pressing the top cover release button (on the right side of the top cover), and raising the top cover to gain access.

The 16 membrane keys are used to place the printer on-line and off-line, advance forms, set top-of-form, set form length, select 6 or 8 lines per inch, select slow or fast speed, adjust character phasing, adjust for copy weight, perform self-tests, select individual hammers for flight time display, and to select and change the configuration features. Table 2-1 lists the membrane keys and their functions.

CAUTION

Press the membrane keys on the control panels with your finger. The keys can be damaged if fingernails, pens, pencils, or other hard objects are used.

The 6 LED indicators indicate the printer status. Table 2-1 lists the LED indicators and their functions.

The 16-character alphanumeric LCD display shows the printer status, error messages, individual hammer flight times, and the configuration feature number, feature name, and present setting in one of four configuration-selectable languages (English, French, German, or Spanish).

The Mode toggle switch is used to select either normal mode or configuration mode (Table 2-1).

2.2.2.2 Rear Control Panel – The rear control panel contains two membrane keys: the TOP OF FORM key and the ON/OFF LINE key. These keys perform the same function as the corresponding keys on the main operator control panel and are for operator convenience when removing hard copy from the stacker area.

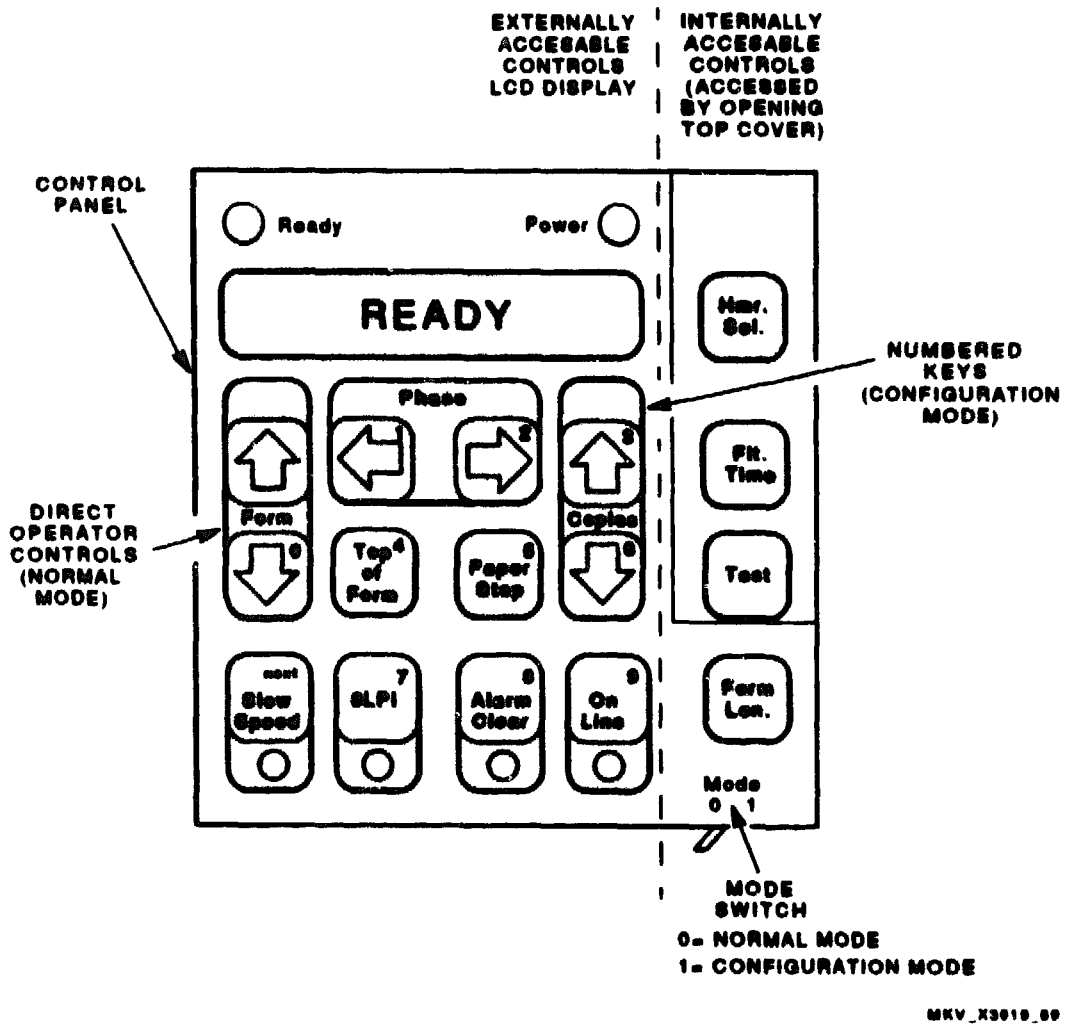


Figure 2-2 LP37 Main Operator Control Panel

Table 2-1 LP37 Main Operator Control Panel Controls and LED Indicators

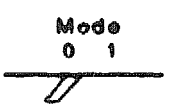
Control/LED	Symbol	Function
Ready		This green LED lights only when the following conditions are met: • Ready to print (when on-line) • No faults exist • Paper is loaded • Alarm Clear LED is not lit If the printer is off-line, it can be placed on-line only when the Ready LED is lit.
Power		This green LED lights when power has been applied to the printer and +5 Vdc logic power is available.
Mode 0/1		When the Mode toggle switch is set to 0, the printer is in normal mode and the keys are in direct operator control. When the Mode toggle switch is set to 1, the printer is in configuration mode and the numbered keys (0 to 9) and next key are active for configuring the printer. Second level diagnostic messages are accessed in Mode 1. Refer to the *LP37 Line Printer Service Manual* for more information on second level diagnostic messages.

Table 2-1 LP37 Main Operator Control Panel Controls and LED Indicators (Cont)

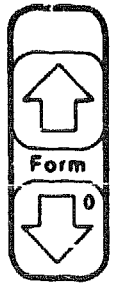
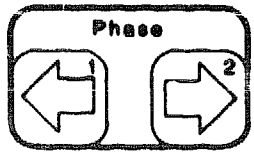
Control	Symbol	Function
Form (Up/Down)		Advances paper/forms one microstep (7 mil) up or down to align paper with preprinted forms. This key is used to align the paper to the top-of-form position. When the printer is off-line, pressing and holding this key will cause paper to advance continuously. If this key is pressed while printing, the paper will reposition itself one microstep for every line.
Phase (Left/Right)		Maintains equal print density on the left and right sides of the characters by centering the hammers. When either of these keys is pressed, the LCD displays a vertical bar to indicate the present phase setting. These keys affect all print columns. If the left side of all print characters is printing light, pressing the Left Phase key will move the vertical bar on the LCD to the left and increase the density on the left side of the characters. If the right side of all print characters is printing light, pressing the Right Phase key will move the vertical bar on the LCD to the right and increase the density on the right side of the characters.

Table 2-1 LP37 Main Operator Control Panel Controls and LED Indicators (Cont)

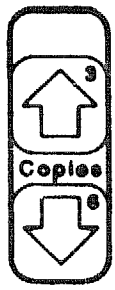
Control	Symbol	Function
Copies (Up/Down)		Increases or decreases the hammer impact energy of all hammers for printing on multipart or single-part paper. When either of these keys is pressed, the LCD displays vertical bars to indicate the present copies setting. Pressing the Down Copies key will decrease the number of vertical bars on the LCD and decrease the hammer impact energy. Pressing the Up Copies key will increase the number of vertical bars on the LCD and increase the hammer impact energy. When the copies setting is increased to five or more vertical bars on the LCD, a CAUTION: MULTI FORMS REQD message will display on the LCD to indicate that copies settings this high should be used only with multipart forms.
Top of Form		Advances paper/forms to the next top-of-form position. This key is active only when the printer is off-line, and is disabled when the printer is on-line.
Paper Step		Advances paper/forms one line at a time. This key is active only when the printer is off-line. When pressed and held, paper will advance continuously.

Table 2-1 LP37 Main Operator Control Panel Controls and LED Indicators (Cont)

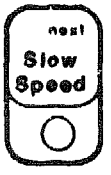
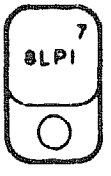
Control	Symbol	Function
Slow Speed (next)		In normal mode (Mode 0), if pressing this key lights the yellow LED, this allows OCR or correspondence quality printing at 980 lines per minute using a 64-character band. If pressing this key extinguishes the yellow LED, this allows normal speed printing at 1200 lines per minute using a 64 character band. In configuration mode (Mode 1), pressing this key selects the next value for the configuration feature shown on the LCD display.
8LPI		Allows selection of either 6 or 8 lines per inch. When the key is pressed and the yellow LED lights, 8 lines per inch is selected. When the key is pressed and the yellow LED is extinguished, 6 lines per inch is selected. The line spacing can be changed only when the printer form is at the top-of-form position. Pressing this key when the printer form is not at the top-of-form position will result in a GOTO TOP OF FORM message being shown on the LCD display.

Table 2-1 LP37 Main Operator Control Panel Controls and LED Indicators (Cont)

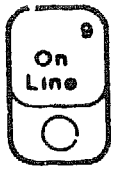
Control	Symbol	Function
Alarm Clear		The red LED lights when an error or fault condition occurs. The fault or error condition is displayed on the LCD. After a fault or error has been corrected, pressing this key master clears and resets the printer for continued operation and extinguishes the Alarm Clear LED. On powerup, the red Alarm Clear LED lights during initialization and goes off after the process comp
On Line		Pressin s key toggles the printer between -line and off-line. When on-line, the pri is ready to receive data. All stored d will be printed before changing from on-line to off-line. The green LED is lit when on-line, and not lit when off-line. A delay of up to 3 seconds may occur when going from off-line to on-line. This is caused by the printer executing an internal self-test before going on-line.
Flight Time (Flt. Time)		This key should be used only by a qualified Digital self-maintenance customer or a Digital Field Service representative. It enables flight time mode for hammer adjustment procedures. When this key is pressed, the hammer number under test displays on the left side of the LCD and the measured flight time variation displays on the right side of the LCD. This key is also used to activate the auto flight time test.

Table 2-1 LP37 Main Operator Control Panel Controls and LED Indicators (Cont)

Control	Symbol	Function
Hammer Select (Hmr. Sel.)		This key should be used only by a qualified Digital self-maintenance customer or a Digital Field Service representative. This key is active only in flight time mode, which is enabled by the Flt. Time key. Pressing this key increments the hammer number under test on the LCD display. Pressing the On Line key starts the hammer flight time test cycle for the hammer number displayed on the LCD. Pressing the On Line key again stops the test.
Test		Allows the selection of the printer self-tests. Consecutive pressing of this key will cycle the LCD display through the names of the self-tests and back to READY - OFFLINE.
Form Length (Form Len.)		Allows selection of form lengths from 3 to 14 inches. The paper must be in the top-of-form position when selecting a new form length. When this key is pressed, the LCD displays the present form length setting (FORM LGH=XXXX"). Continued depressions of this key will cycle the LCD display through the allowable form length values. In 6LPI the allowable values will increase in 1/3-, 1/2-, and 2/3-inch increments. In 8LPI the allowable values will increase in 1/4-, 1/2-, and 3/4-inch increments. Keep pressing the Form Len. key until the desired form length is displayed on the LCD. This key is inoperative if the EVFU is loaded.

2.2.3 Digital Meter Package

The digital meter package is located in the right front corner of the LP37 Line Printer (Figure 2-3) and can be accessed by opening the top cover. The digital meter package contains a 16-character alphanumeric LCD for displaying the power on and print time in hours, the number of lines printed in 1,000 line increments, the number of lines remaining to be printed on the preset ribbon counter, and the preset value of the ribbon counter.

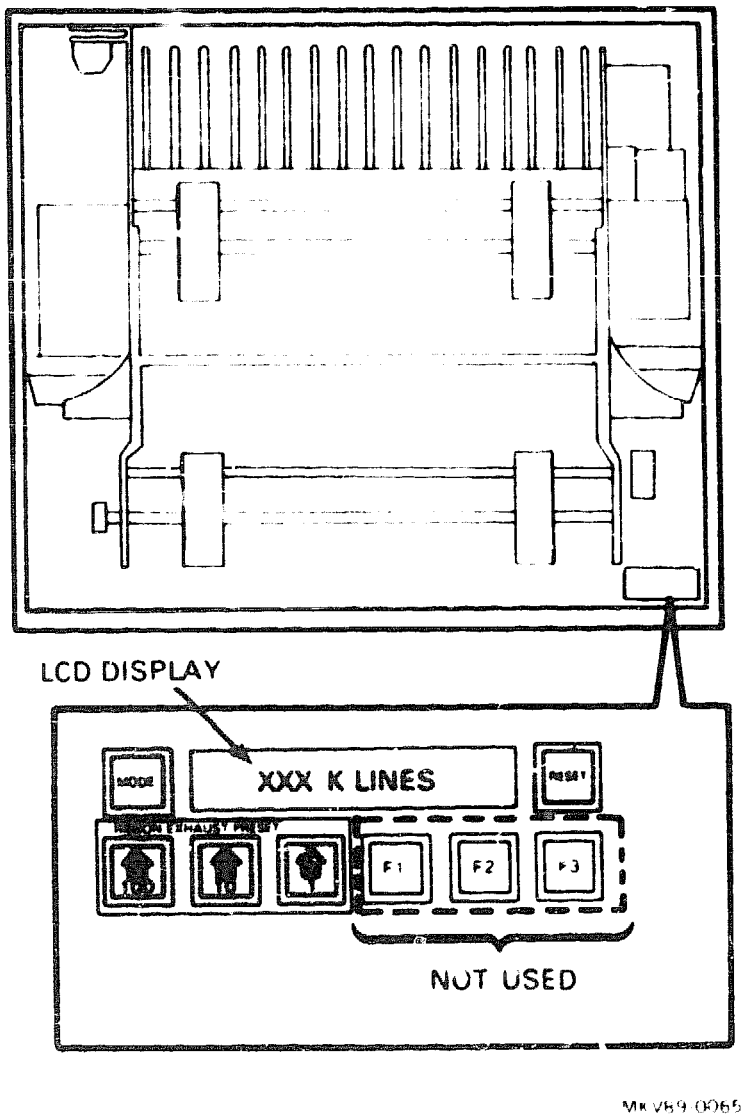


Figure 2-3 Digital Meter Package

When power is applied to the LP37 Line Printer, the digital meter package LCD display will continuously cycle through the following displays:

XXX HOURS ON (Power On Time)
XXX PRINT HRS (Print Time)
XXX K LINES (Line Counter)
XXX K LINES LEFT (Ribbon Counter lines remaining to be printed)
PRESET = XXX K (Preset Ribbon Counter value)

There are five membrane keys on the digital meter panel for controlling the LCD display and setting a preset value in the ribbon counter. Table 2-2 lists these keys and their functions.

The ribbon counter can be preset to the number of lines to be printed on a ribbon. This is useful when printing in OCR applications where high-quality print is desired. When the preset number of lines have been printed, the printer will stop and a RIBBON EXHAUSTED message will be displayed on the main operator control panel LCD and on the digital meter panel LCD. This indicates that the ribbon should be changed. After changing the ribbon, the Reset key on the digital meter panel must be pressed to clear the RIBBON EXHAUSTED message on the digital meter panel LCD before the alarm condition it generates can be cleared on the main operator control panel. The alarm condition is cleared on the main operator control panel by pressing the Alarm Clear key.

Table 2-2 Meter Panel Keys

Key	Symbol	Function
Mode		Pressing this key stops the LCD display from cycling through the different meter displays. Successive depressions of this key will step the LCD display through the different meter displays.
100		This key is active only when PRESET = XXX K is displayed on the digital meter panel LCD. This key increases the preset value by 100 every time it is pressed.
10		This key is active only when PRESET = XXX K is displayed on the digital meter panel LCD. This key increases the preset value by 10 every time it is pressed.
1		This key is active only when PRESET = XXX K is displayed on the digital meter panel LCD. This key increases the preset value by 1 every time it is pressed.
Reset		Pressing this key loads the new preset value into the ribbon counter and sets the XXX K LINES LEFT display to the new preset value. This key must also be pressed to clear the RIBBON EXHAUSTED message on the digital meter panel LCD before the alarm condition it generates can be cleared on the main operator control panel.

Use the following procedure to preset the ribbon counter:

1. Apply power to the printer.

2. Open the top cover by pressing the top cover release button on the right side of the top cover.

3. Press the Mode key on the digital meter panel and continue pressing until PRESET = XXX K appears on the LCD display.

4. Use the 100, 10, and 1 keys to obtain the desired preset value (in thousands of lines).

5. Press the Reset key to load the preset value into the ribbon counter and to set the XXX K LINES LEFT display to the preset value.

If no ribbon preset is desired, use the above procedure and set the preset value to 0. When the Reset key is pressed to load 0 into the ribbon counter, a NO RIBBON PRESET message displays on the digital meter LCD. With no ribbon preset selected, the RIBBON EXHAUSTED message will never appear on the digital meter panel LCD or the main operator control panel LCD, and the digital meter LCD display will continuously cycle through the following displays:

XXX HOURS ON (Power On Time)
XXX PRINT HRS (Print Time)
XXX K LINES (Line Counter)
NO RIBBON PRESET

2.2.4 Paper Controls and Sensors

The paper controls and sensors in the LP37 Line Printer are used to move the paper through the printer, maintain proper paper tension, adjust the horizontal position of the paper, detect paper out or tear conditions, and detect paper jam conditions. The paper controls and sensors are shown in Figure 2-4, and Table 2-3 lists and describes them.

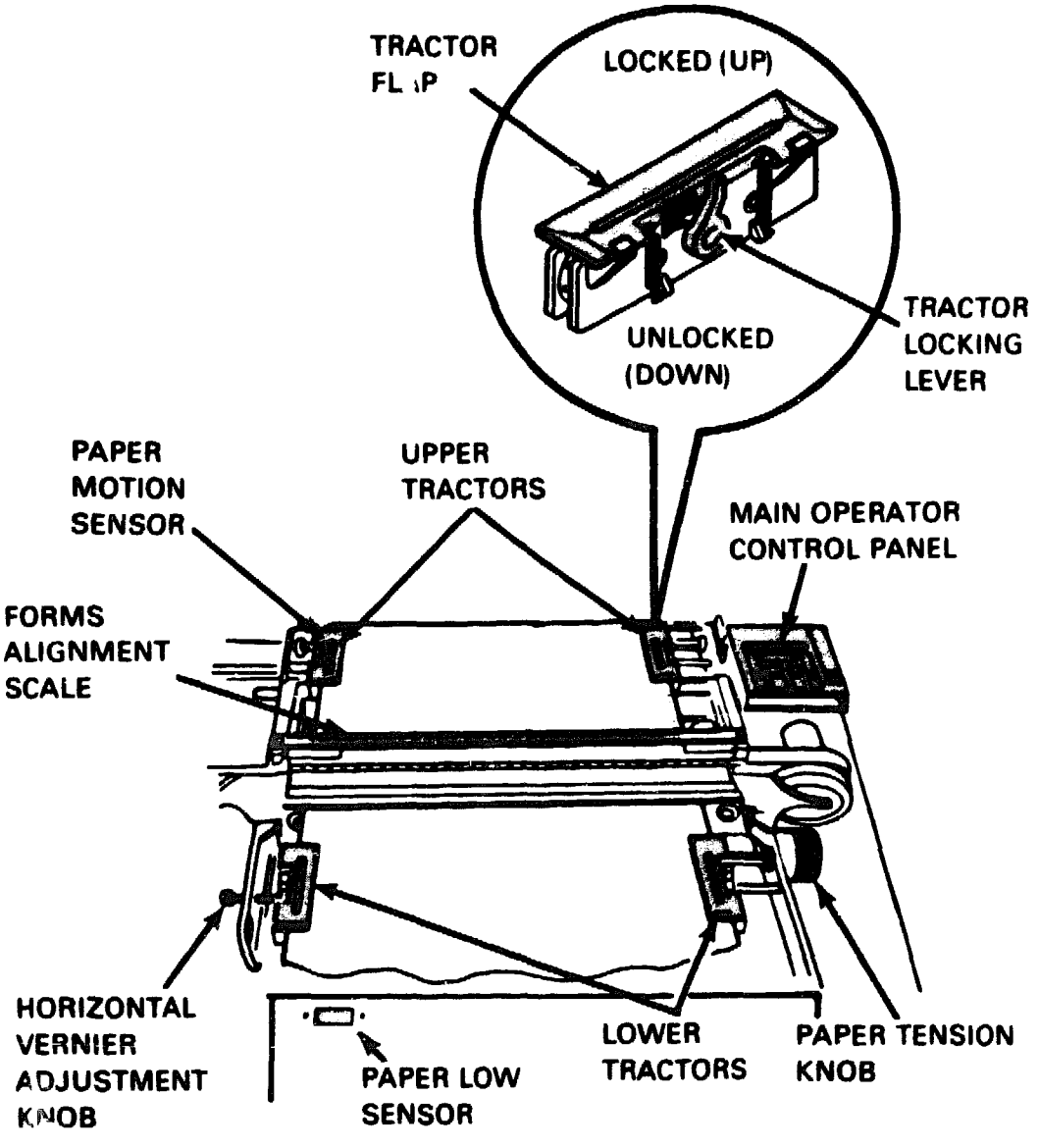


Figure 2-4 Paper Controls and Sensors

Table 2-3 Paper Controls and Sensors

Control/Sensor	Function
Tractors	The two upper and two lower tractors hold the pin-feed paper and move it through the printer. Each tractor has a locking lever that when unlocked (down position) allows it to be moved horizontally along its drive shaft to adjust for different paper widths and for coarse horizontal positioning of the paper. When the tractors are properly adjusted for paper width and horizontal position, the locking levers are locked (up position) to prevent them from moving horizontally along the drive shafts.
Paper Tension Knob	The paper tension knob is used to adjust the vertical paper tension between the upper and lower tractors. Push in the knob and turn counterclockwise to increase paper tension or push in the knob and turn clockwise to decrease paper tension. When power is not applied to the printer, turning the paper tension knob without pushing in will cause all four tractors to move the paper forward or backward through the printer.
Horizontal Vernier Adjustment Knob	This knob is used for fine horizontal positioning of the paper and moves the upper and lower tractor pairs to the left or to the right. Turning the knob counterclockwise will move the paper to the right. Turning the knob clockwise will move the paper to the left. The maximum adjustment range for the horizontal vernier adjustment knob is five columns.
Forms Alignment Scale	This scale is located above the print station and indicates where columns 1 through 136 will be printed. It is used in conjunction with the tractors and the horizontal vernier adjustment knob to obtain proper horizontal positioning of the paper.

Table 2-3 Paper Controls and Sensors (Cont)

Control/Sensor	Function
Paper Low Sensor	The paper low sensor is located on the front left side, 14 inches below the print station. When it detects an out-of-paper condition, the printer will stop printing in the middle of a form, go off-line, and the SINGLE LINE MODE message will display on the main operator control panel LCD. To continue printing the form, press the On Line key and one line of data will be printed. Each successive depression of the On Line key will cause one line of data to be printed until the next top-of-form position is reached and the ADD PAPER message displays on the LCD. The last form that can be printed this way depends on form length as described in the chart below. If printing the rest of the form is not desired, pressing the Top of Form key will eject the paper.

Form Length	Print to Bottom of:
7 inches and longer	Last form
3 1/2 to 7 inches	Next to last form
3 1/2 inches and shorter	2nd to last form

Paper Motion Sensor	The paper motion sensor is located on the upper left tractor. This sensor detects paper jams in the printer. If paper drive is applied and the sensor does not detect paper motion, the printer will stop printing, go off-line, and the CHECK PAPER message will be displayed on the main operator control panel LCD.

2.2.5 Paper Puller Controls and Switches

The paper puller controls and switches are used to control the movement of paper in the stacker area and to ensure correct fan folding of the paper. The paper puller controls and switches are shown in Figure 2-5, and Table 2-4 lists and describes them.

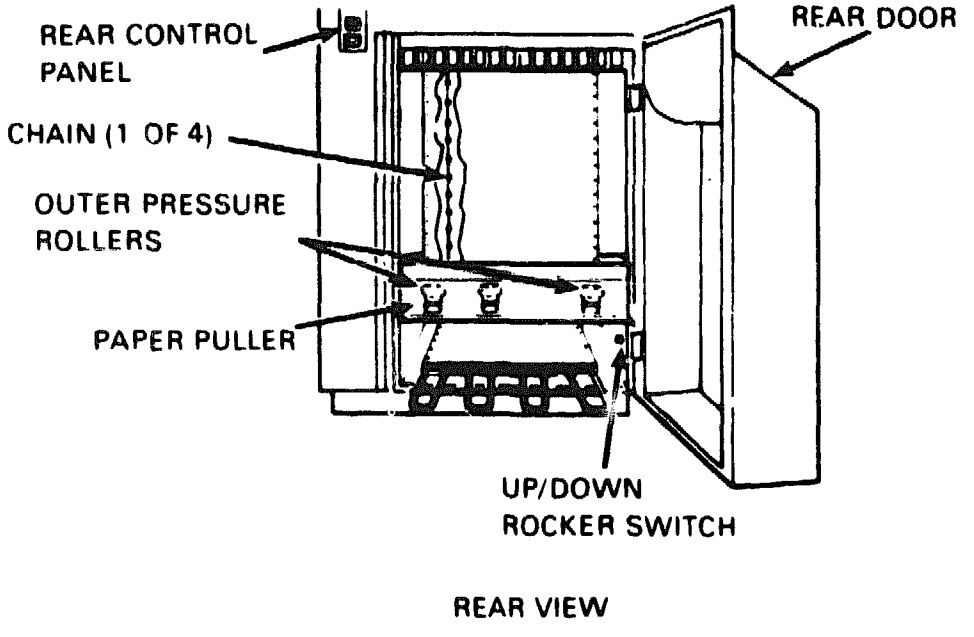


Figure 2-5 Paper Puller Controls and Switches

Table 2-4 Paper Puller Controls and Switches

Control/Switch	Function
Pressure Rollers	The spring-loaded pressure rollers keep the paper pressed against the paper puller drive rollers to ensure that a constant downward pressure is kept on the paper in the stacker area. A tab at the top of the pressure roller assembly can be pulled back to disengage the pressure roller or pushed forward to engage the pressure roller and allow it to push the paper against the drive rollers.
Up/Down Rocker Switch	The up/down rocker switch is used to manually raise and lower the paper puller.
Stack Height Switch	This microswitch is located on the back of the paper puller nearest the up/down rocker switch. When the paper stack approaches the bottom of the paper puller, the long extension on this microswitch will cause the switch to close and automatically raise the paper puller.
Misstack Switch	This microswitch is located on the back of the paper puller to the left of the stack height switch. When this microswitch closes, a STACKER FAULT message displays on the main operator control panel LCD. This indicates that the paper is not stacking correctly or that the paper stack has reached its maximum height.

2.2.6 Band Release Lever

The band release lever (Figure 2-6) is located on the right side of the print mechanism behind the right band idler pulley. The lever should be in the down or locked position during normal operation. The lever is rotated up to release tension on the band for band replacement.

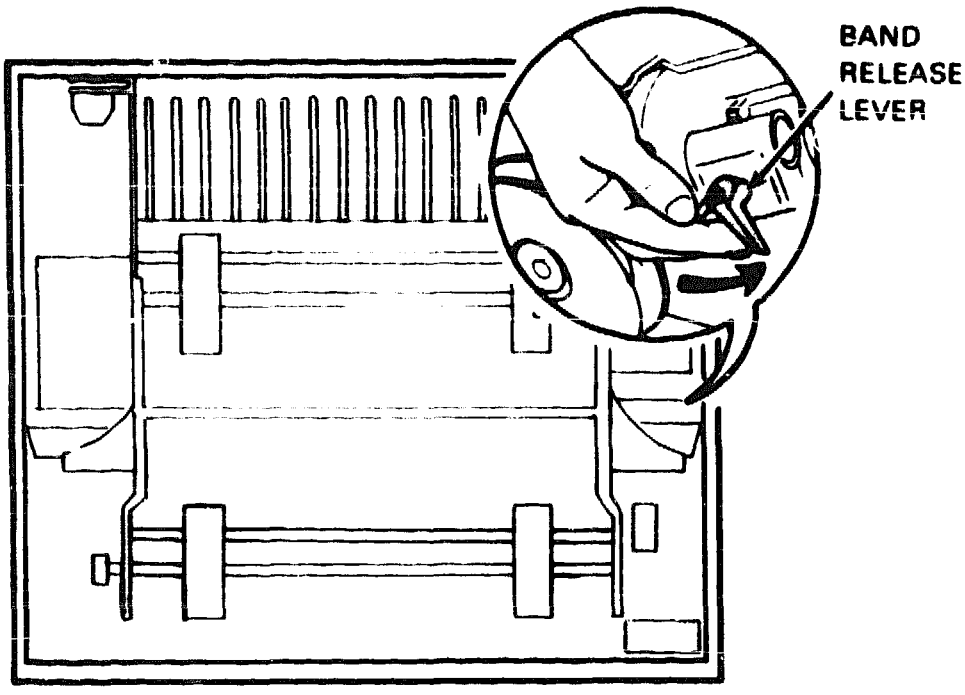


Figure 2-6 Band Release Lever

2.3 LOADING PAPER

When the LP37 Line Printer's paper low sensor detects the last form, the printing stops in the middle of a form, the printer goes off-line, and the SINGLE LINE MODE message is displayed on the main operator control panel LCD. To finish printing to the bottom of the form, press the On Line key. This causes one line of data to print. Continued pressing of the On Line key will cause data to be printed one line at a time until the next top-of-form position is reached and the ADD PAPER message appears on the LCD. The last form that can be printed in single line mode depends on the form length. If the form length is 7 inches and longer, it allows printing to the bottom of the last form. If the form length is 3 1/2 to 7 inches, it allows printing to the bottom of the next to last form. If the form length is 3 1/2 inches and shorter, it allows printing to the bottom of the second to last form.

If the printer is set up to accept forms of the same width and length as the forms being loaded, follow the directions in Section 2.3.1. If the new forms being loaded are a different width or length, follow the directions in Section 2.3.2.

2.3.1 Reloading the Same Size Forms

To load paper or forms that are the same size and weight as used earlier, follow the procedure below.

Procedure

1. If the printer is on-line, press the On Line key. The On Line LED will go off and the LCD will display the READY - OFFLINE message.

CAUTION

DO NOT open the top cover when the printer is on-line. This may cause a loss of data. Place the printer off line and wait for the On Line LED to go off, then open the top cover. To resume, close the top cover and press the On Line key.

2. Press the top cover release button on the right side of the top cover and raise the top cover.

3. Open all four tractor flaps; two upper and two lower.

4. Open the front door and place the paper supply on the removable shelf (if a stack of forms is being used) or on the floor of the printer (if a box of forms is being used), with the edges of the paper lined up with the tractors.

5. Position the paper so that the side to be printed is facing you.

6. Feed the paper up between the cabinet top support and the metal paper shield (Figure 2-7).

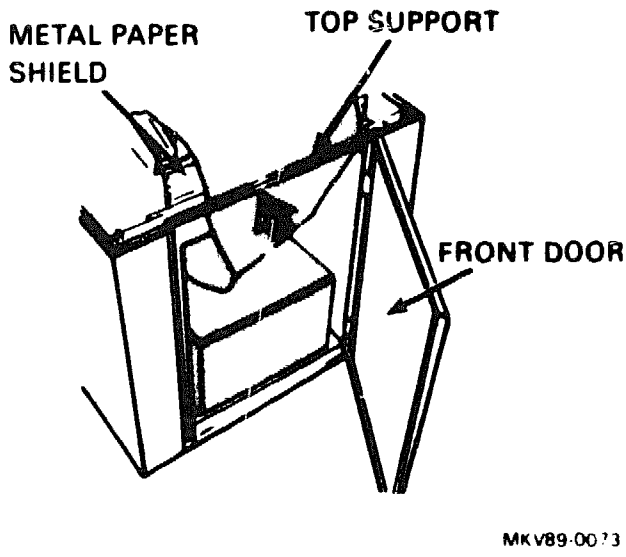


Figure 2-7 Positioning and Feeding Paper

7. Feed the paper over the two lower tractors and through the throat opening between the platen and the hammerbank (Figure 2-8).

NOTE

For single-part paper only, fold over the top sheet at the perforation and insert the double sheet through the throat opening at a slight angle. DO NOT fold multipart forms.

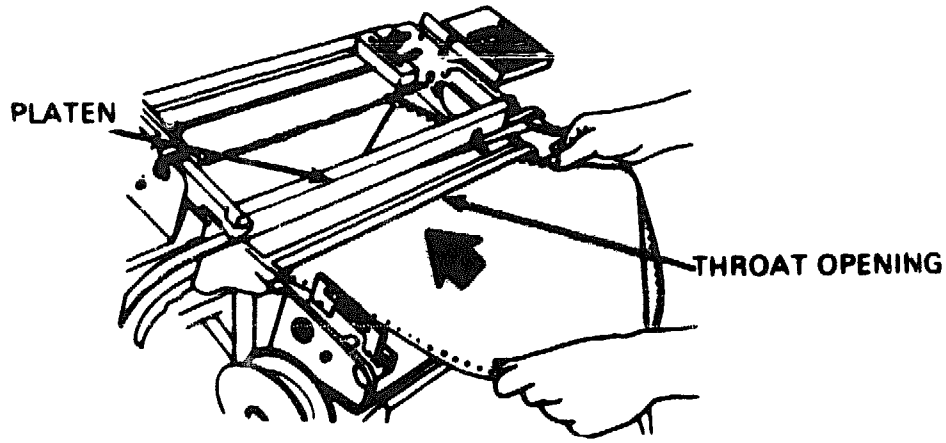


Figure 2-8 Feeding Paper over Lower Tractors and through Throat Opening

8. Continue feeding paper over the upper tractors and into the wire paper guide opening (Figure 2-9).

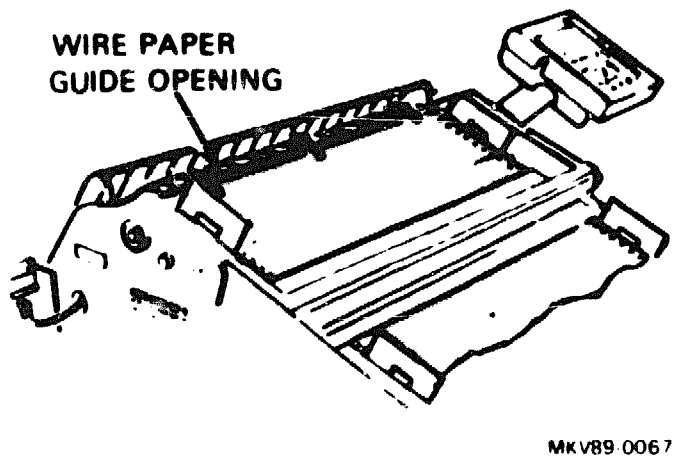


Figure 2-9 Feeding Paper over Upper Tractors and into Wire Paper Guide

9. Position the paper holes over the lower left and right tractor pins, and close the lower tractor flaps.

10. Gently pull the paper up and over the upper left and right tractor pins, and close the upper tractor flaps.

11. Close the top cover.

CAUTION

Ensure that all tractor flaps are closed before closing the top cover, or damage to the tractor flaps may result.

12. Ensure that the scroll feature is enabled (Section 2.7.2).

13. Press the Top of Form key on the main operator control panel.

NOTE

DO NOT press the Top of Form key while the tractor flaps are open.

14. Use the Form Up or Form Down keys to align the paper perforation with the scale on the upper left tractor (Figure 2-10).

NOTE

The number on the scale that is aligned with the perforation indicates the number of blank lines between the perforation and the first line of print. With the scroll feature enabled through the configuration procedure, the paper will scroll down to the first line of print. In Figure 2-10, with 8LPI selected, one blank line will be between the perforation and the first line of print.

15. Open the rear door and feed the paper into the top of the paper puller (Figure 2-5). Use the TOP OF FORM key on the rear control panel to advance the paper, if necessary.

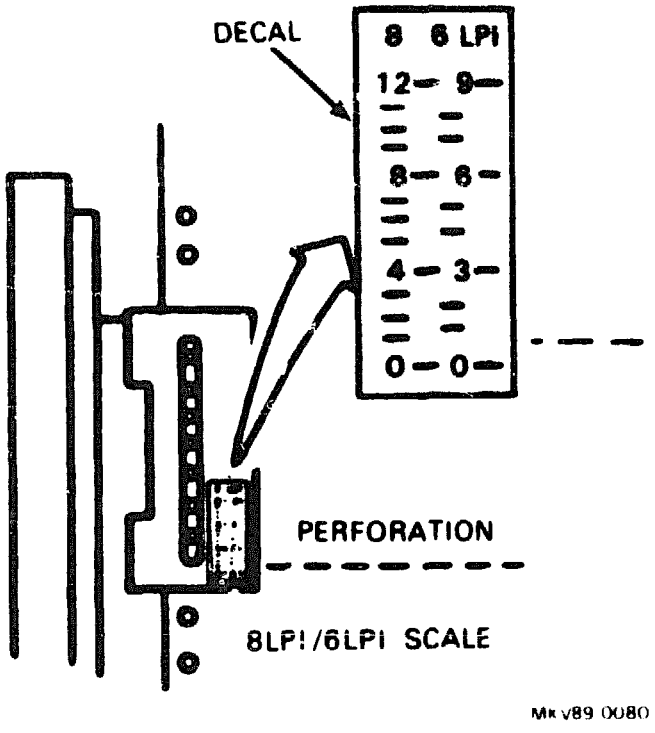


Figure 2-10 Top-of-Form Alignment

16. Ensure that the two pressure rollers contacting the edges of the paper are engaged.

17. Press the TOP OF FORM key on the rear control panel several times to make sure the paper is feeding and stacking properly. The paper puller should be lowered to its bottom position.

NOTE

The paper puller can be manually raised or lowered with the Up/Down rocker switch to ensure proper stacking of the paper.

18. Close the rear and front doors on the printer, and press the On Line key on the main operator control panel. The ON LINE message will display on the main operator control panel LCD.

2.3.2 Loading Different Size Forms

To load paper or forms that are not the same size and weight as those used earlier, follow the procedure below.

Procedure

1. If the printer is on-line, press the On Line key. READY - OFFLINE will display on the main operator control panel LCD.

CAUTION

DO NOT open the top cover when the printer is on-line. This may cause a loss of data. Place the printer off-line and wait for the On Line LED to go off, then open the top cover. To resume, close the top cover and press the On Line key.

2. Press the top cover release button on the right side of the top cover and raise the top cover.

3. Open all four tractor flaps; two upper and two lower. If necessary, remove any paper that may still be in the printer.

4. If a different width paper is being loaded, unlock the upper and lower right tractors by placing the locking levers in the down position.

5. Open the front door and place the paper supply on the removable shelf (if a stack of forms is being used) or on the floor of the printer (if a box of forms is being used), with the edges of the paper lined up with the tractors.

6. Position the paper so that the side to be printed is facing you.

7. Feed the paper up between the cabinet top support and the metal paper shield (Figure 2-7).

8. Feed the paper over the two lower tractors and through the throat opening between the platen and the hammerbank (Figure 2-8).

NOTE

For single-part paper only, fold over the top sheet at the perforation and insert the double sheet through the throat opening at a slight angle. DO NOT fold multipart forms.

9. Continue feeding paper over the upper tractors and into the wire paper guide opening (Figure 2-9).

10. Position the paper holes over the lower left tractor pins and close the lower left tractor flap.

11. Gently pull the paper up and over the upper left tractor pins and close the upper left tractor flap.

12. If the upper and lower right tractors were unlocked in step 4, move the lower right tractor until the tractor pins line up with the holes in the right edge of the paper and close the tractor flap.

13. Move the lower right tractor to the right until the paper between the lower left and lower right tractors is taut and smooth, but not too tight. Lock the lower right tractor in place by moving the locking lever to the up position.

14. Move the upper right tractor until the tractor pins line up with the holes in the right edge of the paper and close the tractor flap.

15. Move the upper right tractor to the right until the paper between the upper left and upper right tractors is taut and smooth, but not too tight. Lock the upper right tractor in place by moving the locking lever to the up position.

16. If the horizontal position of the paper has to be changed, see Section 2.3.3.

17. Close the top cover.

CAUTION

Ensure that all tractor flaps are closed before closing the top cover or damage to the tractor flaps may result.

18. Ensure that the scroll feature is enabled (Section 2.7.2).

19. Press the Top of Form key on the main operator control panel.

NOTE

DO NOT press the Top of Form key while the tractor flaps are open.

20. Use the Form Up or Form Down keys to align the paper perforation with the scale on the upper left tractor (Figure 2-10).

NOTE

The number on the scale that is aligned with the perforation indicates the number of blank lines between the perforation and the first line of print. With the scroll feature enabled through the configuration procedure, the paper will scroll down to the first line of print. In Figure 2-10, with 6LPI selected, one blank line will be between the perforation and the first line of print.

21. If the paper length is not the same as that used earlier, follow the procedure below.

    a. Press the top cover release button on the right side of the top cover and raise the top cover.

    b. Press the Form Len. key, and the main operator control panel LCD will display the present form length (FORM LGH=XXXX).

    c. Continue pressing the Form Len. key until the desired form length displays on the LCD.

    d. Close the top cover.

NOTE

In 6LPI the allowable values will increase in 1/3-, 1/2-, and 2/3-inch increments. In 8LPI the allowable values will increase in 1/4-, 1/2-, and 3/4-inch increments.

22. Open the rear door and feed the paper into the top of the paper puller (Figure 2-5). Use the TOP OF FORM key on the rear control panel to advance paper, if necessary.

23. Ensure that the two pressure rollers contacting the edges of the paper are engaged.

24. Press the TOP OF FORM key on the rear control panel several times to make sure the paper is feeding and stacking properly. The paper puller should be lowered to its bottom position.

NOTE

The paper puller can be manually raised or lowered with the Up/Down rocker switch to ensure proper stacking of the paper.

25. Close the rear and front doors on the printer, and press the On Line key on the main operator control panel. The ON LINE message will display on the main operator control panel LCD.

2.3.3 Horizontal Paper Positioning and Tension Adjustment

To align the horizontal paper position and adjust the horizontal paper tension, follow the procedure below.

Procedure

1. If the printer is on-line, press the On Line key. READY - OFFLINE will display on the main operator control panel LCD.

2. Turn the power switch to OFF.

3. Press the top cover release button on the right side of the top cover and raise the top cover.

4. Unlock all four tractor locking levers by placing them in the down position.

5. Move the paper and tractors horizontally until the paper's first print column position is aligned with the desired print position on the forms alignment scale (Figure 2-11).

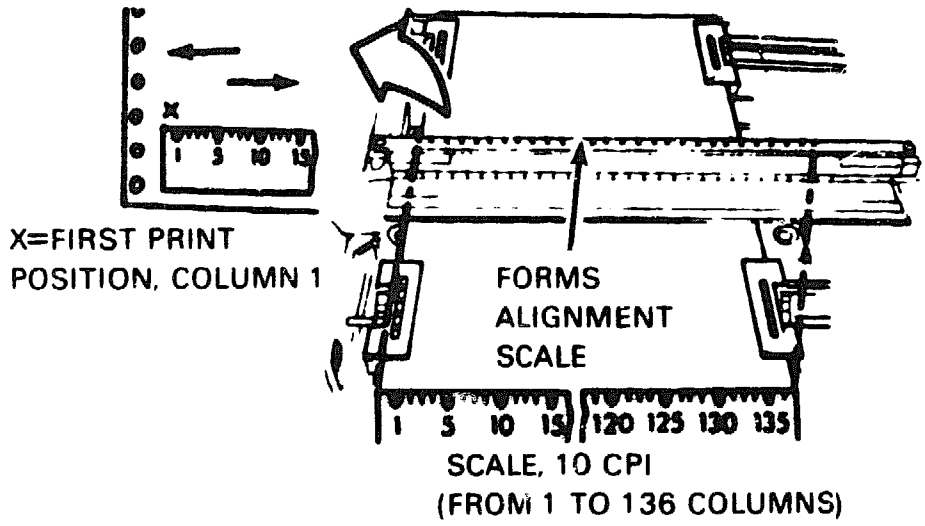


Figure 2-11 Forms Alignment Scale

6. Lock the upper and lower left tractors in place by moving the tractor locking levers to the up position.

7. Move the lower right tractor to the right until the paper between the lower left and lower right tractors is taut and smooth, but not too tight. Lock the lower right tractor in place by moving the locking lever to the up position.

8. Move the upper right tractor to the right until the paper between the upper left and upper right tractors is taut and smooth, but not too tight. Lock the upper right tractor in place by moving the locking lever to the up position.

NOTE

The horizontal vernier adjustment knob moves all four tractors left or right a maximum of five columns for fine horizontal paper positioning.

9. Close the top cover.

10. Turn the power switch to ON.

11. After the diagnostic check is complete, press the On Line key on the main operator control panel. The ON LINE message will display on the main operator control panel LCD.

2.3.4 Vertical Paper Tension Adjustment

To adjust the vertical paper tension between the upper and lower tractors, follow the procedure below.

Procedure

1. If the printer is on-line, press the On Line key. READY - OFFLINE will display on the main operator control panel LCD.

2. Press the top cover release button on the right side of the top cover and raise the top cover.
3. Push in and turn the paper tension knob until the paper between the upper and lower tractors is taut and smooth, but not too tight.

4. For proper tension, the upper tractor pins should be at the top of the form's holes and the lower tractor pins should be at the bottom of the form's holes.

5. If the tension is too great (it is tearing or elongating the holes in the form), push in and turn the paper tension knob clockwise to raise the bottom tractor pins and decrease paper tension.

6. If there is not enough tension (the paper is not taut or the pins on one set of tractors are not aligned as indicated in step 4), push in and turn the paper tension knob counterclockwise to lower the bottom tractor pins and increase paper tension.

7. Press the Test key until SHIFT/REPEAT displays on the main operator control panel LCD.

8. Close the top cover.

9. Press the On Line key to start the Shift/Repeat test.

10. After allowing two or three pages of the test pattern to print, press the On Line key to stop the test.

11. Press the top cover release button on the right side of the top cover and raise the top cover.

12. If the height of printed characters varies from line to line, there is too little tension. Push in and turn the paper tension knob counterclockwise to increase the paper tension.

13. If the paper holes are elongated or torn, there is too much tension. Push in and turn the paper tension knob clockwise to decrease the paper tension.

14. When the tension is properly set, push the Test key until READY - OFFLINE displays on the main operator control panel LCD.

15. Close the top cover.

16. Press the On Line key on the main operator control panel. The ON LINE message will display on the main operator control panel LCD.

2.4 RIBBON REMOVAL AND REPLACEMENT

The ribbon should be replaced when the characters become faint or when the RIBBON EXHAUSTED message displays on the LCD when the ribbon counter is being used. Follow the procedures below to remove and replace the ribbon.

Removal Procedure

1. If the printer is on-line, press the On Line key. READY - OFFLINE will display on the main operator control panel LCD.

CAUTION

DO NOT open the top cover when the printer is on-line. This may cause a loss of data. Place the printer off-line and wait for the On Line LED to go off, then open the top cover. To resume, close the top cover and press the On Line key.

2. Turn the power switch to OFF.
3. Press the top cover release button on the right side of the top cover and raise the top cover.
4. Rotate the left ribbon reel clockwise to loosen the ribbon tension (Figure 2-12)

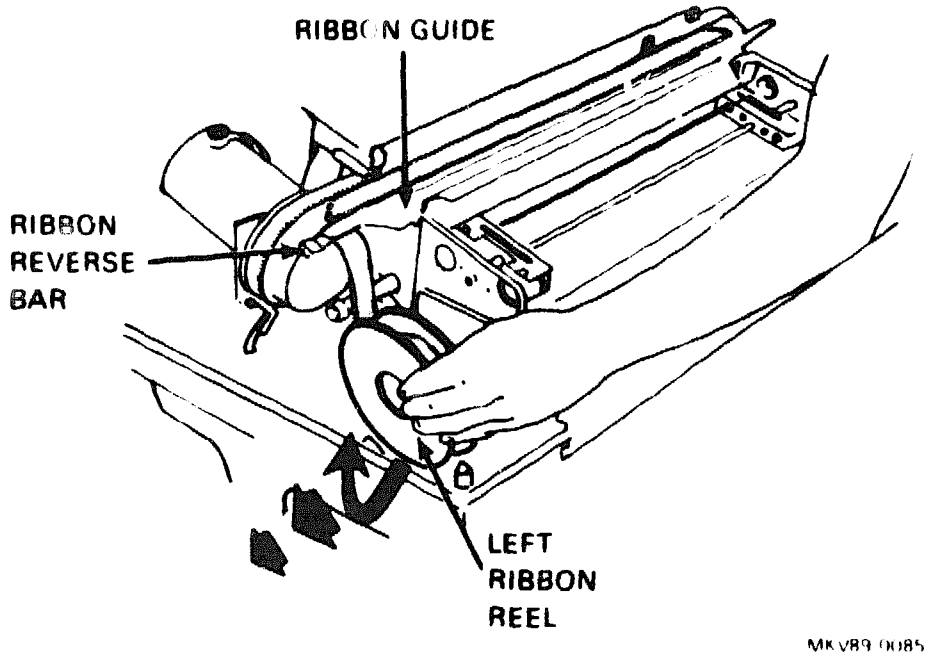


Figure 2-12 Removing Left Ribbon Reel

5. Pull the left ribbon reel out away from the printer mechanism and remove it from the spindle (Figure 2-12).

6. Remove the ribbon from between the ribbon reverse bar and the ribbon guide on the left side of the printer mechanism.

7. Slide the ribbon out from under the print band and from between the ribbon reverse bar and the ribbon guide on the right side of the printer mechanism (Figure 2-13).

8. Pull the right ribbon reel out and away from the print mechanism, and remove it from the spindle (Figure 2-13).

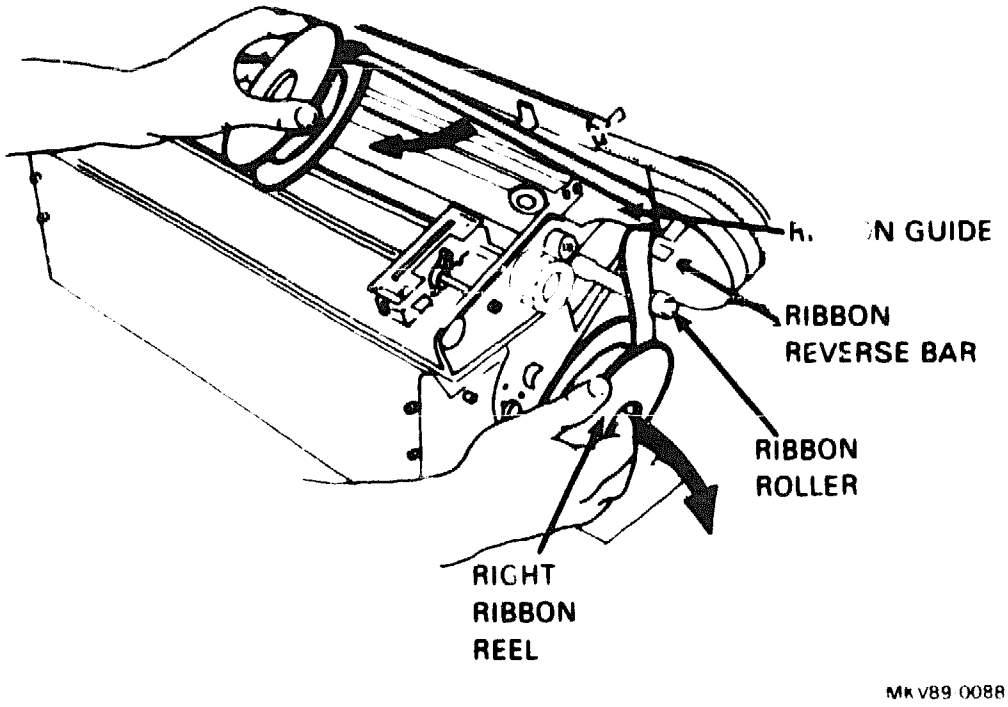


Figure 2-13 Removing the Ribbon and Right Ribbon Reel

Replacement Procedure

1. Unpack the new ribbon.

NOTE

The disposable rubber gloves packed with the ribbon should be worn to prevent getting ink on the hands while installing the ribbon.

2. Position the left ribbon reel so that the ribbon is feeding off the bottom of the reel toward the back of the printer (Figure 2-14).

3. Push the left ribbon reel onto the spindle on the left side of the printer mechanism (Figure 2-14).

4. Guide the ribbon over the ribbon roller and between the ribbon reverse bar and the ribbon guide (Figure 2-14).

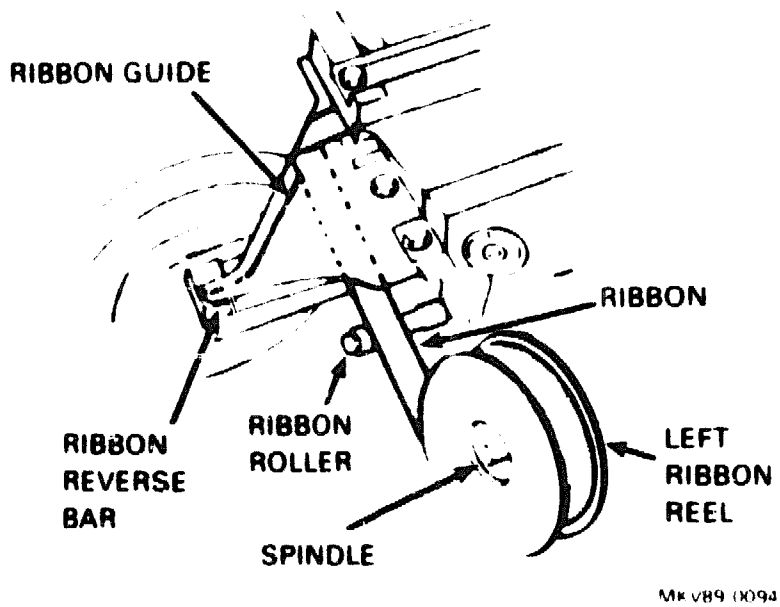


Figure 2-14 Installing Left Ribbon Reel

5. Lift the right ribbon reel over the left ribbon guide and to the right.

6. While unwinding ribbon from the right ribbon reel, route the ribbon across the print station (Figure 2-15). After the ribbon is installed, it will slide under the print band.

7. Route the ribbon over the right ribbon guide and back between the ribbon guide and the ribbon reverse bar (Figure 2-15).

8. Guide the ribbon over the ribbon roller and push the right ribbon reel onto the spindle on the right side of the printer mechanism (Figure 2-15).

9. Rotate the right ribbon reel clockwise until ribbon slack is taken up and the ribbon slides under the print band.

NOTE

The ribbon is angled across the print station to ensure that the entire width of the ribbon is used when printing. Therefore, when the ribbon is properly installed, a portion of the ribbon will extend from under the band and will be visible on the right side of the print station.

10. Close the top cover.

11. Turn the power switch to ON.

12. Perform the Shift/Repeat test (Section 2.8.2) and check the print quality.

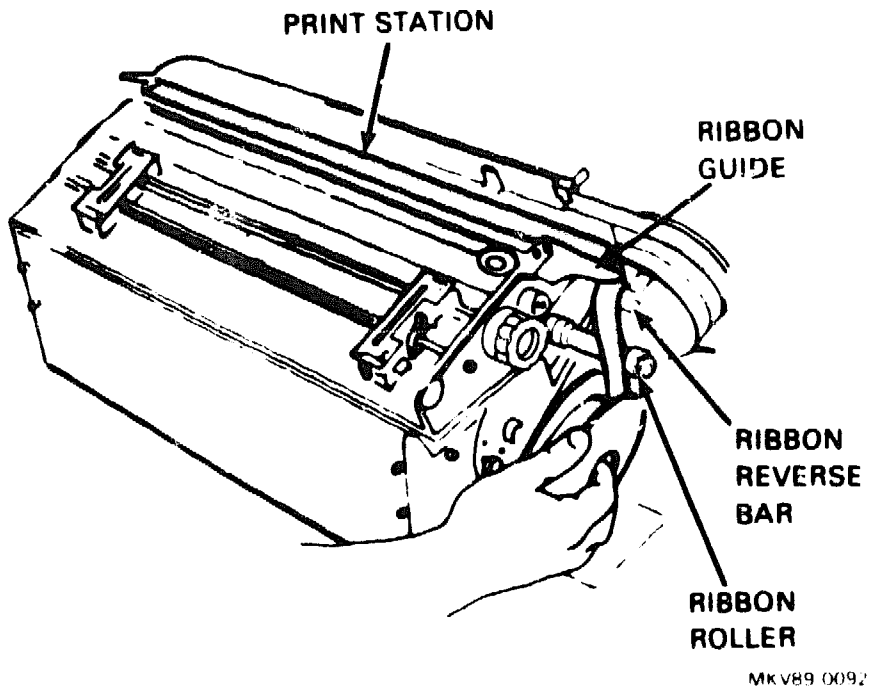


Figure 2-15 Routing Ribbon and Installing Right Ribbon Reel

2.5 BAND REMOVAL AND REPLACEMENT

The LP37 Line Printer is shipped with a 64-character U.S. band installed. If a 96-character U.S. band, an OCR band, or a country kit band is to be used or if a band needs replacing, follow the procedures below to remove and replace the band.

Removal Procedure

1. If the printer is on-line, press the On Line key. READY - OFFLINE will display on the main operator control panel LCD.

2. Turn the power switch to OFF.

3. Press the top cover release button on the right side of the top cover and raise the top cover.

4. Remove the paper from the printer by opening all four tractor flaps and pulling the paper down and out of the print mechanism.

5. Remove the ribbon from the printer (Section 2.4).

6. Push up the band release lever, located on the right side of the printer mechanism behind the right band pulley, to release band tension (Figure 2-6).

7. Slowly rotate the right band pulley counterclockwise while carefully sliding the band off both pulleys at the same time, using care when slipping the band between the transducer and the left band pulley (Figure 2-16).

8. Grasp the band at both ends, and while holding the band taut, guide the band toward the front of the printer through the slot under the mechanism casting until it is free (Figure 2-17).

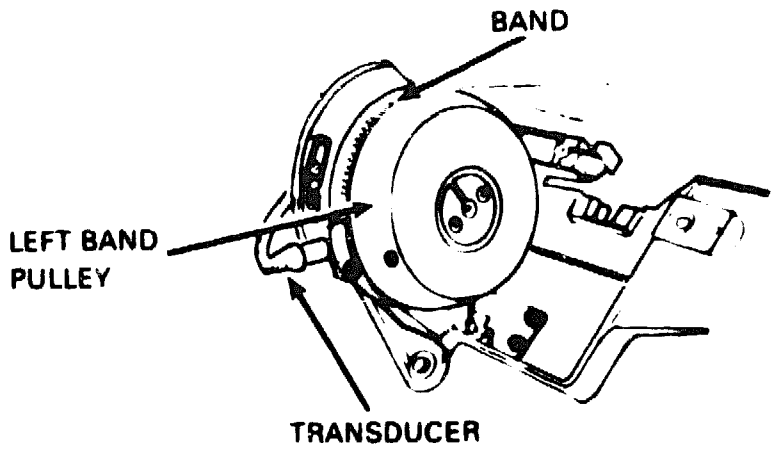


Figure 2-16 Left Band Pulley and Transducer

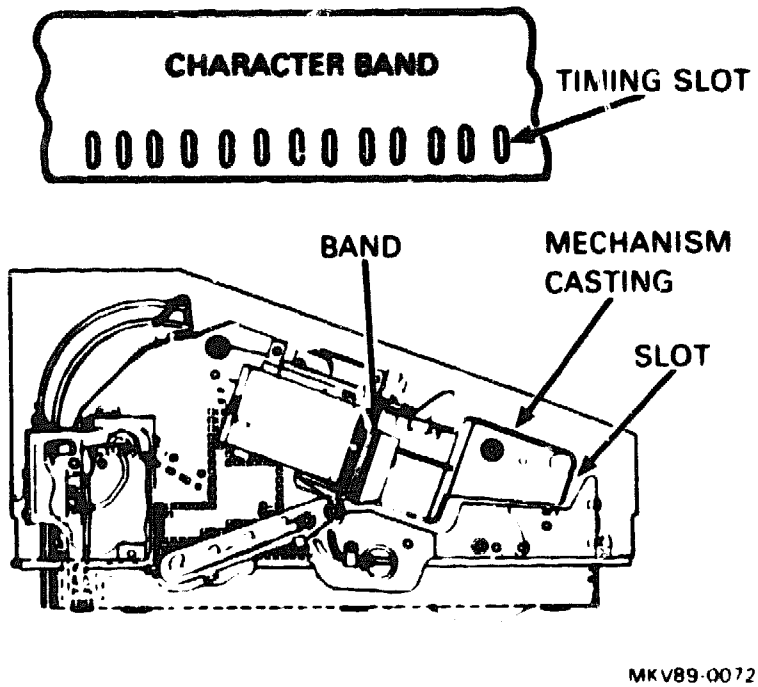


Figure 2-17 Removing and Replacing the Band

Replacement Procedure

1. Unpack the new band.

CAUTION

To avoid damaging the band, DO NOT exceed a bend radius of fewer than six inches.

2. Turn the band so that the print characters are facing the inside of the band and the timing slots are toward the front of the printer.

3. Grasp the band at both ends, and while holding the band taut, guide the band toward the band pulleys through the slot under the mechanism casting (Figure 2-17).

4. Carefully slide the band between the left band pulley and the transducer, and onto the left band pulley (Figure 2-16).

5. While holding the band in place on the left band pulley, carefully guide the band under the platen from left to right across the print station and onto the right band pulley.

6. Slide the band against the flanges on the back edge of both band pulleys (Figure 2-18).

7. While holding the band against the flanges, push down the band release lever to apply tension to the band and lock it in place.

8. Rotate either band pulley counterclockwise and verify that the band is seated properly on both band pulleys and that the band spins freely.

NOTE

The band may not be fully seated against the band pulleys until the paper and ribbon are installed.

9. Reinstall the paper in the printer (Section 2.3.1).

10. Reinstall the ribbon in the printer (Section 2.4).

11. Perform the Fixed Pattern test (Section 2.8.1) and the Shift/Repeat test (Section 2.8.2) to check for correct phasing and print quality.

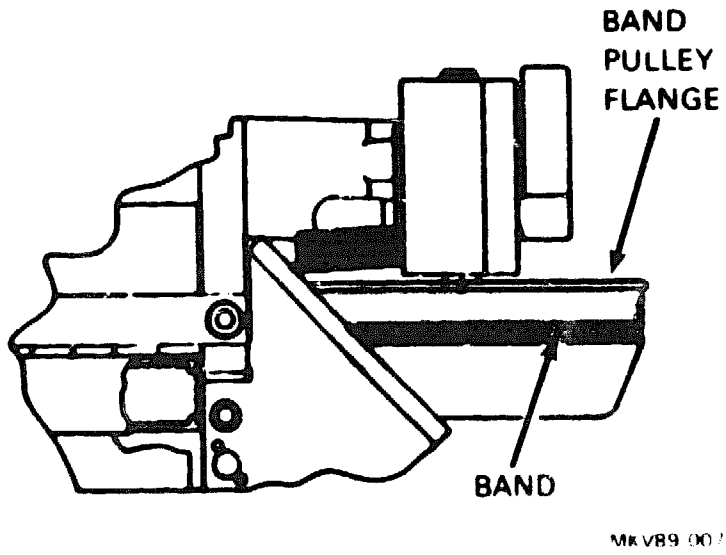


Figure 2-18 Band Pulley Flange

2.6 OPERATING PROCEDURES

The following sections contain the procedures for power-up, power-down, setting top-of-form, and setting form length

2.6.1 Power-Up

With the ribbon and band installed, the paper loaded, and the top cover closed, place the power switch at the rear of the printer to the ON position. The following sequence should occur within approximately 10 seconds on the main operator control panel (Figure 2-2):

1. The green Power LED lights.
2. The LCD displays the DIAGNOSTIC CHECK message for approximately 10 seconds.
3. The red Alarm Clear LED lights.
4. The red Alarm Clear LED goes off, the green Ready LED lights, and the LCD displays the READY - OFFLINE message.

NOTE

If the red Alarm Clear LED remains lit, refer to troubleshooting in Chapter 3 to correct the condition.

To place the printer on-line for printing, press the On Line key. The green On Line LED will light and the LCD will display the ON LINE message.

CAUTION

DO NOT open the top cover when the printer is on-line. This may cause a loss of data. Place the printer off-line and wait for the On Line LED to go off, then open top cover. To resume, close the top cover and press the On Line key.

2.6.2 Power-Down

Use the following procedure to properly power down the LP37 Line Printer:

1. If the On Line LED is lit, press the On Line key to place the printer off-line. The On Line LED should go off and the LCD should display the READY - OFFLINE message.

NOTES

If the On Line LED remains lit, it means that unprinted data remains in the printer memory. Wait until this data is printed and the On Line LED goes off.

If the On Line LED still remains lit, the printer can be taken off-line by sending a control character (LF, CR, or FF) from the user system.

2. Place the power switch to the OFF position.

2.6.3 Setting Top-of-Form

Use the following procedure to set the top-of-form position on the paper.

1. If the printer is on-line, press the On Line key. The On Line LED will go off and the LCD will display the READY - OFFLINE message.

2. Ensure that the scroll feature is enabled (Section 2.7.2).

3. Press the Top of Form key.

4. Use the Form Up or Form Down keys to align the paper perforation with the scale on the upper left tractor (Figure 2-10).

NOTE

The number on the scale that is aligned with the perforation indicates the number of blank lines between the perforation and the first line of print. With the scroll feature enabled through the configuration procedure, the paper will scroll down to the first line of print. In Figure 2-10, with 8LPI selected, one blank line will be between the perforation and the first line of print.

5. After aligning the paper perforation with the scale on the upper left tractor, press the Top of Form key a couple times to ensure that the paper is feeding properly. If the perforation does not align on subsequent sheets, ensure that the proper form length is selected (Section 2.6.4).

6. Press the On Line key. The On Line LED will light and the LCD will display the ON LINE message.

2.6.4 Setting Form Length

The form length can be set for paper from 3 to 14 inches in length. The paper must be at the top-of-form position before the form length can be set. Use the following procedure to set the form length.

1. If the printer is on-line, press the On Line key. The On Line LED will go off and the LCD will display the READY - OFFLINE message.

2. Press the Top of Form key.

3. Ensure that the paper perforation is properly aligned with the scale on the upper left tractor for the top-of-form position. If it is not properly aligned, perform the top-of-form procedure in Section 2.6.3 before continuing.

4. After the top-of-form is aligned properly, press the top cover release button on the right side of the top cover and raise the top cover.

5. Press the Form Len. key, and the main operator control panel LCD will display the present form length (FORM LGH=XXXX).

6. Continue pressing the Form Len. key until the desired form length is displayed on the LCD.

NOTE

In 6LPI the allowable values will increase in 1/3-, 1/2-, and 2/3-inch increments. In 8LPI the allowable values will increase in 1/4-, 1/2-, and 3/4-inch increments.

7. Close the top cover.

8. Press the On Line key. The On Line LED will light and the LCD will display the ON LINE message.

2.6.5 OCR Printing

To perform Optical Character Recognition (OCR) printing, a special OCR band and OCR ribbon have to be installed, and slow speed has to be selected. Follow the procedure below to prepare the printer for OCR printing.

1. If an OCR band is not installed, follow the procedures in Section 2.5 to remove the present band and install one of the OCR bands listed below.

   a. U.S. 64-character OCR-B band (LP37X-BA)
   b. U.S. 96-character OCR-B band (LP37X-BC)
   c. U.S. 96-character OCR-A band (LP37X-BD)

2. If a special OCR ribbon is not installed, follow the procedure in Section 2.4 to remove the present ribbon and install the special OCR ribbon (LP37R-02).

3. After performing the power-up procedures, press the Slow Speed key to light the yellow Slow Speed LED.

After installing an OCR band, installing a special OCR ribbon, and selecting slow speed, the printer is ready to perform OCR printing.

2.7 LP37 LINE PRINTER CONFIGURATION

The LP37 Line Printer has 15 configuration features that are set at the factory and stored in the printer's nonvolatile memory. After installation, these configuration features can be accessed and changed to meet the user's requirements. Table 2-5 contains a list of the configuration features along with the definition and settings for each feature.

Table 2-5 Configuration Features, Settings, and Definitions

Feature Number	Feature	Setting*	Definition
01	FOLDOVR ENB	1 (0)	Automatic Foldover - When enabled (1), causes lowercase alpha character codes to print as uppercase characters if the lowercase character set does not appear on the band. If the lowercase character set is contained on the band, foldover will not occur. When disabled (0), causes lowercase character codes to print as spaces if the lowercase character set does not appear on the band.
02	BND TIMOUT	02 (05,10)	Band Timeout - Allows changing the band timeout to 2, 5, or 10 seconds. If no print data is received for the specified time, the band will stop until data is received.
03	PAPER SCRLL	1 (0)	Paper Scroll - When enabled (1), paper will automatically scroll up to let you see the last line printed if the printer is taken off-line. The paper will scroll down to the correct position when the printer is placed on-line again.

Table 2-5 Configuration Features, Settings, and Definitions (Cont)

Feature Number	Feature	Setting*	Definition
04	80 CL SFTST	0 (1)	80 Column Self-Test - When enabled (1), the self-test print pattern is set to 80 columns. When disabled (0), the self-test print pattern is set to 132 or 136 columns, depending on the print column feature setting.
05	COLUMNS	132 (136)	Print Columns - Sets the maximum print line length to 132 or 136 columns.
06	PARITY	NONE	Data Parity - Sets the parity (ODD,EVEN) checking mode to odd, even, or not tested. If a character is received with incorrect parity, the parity error signal will become active at the printer interface, and a space will be printed in place of the character received with incorrect parity.
07	PERF SKPOVR0	(3,6)	Perforation Skipover - Automatic perforation skip-over can be set to 0, 3, or 6 lines.

Table 2-5 Configuration Features, Settings, and Definitions (Cont)

Feature Number	Feature	Setting*	Definition
08	LF ON CR	0 (1)	Line Feed on Carriage Return - When enabled (1), a line feed (LF) is generated when a carriage return (CR) code is received. If a CR code is received, the printer will print, reset to column 1, and advance 1 line. If a CR,LF code is received, the printer will print, reset to column 1, and advance 2 lines. When disabled (0), a line feed (LF) is not generated when a carriage return (CR) code is received. If a CR code is received, the printer will print and reset to column 1. If a CR,LF code is received, the printer will print, reset to column 1, and advance 1 line.
09	AUTO PRINT	0 (1)	Automatic Print - When enabled (1), a CR (carriage return) code is automatically inserted when the maximum print line length is reached without receiving a control character. The CR code prints a received line when the 132nd (136th) character is received without a control character. When disabled (0), printing starts when a control character is received. If more than 132 (136) characters are received before the control character, the first 132 (136) characters are printed and the rest are lost.

Table 2-5 Configuration Features, Settings, and Definitions (Cont)

Feature Number	Feature	Setting*	Definition
10	MAX OVRPR	8 (140)	Max Overprint – Line overprint can be selected to be either 8 or 140 overstrikes.
11	VFU SKPOVER	0 (1)	VFU Skipover – When enabled (1), the forms perforation skipover is enabled when operating with the VFU loaded. The perforation skipover will cause any forms motion command that would normally stop between BOF and TOF to continue to TOF. When disabled (0), printing can occur between BOF and TOF.
12	INTFACE	7 BIT (8 BIT)	Data Interface – The interface can be selected to be 7 or 8 bits.
13	PAPER INSTR	0 (1)	Paper Instruction – When enabled (1), this feature allows the printer interface to recognize a paper instruction from the user system.
14	STEP CNT TR	0 (1)	Step Count Truncate – When enabled (1), a step count command will end at the top-of-form if the command would have moved the paper beyond the top-of-form position.
15	LANG	ENGLISH (FRENCH, SPANISH GERMAN)	Control Panel Language – Allows the messages to be displayed on the main operator control panel LCD in English, French, Spanish, or German.

* Factory settings are listed first, followed by optional settings in parentheses.

2.7.1 Configuration Printout

Use the following procedure to obtain a configuration printout that lists each feature and its present setting.

1. If the printer is on-line, press the On Line key. The On Line LED will go off and the LCD will display the READY - OFFLINE message.

2. Press the top cover release button on the right side of the top cover and raise the top cover.

3. Press the Test key twice. SHIFT/REPEAT will be displayed on the main operator control panel LCD.

4. Close the top cover.

5. Press the On Line key to start the print cycle.

6. The printer will print the present configuration settings, a character band identification, a VFU memory image, and then continue with the sliding pattern printout.

7. Press the On Line key to stop the print test.

NOTE

Pressing the On Line key again will not print the configuration settings unless the printer has been placed on-line and taken off-line again.

2.7.2 Changing Configuration Settings

There are 15 configuration features available for the LP37 Line Printer. Each feature is identified by a 2-digit feature number; 01 to 15. Some of the configuration features have only two states: DISABLED (0) or ENABLED (1). Other features have a choice of settings. Table 2-5 lists the LP37 configuration features, the available settings for each, and the definition of each.

Follow the procedure below to change the configuration settings.

1. If the printer is on-line, press the On Line key. The On Line LED will go off and the LCD will display the READY - OFFLINE message.

2. Press the top cover release button on the right side of the top cover and raise the top cover.

3. Set the Mode toggle switch to the 1 position.

4. The main operator control panel LCD will show the features sequentially scrolling up from 01 to 15 possible features. The feature number will be shown on the left side of the LCD, the feature will be shown in the center of the LCD, and the present setting will be shown on the right side of the LCD.

5. Press the Form Down key to stop the features from scrolling.

6. Press the Form Up key to manually step through the features. Each time the Form Up key is pressed, the next sequential feature will be displayed on the LCD.

NOTE

If a specific feature is to be viewed or changed, it can be accessed directly by using the number keys on the control panel to enter the 2-digit feature number.

7. If a feature is to be changed, use the Form Up key to step through the features until the feature to be changed is displayed, or use the number keys to enter the 2-digit feature number of the feature to be changed.

8. Press the **next** key to step through the available settings for the displayed feature. Continue pressing the **next** key until the desired setting is shown on the display.

9. If more features are to be changed, repeat steps 7 and 8.

10. After all changes have been made, set the Mode toggle switch to the 0 position.

11. Press the Alarm Clear key to load the changes into memory.

12. Close the top cover.

13. Press the On Line key. The ON LINE message will display on the LCD and the On Line LED will light.

14. Obtain a configuration printout (Section 2.7.1) to verify that the changes have been stored in memory.

2.8 LP37 LINE PRINTER SELF-TESTS

The LP37 Line Printer has two self-tests that are used to check for proper character phasing and print quality. The two self-tests are the Fixed Pattern test and the Shift/Repeat test. A description of these self-tests and the procedure for running them are given in the following sections.

2.8.1 Fixed Pattern Test

The Fixed Pattern test prints an uppercase H in every print position as shown in Figure 2-19. This test is used to ensure that the phasing is set correctly so that both vertical legs of the H have equal density.

Procedure

1. If the printer is on-line, press the On Line key. The On Line LED will go off and the LCD will display the READY - OFFLINE message.

2. Press the top cover release button on the right side of the top cover and raise the top cover.

3. Press the Test key once. FIXED PATTERN will be displayed on the LCD.

4. Close the top cover.

5. Press the On Line key and the H pattern will start to print. After printing several lines, press the On Line key again to stop the test.

6. Check the printout to ensure that both vertical legs of the H have equal density. If the right vertical leg is too light, press the Phase Right key to move the displayed phase bar to the right. If the left vertical leg is too light, press the Phase Left key to move the displayed phase bar to the left.

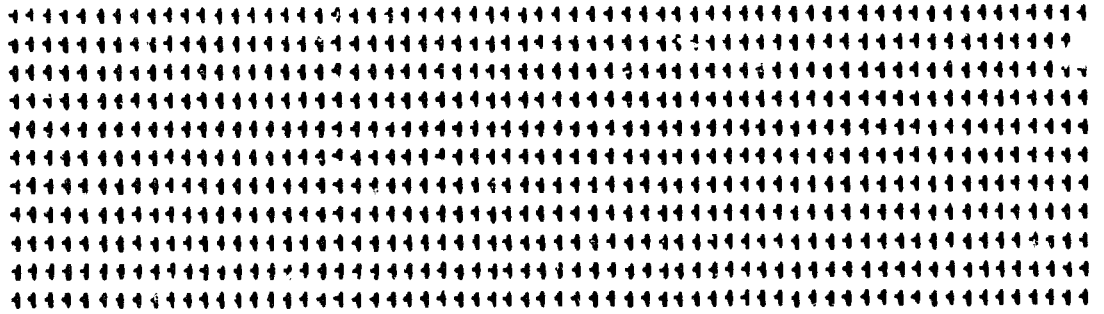
7. After adjusting the left/right density, go back to step 5 and run the test again. Continue running the test, checking the printout, and adjusting the left/right density until both vertical legs of the H characters have equal density.

8. Press the top cover release button on the right side of the top cover and raise the top cover.

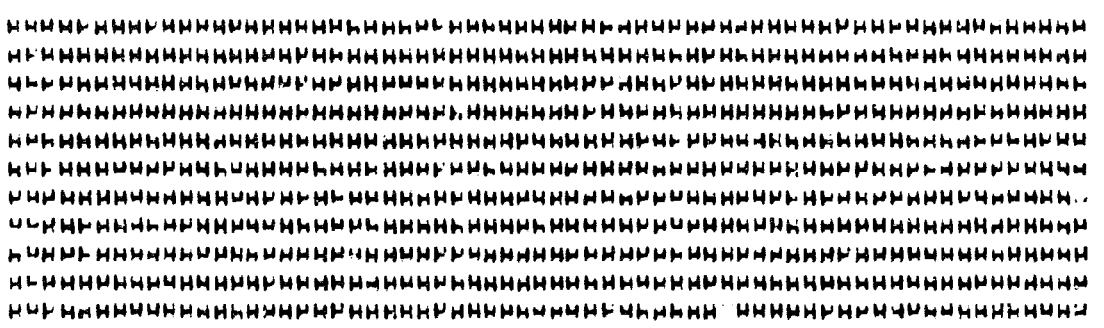
9. Press the Test key twice. READY - OFFLINE will be displayed on the LCD.

10. Close the top cover.

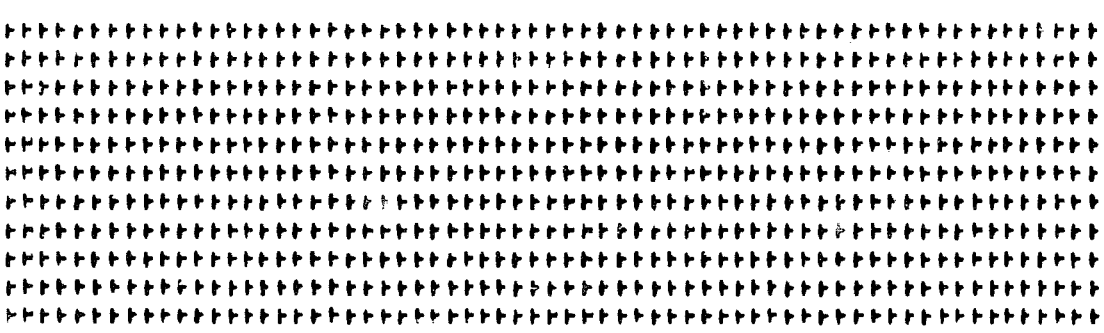
11. Press the On Line key. This will place the printer on-line and the ON LINE message will display on the LCD.



LEFT VERTICAL LEG TOO LIGHT – USE PHASE LEFT KEY TO CORRECT



BOTH VERTICAL LEGS HAVE EQUAL DENSITY – PHASING CORRECT



RIGHT VERTICAL LEG TOO LIGHT – USE PHASE RIGHT KEY TO CORRECT

Figure 2-19 Fixed Patten Printout

2.8.2 Shift/Repeat Test

The Shift/Repeat test prints a rolling pattern of characters as shown in Figure 2-20. This test is used to check the print quality and to ensure that each character can print in every print position.

Procedure

1. If the printer is on-line, press the On Line k[illegible] On Line LED will go off and the LCD will display the READY - OFFLINE [illegible]sage.

2. Press the top cover release button on the right side of the top cover and raise the top cover.

3. Press the Test key twice. SHIFT/REPEAT will be displayed on the LCD.

4. Close the top cover.

5. Press the On Line key and the rolling character pattern will start to print.

6. Check the print quality of the printout and ensure that each character is printing in every print position.

7. After printing several pages, press the On Line key again to stop the test.

8. Press the top cover release button on the right side of the top cover and raise the top cover.

9. Press the Test key once. READY - OFFLINE will be displayed on the LCD.

10. Close the top cover.

11. Press the On Line key. This will place the printer on-line and the ON LINE message will display on the LCD.

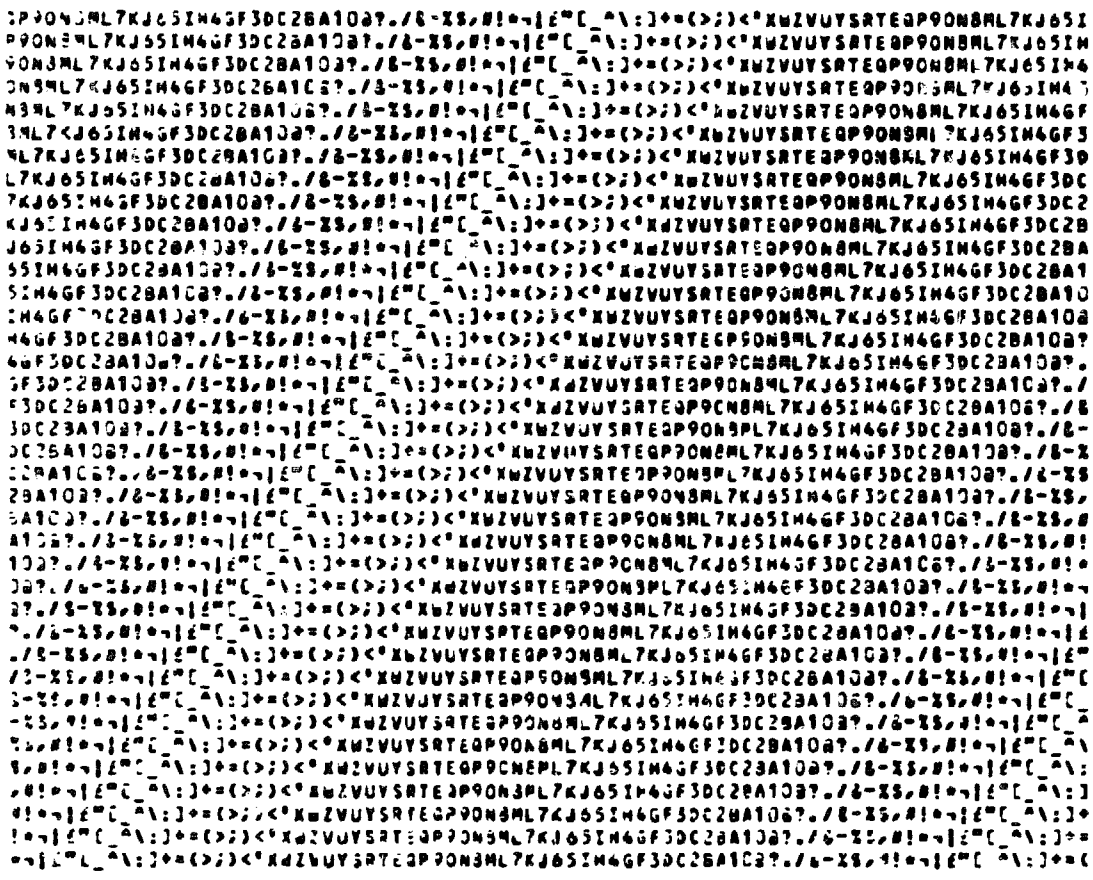
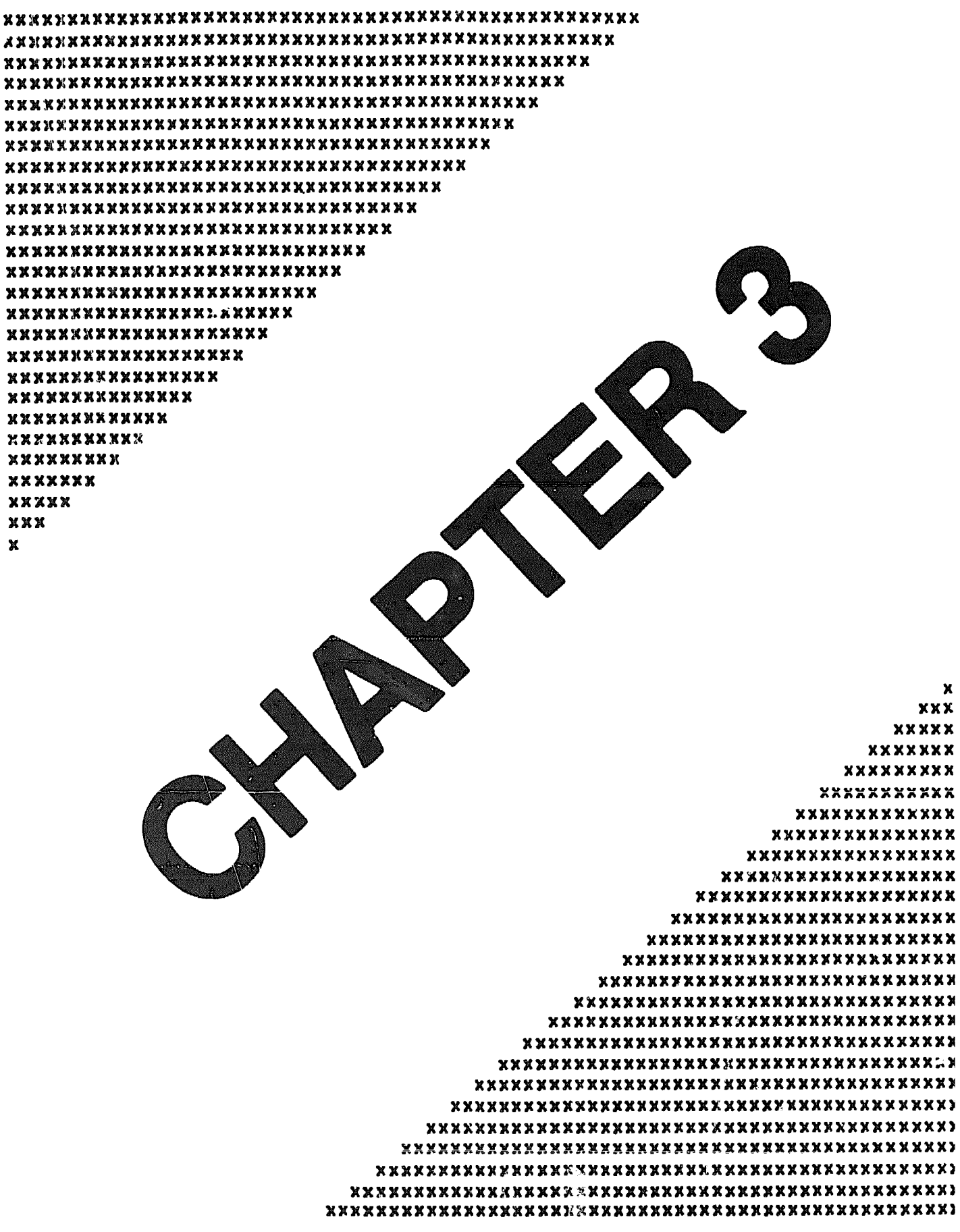


Figure 2-20 Shift/Repeat Printout


CHAPTER 3

CHAPTER 3
TROUBLESHOOTING/ MAINTENANCE

3.1 INTRODUCTION

This chapter contains information for troubleshooting and maintaining the LP37 Line Printer.

3.2 BASIC OPERATOR TROUBLESHOOTING

Table 3-1 lists some common operating problems and corrective actions that the operator may perform. Check this list before calling for service.

Table 3-1 Basic Troubleshooting Chart

Problem	Cause	Corrective Action
Printed characters on one line are shorter than normal.	Vertical paper tension too loose.	Push in and turn paper tension knob counterclockwise until paper is taut, but not too tight.
Paper holes are elongated after going through tractors.	Vertical paper tension too tight.	Push in and turn paper tension knob clockwise until paper is taut, but not too tight.
Paper holes are wider than normal after going through tractors.	Horizontal paper tension too tight.	Unlock and adjust the tractors that are tearing holes.

Table 3-1 Basic Troubleshooting Chart (Cont)

Problem	Cause	Corrective Action
Paper comes out of tractors.	Paper tension is incorrect.	To change vertical tension, push in and turn paper tension knob counterclockwise to increase tension and clockwise to decrease tension. To change horizontal tension, unlock upper and/or lower right tractor. Move tractor(s) right or left to make necessary adjustments.
	Upper tractors and lower tractors not aligned.	Realign tractors so that lower tractors are directly below upper tractors.
Printed characters are fuzzy or smeared.	Band is dirty.	Clean band.
	Band is worn.	Replace band.
Printed characters are too light.	Improper Copies adjustment.	Adjust Copies keys.
	Ribbon worn out.	Replace ribbon.
Left or right portions of characters are missing.	Improper phase adjustment.	Adjust Phase keys.

3.3 FAULT CONDITIONS

All functions of the printer are monitored. When an error is detected, the printer will stop printing, the Alarm Clear LED will light, and an error message will display on the main operator control panel LCD. The two types of fault conditions, resettable and nonresettable, are described in the following sections.

3.3.1 Resettable Fault Conditions

Resettable fault conditions usually can be corrected by the operator. Table 3-2 contains a list of resettable fault error messages, definitions, and corrective actions. After taking the appropriate corrective action, press the Alarm Clear key to reset the printer. If pressing the Alarm Clear key does not clear the alarm condition, power down the printer then power up again.

Use Table 3-2 to troubleshoot resettable error messages.

Table 3-2 Resettable Error Messages/Definitions/Corrective Actions

Error Message	Definition	Corrective Action
ADD PAPER	Out of paper.	Reload new paper.
BND OV SPD FAULT	Band motor running too fast.	Ensure band is installed correctly and is against the flanges on both pulleys, and that the band release lever is in the down (locked) position. Clean band and pulleys.
BND UN SPD FAULT	Band motor running too slow.	Ensure band is installed correctly and is against the flanges on both pulleys, and that the band release lever is in the down (locked) position. Clean band and pulleys.

Table 3-2 Recettable Error Messages/Definitions/Corrective Actions

Error Message	Definition	Corrective Action
CHANNEL NOT FD	Incorrect VFU channel format.	Tell system programmer to check that the VFU channel format is correct (Chapter 4), and reload VFU.
CHECK PAPER	Paper motion sensor has not detected paper movement after paper motion commands were issued.	Check for paper jam in the tractor area and reinstall paper correctly. Check horizontal paper tension. Clean paper motion sensor.
CHECK RIBBON	Ribbon motion has not been detected after ribbon motors were enabled.	Check ribbon and ribbon path for jam, break, ribbon reels on spindles, reversing foil on ribbon, and correct installation. Clean ribbon reversing bars.
CHECK TOP COVER	Top cover is open.	Close top cover and press Alarm Clear key.
CHECK TRANSDUCER	Transducer is not detecting timing slots on band.	Ensure that the band is installed with the timing slots toward the front of the printer and that the band is against the flanges on both pulleys. Also, check that the band release lever is in the down (locked) position.

Table 3-2 Resettable Error Messages/Definitions/Corrective Actions

Error Message	Definition	Corrective Action
EXCESS CRS	More than 8 (140) print lines received, which terminate in a CR or VFU line skip = 0.	Check format code issued to printer or enable LF ON CR (configuration feature 08) by following procedures in Section 2.7.2.
GOTO TOP OF FORM	Paper not at TOF position when trying to change LPI or form length.	Press Top of Form key and align TOF position before changing LPI or form length.
ILLEGAL FORM LGH	Illegal LPI setting for selected form length.	Check form length and LPI settings.
ILLEGAL VFU CODE	Go to channel command received with illegal field value (for example, Channel 14).	Tell system programmer to check and correct the format code sent to printer.
RIBBON EXHAUSTED	Ribbon counter has reached the preset value set on the digital meter.	Press the Reset key on the digital meter, press the Alarm Clear key, and change the ribbon.

Table 3-2 Resettable Error Messages/Definitions/Corrective Actions

Error Message	Definition	Corrective Action
SINGLE LINE MODE	Paper low sensor has detected the last form.	To finish printing the form in the print station, successive depressions of the On Line key will print one line at a time until the next top-of-form position is reached. Then, the ADD PAPER message will display.
STACKER FAULT	Paper stacking problem exists in the stacker area.	Check the stacker area and if full or paper is misstacked, clear the paper.
TRANSDUCER FAULT	Transducer is not detecting timing slots on band.	Ensure that the band is installed with the timing slots toward the front of the printer and that the band is against the flanges on both pulleys. Also, check that the band release lever is in the down (locked) position.
UNDEFINED BAND	A non-Digital band is installed.	Remove the band and install the proper Digital band.
VFU NOT LOADED	Go to channel command received with no data in VFU memory.	Tell system programmer to check that VFU channel format is correct and reload VFU.

3.3.2 Nonresettable Fault Conditions

When a nonresettable fault condition occurs, the main operator control panel LCD will alternately display the error message and the CALL FIELD SERVICE message. Before calling Digital Field Service, power down the printer then power up again. If the error message is still displayed, call Digital Field Service.

The nonresettable error messages are listed below.

- AIR FLOW FAULT
- BAND MOTOR FAULT
- DIAGNOSTIC CHECK
- HAM DRVR FAULT
- HAMMER FAULT
- HV 1 FAULT
- HV 2 FAULT
- I/O DIAG FAULT
- MC PROC FAULT
- OPEN HAMMER
- PAPER FEED MOTOR
- PF MOTOR STALL
- PRINT PROC FAULT
- SYSTEM FAULT
- TRANSDUCER FAULT
- VCL FAULT
- VOLTAGE FAULT
- 12 VOLT FAULT

3.4 MAINTENANCE

The LP37 Line Printer requires minimal operator maintenance. The general operator maintenance consists of changing the paper, ribbon, and bands. Periodically cleaning the band and band pulleys, the ribbon reverse bars, and the print mechanism is required and is dependent on printer usage. Table 3-3 lists the recommended operator cleaning and checking duties and the frequency with which they should be performed.

Table 3-3 Recommended Operator Duties and Frequency

Duty	Frequency
Clean top cover viewing window.	As required.
Vacuum band/mechanism area, band brushes, and paper path.	Each ribbon change or 7 days.
Clean paper motion sensor and paper low sensor.	Each ribbon change or 7 days.
Clean ribbon reverse bars.	Every 30 days.
Clean print band and pulleys.	Every 30 days.
Clean ribbon shafts.	Every 30 days.
Check operator controls and status display.	Every 180 days.

3.4.1 Cleaning the Band and Band Pulleys

The band and band pulleys should be cleaned on a monthly basis, and when the printed characters become fuzzy or smeared.

NOTE

Wear gloves and a protective garment when cleaning the band to prevent staining hands and clothes.

CAUTION

To avoid damaging the band, DO NOT exceed a bend radius of fewer than six inches.

Remove the band and saturate it with a cleaning solution of 91% isopropyl alcohol. Using a small stiff bristle brush and adding more cleaning solution as required, clean both sides thoroughly until the band is free of ink and ribbon fibers. Moisten a soft lint-free cloth with 91% isopropyl alcohol and clean both band pulleys and the band brushes.

After reinstalling the band, run the self-tests and check for proper print quality and phasing.

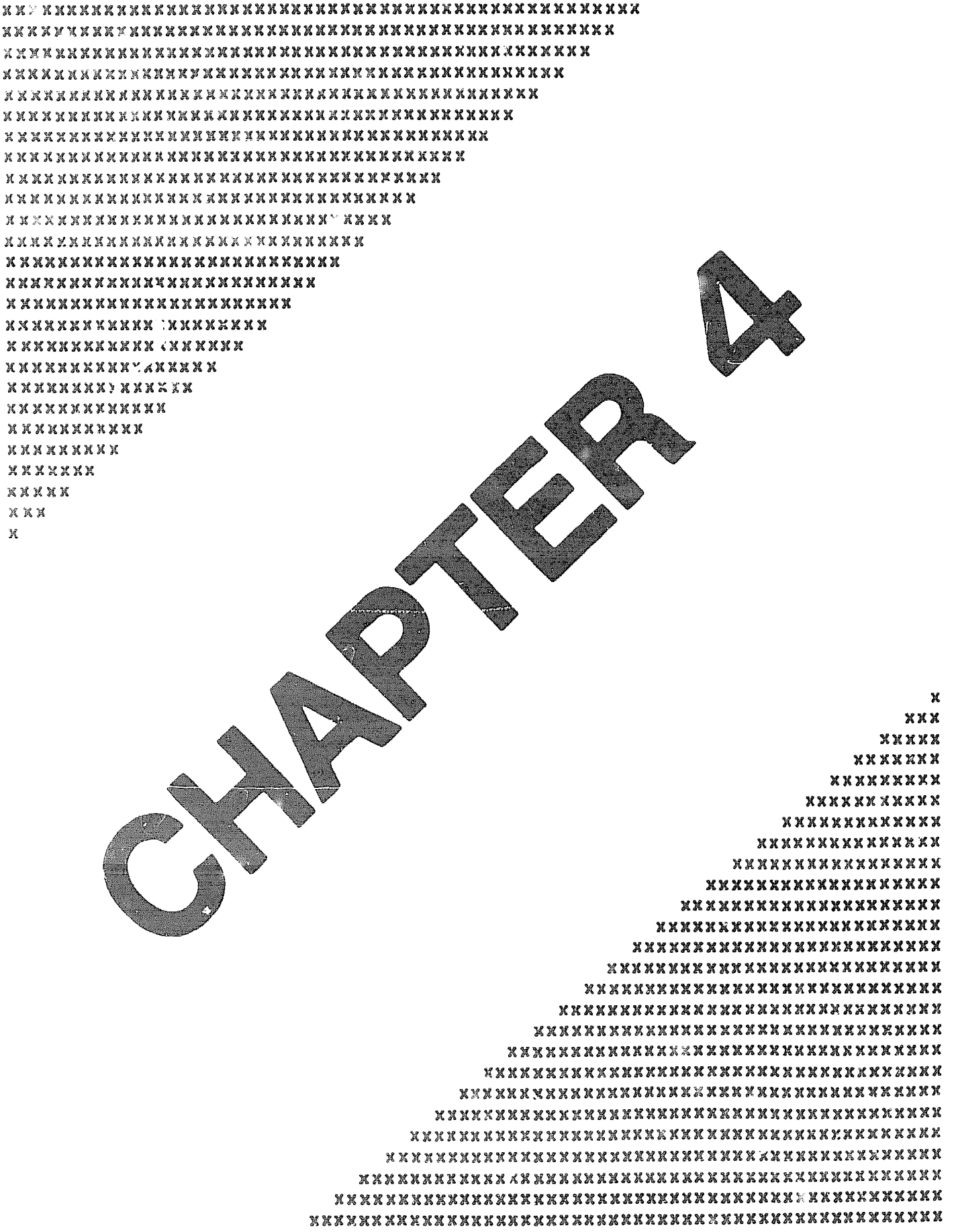
3.4.2 Cleaning the Ribbon Reverse Bars

The ribbon reverse bars should be cleaned on a monthly basis. To clean the ribbon reverse bars, remove the ribbon and use a folded, moist hand towelette to remove all lint and ink from between the ribbon guides and the ribbon reverse bars.

After reinstalling the ribbon, run the self-tests and check for proper print quality and phasing.

3.4.3 Cleaning the Print Mechanism

When the ribbon is replaced, the ribbon reel wells, the interior areas under the print station, and the area around the tractors and paper path should be vacuumed to remove ribbon fibers, paper particles, and dust.


CHAPTER 4

CHAPTER 4
PROGRAMMER REFERENCE

4.1 INTRODUCTION

This chapter describes the control codes to which the LP37 Line Printer responds, the vertical pitch operation, how the EVFU is used to load the VFU memory, channel commands, and line count codes.

NOTE

The electronic vertical format unit (EVFU) allows users to move quickly through files to vertical tab stops, but requires mathematical and programming competence to implement.

4.2 CONTROL CODES

The ASCII control codes to which the LP37 Line Printer responds and their definitions are listed in Table 4-1.

Table 4-1 LP37 Control Codes

Control Code	ASCII	Hex	Description
Line Feed	LF	0A	Causes the print buffer contents to print and the form to advance to the next line.
Form Feed	FF	0C	Causes the print buffer contents to print and the form to advance to the next TOF position.
Carriage Return	CR	0D	Causes the print buffer contents to print. No forms motion will occur.

Table 4-1 LP37 Control Codes (Cont)

Control Code	ASCII	Hex	Description
Vertical Tab	VT	0B	Use only with the VFU. Skip to Channel 2.

NOTES

VT causes the print cycle to be initiated. If the VFU is loaded, the paper will advance to the next Channel 2 stop, or to the next TOF if there are no more Channel 2 stops on the page.

If VFU is not loaded, the paper advances to the next 1-inch increment in the current page.

Vertical Pitch (DECVERP)	<ESC>[nz	1B 5B n 7A	Sets lines per inch (LPI) on the printer.

Where: n = The parameter, and ranges from 0 to 2 ASCII, or none to indicate 6 LPI (default). Leading zeroes must be ignored. Parameters other than 0 to 2 will cause the control sequence to be ignored.

n	LPI
0	6
1	6
2	8

	<ESC>[z	1B 5B 7A	Defaults to 6 LPI.

4.3 VERTICAL PITCH OPERATION

The vertical pitch operation depends on whether the vertical format unit (VFU) is loaded or not, whether the printer is at the TOF position, what the present pitch is, and to what new pitch it is being changed. This section describes the operation of the 6/8 LPI change when the LPI change is initiated by the <ESC> sequence (<ESC>[nz) from the user system.

If the VFU is not loaded and the printer is at the TOF position, the following actions are possible:

- If the form length is not compatible (for example, 11 1/3 inch and 8 LPI is attempted), the ILLEGAL FORM LENGTH message displays on the main operator control panel LCD and the LPI setting does not change.

- If the form length is compatible, the LPI setting changes.

If the VFU is not loaded and the printer is NOT at the TOF position, the following actions are possible:

- If the form length is not compatible (for example, 11 1/3 inch and 8 LPI is attempted), the ILLEGAL FORM LENGTH message displays on the main operator control panel LCD and the LPI setting does not change.

- If the form length is compatible, the LPI setting changes and the current forms position becomes the new TOF.

If the VFU is loaded and the printer is at the TOF position when the change in LPI is initiated from the user system, the LPI setting changes and the current VFU memory image remains unchanged. The original TOF position is also unchanged.

If the VFU is loaded and the printer is NOT at the TOF position when the change in LPI is initiated from the user system, the LPI setting does not change and the current VFU memory image and original TOF position remain unchanged.

4.4 ELECTRONIC VERTICAL FORMAT UNIT (EVFU)

The EVFU allows the printer VFU memory to be loaded by the user system. To load the VFU, two escape sequences are used: one to begin and one to end the load.

NOTE

While the main purpose of these commands is to load the VFU, the TOF is also defined. The actual position of the paper when the Begin Load command is sent determines TOF. Therefore, the paper must be aligned to the desired TOF position before sending the Begin Load command.

The load VFU escape sequences are shown below.

Command	ASCII	Hex
Begin Load	<ESC>[<1h	1B 5B 3C 31 68
End Load	<ESC>[<1l	1B 5B 3C 31 6C

All data between the begin load command and the end load command is placed in VFU memory. This data must be in the VFU data format.

4.4.1 VFU Data Format

The VFU data consists of two 8-bit bytes of data for each line of the form, starting with line 1, which is the TOF line. The LP37 Line Printer uses a 7-bit interface; therefore, the VFU data for the LP37 consists of two 7-bit bytes of data for each line. The two bytes of data indicate channel number(s). Channel 1 is used for top-of-form and Channel 12 is used for bottom-of-form. The format for the pair of data bytes is shown below.

Bit:	8	7	6	5	4	3	2	1	
Value:	x	1	C6	C5	C4	C3	C2	C1	First byte
	x	1	C12	C11	C10	C9	C8	C7	Second byte

Where: x = Not used
Bit 7 = Always 1
Bits 1-6 = Represent channels with binary 1s and 0s
1 = Channel present
0 = No channel

C1-C12 = Channels 1 through 12
C1 identifies TOF
C2 is the vertical tab channel
C12 identifies BOF

4.4.2 VFU Channel Commands

After the VFU is loaded, the format is set but no paper movement has occurred. The next step is issuing channel commands to move the paper forward to the specified channel. The channel selection escape sequence is given below.

Command	ASCII	Hex
Channel Selection	ESC [nn&y	1B 5B nn 26 79

Where: nn The channel to which paper will move, and ranges from 0 to 11 decimal, or none to indicate Channel 1 (default). Leading zeroes must be ignored. Parameters other than 0 to 11 cause the control sequence to be ignored.

nn = 0 - Move to Channel 1
nn = 1 - Move to Channel 2

.
.
.

nn = 11 - Move to Channel 12

4.4.3 Line Count Codes

The LP37 Line Printer allows the user system to move paper forward from the current paper position. Paper is moved forward a specific number of lines by sending the following escape sequence. This is useful when the form needs to be moved only part way to the next channel tab. Moves of this type can also be accomplished by using <LF>s.

Command	ASCII	Hex
VPR (vertical position relative)	<ESC>[nne	1B 5B nn 65

Where: nn = The number of lines the paper advances, and ranges from 0 to 63 decimal, or none to indicate 1 line (default). Leading zeroes must be ignored. Parameters other than 0 to 63 cause the control sequence to be ignored.

nn=0 or 1 - Move 1 line
nn=2 - Move 2 lines

.
.
.

nn=63 - Move 63 lines

4.5 EXAMPLE OF USING THE EVFU

The following sections contain: information for setting up the printer and system for EVFU operation; an example of creating a file that contains EVFU load information, and text with VFU channel commands and line count codes embedded; and information for printing the example file.

4.5.1 Setup

This section contains information for setting up the printer characteristics, the system form definition, and the printer configuration for using the EVFU.

Printer Set-up Characteristics

The following printer characteristics should be set up.

- Page Width: 255 to accommodate long EVFU load information
- Page Length: 66
- Carriage Return
- Formfeed
- Lowercase
- Passall
- No Wrap
- Printall
- No Failback
- No Tab
- No Truncate

System Form Definition

The default form characteristics are adequate for most applications, but the TRUNCATE characteristic may need to be set to NOTRUNCATE, depending on the length of the EVFU load.

Printer Configuration

To use the EVFU, the Paper Instruction configuration feature must be enabled. Refer to Section 2.7.2 to enable the Paper Instruction feature.

4.5.2 Creating EVFU Load Information

The load information is used to electronically set up the vertical tab stops for the printer. This replaces the paper tape that is required in older VFUs.

There are 12 channels (vertical tab stops) available. Channel 1 is for the Top-Of-Form and Channel 12 is for the Bottom-Of-Form. The remaining channels can be used to assign vertical tab stops to specific lines on the form. The example described below is for a 33-line form, with the following lines on the form being assigned the indicated channel numbers as vertical tab stops:

- Line 1 (TOF) is assigned a Channel 1 vertical tab stop
- Line 4 is assigned a Channel 2 vertical tab stop
- Line 8 is assigned a Channel 3 vertical tab stop
- Line 12 is assigned a Channel 4 vertical tab stop
- Line 16 is assigned a Channel 5 vertical tab stop
- Line 20 is assigned a Channel 6 vertical tab stop
- Line 24 is assigned a Channel 7 vertical tab stop
- Line 28 is assigned a Channel 8 vertical tab stop
- Line 33 (BOF) is assigned a Channel 12 vertical tab stop

The VFU data format (Section 4.4.1) consists of two 7-bit bytes of data for each line on the form. Before creating a file that contains the EVFU load information, a matrix similar to Table 4-2 should be created to show the two 7-bit bytes required for each line on the form. Table 4-2 contains the matrix for the example described above. Since the example is a 33-line form, 66 7-bit bytes of data will be entered into the EVFU load file. The begin load <ESC> sequence (<ESC>[<1h) is at the beginning of the EVFU load file, and the end load <ESC> sequence (<ESC>[<1l) is at the end of the EVFU load file.

After the matrix containing the two 7-bit bytes for each line on the form has been created, this information has to be entered into the EVFU load file. In this example, a VT100 terminal and the VAX EDT editor is used to create the file and enter the EVFU load information.

NOTE

The EVFU load file can be created using other terminals and editors, but the required keyboard entries and resultant control characters may be different than the ones in this example.

Use the following procedure to create the EVFU load file and enter the load information:

1. Open an EDT file by entering EDIT EVFU.TST at the $ prompt ($ EDIT EVFU.TST).

2. Enter the begin load <ESC> sequence (<ESC>[<1h).

Table 4-2 VFU Example Load Matrix

		Channels												
Line	**x**	**12**	**11**	**10**	**9**	**8**	**7**	**x**	**6**	**5**	**4**	**3**	**2**	**1**
1	1	0	0	0	0	0	0	1	0	0	0	0	0	1
2	1	0	0	0	0	0	0	1	0	0	0	0	0	0
3	1	0	0	0	0	0	0	1	0	0	0	0	0	0
4	1	0	0	0	0	0	0	1	0	0	0	0	1	0
5	1	0	0	0	0	0	0	1	0	0	0	0	0	0
6	1	0	0	0	0	0	0	1	0	0	0	0	0	0
7	1	0	0	0	0	0	0	1	0	0	0	0	0	0
8	1	0	0	0	0	0	0	1	0	0	0	1	0	0
9	1	0	0	0	0	0	0	1	0	0	0	0	0	0
10	1	0	0	0	0	0	0	1	0	0	0	0	0	0
11	1	0	0	0	0	0	0	1	0	0	0	0	0	0
12	1	0	0	0	0	0	0	1	0	0	1	0	0	0
13	1	0	0	0	0	0	0	1	0	0	0	0	0	0
14	1	0	0	0	0	0	0	1	0	0	0	0	0	0
15	1	0	0	0	0	0	0	1	0	0	0	0	0	0
16	1	0	0	0	0	0	0	1	0	1	0	0	0	0
17	1	0	0	0	0	0	0	1	0	0	0	0	0	0
18	1	0	0	0	0	0	0	1	0	0	0	0	0	0
19	1	0	0	0	0	0	0	1	0	0	0	0	0	0
20	1	0	0	0	0	0	0	1	1	0	0	0	0	0
21	1	0	0	0	0	0	0	1	0	0	0	0	0	0
22	1	0	0	0	0	0	0	1	0	0	0	0	0	0
23	1	0	0	0	0	0	0	1	0	0	0	0	0	0
24	1	0	0	0	0	0	1	1	0	0	0	0	0	0

Table 4-2 VFU Example Load Matrix (Cont)

		Channels												
Line	x	12	11	10	9	8	7	x	6	5	4	3	2	1
25	1	0	0	0	0	0	0	1	0	0	0	0	0	0
26	1	0	0	0	0	0	0	1	0	0	0	0	0	0
27	1	0	0	0	0	0	0	1	0	0	0	0	0	0
28	1	0	0	0	0	1	0	1	0	0	0	0	0	0
29	1	0	0	0	0	0	0	1	0	0	0	0	0	0
30	1	0	0	0	0	0	0	1	0	0	0	0	0	0
31	1	0	0	0	0	0	0	1	0	0	0	0	0	0
32	1	0	0	0	0	0	0	1	0	0	0	0	0	0
33	1	1	0	0	0	0	0	1	0	0	0	0	0	0

3. Start entering the 7-bit bytes for each line by following the procedure below:

   a. Using line 1 in Table 4-2, the first 7-bit byte corresponds to Channels 1-6 and is equal to 1000001_2 (65_{10}).

   b. To enter this information: press the PF1 key on the right-hand keypad, enter the number 65 on the main keyboard, then press the PF1 key and the 3 key on the right-hand keypad.

   c. This enters a control character into the file that looks like an "A."

   d. The second 7-bit byte for line 1 in Table 4-2 corresponds to Channels 7-12 and is equal to 1000000_2 (64_{10}).

   e. To enter this information: press the PF1 key on the right-hand keypad, enter the number 64 on the main keyboard, then press the PF1 key and the 3 key on the right-hand keypad.

   f. This enters a control character into the file that looks like an "@."

4. Repeat step 3 for every line on the form using the corresponding matrix data for each line. Use Table 4-3 to convert the 7-bit binary data into decimal data for entry into the file.

Table 4-3 Binary-to-Decimal Conversion

Binary	Decimal
1000000	64
1000001	65
1000010	66
1000100	68
1001000	72
1010000	80
1100000	96

5. After the two 7-bit bytes of data have been entered for each line on the form, enter the end load <ESC> sequence (<ESC>[<1I).

After the begin load <ESC> sequence, the 66 7-bit bytes of data from Table 4-2, and the end load <ESC> sequence have been entered, the file looks like Figure 4-1.

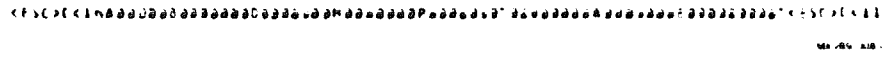


Figure 4-1 Example EVFU Load File

NOTE

The entire EVFU load file should be on one line. If it is not, it WILL NOT work. Ensure that the EVFU load information is not being truncated (Section 4.5.1).

It is possible to set up the load information in device control libraries, but doing this is beyond the scope of this example.

Now that the EVFU load file is complete, text needs to be entered, and the VFU channel commands (Section 4.4.2) and line count codes (Section 4.4.3) need to be embedded in the text to move the paper.

4.5.3 Printing an EVFU File

The final test file for this example is shown in Figure 4-2. This file contains the EVFU load information, text, VFU channel commands, and line count codes. All the load information and the text for line 1 are on the first line of the file.

It is not necessary to enter a VFU channel command to move to Channel 1 (TOF) because the paper should already be set to the top-of-form (Channel 1) position before the file is printed.

NOTE

If a VFU channel command is executed and the paper is already positioned at or below that channel on the present form, the paper will move to that channel on the next form.

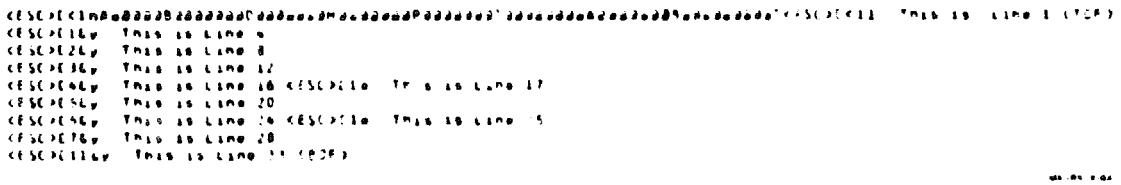


Figure 4-2 Final Example Test File

The final steps of this example are to make sure that the printer is at the top-of-form position, and then to print the file. Figure 4-3 contains the printout of the example test file that is shown in Figure 4-2 after it has been printed on an LP37 Line Printer.

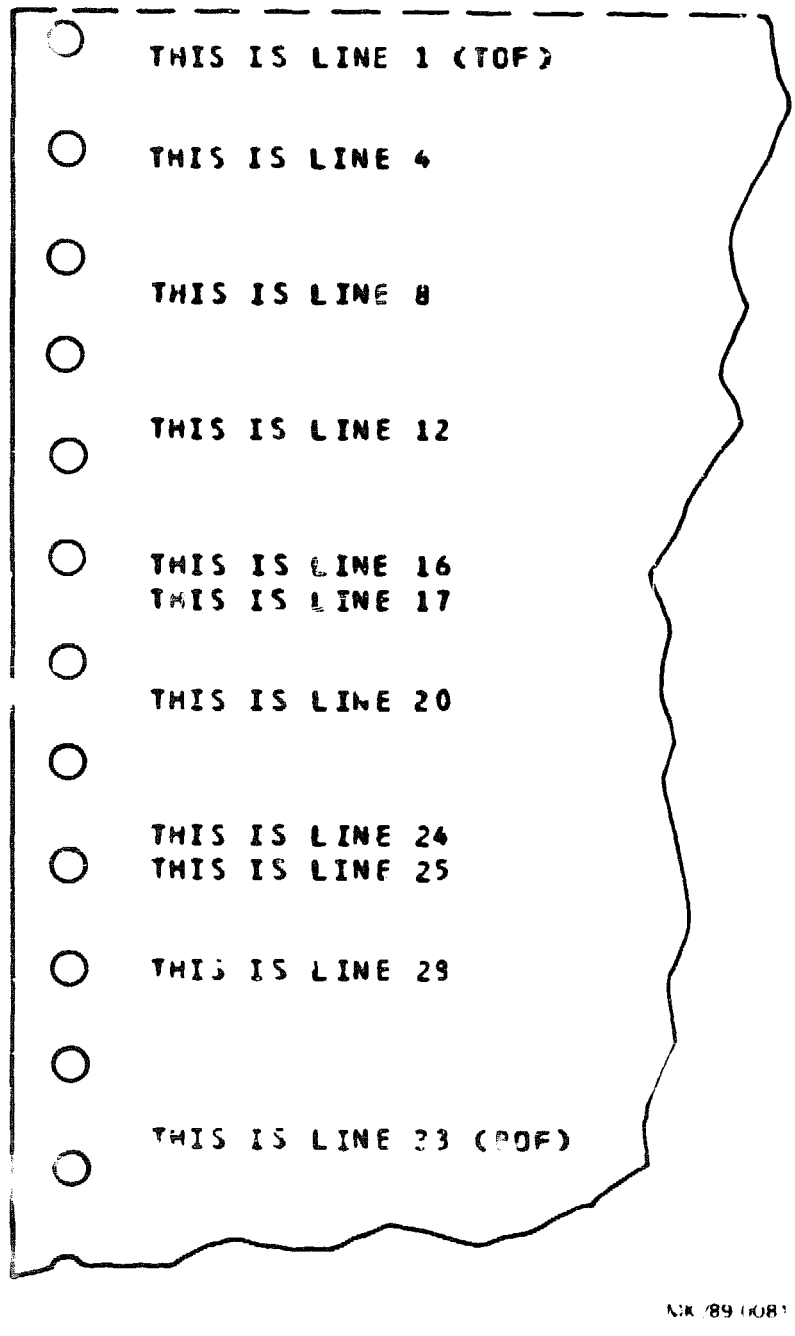


Figure 4-3 Printout of the Example Test File


INDEX

INDEX

A

B

C

D

E

F

G

H

I

L

M

N

O

P

R

S

T

V

#