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LA120

USER GUIDE

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FORMS (CONT)

KEY	FUNCTION/COMMENTS
H	Horizontal pitch (Characters per inch) NOTE: Changing horizontal pitch clears left and right margins.

DISPLAY	PITCH
5	5.00 CPI
6	6.00 CPI
7	6.60 CPI
8	8.25 CPI
10	10.0 CPI
12	12.0 CPI
13	13.2 CPI
16	16.5 CPI

V — Vertical pitch (Lines per inch)

NOTE: Changing vertical pitch clears top and bottom margins.

DISPLAY	PITCH
2	2 LPI
3	3 LPI
4	4 LPI
6	6 LPI
8	8 LPI
12	12 LPI

OPERATOR COMFORT

KEY	FUNCTION/COMMENTS
G	Bell volume 0 = Low Volume 1 = High Volume
K	Key click 0 = Off 1 = On
R	Auto repeat 0 = Off 1 = On
Z	Last character view 0 = Manual 1 = Auto

COMMUNICATION

KEY	FUNCTION/COMMENTS
A	Auto answerback 0 = Off 1 = On
B	Buffer control 0 = Small 1 = Large
C	Printer character set 1 = United States 2 = United Kingdom
D	Auto disconnect 0 = Off 1 = On
E	Local echo 0 = Off 1 = On

COMMUNICATION (CONT)

KEY	FUNCTION/COMMENTS
J	Auto new line at right margin 0 = Off 1 = On
L	Auto line feed (Return key) 0 = Off 1 = On
M	Modem 1 = FDX, No Modem 2 = FDX, Modem 3 = HDX, Supervisory 4 = HDX, EOT 5 = HDX, ETX
N	Keyboard and printer character set 1 = United States 2 = United Kingdom
O (letter)	Alternate character set 0 = OFF 1 = ON
P	Parity and data bits

DISPLAY	DATA BITS	PARITY REC	PARITY XMT
1	7	IGNORE	MARK
2	7	IGNORE	SPACE
3	7	IGNORE	ODD
4	7	IGNORE	EVEN
5	7	ODD	ODD
6	7	EVEN	EVEN
7	7	NONE	NONE
8	8	NONE	NONE
9	8	ODD	ODD
10	8	EVEN	EVEN

Q — HDX initial calling state
0 = Transmit
1 = Receive

S — Secondary channel

DISPLAY	FDX * MODE	HDX * REV CH.
0	Speed	No
1	Restraint	Yes

* See M Key, Modem

U — Break enabled
0 = No
1 = Yes

W — Printer new line character
1 = None
2 = Line feed (LF)
3 = Return (CR)

X — XON/XOFF
0 = No
1 = Yes

Y — Alternate keypad mode
0 = No
1 = Yes

COMMUNICATION (CONT)

KEY	FUNCTION/COMMENTS
[0] (number)	Selects receive and transmit baud rates and number of stop bits.

BAUD RATE (DISPLAYED)	STOP BITS
50	2
75	2
110	2
134	1
150	1
200	1
300	1
600	1
1200	1
1800	1
2400	1
4800	1
7200	1
9600	1

[SHIFT] and [0] — Selects split baud rates.
[0] selects receive baud rate; [SHIFT] and [0] then offers a choice of three transmit baud rates.

RECEIVE BAUD RATE (NOT DISPLAYED)	TRANSMIT BAUD RATE (DISPLAYED)	TRANSMIT STOP BITS
600	75	2
	150	1
	600	1
1200	75	2
	150	1
	1200	1
2400	300	1
	600	1
	2400	1
4800	300	1
	600	1
	4800	1

STORE RECALL AND STATUS

KEY	FUNCTION/COMMENTS
[I] (letter)	Select factory set-up parameters
[8]	Print status message
[9]	Recall set-up parameters
[SHIFT] and [9]	Store set-up parameters

SELF TEST

KEY	FUNCTION/COMMENTS
[T]	Initiate printing self test
[SHIFT] and [>]	Initiate non-printing self test NOTE: Type any character in set-up mode to stop self test.

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digital DECWRITER III

LA120 OPERATOR REFERENCE CARD

SET-UP

KEY	FUNCTION/COMMENTS
[CTRL] and [SET-UP]	Locks LA120 in set-up mode; SET-UP light flashes. To exit set-up mode press [SET-UP]
[SET-UP]	Places LA120 in set-up mode while [SET-UP] is held down; SET-UP light flashes. To exit set-up mode release [SET-UP]

NOTES:
1. **LA120 must be in set-up mode to set the following features.**
2. **Do not use [SHIFT] unless specified.**

FORMS

KEY	FUNCTION/COMMENTS
[SHIFT]	Display current line number Releasing [SHIFT] returns display to current column number
[1]	Set horizontal tab at current column
[SHIFT] and [1]	Set vertical tab at current line
[2]	Clear horizontal tab at current column
[SHIFT] and [2]	Clear vertical tab at current line
[3]	Clear all horizontal tabs
[SHIFT] and [3]	Clear all vertical tabs
[4] or [SHIFT] and [4]	Establish top of form (TOF)
[5]	Set minimum column number (left margin)
[SHIFT] and [5]	Set minimum line number (top margin)
[6]	Set maximum column number (right margin)
[SHIFT] and [6]	Set maximum line number (bottom margin)
[7]	Clear left and right margins
[SHIFT] and [7]	Clear top and bottom margins
[F]	Form Length NOTE: Changing form length clears top and bottom margins and establishes TOF. DISPLAY: 1 thru 168 — Lines per form

LA120
USER GUIDE

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CONTENTS

CHAPTER 2 INSTALLATION, INTERFACE INFORMATION, AND SPECIFICATIONS

CHAPTER 3 PROGRAMMER'S SECTION

CHAPTER 4 COMMUNICATIONS

CHAPTER 5 20 mA LA12X-AL OPTION

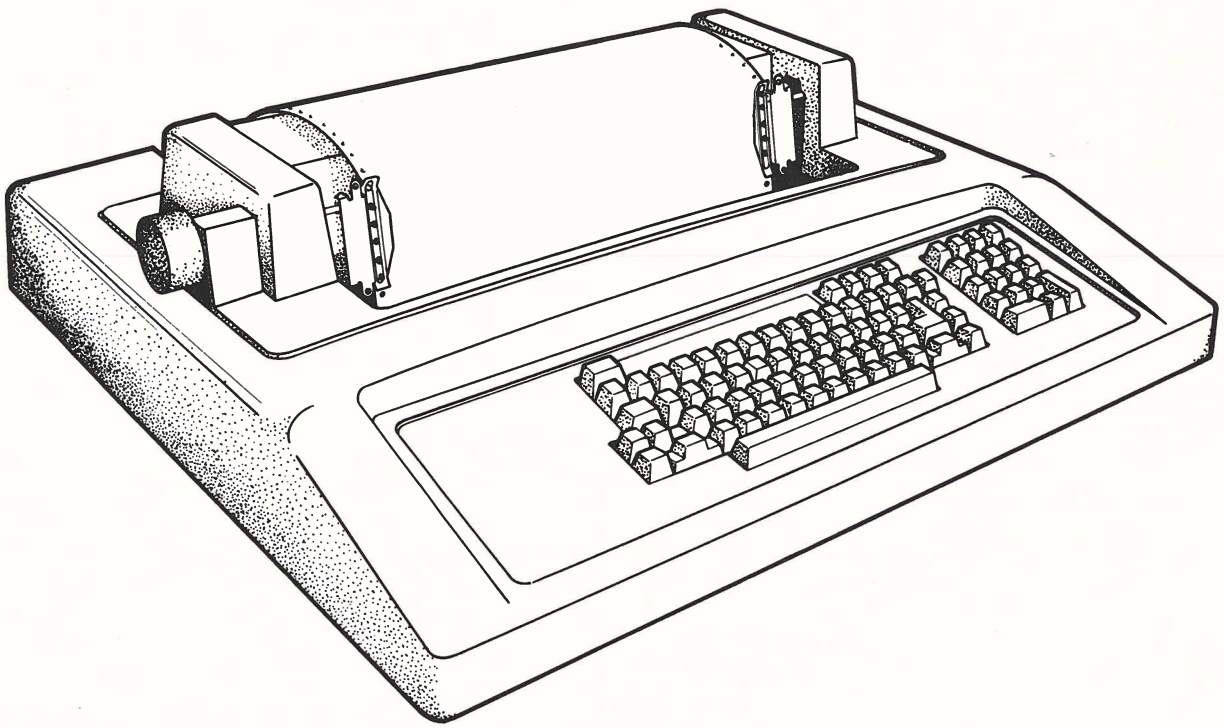
CHAPTER 6 HOW TO ORDER SUPPLIES AND ACCESSORIES

INTRODUCTION

We are sure you will find your LA120 DECwriter III terminal easy to use. It is designed to work very much like a typewriter. If you can type, this guide will help you learn how to use your LA120.

The LA120 is also easy to integrate with most systems. It is compatible with both EIA and ANSI standards.

Besides the many standard features built into your basic LA120 DECwriter III, there are a number of options and accessories that may be added to your terminal to make it useful in an even wider range of applications.



Operator Information

OPERATOR'S INFORMATION

• INTRODUCTION

The LA120 DECwriter III terminal is basically a typewriter, with a wide range of features, that communicates with a computer.

Part 1 of the operator's chapter is for the general user or user already familiar with the features of a terminal.

It contains the following:

- Description of the Operator's Console
- Description of Alarm and Bell Signals
- Summary of LA120 DECwriter III Features (Operator Reference Card)
- Operator Testing and Troubleshooting.

Part 2 is for the user new to the LA120 DECwriter III. It contains an explanation of each feature plus a step-by-step procedure for implementing the feature.

The features have been grouped as follows to help the user understand under what conditions a feature is used:

- Setting up a Form
- Operator Comfort Features
- Communication Features
- Store, Recall, and Status Features
- Self Test Features.

Part 3 describes how to load forms, change ribbons, and adjust the print impression.

Part 1 GENERAL USER INFORMATION

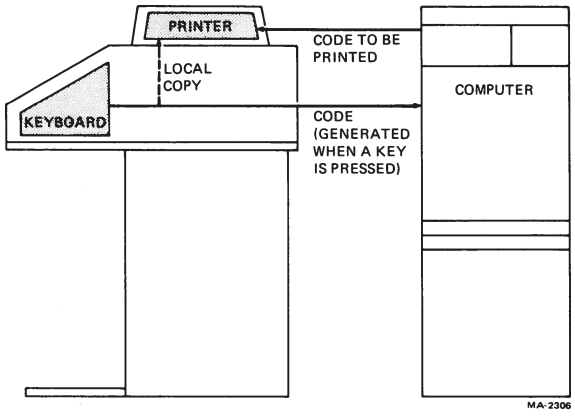
• OPERATOR'S CONSOLE

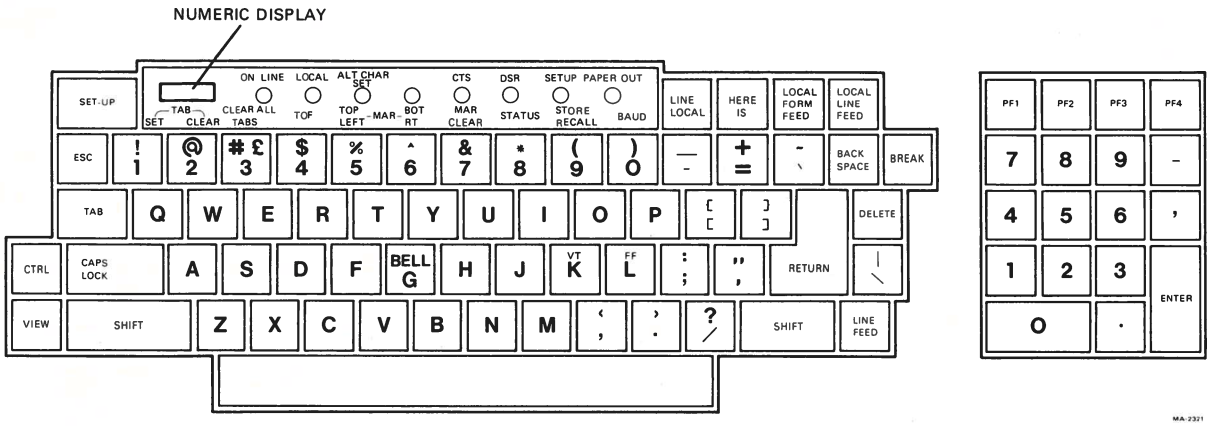
To have a better understanding of how the keyboard on the LA120 works you should think of the LA120 as two things.

First, as an input device to a computer; that is, pressing a keyboard key, sends information (code) to a computer.

Second, as a printer. Information is sent from the computer to the printing portion of the LA120.

However, you can set up your system to send information from the keyboard to the printer and computer at the same time.





NUMERIC DISPLAY
The numeric display indicates the next column number during normal operation.

In setup mode the numeric display may also indicate line number, baud rate, form length, etc.

ON LINE LIGHT
The ON LINE light indicates the LA120 is on line. Data is transmitted and received only while on line.

LOCAL LIGHT
The LOCAL light indicates that the LA120 is in local. In local, the LA120 operates as a typewriter and does not transmit or receive data.

LINE/LOCAL KEY
The LINE/LOCAL key switches the LA120 to or from line and local, as indicated by the line and local lights.

ALT CHAR SET LIGHT
The ALT CHAR set light indicates that an optional alternate character set, such as APL, is in use.

CTS LIGHT
The CTS light indicates that transmission of data is enabled (clear to send).

DSR LIGHT
The DSR light indicates that the modem is in data mode (data set ready).

SET UP LIGHT
The SET UP light flashes to indicate that the LA120 is in setup mode.

PAPER OUT LIGHT
The PAPER OUT light flashes to indicate that the printer is not ready, due to any of the following conditions.

- Paper out
- Cover open
- Print head jam

LOCAL LINE FEED
The LOCAL LINE feed key advances the paper one line at a time without transmitting a code to the host computer.

LOCAL FORM FEED
The LOCAL FORM feed key performs a form feed without transmitting a code to the host computer.

VIEW
The VIEW key allows the operator to view the last character printed. For additional detail refer to the Auto Last Character Visibility feature in Part 2 of this chapter.

SET UP
The SET UP key is used to exam or change the LA120 features. For a detailed description refer to Setup Mode in Part 2 of this chapter.

When in setup, keys 14 through 23 function in the following manner.

SET TAB
[! / 1]
SET TAB unshifted sets a horizontal tab stop at the current column. Shift sets a vertical tab stop at the current line.

CLEAR TAB
[@ / 2]
CLEAR TAB unshifted clears the horizontal tab stop at the current column. Shift clears the vertical tab stop at the current line.

CLEAR ALL
[#£ / 3]
CLEAR ALL unshifted clears all horizontal tab stops. Shift clears all vertical tab stops.

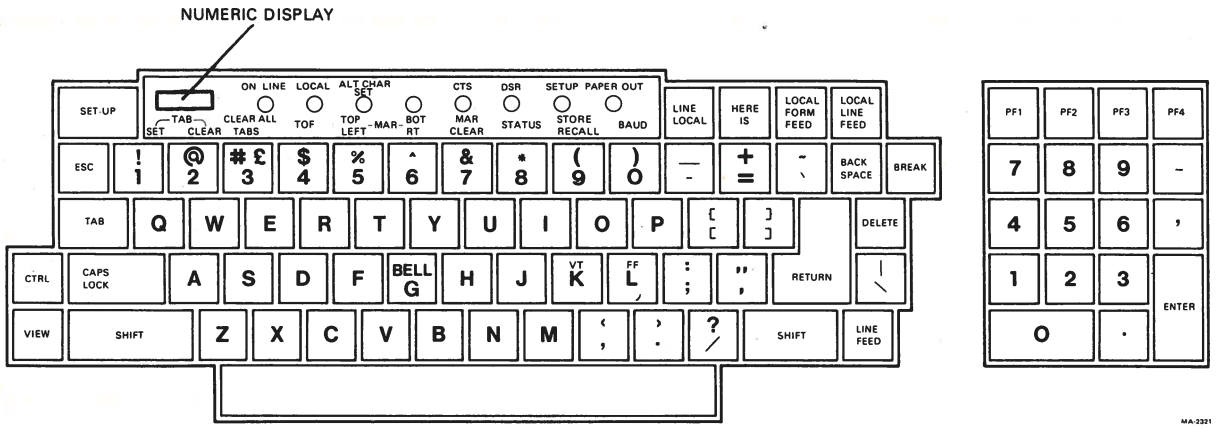
TOF
[$ / 4]
TOF shift or unshifted designates the current paper position as top of form. If top of form is not the same as the top margin, the paper will move to the top margin (first printable line).

TOP/LEFT MAR
[% / 5]
TOP/LEFT MAR unshifted sets left margin at the current column. Shift sets top margin at the current line.

BOT/RT MAR
[^ / 6]
BOT/RT MAR unshifted sets right margin at the current column. Shift sets bottom margin at the current line.

MAR CLEAR
[& / 7]
MAR CLEAR unshifted clears the left and right margins. Shifted clears the top and bottom margins. Left or top margin becomes 1. Right or bottom margin becomes the maximum allowable in the current characters per inch (pitch) and form length.

STATUS
[* / 8]
STATUS prints a status message containing the currently selected values of setup features.



STORE/RECALL

(9

STORE/RECALL unshifted recalls the setup parameters. Shift stores the setup parameters.

BAUD

) 0

BAUD unshifted selects receive and transmit baud rates. Shift selects split baud rates.

SHIFT

SHIFT functions the same as a shift key on a typewriter.

CAPS LOCK

CAPS LOCK causes the 26 alphabetic keys to transmit shift codes, regardless of the position of the SHIFT key. The CAPS LOCK key does not affect numeric or other keys.

RETURN

RETURN generates the code for carriage return or the codes for a carriage return and line feed sequence (in auto line feed mode). In half duplex with code turnaround, the RETURN key also generates the turnaround character following its normal code or codes.

LINE FEED
LINE FEED generates the code for line feed.

BACK SPACE
BACK SPACE generates the code for backspace.

TAB
TAB generates the code for space.

SPACE BAR
SPACE BAR generates the code for space.

DELETE
DELETE generates the code for delete.

ESC
ESC generates the code for escape.

CTRL
CTRL modifies function of other keys when held down.

BELL
G
While holding CTRL key pressing G key generates the code for the bell.

VT
K
While holding CTRL key pressing K key generates the code for the vertical tab.

FF
L
While holding CTRL key pressing L key generates the code for vertical tab (Generates the code for form feed).

PF1 **PF2** **PF3** **PF4**
These keys generate escape sequences which may have special meanings. (See Programmer's chapter)

NUMERIC KEYPAD
The numeric keypad allows numbers to be entered in adding machine fashion. Each number key, the minus key, and the comma key, normally generate the same codes as the corresponding unshifted keys on the main keyboard. The SHIFT key does not affect the numeric keypad.

In the alternate keypad mode, the keys generate escape sequences which may have special meanings. (See Chapter 3)

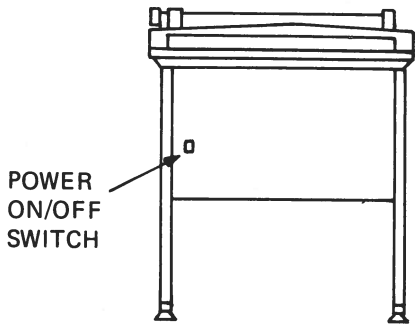
ENTER
Enter normally corresponds to the RETURN key. In the alternate keypad mode the ENTER key generates an escape sequence which may have a special meaning. (See Chapter 3)

HERE IS
Here is transmits the answerback message.

BREAK
Break transmits a break signal. (See Programmer's chapter)

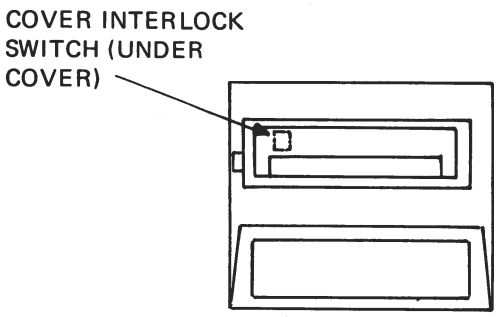
POWER ON/OFF SWITCH

The power switch controls power application to the LA120.



COVER INTERLOCK SWITCH

The cover interlock switch is a safety feature which prevents operation of the LA120 when the cover is open.



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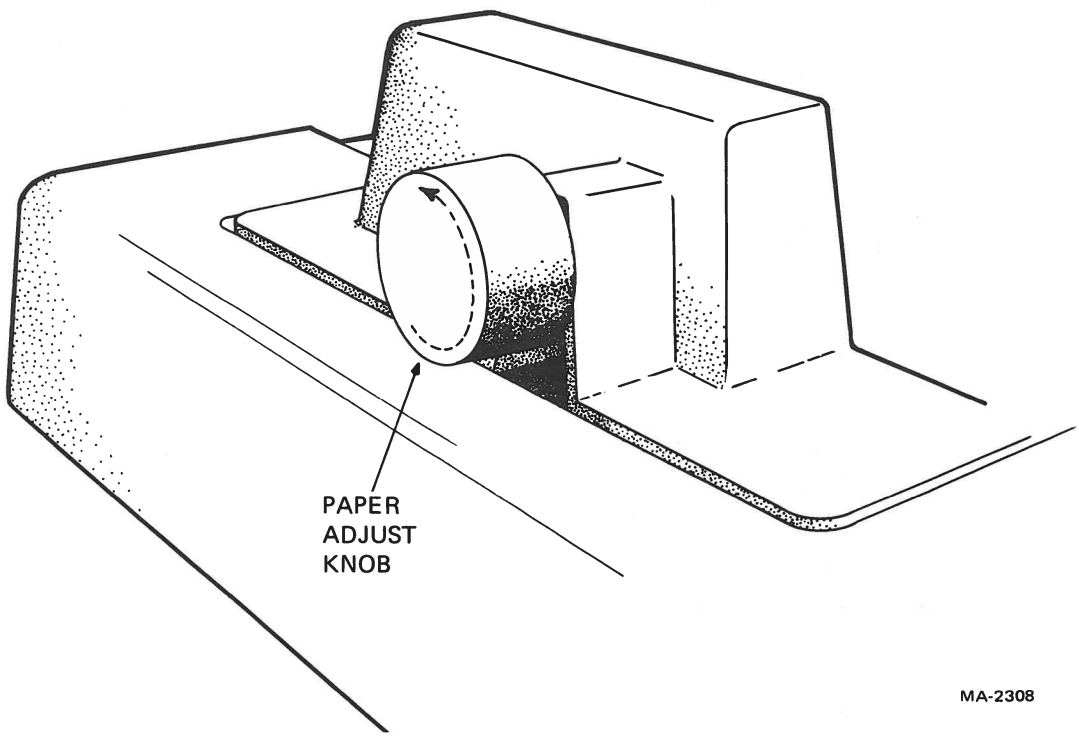
PAPER ADJUST KNOB

The paper adjust knob, when turned, advances the paper one step at a time. Pressing in and turning the paper advance knob enables the paper to be rolled freely in either direction, and allows precise vertical forms positioning.

NOTE
This knob should only be used when setting up the form. To advance the paper use LOCAL LINE FEED *or* LOCAL FORM FEED.



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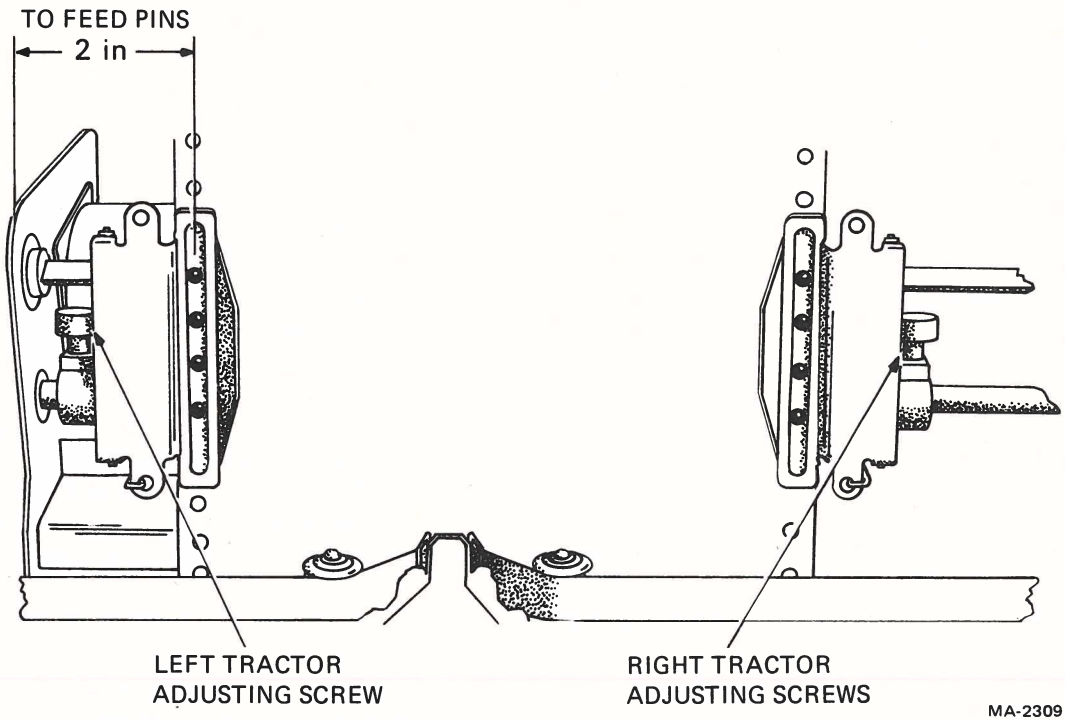
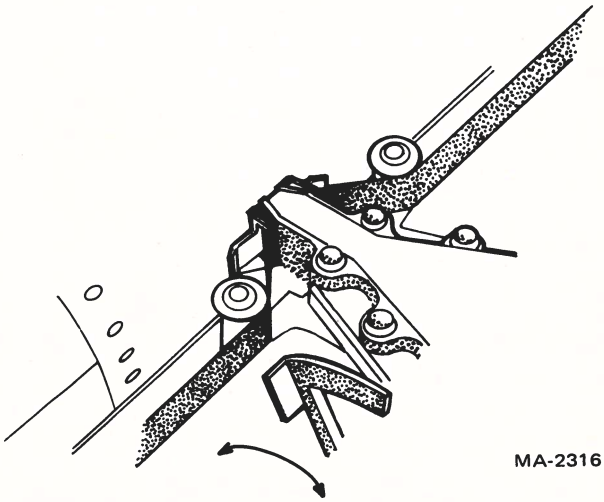
TRACTOR ADJUST KNOBS

The tractor adjust knobs allow fine horizontal adjustment of forms.



CARRIAGE ADJUSTMENT LEVER

The carriage adjustment lever controls the print head gap for single or multipart forms.



• ALARM INDICATIONS

The LA120 produces several different alarm and bell signals. The operator should become familiar with these signals to determine the correct response.

BELL and flashing PAPER OUT light:
These alarm indications will occur under the following conditions.

NOTE

1. *When out of paper bell will turn off after five seconds.*

2. *If PAPER OUT light continues to flash after cover is closed paper fault still exists.*

CAUSE:	ACTION/COMMENTS:
Paper Out	Load paper. Printer will resume normal operation after paper is loaded and cover is closed.
Head Jam	Open the top cover and clear obstruction causing head jam (see *Operator's Trouble-shooting Guide* for additional trouble-shooting information). Close cover.

BELL Only:
The bell will beep under the following conditions.

CAUSE:	ACTION/COMMENTS:
Approaching Right Margin	One high-pitch bell tone occurs when the right margin is approached.
Keyboard Buffer Overflow	Typing faster than the communications line can handle will cause a buffer overflow. This condition is indicated by a low pitch bell tone each time a character is typed. Under these conditions the data will not be lost.
Input Buffer Overflow	LA120 inputs faster than 1200 baud without X ON-X OFF or its equivalent can cause a buffer overflow. This condition will be indicated by a bell tone, parity symbol (⁞) printout, and loss of data.
Bell Character	Each bell character code received causes a high-pitch bell tone.
Invalid Setup Command	One bell tone will occur for each invalid setup command.
Incorrect Entry of Answerback Message	Attempting to enter in more than a 30 character answerback message will cause a bell tone.

digital DECWRITER III

LA120 OPERATOR REFERENCE CARD

SET-UP

KEY	FUNCTION/COMMENTS
[CTRL] and [SET-UP]	Locks LA120 in set-up mode; SET-UP light flashes. To exit set-up mode press [SET-UP]
[SET-UP]	Places LA120 in set-up mode while [SET-UP] is held down; SET-UP light flashes. To exit set-up mode release [SET-UP]

NOTES:

1. **LA120 must be in set-up mode to set the following features.**
2. **Do not use [SHIFT] unless specified.**

FORMS

KEY	FUNCTION/COMMENTS
[SHIFT]	Display current line number Releasing [SHIFT] returns display to current column number
[1]	Set horizontal tab at current column
[SHIFT] and [1]	Set vertical tab at current line
[2]	Clear horizontal tab at current column
[SHIFT] and [2]	Clear vertical tab at current line
[3]	Clear all horizontal tabs
[SHIFT] and [3]	Clear all vertical tabs
[4] or [SHIFT] and [4]	Establish top of form (TOF)
[5]	Set minimum column number (left margin)
[SHIFT] and [5]	Set minimum line number (top margin)
[6]	Set maximum column number (right margin)
[SHIFT] and [6]	Set maximum line number (bottom margin)
[7]	Clear left and right margins
[SHIFT] and [7]	Clear top and bottom margins
[F]	Form Length NOTE: Changing form length clears top and bottom margins and establishes TOF. DISPLAY: 1 thru 168 — Lines per form

FORMS (CONT)

KEY	FUNCTION/COMMENTS
[H]	Horizontal pitch (Characters per inch) NOTE: Changing horizontal pitch clears left and right margins.

DISPLAY	PITCH
5	5.00 CPI
6	6.00 CPI
7	6.60 CPI
8	8.25 CPI
10	10.0 CPI
12	12.0 CPI
13	13.2 CPI
16	16.5 CPI

[V] Vertical pitch (Lines per inch)

NOTE: Changing vertical pitch clears top and bottom margins.

DISPLAY	PITCH
2	2 LPI
3	3 LPI
4	4 LPI
6	6 LPI
8	8 LPI
12	12 LPI

OPERATOR COMFORT

KEY	FUNCTION/COMMENTS
[G]	Bell volume 0 = Low Volume 1 = High Volume
[K]	Key click 0 = Off 1 = On
[R]	Auto repeat 0 = Off 1 = On
[Z]	Last character view 0 = Manual 1 = Auto

COMMUNICATION

KEY	FUNCTION/COMMENTS
[A]	Auto answerback 0 = Off 1 = On
[B]	Buffer control 0 = Small 1 = Large
[C]	Printer character set 1 = United States 2 = United Kingdom
[D]	Auto disconnect 0 = Off 1 = On
[E]	Local echo 0 = Off 1 = On

COMMUNICATION (CONT)

KEY	FUNCTION/COMMENTS
[J]	Auto new line at right margin 0 = Off 1 = On
[L]	Auto line feed (Return key) 0 = Off 1 = On
[M]	Modem 1 = FDX, No Modem 2 = FDX, Modem 3 = HDX, Supervisory 4 = HDX, EOT 5 = HDX, ETX
[N]	Keyboard and printer character set 1 = United States 2 = United Kingdom
[O] (letter)	Alternate character set 0 = OFF 1 = ON
[P]	Parity and data bits

DISPLAY	DATA BITS	PARITY REC	PARITY XMT
1	7	IGNORE	MARK
2	7	IGNORE	SPACE
3	7	IGNORE	ODD
4	7	IGNORE	EVEN
5	7	ODD	ODD
6	7	EVEN	EVEN
7	7	NONE	NONE
8	8	NONE	NONE
9	8	ODD	ODD
10	8	EVEN	EVEN

KEY	FUNCTION/COMMENTS
[Q]	HDX initial calling state 0 = Transmit 1 = Receive
[S]	Secondary channel

DISPLAY	FDX * MODE	HDX * REV.CH.
0	Speed	No
1	Restraint	Yes

* See M Key, Modem

KEY	FUNCTION/COMMENTS
[U]	Break enabled 0 = No 1 = Yes
[W]	Printer new line character 1 = None 2 = Line feed (LF) 3 = Return (CR)
[X]	XON/XOFF 0 = No 1 = Yes
[Y]	Alternate keypad mode 0 = No 1 = Yes

COMMUNICATION (CONT)

KEY	FUNCTION/COMMENTS
[0] (number)	Selects receive and transmit baud rates and number of stop bits.

BAUD RATE (DISPLAYED)	STOP BITS
50	2
75	2
110	2
134	1
150	1
200	1
300	1
600	1
1200	1
1800	1
2400	1
4800	1
7200	1
9600	1

[SHIFT] and [0] Selects split baud rates. [0] selects receive baud rate; [SHIFT] and [0] then offers a choice of three transmit baud rates.

RECEIVE BAUD RATE (NOT DISPLAYED)	TRANSMIT BAUD RATE (DISPLAYED)	TRANSMIT STOP BITS
600	75	2
	150	1
	600	1
1200	75	2
	150	1
	1200	1
2400	300	1
	600	1
	2400	1
4800	300	1
	600	1
	4800	1

STORE RECALL AND STATUS

KEY	FUNCTION/COMMENTS
[I] (letter)	Select factory set-up parameters
[8]	Print status message
[9]	Recall set-up parameters
[SHIFT] and [9]	Store set-up parameters

SELF TEST

KEY	FUNCTION/COMMENTS
[T]	Initiate printing self test
[SHIFT] and [>]	Initiate non-printing self test NOTE: Type any character in set-up mode to stop self test.

 2nd printing

• TESTING AND TROUBLESHOOTING THE LA120

When turned on, the LA120 automatically runs an internal test and displays the test results in the numeric display.

DISPLAY INDICATES	CAUSES	CORRECTIVE ACTION
0 (flashing)	Electronic failure	See note
1 (flashing)	Electronic failure	See note
2 (flashing)	Electronic failure	See note
3 (flashing)	Electronic failure	See note
4 (flashing)	Electronic failure	See note
5 (flashing)	Electronic failure	See note
6 (flashing)	Electronic failure	See note
7 (flashing)	Electronic failure	See note
8 (flashing)	Electronic failure	See note
9 (flashing)	Electronic failure	See note
8888 (constant indication	Cover open, or paper out indication	Close cover Reload paper

NOTE

Turn LA120 off then back on. If an error indication reappears, record indication and call for service.

An additional test is the **self-test** (see Part 2 of the operator's chapter) which can be initiated by the operator. This test will help determine if the problem is in the printer or some other portion of your communication system.

If you are unable to turn on the printer or if the printer appears to be faulty, refer to the following table. This table describes those things an operator can check prior to requesting service.

OPERATOR TROUBLESHOOTING TABLE

SYMPTOM	POSSIBLE CAUSE AND CORRECTIVE ACTION
LA120 will not turn ON when the PRINTER switch is set to ON	AC power cord is not plugged into wall outlet or front of printer; plug in cord. Power is not coming from the wall outlet; check outlet with a known working electrical device (such as a lamp). If no power, call your electrician. AC line fuse blown; turn printer off and have the fuse replaced. (See Part 3 for fuse location)

OPERATOR TROUBLESHOOTING TABLE (Cont)

SYMPTOM	POSSIBLE CAUSE AND CORRECTIVE ACTION
Characters will not print	Printer out of paper; load paper. (See Part 3 for paper loading)
	Printer cover open or ajar; close cover.
	Print head too far from paper; readjust the print head adjustment lever. (See Part 3 for adjustment)
	Data set unplugged; plug it in.
	Incorrect communication setup.
Light print	Print head too far from paper; readjust the print head adjustment lever.
	Ribbon out of ink; reverse or replace the ribbon. (See Part 3 for ribbon replacement)
NOTE *Reverse the ribbon after 5 to 6 hours of continuous printing. Ribbon can be reversed only once, then must be replaced.*	
Paper does not advance	Paper not loaded properly; check that the tractor covers are closed and the feed holes are properly aligned.
	Feed holes torn; reload paper. If the paper pulls against the tractor pins or bows in the middle, readjust the right tractor.
Paper tearing on multipart forms	Print head exerting too much pressure on the paper; readjust the print head adjustment lever.
	Tractors incorrectly adjusted. If the paper pulls against the tractor pins or bows in the middle, readjust the right tractor.
	Paper not straight in printer; realign paper.
Print head jam or print head does not move	Paper or print head jam; clear the jam.
No keyboard or printer response	Printer cover open or ajar (normally indicated by flashing 888 and paper out light); close the cover.
Incorrect communication setup.	Garbled characters or double characters.

FORM SET UP FEATURES

When putting a form in a typewriter you must position the form, set margins, set tabs, etc. Setting up your LA120 is very similar; however, in addition to the standard typewriter settings, you can select vertical margins, lines per inch, characters per inch, and form length, etc. Not only are these additional selections available but they can be permanently stored in the LA120 for future use.

NOTE
Form settings can be automatically loaded into the LA120 by the computer. (See Programmer's Chapter)

To help you set up your form you will first be given a recommended set-up sequence.

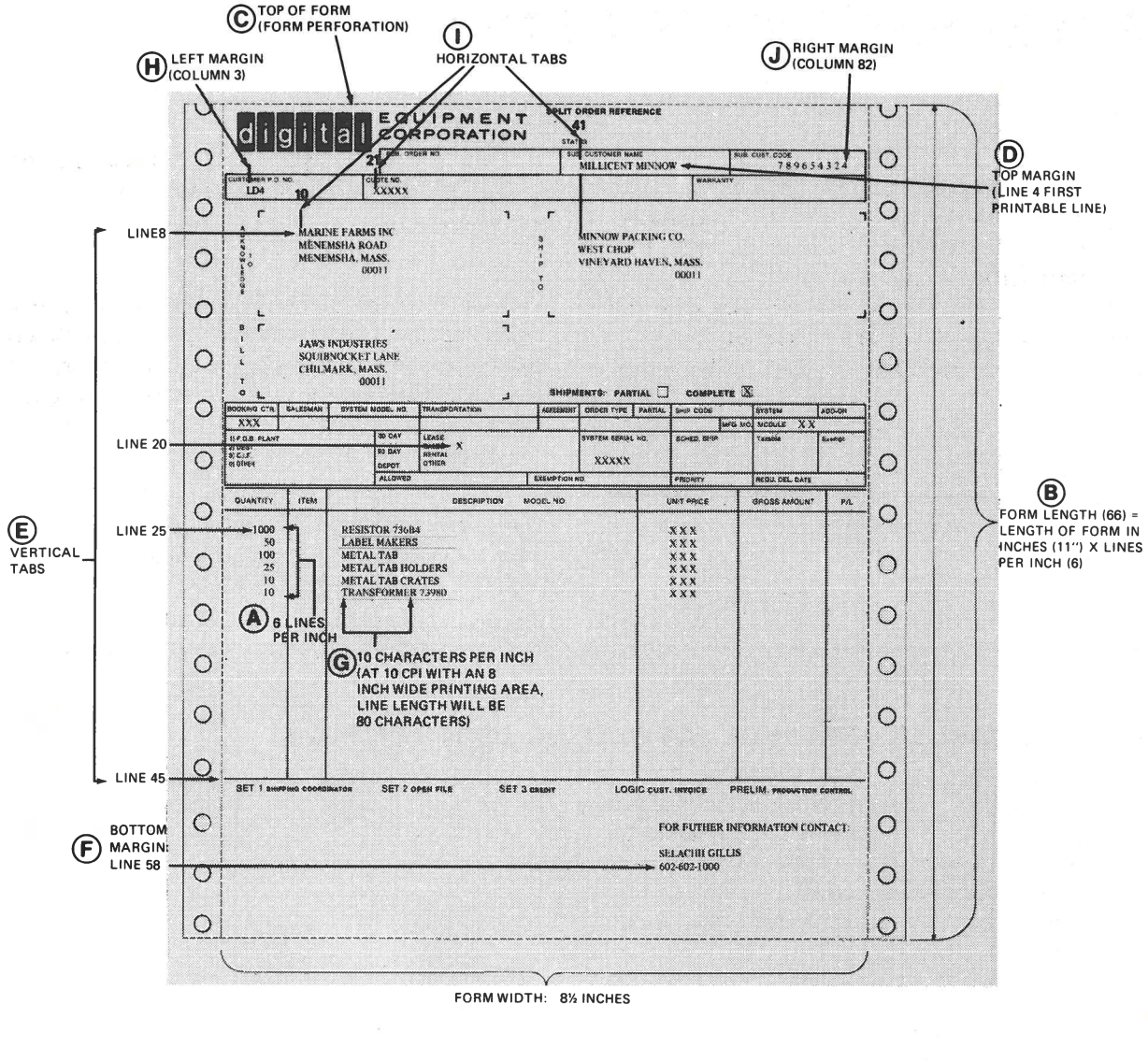
You will then be shown a sample form with a typical setup procedure and sample values. When setting up the sample form for the first time, you may find it necessary to know more about each feature.

The remainder of this section is designed to answer all your questions about a specific feature.

• RECOMMENDED SEQUENCE FOR SETTING UP A NEW FORM

The following is the recommended sequence for setting up a form. It is provided as a guide to illustrate all the steps that an operator may perform. You do not have to use all the steps or features, however, you must follow the order presented.

A. Load paper and ribbon
B. Turn power-switch on
C. Place LA120 in local
D. Enter setup mode
E. Clear horizontal tabs
F. Select the number of lines per inch you require
G. Enter form length
H. Establish the top of the form (TOF)
I. Set top vertical margin
J. Set vertical tabs
K. Set bottom margin
L. Select the number of characters per inch you require
M. Set left horizontal margin
N. Set horizontal tabs
O. Set right horizontal margin
P. If desired store form settings



SAMPLE FORM SETUP

The best way to learn how to use your LA120 is by setting up a sample form. Simply perform the steps in the **PROCEDURE** column, and observe the **NUMERIC DISPLAY** for the desired results.

The **KEYS USED** column lists the keys that must be pressed to perform the procedure. When you are finished, your form will have the same margins, tabs, etc., as the sample above.

PROCEDURE	NUMERIC DISPLAY	KEYS USED
Enter setup	Indicates column number	CTRL and SET UP
Select 6 lines per inch (A)	6	V

PROCEDURE	NUMERIC DISPLAY	KEYS USED
Enter form length; 66 lines (B)	66	F
Establish top of form at form perforation (C)	Indicates column number	4

NOTES
1. In the following steps use LOCAL LINE FEED *to advance the paper.*
2. Press SHIFT *to display current line number.*

Set top margin at line 4 (D)	4 *	SHIFT and 5
Clear vertical tabs	Indicates column number	SHIFT and 3
Set vertical tabs at lines 8, 20, 25, and 45 (E)	8 *	SHIFT and 1
	20 *	SHIFT and 1
	25 *	SHIFT and 1
	45 *	SHIFT and 1
Set bottom margin at line 58 (F)	58 *	SHIFT and 6
Select 10 characters per inch (G)	10	H

NOTE
Use space bar to move to desired column.

Set left margin at column 3 (H)	3	5
Clear horizontal tabs	Indicates column number	3
Set horizontal tabs at columns 10, 21, and 41 (I)	10	1
	21	1
	41	1
Set right margin at 82 (J)	82	6

NOTE
Select your operator comfort features and communication features prior to storing your form settings. This will enable you to store all your features at the same time.

If desired, store parameters.	(Display goes blank for a few seconds)	SHIFT and 9

* Depress SHIFT to obtain correct numeric display indication.

• FORM SET UP FEATURES

SET UP MODE

LA120 features can be changed only while in the setup mode. Normally four steps are required to perform setup.

1. Enter setup
2. Change a feature such as tabs, baud rate, etc.
3. Store the feature if desired (see note)
4. Exit setup.

NOTE
Storing enables the selected feature to be permenently stored. For detailed information refer to the Storage, Recall, and Status description in this chapter.

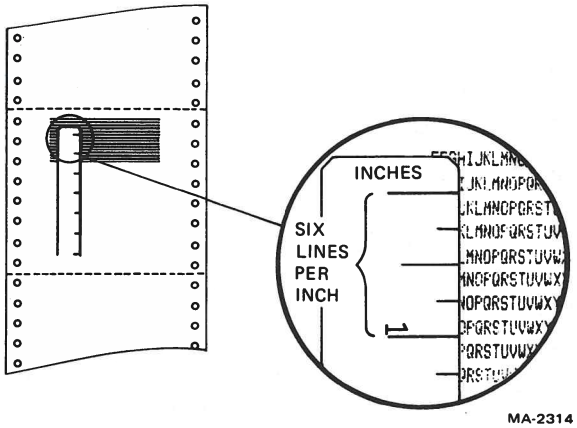
Setup should be performed with the LA120 in local; however, setup can be performed on-line if your system uses XON/XOFF. The use of XON/XOFF prevents the computer from sending the LA120 data while in the setup mode.

The following procedure describes the two methods of entering and exiting setup.

PROCEDURE:	INDICATION/COMMENTS:
Method 1	
While holding [CTRL] press [SET UP]; release both keys. You may now change any setup feature.	SET UP lamp flashes indicating you have entered setup.
Press [SET UP] if you wish to exit setup.	SET UP lamp will stop flashing.
Method 2	
Press and hold [SET UP]. You must continue to hold the SET UP key while changing any feature.	SET UP lamp flashes indicating you are in setup.
Release [SET UP] if you wish to exit setup.	SET UP lamp will stop flashing.

• LINES PER INCH SELECTION

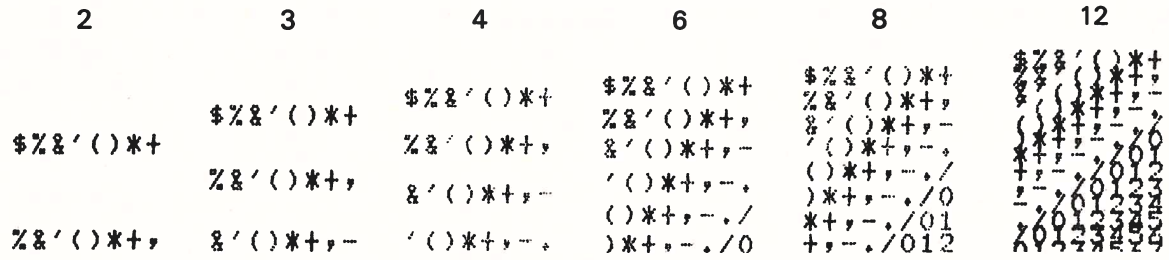
The LA120 offers six different vertical pitch (line per inch) selections. This feature enables your LA120 to be tailored to accept a large variety of preprinted forms. Count the lines of type per inch on your form; then set the LA120 to the corresponding number.



MA-2314

NOTE
Changing lines per inch clears top and bottom margins.

EXAMPLE
LINES PER INCH AVAILABLE



PROCEDURE:	INDICATION/COMMENTS:
Enter [SET UP]	SET UP lamp flashes indicating you are in setup mode.
Press [V]	Numeric display indicates current line per inch selection.
Continue to press [V] to change per inch selection.	Numeric Display / Lines per Inch: 2/2, 3/3, 4/4, 6/6, 8/8, 12/12
Exit [SET UP]	SET UP lamp will stop flashing.

Table 1 Form Length (Lines per Form)

Form Length in Inches	Lines per Inch Selected					
	2	3	4	6	8	12
3	6	9	12	18	24	36
3.5	7	10.5	14	21	28	42
4	8	12	16	24	32	48
5.5	11	16.5	22	33	44	66
6	12	18	24	36	48	72
7	14	21	28	42	56	84
8	16	24	32	48	64	96
8.5	17	25.5	34	51	68	102
11	22	33	44	66*	88	132
12	24	36	48	72	96	144
14	28	42	56	84	112	168

*11 inch form at 6 lines per inch = 66 line form length.

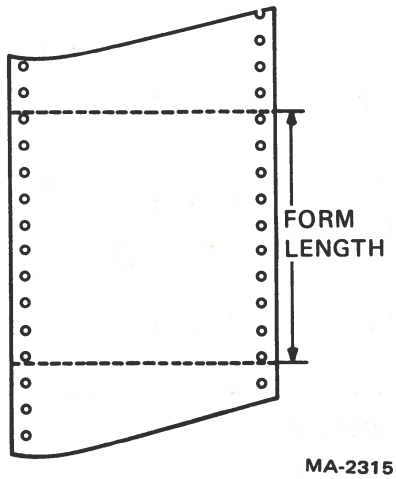
• SETTING FORM LENGTH

The LA120 measures form length in lines per form. To determine how long your form is, measure the length of form in inches, then multiply the length of form by the lines per inch you have previously selected.

Form Length = Length of Form in Inches X Selected Number of Lines per Inch

Perform the following procedure to enter the number of lines per form. Your choices of form length range from 1 to 168 lines.

NOTE
Changing form length clears top and bottom margins, and sets the current line number to 1.

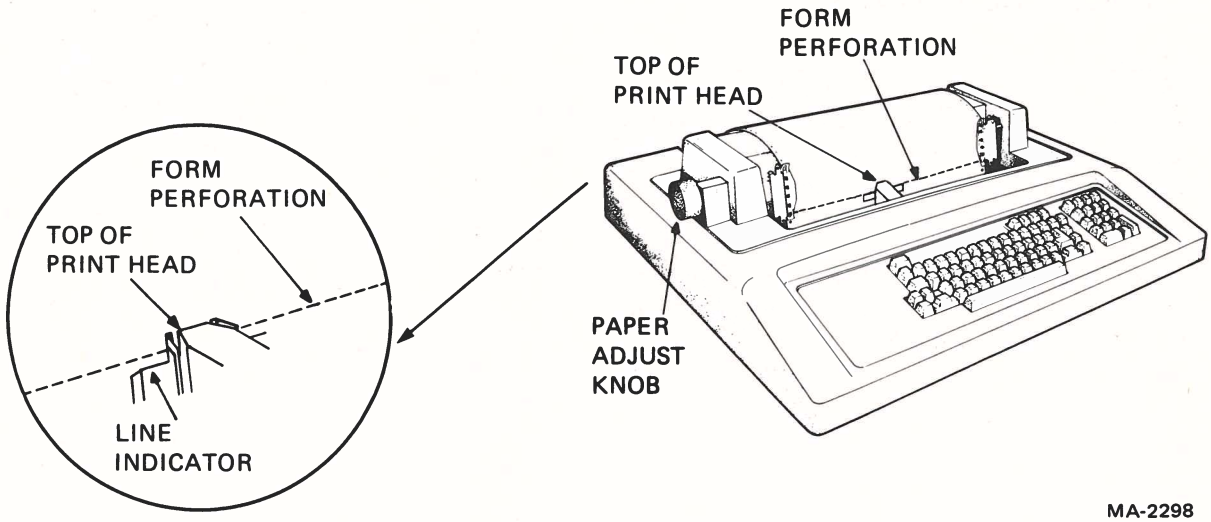


MA-2315

PROCEDURE:	INDICATION/COMMENTS:
Enter [SET UP]	SET UP lamp flashes indicating that you are in setup.
Press [F]	Current form length in lines is displayed by numeric display.
Continue to press [F] to change form length.	Numeric display will indicate a new value each time [F] is pessed. Stop when desired number of lines is displayed.
Exit [SET UP]	SET UP lamp will stop flashing.

• TOP OF FORM (TOF)

Since the LA120 has no way of knowing where your form starts you must establish the top of the form (TOF). Top of form should be set for all new forms or when changing existing forms.



MA-2298

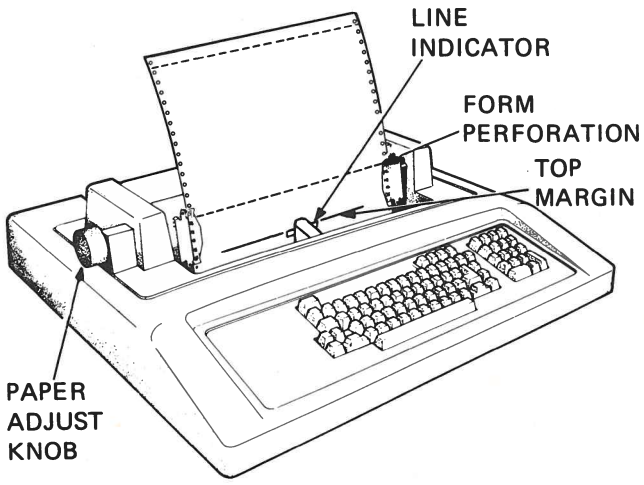
PROCEDURE:	INDICATION/COMMENTS:
Enter setup	SET UP lamp flashes indicating you are in setup.
Using the paper adjust knob set the form perforation for half way between the line indicator and the top of print head.	Form perferation is lined up with print head.
Press [SHIFT] and [4]	Top of form is established, display indicates line number. If top margin is not line 1, paper will move to top margin.
Exit setup	SET UP lamp will stop flashing.

• VERTICAL MARGINS AND TABS

[SHIFT], [TOP/MAR], and [BOT/MAR] are used to establish or change the top and bottom vertical margins. The top margin specifies the first printable line on the form.

[SHIFT], and [SET TAB] or [CLR TAB] are used to set and clear vertical tabs. Once a vertical tab is set, pressing and holding the [LINE FEED] key will advance the form to the vertical tab.

Tabs can be set or cleared at any time; however, when setting up a new form the best time to set tabs is after setting the first margin.



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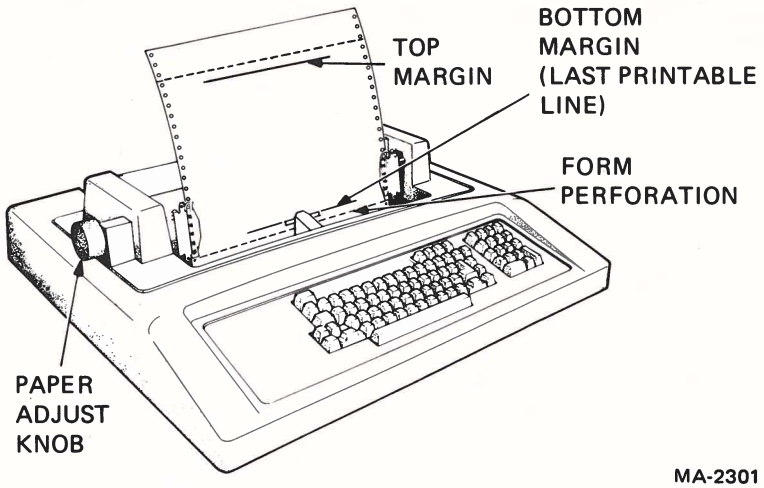
SETTING TOP VERTICAL MARGIN

PROCEDURE:	INDICATION/COMMENTS:
Enter setup	SET UP lamp flashes indicating you are in setup.
Press and hold [SHIFT] and press [& 7].	Old vertical margins are cleared.
Using [LOCAL LINE FEED] key, advance the paper to the desired location of the top margin. If necessary use the paper advance knob for lining up the form.	
Press and hold [SHIFT] and press [% 5].	Top margin is set. With SHIFT held down, display will indicate line number of margin.

SETTING BOTTOM VERTICAL MARGIN



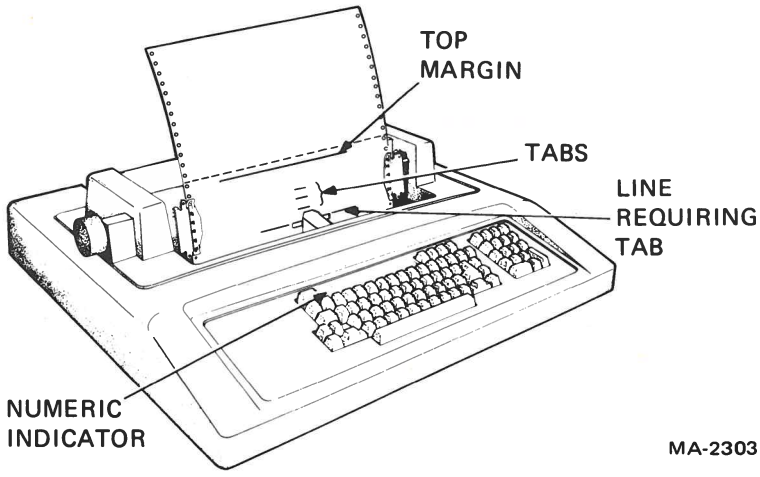
MA-2301

PROCEDURE:	INDICATION/COMMENTS:
Using the [LOCAL LINE FEED] key, advance the paper to be desired location of the bottom margin.	
Press [SHIFT] and [6] at the same time.	Bottom margin is set. Observe line number.
Exit setup.	SET UP lamp will stop flashing.

CLEARING VERTICAL MARGINS

PROCEDURE:	INDICATION/COMMENTS:
Enter setup.	SET UP lamp flashes, indicating you are in setup.
Press [SHIFT] and [& 7].	Top and bottom vertical margins are cleared.
Exit setup.	SET UP lamp will stop flashing.

SETTING SINGLE OR MULTIPLE VERTICAL TABS



PROCEDURE:	INDICATION/COMMENTS:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Using the [LOCAL LINE FEED] key advance the form to the line requiring a tab.	
To set tab, press [SHIFT] and [! 1] at the same time.	Numeric display indicates line number of tab.
Repeat the above two steps for each additional tab.	
Exit setup.	SET UP lamp will stop flashing.

CLEARING A SINGLE VERTICAL TAB

PROCEDURE:	INDICATION/COMMENTS:
Enter setup.	SET UP lamp flashes, indicating you are in setup.
Press and hold [CTRL] and press [VT].	Form will advance to vertical tab. To view line number of tab press [SHIFT] and observe display.
Press and hold [SHIFT] and press [@ 2].	The vertical tab is cleared.
Exit setup	SET UP lamp will stop flashing.

CLEARING ALL VERTICAL TABS

PROCEDURE:	INDICATION/COMMENTS:
Press and hold SHIFT and press £ 3.	The vertical tabs are cleared.
Exit setup.	SET UP lamp will stop flashing.

• CHARACTERS PER INCH (HORIZONTAL PITCH)

The LA120 offers eight different character per inch selections.

NOTE
Changing characters per inch clears left and right margins.

Characters Per Inch	Example
5	"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijkl
6	"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]
6.6	"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVW>
8.25	"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNC
10.0	"#$%&'()*+,-./0123456789:;<=>?@ABCDEFC
12.0	"#$%&'()*+,-./0123456789:;<=>?
13.2	"#$%&'()*+,-./0123456789:;<=
16.5	"#$%&'()*+,-./012345678

This feature, besides saving paper, can be used to print a full 132 columns on 8 1/2 inch X 11 inch paper that can conveniently be bound in a loose-leaf notebook and stored in a standard-width file cabinet.

The following table lists the number of characters that can be printed on the most commonly used forms.

Typical Form Width* (in inches)	Characters per Inch							
	5	6	6.6	8.25	10	12	13.2	16.5
6	30	36	39	49.5	60	72	79	99
7	35	42	46	57	70	84	92	115
8	40	48	52	66	80†	96	105	132
10	50	60	66	82	100	120	132	165
11	55	66	72	90	110	132	145	181
13.2	66	79	87	108	132	158	174	217

*Form widths listed represent the usable printing area on the most commonly used forms.

†At 10 characters per inch, 80 characters can be printed on an 8-1/2 inch wide form with 1/4 inch margins.

PROCEDURE:	INDICATION/COMMENTS:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press and release [H] as many times as necessary to display desired characters per inch.	Current character per inch selection is displayed by numeric display.

Numeric Display Indicates	Characters Per Inch
5	5
6	6
7	6.6
8	8.25
9	10
12	12
13	13.2
16	16.5

Numeric display indicates current characters per inch selection.

Exit setup. — SET UP lamp will stop flashing.

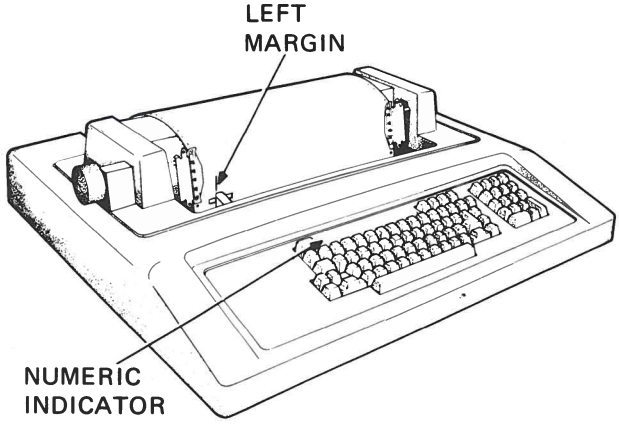
NOTE
If preprinted forms are used, check to ensure that the characters are printed within the columns.

• HORIZONTAL MARGINS AND TABS

LEFT MAR and RT MAR are used to change the left and right horizontal margins. The left margin specifies the first printable column, the right margin specifies the last printable column.

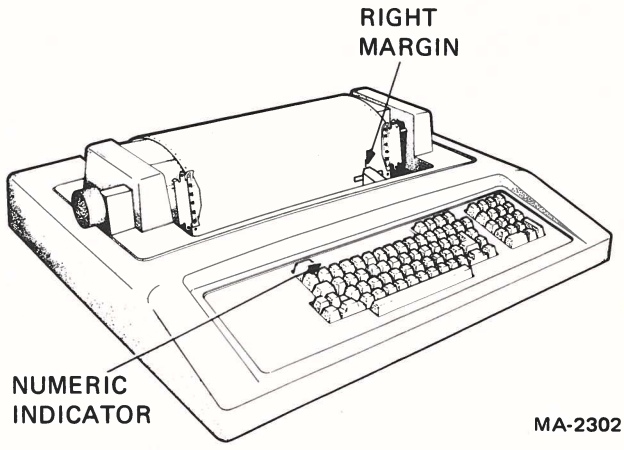
SET TAB and CLR TAB are used to set and clear horizontal tabs. Tabs on the LA120 work similar to tabs on a typewriter.

When a horizontal tab code is received the print head advances to the next horizontal tab stop. If the tab stop is column 9, printing will start in column 9.



MA-2304

SETTING LEFT AND RIGHT HORIZONTAL MARGINS



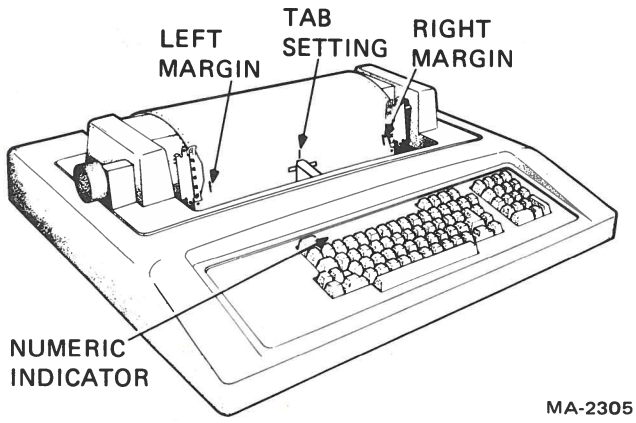
PROCEDURE:	INDICATION/COMMENTS:
Enter setup.	SET UP lamp flashes indicating you are in setup.
To select the left margin, position the print head in the desired column as indicated by the numeric display.	
Press % 5.	Left margin is set.
To select right margin position the print head in the desired column as indicated by numeric display.	
Press ^ 6	Right margin is set.
Exit setup.	SET UP lamp will stop flashing.

NOTE
If desired, perform the tab setting procedure prior to setting the right margin.

CLEARING HORIZONTAL MARGINS

PROCEDURE:	INDICATION/COMMENTS:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press & 7.	Left and right horizontal margins are cleared.
Exit setup.	SET UP lamp will stop flashing.

SETTING HORIZONTAL TABS



PROCEDURE:	INDICATION/COMMENTS:
Enter setup.	SET UP lamp flashes indicating you are in setup.
If desired clear horizontal tabs.	
Position the print head in the desired column as indicated by the numeric display.	
Press [! 1].	Tab is set, numeric display indicates column number of the tab setting.
Repeat the above two steps for each additional tab.	
Exit setup.	SET UP lamp will stop flashing.

CLEARING A SINGLE HORIZONTAL TAB

PROCEDURE:	INDICATION/COMMENTS:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press [TAB] to move print head to the desired tab location.	Head will advance to the horizontal tab and numeric display will indicate column number of tab.
Press [@ 2].	The horizontal tab is cleared.
Exit setup.	SET UP lamp will stop flashing.

CLEARING ALL HORIZONTAL TABS

PROCEDURE:	INDICATION/COMMENTS:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press [£ 3] (CLR ALL).	All horizontal tabs are cleared.
Exit setup.	SET UP lamp will stop flashing.

OPERATOR COMFORT FEATURES

The LA120 contains a number of features designed for operator comfort. These features are:

- Auto repeat – character is repeated for as long as the key is pressed.
- Last character view – Print head moves enabling the last character typed to be seen.
- Bell Volume.
- Key Click.

• AUTO REPEAT

The auto repeat feature of the LA120 allows the pressed key to be automatically repeated at the rate of 7.5 to 25 characters per second when the key is held down for more than 1/2 second. The auto repeat feature affects all printable character keys plus space, backspace, and line feed delete keys. The auto repeat feature may be turned totally on or off by using the following procedure.

PROCEDURE:	COMMENTS/INDICATION:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press [R].	Current selection of auto repeat is displayed in numeric display.
Continue pressing [R] to change numeric display indication.	Numeric display indicates one of the following: 0 = Auto repeat off 1 = Auto repeat on
Exit setup.	SET UP lamp will stop flashing.

• LAST CHARACTER VIEW

Last character view (LCV) is a feature that enables the operator to view the last characters typed. When the operator pauses, the print head moves to the right for a clear view of the last character, then moves back automatically to print. To select LCV perform the following procedure. When LCV is not selected the VIEW key can be used to view the last character typed.

PROCEDURE:	COMMENTS/INDICATION:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press [Z].	Current selection of Last Character View is displayed in numeric display.
Continue pressing [Z] to change numeric display indication.	Numeric display indicates one of the following: 0 = Manual 1 = Automatic
Exit setup.	SET UP lamp will stop flashing.

• BELL VOLUME

The LA120 bell sounds can be adjusted for a high or low volume to meet your personal requirements. Performing the following procedure will lower the volume if it is high, or increase the volume if it is low.

PROCEDURE:	INDICATION/COMMENTS:
Enter setup.	SET UP flashes indicating you are in setup.
Press [G].	Current selection of bell volume is displayed in numeric display.
Continue pressing [G] to change numeric display indication.	Numeric display indicates one of the following: 0 = low volume 1 = high volume
Exit setup.	SET UP lamp will stop flashing.

• KEY CLICK

The LA120 has a silent keyboard for low-noise environments. However, if a key click is desired or if you wish to turn off the key click, per form the following procedure.

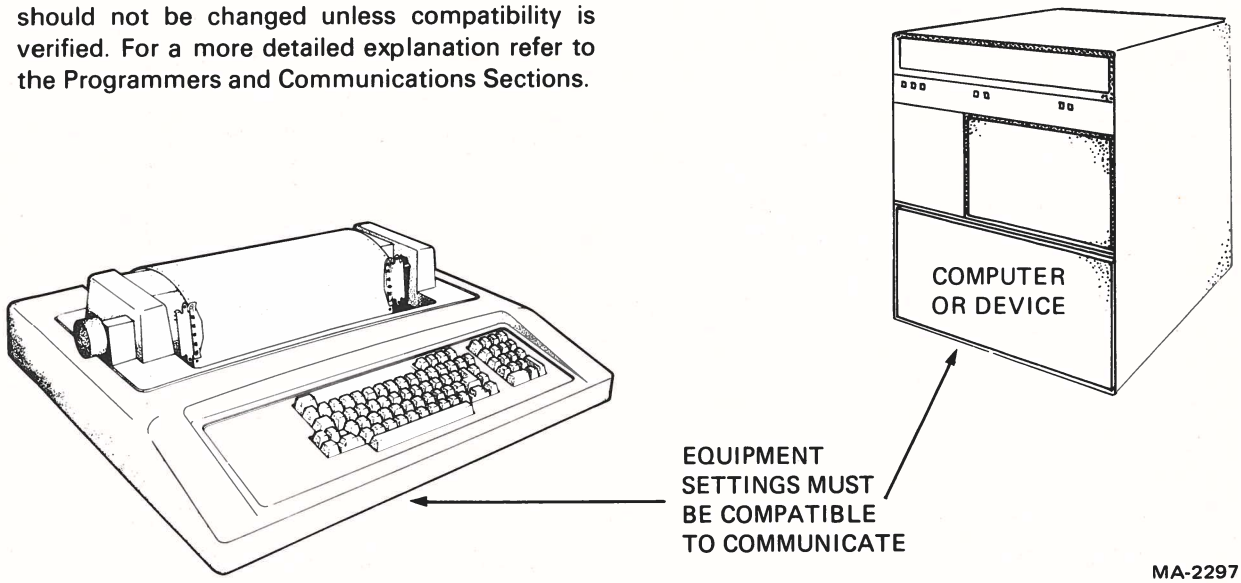
NOTE

The bell volume feature also changes the volume of the key click.

PROCEDURE:	COMMENTS/INDICATION:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press [K].	Current selection of key click is displayed in numeric display.
Continue pressing [K] to change numeric display indication.	Numeric display indicates one of the following: 0 = Key click off 1 = Key click on
Exit setup.	SET UP lamp will stop flashing.

COMMUNICATION FEATURES

To send and receive data, the LA120 must be compatible with the equipment and program at the other end of the line. Therefore, the communication features are normally preselected and should not be changed unless compatibility is verified. For a more detailed explanation refer to the Programmers and Communications Sections.

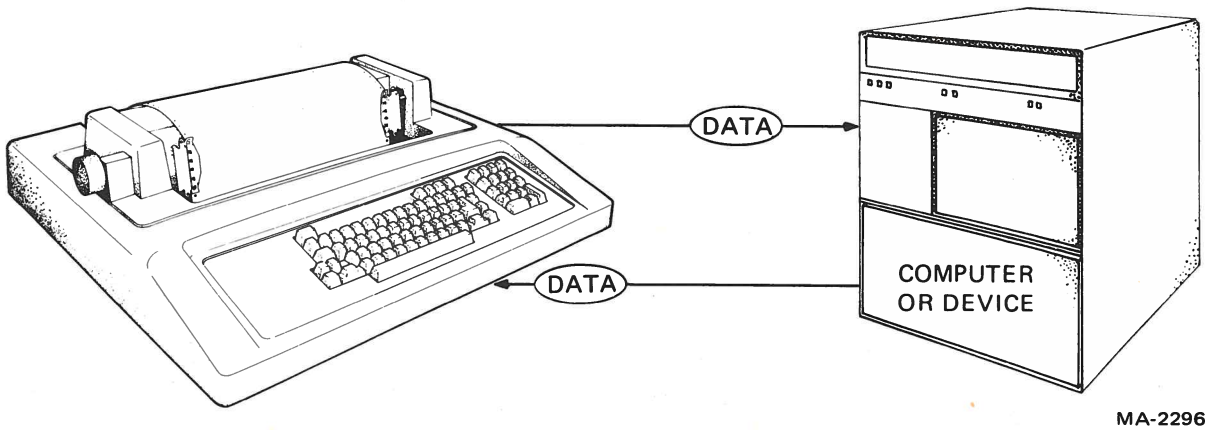


The following is a list of features, described in detail in the following paragraphs, which can be selected to match your system requirements.

- Baud rate
- Answerback
- Auto answerback
- Buffer size
- Keyboard and printer character set
- Printer character set
- Auto disconnect
- Local echo
- Auto new line at right margin
- Auto line feed
- Modem
- Half duplex (HDX) initial calling state
- Secondary channel
- Parity and data bits
- XON–XOFF
- Alternate keypad mode

• BAUD RATE (SPEED)

Baud rate is the speed that data moves to and from your LA120. Due to the many systems you must communicate with, a large selection of baud rates are available.



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PROCEDURE:	INDICATION/COMMENTS:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press) 0 .	Current selection of baud rate is displayed.
Continue pressing) 0 to select, transmit, and receive baud rate as indicated by numeric display.	

Baud Rate (Displayed)	Actual Baud Rate	Stop Bits
50	50	2
75	75	2
110	110	2
134	134.5	1
150	150	1
200	200	1
300	300	1
600	600	1
1200	1200	1
1800	1800	1
2400	2400	1
4800	4800	1
7200	7200	1
9600	9600	1

NOTE
If different transmit and receive baud rates are desired perform the following step.

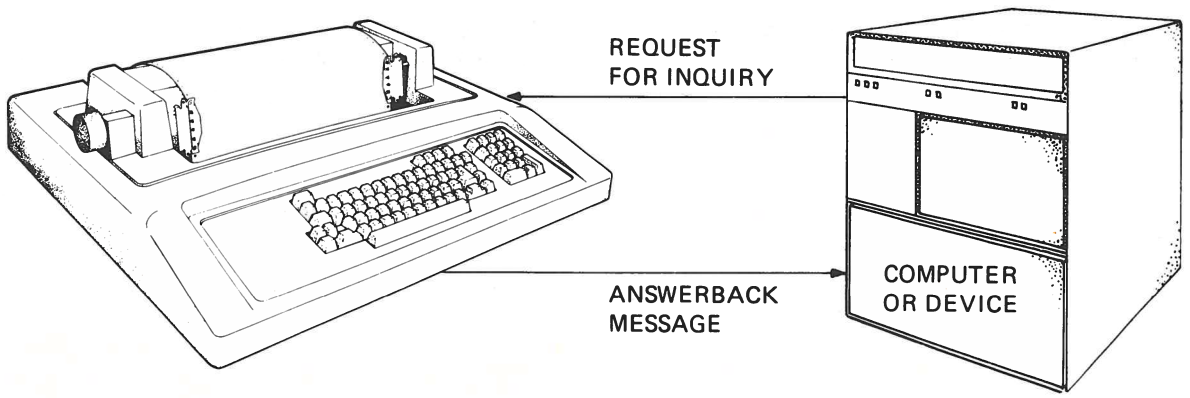
PROCEDURE:	INDICATION/COMMENTS:
Press [)/0] until a receive baud rate of 600, 1200, 2400, or 4800 is displayed. Then press and hold [SHIFT] and press [)/0] to display transmit baud rate.	
Continue holding [SHIFT] and pressing [)/0] to select transmit baud rate as indicated by numeric display.	**Split Baud Rate Selections**

Receive Baud Rate (Not Displayed)	Transmit Baud Rate (Displayed)	Stop Bits
600	75	2
	150	1
	600	1
1200	75	2
	150	1
	1200	1
2400	300	1
	600	1
	2400	1
4800	300	1
	600	1
	4800	1

Exit setup.	SET UP lamp will stop flashing.

• ANSWERBACK

Answerback is a short message of up to 30 characters that is entered by the operator into the LA120. This message is transmitted from the LA120 upon receipt of a command from another device or when the operator initiates the answerback message from the keyboard. The message usually consists of a code that identifies the LA120. This feature may also be used as a means of automatically logging onto a system.



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Control codes such as carriage return, line feed, tab, etc., may be part of the answerback message. If a control code is entered a unique character will be printed. The following is a list of those characters.

To obtain a permanent answerback message that cannot be changed by the operator, there is a jumper wire internal to the LA120 which may be cut or removed by the installer after entering and testing the answerback message. See Installation Chapter for additional information.

NOTE

If the answerback jumper is removed the answerback message cannot be altered or erased.

Control Code	Printed Character	Control Code	Printed Character
000	^@	020	^P
001	^A	021	^Q
002	^B	022	^R
003	^C	023	^S
004	^D	024	^T
005	^E	025	^U
006	^F	026	^V
007	^G	027	^W
010	^H	030	^X
011	^I	031	^Y
012	^J	032	^Z
013	^K	033	^[
014	^L	034	^\
015	^M	035	^]
016	^N	036	^
017	^O	037	^_

TRANSMITTING OR PRINTING OUT THE ANSWERBACK MESSAGE

PROCEDURE:	COMMENTS/INDICATION:
Press HERE IS.	On line, the LA120 will transmit the answerback message. Message will be printed out if the computer echos the message or local echo is selected. In local message will be printed out.

ENTERING THE ANSWERBACK MESSAGE

NOTE
LA120 will not respond if HERE IS is pressed while in setup.

PROCEDURE:	COMMENTS/INDICATION:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press and hold CTRL and press HERE IS	Next character typed will start the answerback.
Type up to 30 characters to enter message. *NOTE* *Typing more than 30 characters prevents the answerback message from being permanently stored. If this occurs a bell will ring, and the entire procedure (starting with CTRL and HERE IS) must be repeated.*	Answerback message is printed and temporarily stored.
Press and hold CTRL and press HERE IS	Answerback message is permanently stored.
Exit setup.	SET UP lamp will stop flashing.

• AUTO ANSWERBACK

This feature causes the answerback message to be automatically transmitted the first time the LA120 is transmit enabled, after the modem enters data mode.

PROCEDURE:	INDICATION/COMMENTS:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press [A].	Current selection of auto answerback is displayed in numeric display.
Continue pressing [A] to change numeric display indication.	Numeric display indicates one of the following: 0 = Answerback message is disabled. 1 = Answerback is on and can be transmitted or printed.
Exit setup.	SET UP lamp will stop flashing.

• BUFFER CONTROL

Typically a printer receives a series of characters, temporarily stores the characters in a buffer, then prints the characters one at a time. The LA120 has a 1000 character buffer.

If restrain or XON/XOFF has been selected, this feature can control the point at which the restraint or XON/XOFF signal is generated. If buffer control large is selected, then restraint or XOFF (DC3) is generated if the buffer contains more than 600 characters. If buffer control small is selected, then restraint or XOFF (DC3) is generated if the buffer contains more than 50 characters.

It should be noted that when the LA120 is switched off line, it may continue to print several lines of data. This is a normal condition when using the large buffer.

Summary Table

Control	Comment
Small	50 characters Recommended when terminal is used interactively.
Large	Approximately 1000 characters Recommended when LA120 is used primarily as a printer.

PROCEDURE:	COMMENTS/INDICATION:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press [B].	Current selection of buffer size is displayed in numeric display.
Continue pressing [B] to change numeric display indication.	Numeric display indicates one of the following: 0 = Small buffer 1 = Large buffer
Exit setup.	SET UP lamp will stop flashing.

• KEYBOARD AND CHARACTER SET

The feature enables the LA120 keyboard and printer to function in a specific national language. The standard choices are the American or British keyboards.

Finnish, Swedish, Norwegian/Danish, German and French are optional keyboards, and require different key caps.

PROCEDURE:	COMMENTS/INDICATION:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press [N].	Current keyboard and character set is displayed in numeric display.
Continue pressing [N] to change numeric display indication.	**Numeric Display Indicates** — **Description** 1 United States } Standard 2 Great Britain 3 Finland } Optional 4 Sweden 5 Norway/Denmark 6 Germany 7 France
Exit setup.	SET UP lamp will stop flashing.

• PRINTER CHARACTER SET

This feature enables you to receive messages in a specific national language that is different from your keyboard. These languages are:

1. United States	Standard
2. Great Britain	Standard
3. Finland	Optional
4. Sweden	Optional
5. Norway/Denmark	Optional
6. Germany	Optional
7. France	Optional

The following is an example of the use of this feature. You are an import firm in Great Britain and your daily business over the LA120 is conducted in English. A Swedish customer decides to send an order in Swedish. You would select character set 4 enabling you to receive and print the order in Swedish.

PROCEDURE:	COMMENTS/INDICATION:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press [C].	Displays current printer character set.
Continue pressing [C] to change numeric display.	**Numeric Display**

Indicates	Description	
1	United States	Standard
2	Great Britain	Standard
3	Finland	Optional
4	Sweden	Optional
5	Norway/Denmark	Optional
6	Germany	Optional
7	France	Optional

Exit setup.	SET UP lamp will stop flashing.

• AUTO DISCONNECT

Auto disconnect is a feature that will hang up the phone line when the LA120 runs out of paper, the cover opens or the print head jams. This feature is especially useful if your terminal is unattended.

NOTE
If auto disconnect is not used it **must** *be set to off.*

Depending on your communications system auto disconnect can also be used to hang up the phone when [CTRL] [D] is typed, or EOT (End of Transmission) is received from your computer.

When auto disconnect is off, Data Terminal Ready is always asserted. (See Programmers and Communication section.)

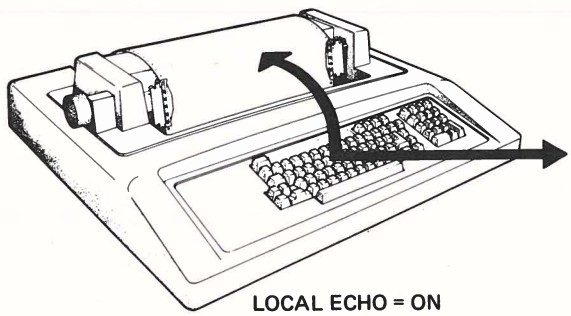
PROCEDURE:	COMMENTS/INDICATION:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press [D].	Current selection of auto disconnect is displayed in numeric display.
Continue pressing [D] to change numeric display indication.	Numeric display indicates one of the following: 0 = Off 1 = On
Exit setup.	SET UP lamp will stop flashing.

• LOCAL ECHO

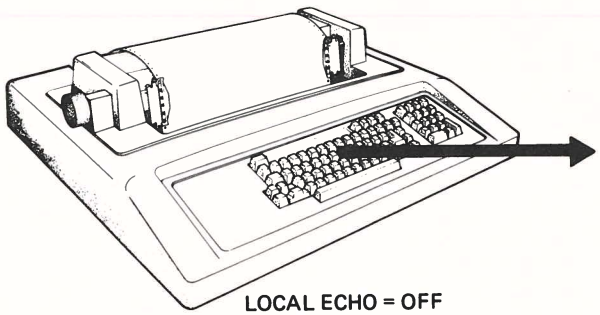
Selecting local echo causes each typed character to be transmitted and printed. If local echo is not selected, pressing a key will only transmit the character.

NOTES

1. *If your computer does not echo characters, local echo feature should be selected.*
2. *ENQ characters are never echoed.*



LOCAL ECHO = ON
CHARACTER TRANSMITTED
AND PRINTED



LOCAL ECHO = OFF
CHARACTER TRANSMITTED
ONLY

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PROCEDURE:	COMMENTS/INDICATION:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press [E].	Current selection of local echo is displayed in numeric display.
Continue pressing [E] to change numeric display indication.	Numeric display indicates one of the following: 0 = Off 1 = On
Exit setup.	SET UP lamp will stop flashing.

• AUTO NEW LINE AT RIGHT MARGIN

This feature when selected causes the LA120 to generate an internal carriage return and line feed if the incoming message tries to print past the right margin.

This is extremely useful in a message network where the accidental omission of a line feed or carriage return code would result in the partial loss of the message.

If not selected, attempting to print past the right margin will sound the bell and the characters will be lost.

PROCEDURE:	COMMENTS/INDICATION:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press [J].	Current selection of auto new line is displayed in numeric display.
Press [J] to change numeric display indication.	Numeric display indicates one of the following: 0 = Auto new line feature off 1 = Auto new line feature on
Exit setup.	SET UP lamp will stop flashing.

• AUTO LINE FEED

The auto line feed feature enables the RETURN key on the LA120 function like the RETURN key on a standard electric typewriter. When the auto line feed feature is turned on, depressing the RETURN key generates the carriage return (CR) and line feed (LF) codes. When the auto line feed feature is disabled, the RETURN key generates only the carriage return (CR) code.

NOTES

1. *If a double line feed occurs, turn this feature off since the computer is already performing this function automatically.*

2. *The ENTER key on the numeric keypad is also affected by this feature.*

PROCEDURE:	COMMENTS/INDICATION:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press [L].	Current selection of auto line feed is displayed in numeric display.
Continue pressing [L] to change numeric display indication.	Numeric display indicates one of the following: 0 = Off 1 = On
Exit setup.	SET UP lamp will stop flashing.

• MODEM

This feature enables the selection of a protocol that matches your communication requirements (see Communication and Programming section).

Refer to the HDX Initial Calling State, and the Secondary Channel procedures for related modem setups.

Selectable Protocols

1. FDX, (Full Duplex) No Modem
2. FDX, Modem
3. HDX, (Half Duplex) Supervisory
4. HDX, EOT
5. HDX, EXT

PROCEDURE:	COMMENTS/INDICATION:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press [M].	Current selection of modem is displayed in numeric display.
Continue pressing [M] to change numeric display.	**Numeric Display Indicates** — **Description** 1 — FDX, No Modem 2 — FDX, Modem 3 — HDX, Supervisory 4 — HDX, EOT 5 — HDX, ETX
Exit setup.	SET UP lamp will stop flashing.

• HDX (HALF DUPLEX) INITIAL CALLING STATE

When an operator of the LA120 initiates communication with a computer, the condition of the HDX initial calling state will be checked. The condition of this state will determine if the LA120 starts out by receiving or transmitting. This feature can only be used if choice 4 or 5 of the Modem procedure has been selected.

PROCEDURE:	COMMENTS/INDICATION:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press [Q].	Current selection of HDX initial calling state is displayed in numeric display.
Continue pressing [Q] to change numeric display indication.	Numeric display indicates one of the following: 0 = Transmit 1 = Receive
Exit setup.	SET UP lamp will stop flashing.

• SECONDARY CHANNEL

This feature has two meanings. First, if modem choices 1 or 2 (full duplex) have been selected, the secondary channel feature can be used to indicate the restraint mode.

The second meaning applies when half duplex modem choices 4 or 5 have been selected. With this choice the secondary channel feature can be used to indicate the presence of a secondary (reverse) channel.

PROCEDURE:	COMMENTS/INDICATION:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press [S].	Current selection of secondary channel is displayed in numeric display.

PROCEDURE:	INDICATION/COMMENTS:
Continue pressing [S] to change numeric display indication.	

Numeric Display Indicates	Modem 1 or 2 Selected	Modem 4 or 5 Selected
0	Speed Control Mode	Secondary Channel – No
1	Restraint Mode	Secondary Channel – Yes

Exit setup.	SET UP lamp will stop flashing.

• PARITY AND DATA BITS

Parity enables data errors to be monitored, and thereby verifies the correctness of data. If an error in transmission has occurred, the LA120 can detect it and indicate its presence by printing a special symbol (⁒).

In addition to parity, this feature enables the selection of 7 or 8 data bits.

PROCEDURE:	COMMENTS/INDICATION:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press [P].	Current selection of parity bits is displayed in numeric display.
Continue pressing [P] to select parity and data bits as indicated by numeric display.	

Numeric Display Indicates	Data Bits	Parity Rec	Parity Transmit
1	7	Ignore	Mark
2	7	Ignore	Space
3	7	Ignore	Odd
4	7	Ignore	Even
5	7	Odd	Odd
6	7	Even	Even
7	7	None	None
8	8	None	None
9	8	Odd	Odd
10	8	Even	Even

Exit setup.	SET UP lamp will stop flashing.

• PRINTER NEW LINE CHARACTER

This feature controls the way the LA120 responds to the received line feed or carriage return code. You can select three different ways for the LA120 to respond as described in the following table.

NOTE
In choice 2 the LA120 also performs a carriage return when it receives vertical tab and form feed characters.

Selections Indicated by Numeric Display	Received Carriage Return Code	Received Line Feed code
1	LA120 performs a carriage return.	LA120 performs a line feed.
2	LA120 performs a carriage return.	LA120 performs a carriage return and line feed.
3	LA120 performs a carriage return and line feed.	LA120 performs a line feed.

PROCEDURE:	COMMENTS/INDICATIONS:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press [W].	Current selection of printer new line character is displayed in numeric display.
Continue pressing [W] to change numeric display.	Numeric display indicates one of the following: 1 2 See table above. 3
Exit setup.	SET UP lamp will stop flashing.

• XON/XOFF

The LA120 is capable of automatically generating the XON (DC1) and XOFF (DC3) codes. The XOFF code is used to stop the transmission of data from the computer to the terminal, while the XON code is used to resume the transmission.

For related information refer to the Buffer Control procedure.

NOTE
XON/XOFF should only be changed when in LOCAL.

PROCEDURE:	COMMENTS/INDICATION:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press [X].	Current selection of XON/XOFF is displayed in numeric display.
Press [X] to change numeric display.	Numeric display indicates one of the following: 0 = XON/XOFF is disabled 1 = XON/XOFF is enabled
Exit setup.	SET UP lamp stops flashing.

• ALTERNATE KEYPAD MODE

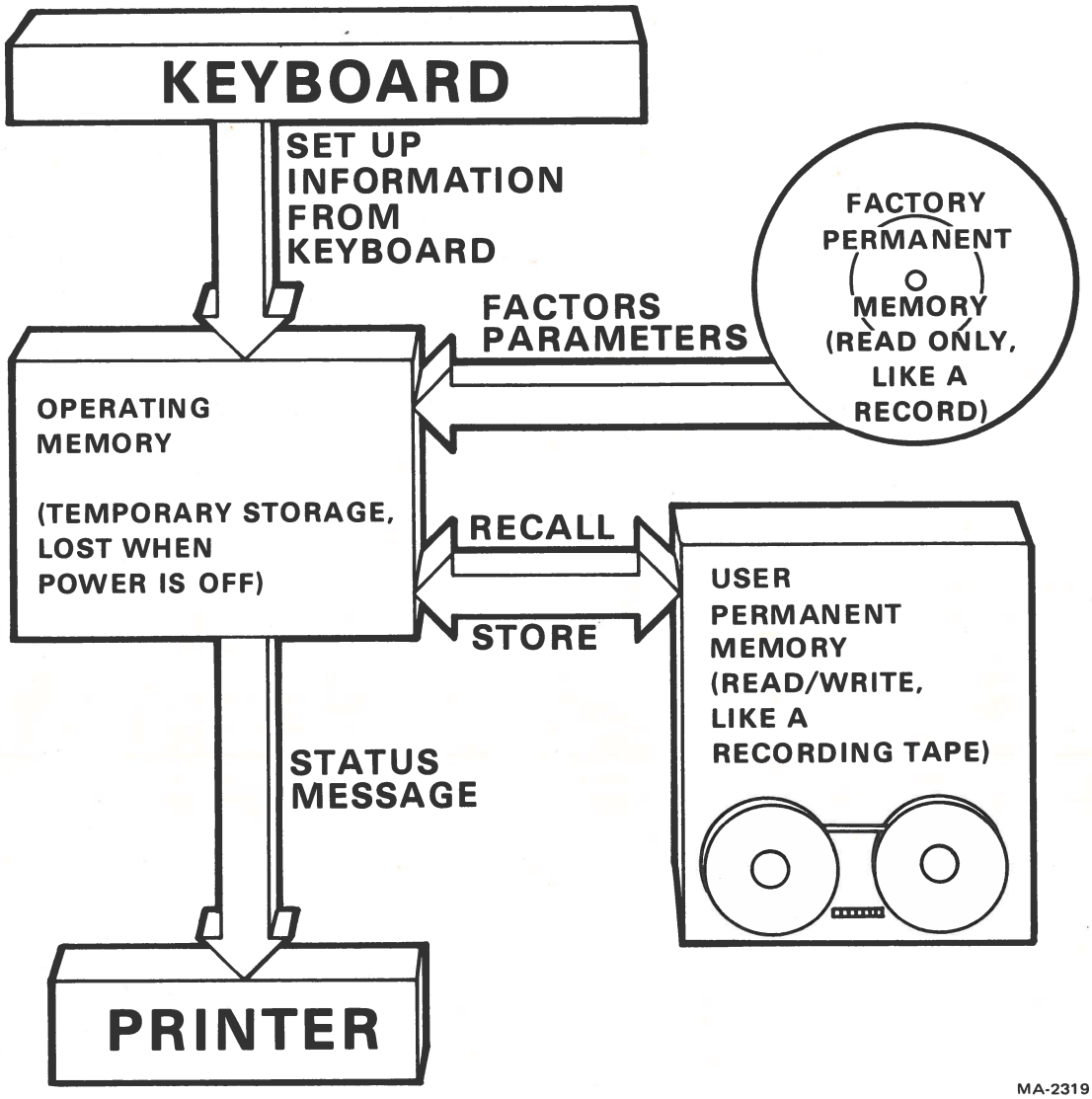
This procedure enables the operator to use the optional numeric keypad in two different ways; to generate character codes, or to generate escape sequences. The following table describes the characters and escape sequences associated with the 18 keys on the keypad.

NOTE
When in alternate keypad mode, and in local the numeric keypad will not function.

Character or Escape Sequence

Numeric Keypad	In Normal Keypad Mode	In Alternate Keypad Mode
PF1	ESC O P	ESC O P
PF2	ESC O Q	ESC O Q
PF3	ESC O R	ESC O R
PF4	ESC O S	ESC O S
ENTER	CR or CR LF	ESC O M
,	,	ESC O l
-	-	ESC O m
.	.	ESC O n
0	0	ESC O p
1	1	ESC O q
2	2	ESC O r
3	3	ESC O s
4	4	ESC O t
5	5	ESC O u
6	6	ESC O v
7	7	ESC O w
8	8	ESC O x
9	9	ESC O y

PROCEDURE:	COMMENTS/INDICATION:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press [Y].	Current selection of alternate keypad mode displayed in numeric display.
Press [Y] to change numeric display indication.	Numeric display indicates one of the following: 0 = Normal keypad mode 1 = Alternate keypad mode
Exit setup.	SET UP lamp will stop flashing.


KEYBOARD
SET UP INFORMATION FROM KEYBOARD
FACTORY PERMANENT MEMORY (READ ONLY, LIKE A RECORD)
FACTORS PARAMETERS
OPERATING MEMORY
(TEMPORARY STORAGE, LOST WHEN POWER IS OFF)
RECALL
STORE
USER PERMANENT MEMORY (READ/WRITE, LIKE A RECORDING TAPE)
STATUS MESSAGE
PRINTER

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STORE, RECALL, AND STATUS FEATURES

The LA120 contains two permanent memories, and one temporary memory.

One permanent memory is set at the factory with typical setup information (see Factory Stored Settings procedure). This memory is a read-only memory; it cannot be changed or erased. It is like the record used on your record player.

The other permanent memory (see STORE/RECALL procedure) is provided for the user to store important or commonly used setup information. This memory is a read/write memory. It is like the tape in your tape recorder, that is, new information can be stored or old information changed.

NOTE
These permanent memories represent the state of the art, and do not require batteries.

The temporary memory is like the memory in most calculators. When power is turned off the information is lost. Your LA120 operates from this memory. When power is turned on, the information in the read/write memory is loaded into the temporary operating memory. The LA120 then uses this information for forms control and message transmission. When new setup procedures are performed they are loaded directly into the temporary operating memory. To save (store) new setups the store procedure must be performed.

To read the contents of the operating memory simply perform the status procedure (described in the following procedures).

• FACTORY STORED SETTINGS

This procedure enables you to change the state of all the LA120 settings to the values originally set at the factory. This is useful if you have no special setting requirements, or if you desire a specific starting point for your setup. The factory settings are described in the following table.

Parameter	Setting
Horizontal tab stops	1,9,17,25,33,41,49, 57,65,73,81,89,97, 105,113,121,129, 137,145,153,161, 169,177,185,193, 201,209,217
Vertical tab stops	1,9,17,25,33,41,49, 57,65,73,81,89,97, 105,113,121,129, 137,145,153,161
Left Margin	1
Right Margin	132
Top margin	1
Bottom margin	66
Line/Local Status	On line

Parameter	Setting
REC	1200
XMT	1200
A	0
B	1
C	1
D	1
E	0
F	66
G	1
H	10
J	1
K	0
L	0
M	1
N	1
O	1
P	1
Q	0
R	1
S	0
U	1
V	6
W	1
X	1
Y	0
Z	1

PROCEDURE:	COMMENTS/INDICATION:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press [I] (letter).	LA120 is loaded with factory stored setting.
Exit setup.	SET UP lamp will stop flashing.

• STORE/RECALL

Normally, setting up your LA120 is a one-time job. This is due to a unique feature which stores all your settings in a permanent memory; that is, the LA120 can be turned off without losing the following settings:

Horizontal tab stops
Vertical tab stops
Left margin
Right margin
Top margin
Bottom margin
Line/local status
Baud rate
Answerback
Buffer control
Printer character set
Auto disconnect
Local echo
Form length
Horizontal pitch
Auto new line
Key click
Auto line feed
Modem
Keyboard and printer character set
HDX initial calling state
Auto repeat
Secondary channel
XON/XOFF
Alternate keypad mode
Auto view
Printer new line character
Alternate character set
Break action

When the LA120 is turned on it will automatically enter the last settings stored by the operator.

NOTE
Setups must be stored to be saved.

STORE

PROCEDURE:	COMMENTS/INDICATION:
Enter setup.	SET UP light will start flashing indicating you are in setup.
Press and hold [SHIFT] and press [ ) 9].	All settings in the operating memory are stored in non-destructive memory. Numeric display will go blank for a few seconds.
Exit setup.	SET UP lamp will stop flashing.

RECALL

PROCEDURE:	COMMENTS/INDICATION:
Enter setup.	SET UP light will start flashing indicating you are in setup.
Press [)/9].	Settings stored in permanent memory will be recalled. Numeric display will go blank for a few seconds.
Exit setup.	SET UP lamp will stop flashing.

• STATUS

What is the status of the printer? A special feature of the LA120 is a printout of all the current setup values except tabs and margins.

NOTE
Horizontal margin and tab locations are obtained by advancing the print head to the margin or tab and reading the column number displayed. Press [SHIFT] to read vertical margins and tabs.

The following is a sample printout of the status message using the factory parameters.

Typical Status Message

REC	1200
XMT	1200
A	0
B	1
C	1
D	1
E	0
F	66
G	1

Typical Status Message

H	10
J	1
K	0
L	0
M	1
N	1
O	1
P	1
Q	0
R	1
S	0
U	1
V	6
W	1
X	1
Y	0
Z	1

NOTE
Do not press [SHIFT] when printing out status message.

PROCEDURE:	INDICATION/COMMENTS:
Enter setup.	SET UP light will flash when LA120 is in setup.
Press [*/8] (Status).	Status message will be printed out.
Exit setup.	SET UP light will stop flashing.

• SELF TEST FEATURE

If at any time it appears that a problem exists in the LA120, you should initiate the self test.

Two self tests are provided. The first prints out characters within the currently selected margins.

The second test causes the LA120 to go through the same motions as the printing test, but without printing. The non-printing self test should be used if your printer is loaded with valuable forms, such as checks or tickets.

SAMPLE SELF TEST PRINTOUT

```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`
"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`a
#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`ab
$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abc
%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcd
&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcde
'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdef
()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefg
)*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefgh
*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghi
+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghij
,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijk
-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijkl
```

PRINTING SELF TEST

PROCEDURE:	COMMENTS/INDICATION:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press [T] to initiate self test.	LA120 will print out the self test pattern.
To stop test, exit setup or press any character.	Self test is terminated.
Exit setup.	SET UP lamp will stop flashing.

NON-PRINTING SELF TEST

PROCEDURE:	COMMENTS/INDICATION:
Enter setup.	SET UP lamp flashes indicating you are in setup.
Press and hold [SHIFT] and press [> .]	LA120 will perform a non-printing self test.
To stop test exit setup or press any character.	Non-printing self test terminated.
Exit setup.	SET UP lamp will stop flashing.

• INSTALLING RIBBON

The ribbon used in the LA120 will provide approximately 6 to 8 hours of continuous printing.

When the print contrast becomes too light, the ribbon may be reversed to provide an additional 2 hours of printing, then it should be replaced.

CAUTION

Only DIGITAL-recommended ribbons (Part No. 36-12153-01) should be used in the LA120. Use of other ribbons can damage the print head and may void the warranty.

1. Open top cover.
2. Move carriage adjustment lever to number 9.
3. Remove old ribbon, saving empty spool.
4. Install new ribbon as shown.

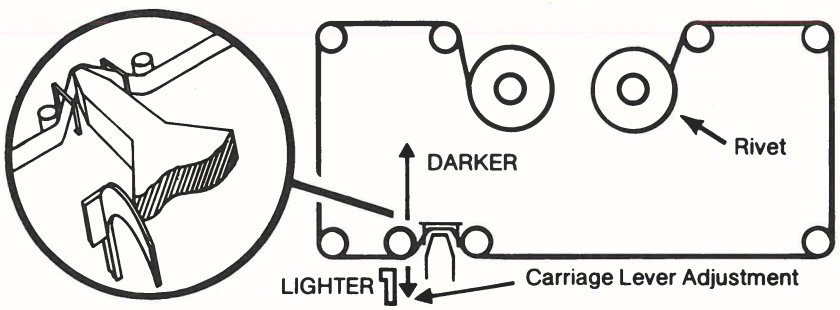
NOTE

Ribbon rivet must be on empty spool to ensure correct operation of direction-changing mechanism.

5. Adjust impression (described in the following paragraphs).
6. Close cover.

PRINT IMPRESSION ADJUSTMENT

1. Open cover.
2. Using carriage adjust lever, adjust printer head for contact with your form.
3. Move printhead and carriage sideways by hand to check for form smudging or paper rippling.
4. Close cover and type about 10 characters.
5. If smudging or rippling occurs, move the carriage lever away from the paper slightly (towards operator) and repeat step 2.



• LOADING PAPER/FORMS

The LA120 will accept sprocket-fed, multipart paper/forms ranging in width from 3 to 14-7/8 inches. The following rules apply to paper used in the LA120.

- Multipart forms may have only one card part; the card must be the last part.
- First-surface impact paper is not recommended.
- Dot or line glue margins are acceptable (one margin only).
- Split forms are not recommended (different number of sheets on each side of the form).

Initial Paper/Forms Loading

1. Turn the printer off and open the printer cover.

2. Loosen the left and right tractor adjusting screws.

3. Position the left tractor feed pins approximately 2 inches from the left-hand side plate and tighten the left tractor adjusting screw. This provides optimum margins for 132-column paper. It may be necessary to readjust when using preprinted forms.

4. Open both tractor covers and move the print head adjustment lever to the last notch toward you.

5. Place the paper/forms on the floor between the legs of the LA120 with the leading edge of the paper parallel to the paper slot and the left edge of the paper in line with the left tractor.

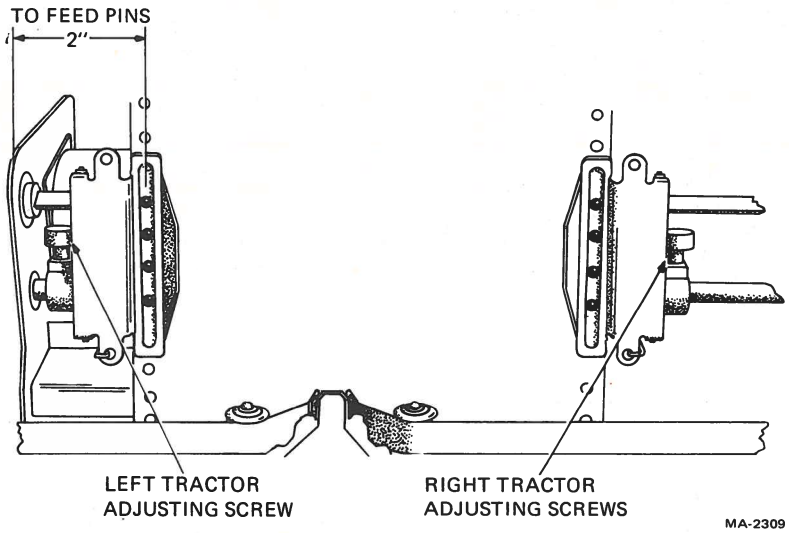
6. Feed the paper up through the paper slot, align the left margin holes over the feed pins, and close the left tractor cover.

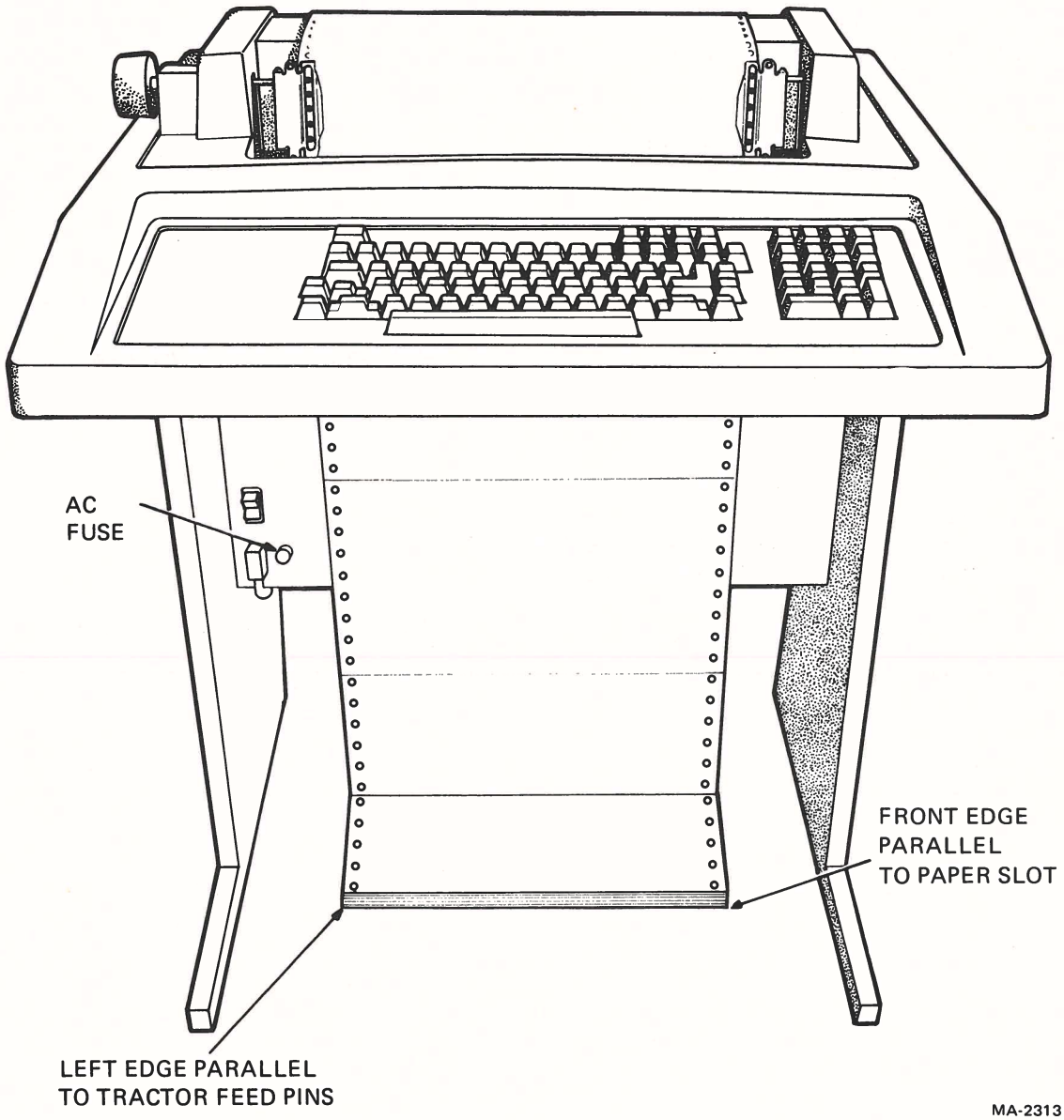
7. Align the right margin holes over the feed pins, tighten the right tractor adjusting screw, and close the right tractor cover.

NOTE
If the paper pulls against the tractor pins or bows in the middle, readjust the right tractor.

8. Perform the impression adjustment.

9. Set up your form as described in the Forms section of this chapter.




AC
FUSE
FRONT EDGE
PARALLEL
TO PAPER SLOT
LEFT EDGE PARALLEL
TO TRACTOR FEED PINS
MA-2313

• RELOADING PAPER/FORM

The LA120 operates normally until the physical end of the form passes the print head. Printer operation ceases, the PAPER OUT lamp flashes and the bell is turned on for five seconds. The operator must then perform the following procedure.

NOTE
Do not turn power off when loading paper. Turning off power will cause the loss of the temporarily stored features.

PROCEDURE:	INDICATION/COMMENTS:
Open cover.	
Open tractors and load paper.	
Using the paper advance knob line up the form perforations with the line indicator.	
Close cover.	PAPER OUT light will stop flashing.

Installation, Interfacing and Specifications

INSTALLATION, INTERFACE INFORMATION, AND SPECIFICATIONS

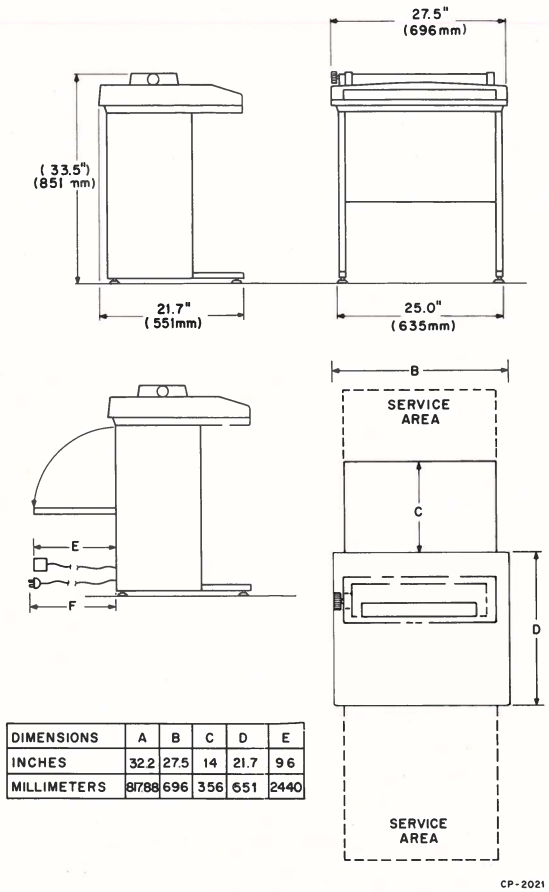
GENERAL INSTALLATION INFORMATION

• INSTALLATION AND CONFIGURATION

This section contains the step-by-step procedures for unpacking, cabling, and unit checkout to ensure that the unit was not damaged during shipment and that the unit is operating properly prior to connection to the communication system.

The LA120 should be installed in an area that is free of excessive dust, dirt, corrosive fumes, and vapors. To ensure that the unit has proper ventilation and cooling, the ventilation openings on the side of the cabinet should not be obstructed.

A minimum 4-inch clearance between units must be maintained at all times. Adequate service clearance must also be provided for servicing the unit (refer to Figure 2-1).



DIMENSIONS	A	B	C	D	E
INCHES	32.2	27.5	14	21.7	96
MILLIMETERS	8788	696	356	651	2440

Figure 2-1 LA120 Site Considerations

UNPACKING AND INSPECTION

The following procedure outlines the steps required for unpacking and inspecting the LA120.

1. Cut the nylon retaining straps from around the shipping carton and discard them.

2. Remove the outer cardboard shipping container.

3. Remove all shock-absorbing material and packing from around the LA120 (Figure 2-2).

4. Loosen and remove the hex head bolts that secure the wood leg brace to the skid assembly. Remove microfoam from around each leg of the LA120.

5. Carefully inspect the LA120 cabinet and carriage assembly for possible shipping damage. Inspect and check the enclosed packing list for lost or missing items. Report any damaged or missing items to the local DIGITAL Field Service or Sales Office and the local carrier.

6. Remove the printer from the wooden shipping skid and place it in the desired location.

7. Lift the LA120 top cover assembly and *clip and remove the nylon cable tie* securing the print head assembly.

8. Install and adjust the leveling feet on the LA120 legs.

9. If necessary, wipe all outer surfaces with a clean, soft, lint-free cloth.

10. Connect the EIA interface cable to the user's equipment.

11. Enclosed in the package with this manual is the LA120 setup label. If desired the label can be fastened to the area shown in the figure on the next page.

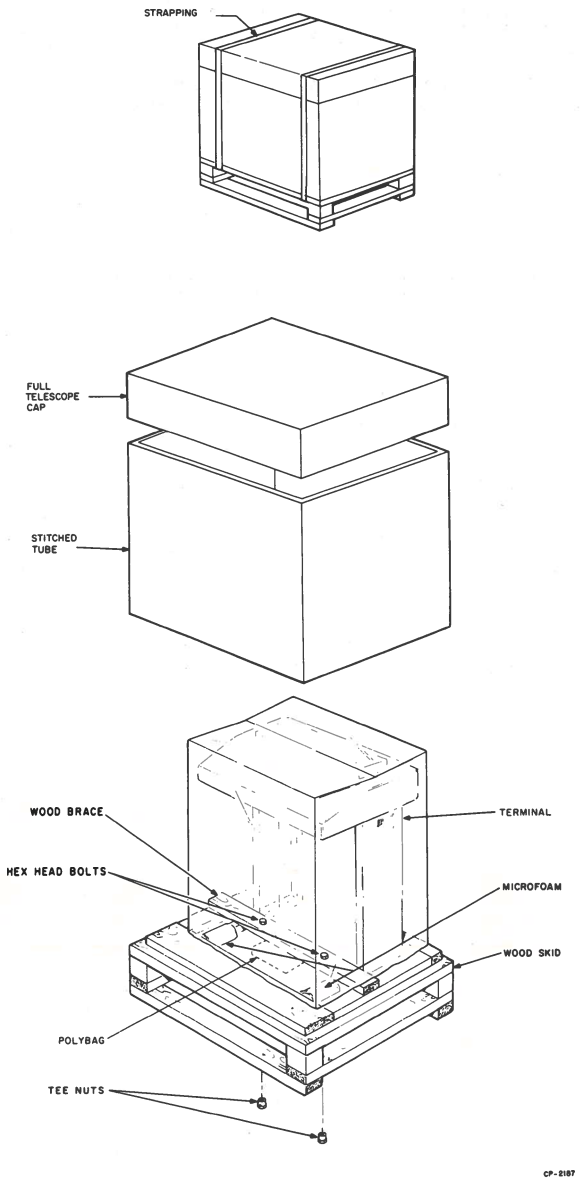
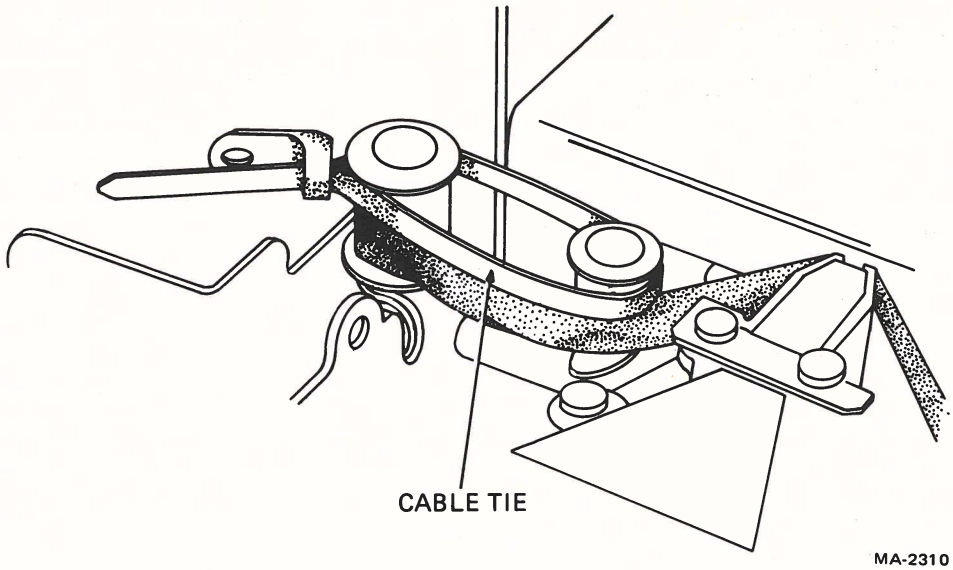


Figure 2-2 Unpacking/Packing

NOTE

1. To install the 20 mA option refer to the 20 mA Option chapter.

2. Site plans are not supplied by Digital Equipment Corporation. Interface logic connections must be specified and provided by the system supplier or the customer because each installation may be different.



MA-2310

PACKING PROCEDURES

If it becomes necessary to ship your LA120 to another location, repack it per the following procedure.

1. Remove the ribbon and paper.
2. Using a nylon cable tie, secure the print head assembly to prevent movement while in transit.
3. Pack the LA120 as shown in Figure 2-2.

CHECKOUT PROCEDURES

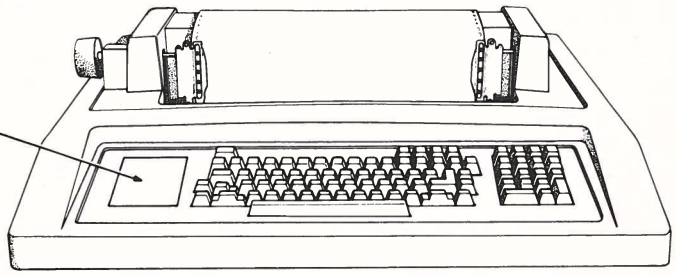
1. Install a ribbon per the ribbon installation procedure (see Part 3 of the Operator's chapter.)
2. Install paper per the loading paper/forms procedure (see Part 3 of the Operator's chapter.)

CAUTION

Before connecting the LA120 to a power source, ensure that the line voltage and frequency are compatible with the power requirements of the machine. Ensure that the power switch is off.

3. Connect the LA120 line cord to the correct wall receptacle; set the power switch to on. The print head automatically positions itself to the left margin.
4. Perform the self-test procedure (see Part 2 of the Operator's chapter).

REC	Receive baud rate		
XMT	Transmit baud rate		
A	Auto-answerback	0=Off	1=On
B	Buffer control	0=Small	1=Large
C	Printer char. set	1=US	2=GB
D	Auto-disconnect	0=Off	1=On
E	Local echo	0=Off	1=On
F	Form length	Lines per form	
G	Bell volume	0=low	1=High
H	Horizontal pitch	Char. per inch	
J	Auto-newline	0=Off	1=On
K	Key click	0=Off	1=On
L	Auto-linefeed	0=Off	1=On
M	Modem/protocol		
N	Keyboard char. set	1=US	2=GB
O	Alt. char. set	0=Off	1=On
P	Parity/data bits		
Q	HDX initial state	0=XMT	1=REC
R	Auto-repeat	0=Off	1=On
S	Secondary channel	0=No	1=Yes
U	Break enable	0=No	1=Yes
V	Vertical pitch	Lines per Inch	
W	Printer NL char.	1=None	2=LF 3=CR
X	XON/XOFF	0=No	1=Yes
Y	Alt keypad mode	0=No	1=Yes
Z	Auto-view	0=Off	1=On
I	Initialize to factory settings		
T	Self test: Type a character to stop		



MA-2307

• ANSWERBACK JUMPER

To obtain a permanent answerback message that cannot be changed by the operator, cut or remove the jumper shown in the following figure.

NOTES

1. *The answerback message must be stored in the permanent memory prior to cutting the jumper.*

2. *With the jumper removed the answerback message cannot be altered or erased.*

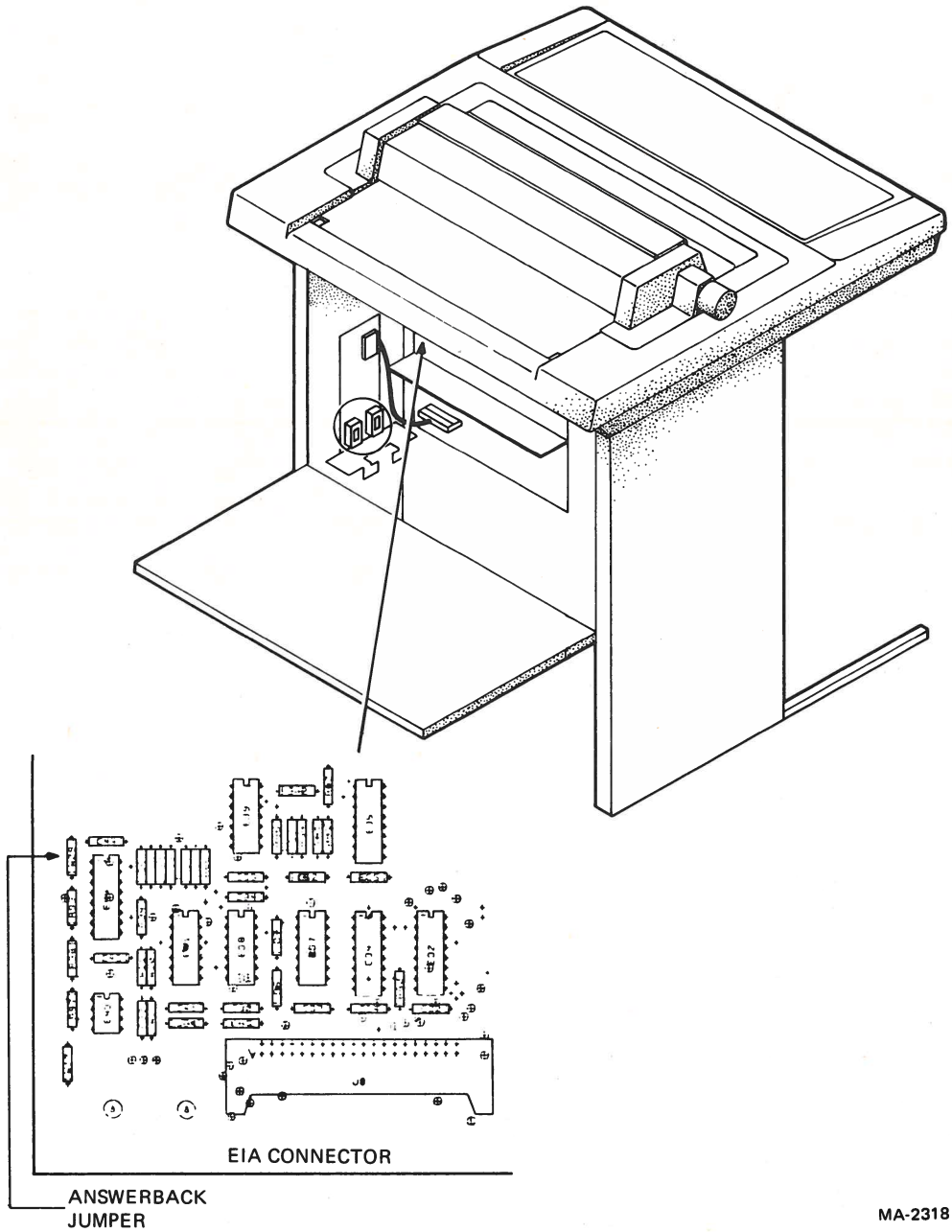
PROCEDURE:

Store answerback message if required.

Turn power off.

Cut or remove jumper.

Turn power on.



MA-2318

• INTERFACE INFORMATION

EIA INTERFACE

The LA120 interfaces with EIA devices using an optional 9-foot BC05D modem cable with a 25-pin connector (shown below). The LA120 interface is compatible with Bell 103, 212A, and 202 modems, and meets the requirements of EIA specification RS232C. The following paragraphs describe the interface signals.

Protective Ground – This conductor is connected to the chassis of the LA120. It is further connected to external grounds through the third wire of the power cord.

Transmitted Data (TXD) Direction: FROM LA120 – Signals on this circuit represent serially encoded characters that are generated by the LA120. The LA120 does not transmit data on this circuit unless an on condition is present on the Clear-to-Send (CTS) circuit.

Received Data (RXD) Direction: TO LA120 – Signals on this circuit represent serially encoded characters that are generated by the users equipment. The LA120 does not accept data on this circuit unless an on condition is present on the Carrier Detect (RLSD) circuit.

BC05D MODEM CABLE

Pin	Source	Name	Function	Circuit CCITT/EIA
1			Protective ground	101/AA
2	LA120	TXD	Transmitted data	103/BA
3	User	RXD	Received data	104/BB
4	LA120	RTS	Request to send	105/CA
5	User	CTS	Clear to send	106/CB
6	User	DSR	Data set ready	107/CC
7			Signal Ground	102/AB
8	User	RLSD	Carrier detect	109/CF
9				
10				
11	LA120	SRTS	Sec. req. to send	120/SCA
12	User	SPDI	Speed indicator (FDX)	CI
12	User	SRLSD	Sec. carrier det. (HDX)	122/SCF
13				
14				
15				
16				
17				
18				
19	LA120	SRTS	Sec. req. to send	120/SCA
20	LA120	DTR	Data term. ready	108.2/CD
21				
22	User	RI	Ring indicator	125/CE
23	LA120	SPDS	Speed select (FDX)	CH
24				
25				

NOTE
Pins 11, 19, and 13 are driven by a common circuit whose function is determined by the modem and secondary channel set-up commands.

Request To Send (RTS) Direction: FROM LA120 – The on condition of RTS means that the LA120 intends to transmit data. After turning this circuit on, the LA120 waits for an on condition on the Clear-to-Send (CTS) circuit before starting transmission.

Clear To Send (CTS) Direction: TO LA120 – The on condition of CTS means that the users' equipment is ready to accept data. The off condition of CTS prevents the LA120 from transmitting data. In full duplex without EIA control, this circuit is assumed to always be in the on condition.

Data Set Ready (DSR) Direction: TO LA120 – The on condition of DSR indicates that the users' equipment is capable of transmitting and receiving data signals. The off condition of DSR causes the LA120 to ignore all other interface inputs except Ring Indicator (RI). In full duplex without EIA control, this circuit is assumed to always be in the on condition.

Signal Ground – This circuit establishes the common ground reference potential for all interface circuits except protective ground. This circuit is permanently connected to the protective ground circuit.

Carrier Detect (RLSD) Direction: TO LA120 – The on condition of RLSD indicates that data transmission from the users' equipment to the LA120 is enabled. In full duplex without EIA control, this circuit is assumed to always be in the on condition.

Speed Indicator (SPDI) Direction: TO LA120 (Full Duplex Only) – The on condition of SPDI indicates that the baud rate is 1200 baud, regardless of the rate selected by the operator. The off condition of SPDI indicates that the operator selected baud rate is being used.

Secondary Carrier Detect (SRLSD) Direction: TO LA120 (Half Duplex Only) – The on condition of SRLSD indicates that the users' equipment is capable of successfully processing the transmitted data from the LA120.

Secondary Request To Send (SRTS) Direction: FROM LA120 (Half Duplex Only) – The on condition of SRTS indicates that the LA120 is capable of successfully processing the received data from the users' equipment. In restraint mode, the off condition of SRTS indicates that the users' equipment should temporarily suspend the transmission of data. When SRTS goes on, transmission may be resumed.

Data Terminal Ready (DTR) Direction: FROM LA120 – The on condition of DTR indicates that the LA120 is capable of transmitting and receiving data signals. The off condition of DTR may cause the users' equipment to set the Data Set Ready signal (DSR) to the off condition. The LA120 ignores all interface inputs except Ring Indicator (RI) when DTR is off.

Ring Indicator (RI) Direction: TO LA120 – If Data Terminal Ready (DTR) is off, then the on condition of RI caused DTR to turn on. DTR remains on until Data Set Ready (DSR) turns on or 30 seconds elapses, whichever occurs first; then DTR turns off. If DTR is on, then the on condition of RI causes a 30 second timeout. If no data is received in 30 seconds then DTR is pulsed low for 233 ms – 10 to +10 percent.

Speed Select (SPDS) Direction: FROM LA120 (Full Duplex Only) – If the operator selected baud rate is 600 or higher, then the LA120 asserts an on condition on SPDS, otherwise the LA120 holds this circuit in the off condition.

IMPEDANCE OF TERMINATOR

The terminating impedance of the receiving end of the interface circuits has a dc resistance of not less than 3000 ohms nor more than 7000 ohms. When the interface plug is disconnected, the interface voltage on terminator circuits is –2 volts to +2 volts.

RISE AND FALL TIMES

The circuitry that receives signals from an interface circuit is dependent only on the signal voltage and conforms to RS-232-C with regard to the rise time and fall time. For control interface circuits, the time required for the signal to pass through the transition region (–3 volts to +3 volts) during a change in state does not exceed one millisecond. For the Transmitted Data circuit the rise time and the fall time does not exceed 16.7 microseconds through the 6-volt range (–3 volts to +3 volts). The received data and the clock signals also meet this limit.

OPEN CIRCUIT VOLTAGES

The open circuit driver voltage with respect to signal ground on any interface circuit does not exceed –12 volts to +12 volts. The terminator on an interface circuit is designed to withstand any input signal within the –25 volts to +25 volt limit. When the terminating impedance is in the proper range (3000 ohms to 7000 ohms) and the terminator open circuit voltage is zero, the potential at the point of interface is not less than –5 volts to +5 volts or more than –12 volts to +12 volts. An open circuit or applied voltage more negative than +0.6 volts will be interpreted the same as a legitimate negative applied voltage (–3 to –25 volts).

• LA120 SPECIFICATIONS

Speed	180 characters per second
Baud Rate	Up to 9600 baud
Line Length	13.2 inches maximum
Characters	96 upper/lowercase ASCII 7 × 7 dot matrix
Paper	Tractor drive, pin-feed
Width	7.62 to 37.78 cm (3 to 14-7/8 in)
Weight	
Single-Part	6.8 kg (15 lb) paper minimum 0.25 mm (0.010 in) thick card stock maximum
Multipart	1 to 6 parts (see notes) 0.50 mm (0.020 in) thick maximum

NOTES

1. *Multipart forms may have only one card part. The card must be the last part.*
2. *NCR or 3M paper, up to 6-part, must use ribbon on the top copy. First-surface impact paper is not recommended.*
3. *Continuous-feed, fan-fold business forms with 3- or 4-prong margin crimps on both margins (multipart) are recommended. Stapled forms are not recommended and may damage tractors and other areas of the machine. Dot or line glue margins are acceptable (if line is on one margin only). Do not line glue both margins as air will not be able to escape and poor impressions will result.*
4. *Split forms (forms with each side containing a different number of sheets) are not recommended.*

Ribbon	DIGITAL-specified nylon fabric (Part No. 36-12153)
Spool Assembly	127 cm wide × 54.87 m long (0.05 in × 60 yd)
Power	87–128 Vac 59–61 Hz
Temperature	
Operating	10° to 40° C (50° to 104° F), noncondensing
Nonoperating	–40° to 66° C (–40° to 151° F), noncondensing
Relative Humidity	
Operating	10 to 90 percent with a maximum wet bulb temperature of 28° C (82° F) and a minimum dew point of 2° C (36° F), noncondensing
Nonoperating	5 to 95 percent
Dimensions	
Width	69.85 cm (27.5 in)
Height	817.88 cm (32.2 in)
Depth	60.69 cm (24 in) deep
Shipping Weight	68.04 kg (150 lb)

Programmers Section

PROGRAMMER'S SECTION

• GENERAL

The LA120 utilizes escape sequences standardized by ANSI to control many of its features. For those LA120 features which lack an ANSI standard escape sequence, additional escape sequences have been defined within the realm of extensions permitted by the ANSI system.

ANSI, the American National Standards Institute, has established a flexible and comprehensive system for transmitting format and editing information. It can be used with printing terminals like the LA120 as well as with video terminals and printers. It has the following important advantages:

1. It is well defined and well documented. This greatly decreases the chances of incompatible implementations and aids in achieving device independence in output.

2. It has ample provisions for future extensions without sacrificing compatibility with older programs. The syntax used in ANSI controls allows a large number of new controls to be added with little difficulty.

3. It is compatible with all the frequently used communication protocols. In contrast, many other systems use control codes that are reserved for communication functions. In these other systems, codes used for line turnaround, disconnect and synchronization get confused with those used to send parameter values.

Using the escape sequences described in this chapter, the programmer can control the following LA120 features:

- Printer character set
- Active position
- Horizontal pitch
- Horizontal margins
- Horizontal tabs
- Vertical pitch
- Form length
- Vertical margins
- Vertical tabs
- Product identification
- Linefeed newline mode
- Alternate keypad mode

• ESCAPE SEQUENCES

The LA120 interprets escape sequences sent to it. None of the characters in an escape sequence are printed. When the end of the sequence is found (or an error occurs), the LA120 reverts to its normal printing mode. Control characters (that is, characters with octal codes 000 through 037) may be embedded anywhere in an scape sequence. The control character performs its normal function and has no effect on the escape sequence. If an escape sequence is received by the LA120 that it does not support, it is ignored.

An escape sequence only partially received when the operator enters set-up mode, will complete normally when he leaves set-up mode. Escape sequences may also be entered and processed while in local mode, and may be used in lieu of setup commands.

In the lists of escape sequences which follow, the escape character, octal code 033, is designated as **ESC**. Numeric parameters are shown explicitly or designated as **n** or n_1, n_2, etc. The graphic characters in escape sequences are shown using the United States ASCII character set. The characters are spaced apart for clarity only. The space character, octal code 040, never appears in an escape sequence.

The format of a numeric parameter is a sequence of ASCII decimal digits. That is, octal codes 060 through 071. The parameter is interpreted as an unsigned decimal integer, with the most significant digit transmitted first. Leading zeros are allowed but not necessary. A missing parameter is interpreted as a value of zero. Plus and minus signs are not allowed in parameters.

PRINTER CHARACTER SETS

The LA120 is capable of receiving and printing both the United States ASCII character set and the British version in which the character "#" is replaced by the character "£".

The United States ASCII character set is shown below:

Code	Char	Code	Char	Code	Char
040	space	100	@	140	`
041	!	101	A	141	a
042	"	102	B	142	b
043	#	103	C	143	c
044	$	104	D	144	d
045	%	105	E	145	e
046	&	106	F	146	f
047	'	107	G	147	g
050	(	110	H	150	h
051	)	111	I	151	i
052	*	112	J	152	j
053	+	113	K	153	k
054	,	114	L	154	l
055	–	115	M	155	m
056	.	116	N	156	n
057	/	117	O	157	o
060	0	120	P	160	p
061	1	121	Q	161	q
062	2	122	R	162	r
063	3	123	S	163	s
064	4	124	T	164	t
065	5	125	U	165	u
066	6	126	V	166	v
067	7	127	W	167	w
070	8	130	X	170	x
071	9	131	Y	171	y
072	:	132	Z	172	z
073	;	133	[	173	{
074	<	134	\	174	|
075	=	135	]	175	}
076	>	136	^	176	~
077	?	137	–		

The following escape sequences are used to select the printer character sets:

ESCAPE SEQUENCE:	FUNCTION/COMMENTS:
ESC (A	Select character set of Great Britain.
ESC (B	Select character set of United States.

OPTIONAL CHARACTER SETS

Five additional national character sets and an APL character set are available as an option. The national character sets are selected by the operator, using setup commands, or by the programmer using escape sequences. The national character sets differ from United States ASCII in only a limited number of code positions.

The code differences among the national character sets are shown below:

	Code									
Character Set	**043**	**100**	**133**	**134**	**135**	**136**	**140**	**173**	**174**	**175**	**176**
United States	#	@	[	\	]	^	`	{	|	}	~
Great Britain	£	@	[	\	]	^	`	{	|	}	~
Finland	#	@	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Sweden	#	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Norway/Denmark	#	Ä	Æ	Ø	Å	Ü	ä	æ	ø	å	ü
Germany	#	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
France	£	à	°	ç	§	^	`	é	ù	è	¨

The following additional escape sequences are used to select the optional printer character sets.

ESCAPE SEQUENCE:	FUNCTION/COMMENTS:
ESC (C	Select character set of Finland.
ESC (E	Select character set of Norway/Denmark.
ESC (H	Select character set of Sweden.
ESC (K	Select character set of Germany.
ESC (R	Select character set of France.

ACTIVE COLUMN AND ACTIVE LINE

Active column is defined as the column where the next character will normally be printed. Active line is defined as the line where the next character will normally be printed. Column and line numbers begin with one, not zero. Printable characters normally increment active column. Linefeeds normally increment active line. Active column and active line are collectively known as active position.

Active position is only loosely linked to the physical position of the LA120 printhead and paper mechanism. In general, the active column is only recorded when a character is actually printed. Any previous history of active column values is not significant. The active line is different because it may only be advanced, since backward paper motion is not allowed. When the LA120 is idle, the active and physical positions are identical.

In the LA120, bell characters have only an active line attribute. They are not guaranteed to be sounded at any particular column within a line.

In addition to the normal position control characters (space, backspace, carriage return, linefeed, vertical tab, and form feed) the following escape sequences are used to modify active position.

ESCAPE SEQUENCE:	FUNCTION/COMMENTS:
ESC [**n**	Set active column to column **n**.
ESC [**n** a	Advance active column by **n** columns.
ESC E	Set active column to left margin and increment active line.
ESC D	Increment active line (active column unchanged).
ESC [**n** d	Set active line to line **n**.
ESC [**n** e	Advance active line by **n** lines.

LINEFEED NEWLINE MODE

Linefeed newline mode is controllable both by the operator and the programmer. If linefeed newline mode is enabled, the characters linefeed, vertical tab, and form feed each return the active column to the left main in addition to their normal functions. Linefeed newline mode may be enabled by the operator selecting choice 2 (linefeed) in the printer newline character setup command. The mode is disabled any time the operator selects choice 1 (none) or choice 3 (carriage return) in the printer newline character setup command.

The following escape sequences are used to control linefeed newline mode.

ESCAPE SEQUENCE:	FUNCTION/COMMENTS:
ESC [20 h	Enable linefeed newline mode.
ESC [20 l	Disable linefeed newline mode.

HORIZONTAL PITCH

Horizontal pitch determines the width of printed characters as well as their spacing. The LA120 has eight different horizontal pitches. Any combination of pitches may be used on a single print line. Changing horizontal pitch modifies the active column. The resulting new active column is that of the first column boundary at or to the right of the physical position of the previous active column in the old pitch. It is calculated as follows.

$$\text{Newcol} = 1 + \frac{(\text{Oldcol} - 1) * \text{Oldpitch}}{1 \quad \text{Newpitch}}$$

where Newcol = The new active column
Newpitch = the new pitch in chars/inch
Oldcol = the old active column
Oldpitch = the old pitch in chars/inch

The division performed above is integer division. Any remainder or fractional part of the quotient is discarded.

The following escape sequences are used to set horizontal pitch.

ESCAPE SEQUENCE:	FUNCTION/COMMENTS:
ESC [w	Set horizontal pitch to 10 char/inch
ESC [1 w	Set horizontal pitch to 10 char/inch
ESC [2 w	Set horizontal pitch to 12 char/inch
ESC [3 w	Set horizontal pitch to 13.2 char/inch
ESC [4 w	Set horizontal pitch to 16.5 char/inch
ESC [5 w	Set horizontal pitch to 5 char/inch
ESC [6 w	Set horizontal pitch to 6 char/inch
ESC [7 w	Set horizontal pitch to 6.6 char/inch
ESC [8 w	Set horizontal pitch to 8.25 char/inch

HORIZONTAL MARGINS

Printing is permitted only within the inclusive left and right margins. A carriage return character sets the active column to the left margin. Attempting to move the active column left of the left margin sets the active column equal to the left margin. Attempting to move the active column more than one column right of the right margin executes an auto-newline if auto-newline is enabled. If auto-newline is disabled, an error bell sounds and the character or command which attempted the motion is discarded.

Horizontal margins may be set so long as the following is true.

$1 \leqslant$ left margin $\leqslant$ right margin $\leqslant$ max column

Note that max column is a function of horizontal pitch.

max column = 13.2 inches * horiz pitch

where the product is rounded down to the nearest column.

The following escape sequences are used to set the left and right margins.

ESCAPE SEQUENCE:	FUNCTION/COMMENTS:
ESC [**n** s	Set left margin to column **n**.
ESC [; **n** s	Set right margin to column **n**.
ESC [n_1 ; n_2 s	Set left margin to column n_1 and set right margin to column n_2.

HORIZONTAL TABS

The LA120 has 217 possible horizontal tab stops, one for each column. Tab stops are associated with column numbers, not physical positions on the paper. Thus, changing horizontal pitch will also change the physical position of tab stops. Each stop may be set or cleared independently. Setting a stop already set has no effect; the same is true for clearing a stop already clear. Tab stops may be set or cleared without regard to margins or horizontal pitch.

The following escape sequences are used to set or clear horizontal tab stops.

ESCAPE SEQUENCE:	FUNCTION/COMMENTS:
ESC H	Set horizontal tab stop at active column.
ESC 1	Set horizontal tab stop at active column.
ESC [g	Clear horizontal tab stop at active column.
ESC [2 g	Clear all horizontal tab stops.
ESC [3 g	Clear all horizontal tab stops.
ESC 2	Clear all horizontal tab stops.
ESC [**n** u	Set horizontal tab stop at column **n**.
ESC [n_1 ; n_2 u	Set horizontal tab stops at column n_1 and at column n_2.
ESC [n_1 ; n_2 ; ... n_x u	Set horizontal tab stops at columns n_1, n_2, ... n_x ($x \leqslant 16$)

VERTICAL PITCH

Vertical pitch determines the spacing between lines, not the height of printed characters. Changing vertical pitch does not affect active line number, though it does clear vertical margins.

The following escape sequences are used to set vertical pitch.

ESCAPE SEQUENCE:	FUNCTION/COMMENTS:
ESC [z	Set vertical pitch to 6 lines per inch.
ESC [1 z	Set vertical pitch to 6 lines per inch.
ESC [2 z	Set vertical pitch to 8 lines per inch.
ESC [3 z	Set vertical pitch to 12 lines per inch.
ESC [4 z	Set vertical pitch to 2 lines per inch.
ESC [5 z	Set vertical pitch to 3 lines per inch.
ESC [6 z	Set vertical pitch to 4 lines per inch.

FORM LENGTH

Form length is defined in lines, not physical units. Therefore, changing vertical pitch will alter the physical form length. Forms may be from 1 to 168 lines in length. Changing form length clears vertical margins and defines the current line as line one.

The following escape sequence is used to set form length.

ESCAPE SEQUENCE:	FUNCTION/COMMENTS:
ESC [**n** t	Set form length to **n** lines, set top margin to line 1, set bottom margin to line **n**, set active line to line 1.

VERTICAL MARGINS

Printing is permitted only on lines within the inclusive top and bottom margins. When vertical pitch or form length are changed, these margins are cleared: that is, the top margin is set to line one and the bottom margin is set to the form length. The following must be true to successfully set new vertical margins.

$1 \leqslant$ top margin $\leqslant$ bottom margin $\leqslant$ form length

If it is ever the case that

active line $<$ top margin
or
active line $>$ bottom margin,

the active line is set to the top margin. For example, a linefeed performed at the bottom margin will execute a form feed.

The following escape sequences are used to set the top and bottom margins.

ESCAPE SEQUENCE:	FUNCTION/COMMENTS:
ESC [**n** r	Set top margin to line **n**.
ESC [; **n** r	Set bottom margin to line **n**.
ESC [n_1 ; n_2 r	Set top margin to line n_1 and set bottom margin to line n_2.

VERTICAL TABS

The LA120 has 168 vertical tab stops, which are set and cleared in a way analogous to horizontal tab stops. Vertical tab stops are associated with specific line numbers, not physical positions on the paper. Thus, changing vertical pitch will change the printing position of vertical tabs.

The following escape sequences are used to set or clear vertical tab stops.

ESCAPE SEQUENCE:	FUNCTION/COMMENTS:
ESC J	Set vertical tab stop at active line.
ESC 3	Set vertical tab stop at active line.
ESC [1 g	Clear vertical tab stop at active line.
ESC [4 g	Clear all vertical tab stops.
ESC 4	Clear all vertical tab stops.
ESC [**n** v	Set vertical tab stop at line **n**.
ESC [n_1 ; n_2 v	Set vertical tab stops at line n_1 and at line n_2.
ESC [n_1 ; n_2 ; ... n_x v	Set vertical tab stops at lines n_1, n_2, ... n_x ($x \leqslant 16$).

PRODUCT IDENTIFICATION

The LA120 terminal automatically transmits an answer to the ANSI standard request for device attributes escape sequence.

The following escape sequence is used to cause the LA120 to transmit its product identification escape sequence.

ESCAPE SEQUENCE:	FUNCTION/COMMENTS:
ESC [C	LA120 transmits ESC [? 2 c

ALTERNATE KEYPAD MODE

Alternate keypad mode allows application programs to differentiate between keystrokes performed on the optional numeric pad and those performed on the main keyboard so that the numeric pad may be used for commands or special functions.

Alternate keypad mode is controllable both by the operator, using the alternate keypad mode setup command, and by the programmer. If alternate keypad mode is disabled, the keys on the optional numeric keypad transmit the codes that correspond to the keycap legends. If alternate keypad mode is enabled, each of these keys transmits the escape sequence specified below.

Key	Code Transmitted	
	Normally	Alternate Keypad Mode
PF1	ESC O P	ESC O P
PF2	ESC O Q	ESC O Q
PF3	ESC O R	ESC O R
PF4	ESC O S	ESC O S
ENTER	Same as RETURN key	ESC O M
,	,	ESC O l
-	-	ESC O m
.	.	ESC O n
0	0	ESC O p
1	1	ESC O q
2	2	ESC O r
3	3	ESC O s
4	4	ESC O t
5	5	ESC O u
6	6	ESC O v
7	7	ESC O w
8	8	ESC O x
9	9	ESC O y

The following escape sequences are used to control alternate keypad mode.

ESCAPE SEQUENCE:	FUNCTION/COMMENTS:
ESC =	Enable alternate keypad mode.
ESC >	Disable alternate keypad mode.

• CONTROL CHARACTERS

The LA120 receives the following control characters and responds accordingly.

Code	Mnemonic	Name
000	NUL	Null
003	ETX	End Of Text
004	EOT	End Of Transmission
005	ENQ	Enquiry
007	BEL	Bell
010	BS	Backspace
011	HT	Horizontal Tabulation
012	LF	Line Feed
013	VT	Vertical Tabulation
014	FF	Form Feed
015	CR	Carriage Return
016	SO	Shift Out
017	SI	Shift In
020	DLE	Data Link Escape
030	CAN	Cancel
032	SUB	Substitute
033	ESC	Escape
177	DEL	Delete

Control characters not listed above are always ignored when received by the LA120.

NULL OR DELETE (NULL or DEL)

The null and delete characters cause no operation but are different from ignored characters in that they are disposed of without occupying space in the character buffer. Thus they are truly equivalent to idle marking time.

END OF TEXT OR TRANSMISSION (ETX or EOT)

Either an **ETX** or **EOT** (but not both) communication control character is recognized as a line turnaround character in half-duplex, if so designated; otherwise **ETX** and **EOT** are ignored.

ENQUIRY (ENQ)

The LA120 automatically transmits its answerback message upon receipt of **ENQ**.

BELL (BEL)

The bell character sounds a 2400 Hertz tone.

BACKSPACE (BS)

The backspace character decrements the active column, unless the active column is at the left margin, in which case the backspace character is ignored.

HORIZONTAL TAB (HT)

The horizontal tab character advances the active column to the next horizontal tab stop greater than the current active column but no greater than the right margin. If there is no such tab stop, the active column is advanced to the column after the right margin.

LINE FEED (LF)

The linefeed character increments the active line, unless the active line is at the bottom margin, in which case it sets the active line to the top mar gin of the next page. If linefeed newline mode is enabled, the active column is set to the left margin.

VERTICAL TAB (VT)

The vertical tab character advances the active line to the next vertical tab stop greater than the current active line but no greater than the bottom margin. If there is no such tab stop, the active line is set to the top margin (on the next page). If linefeed newline mode is enabled, the active column is set to the left margin.

FORM FEED (FF)

The form feed character advances the active line to the top margin of the next page, which may or may not be the physical top of form. If linefeed newline mode is enabled, the active column is set to the left margin.

CARRIAGE RETURN (CR)

The carriage return character returns the active column to the left margin. If carriage return is selected as the printer newline character, the active line is incremented.

SHIFT IN (SI)

The shift in character shifts the printer to the primary character set. If no secondary character set (such as APL) is installed, then this command has no effect.

SHIFT OUT (SO)

The shift out character shifts the printer to the secondary character set. If no secondary character set (such as APL) is installed, then this command has no effect.

DATA LINK ESCAPE (DLE)

If the LA120 is operating in half duplex with **EOT** turnaround, the data link escape character, when received or transmitted immediately prior to an **EOT**, causes the **EOT** to be interpreted as a disconnect request. If the LA120 is operating in any other full or half duplex mode, then the **DLE** character has no effect.

CANCEL (CAN)

The cancel character terminates any pending escape sequence and causes the sequence to be ignored.

SUBSTITUTE (SUB)

The substitute character is interpreted as being in place of a character received in error. Characters which are received with parity errors are converted to the **SUB** character. If characters are ever lost due to input buffer overflow, a **SUB** character is placed in the input buffer at that point. The **SUB** character is printed as the following graphic symbol:

The **SUB** character also has the effect of a cancel character.

ESCAPE (ESC)

The escape character is interpreted as an introducer of an escape sequence. Escape sequences are described in detail in their own section of this chapter.

• APL CHARACTER SET

The optional APL character set is selectable by the **SO** control character, independent of the national character set which is in use. The **SI** control character returns the printer to the previously selected national character set.

For the APL keyboard to work properly the keyboard character set must have been set by the operator to United States or Great Britain.

The APL character set is shown below.

Code	Char	Code	Char	Code	Char
040	space	100	⁻	140	
041	"	101	⍺	141	A
042	)	102	⊥	142	B
043	<	103	∩	143	C
044	≤	104	L	144	D
045	=	105	ε	145	E
046	>	106	_	146	F
047	]	107	∇	147	G
050	∨	110	∆	150	H
051	∧	111	⍳	151	I
052	≠	112	⋄	152	J
053	÷	113	'	153	K
054	,	114	⍞	154	L
055	+	115	⌈	155	M
056	.	116	⍵	156	N
057	/	117	⍵	157	O
060	0	120	⍟	160	P
061	1	121	?	161	Q
062	2	122	⍴	162	R
063	3	123	⌊	163	S
064	4	124	~	164	T
065	5	125	↓	165	U
066	6	126	∪	166	V
067	7	127	⍹	167	W
070	8	130	⊃	170	X
071	9	131	↑	171	Y
072	(	132	⊂	172	Z
073	[	133	←	173	{
074	;	134	⊢	174	
075	×	135	→	175	}
076	:	136	⍸	176	$
077	\	137	+		

• FORM SET-UP EXAMPLE

All of the form control features available to the operator in set-up mode can also be transmitted to the LA120 using escape sequences. The form illustrated in Chapter 2, Part 2 could be set up using the following escape sequences.

ESCAPE SEQUENCE:	FUNCTION/COMMENTS:
ESC [1 z	Selects 6 lines per inch.
ESC [66 t	Sets form length to 66 lines and sets top-of-form at current line.
ESC [4 ; 58 r	Sets top margin at line 4 and bottom margin at line 58.
ESC [4 g	Clears all vertical tabs.
ESC [8 ; 20 ; 25 ; 45 v	Sets vertical tabs at lines 8, 20, 25 and 45.
ESC [1 w	Sets horizontal pitch to 10 characters per inch.
ESC [3 ; 82 s	Sets left margin to column 3 and right margin to column 82.
ESC [2 g	Clears all horizontal tabs.
ESC [10 ; 21 ; 41 u	Sets horizontal tabs at columns 10, 21 and 41.

• SYNCHRONIZATION

When the LA120 receives a character (other than the fill characters, **NUL** and **DEL**), it stores it in its 1000 character input buffer. When the printer is ready, characters are fetched from the input buffer and printed. If the printer falls behind by more than about 1000 characters, the input buffer overflows and data is lost. There are three ways to avoid buffer overflows.

1. Send data only as fast as it can be printed. When receiving data at 1200 baud or less, the LA120 can keep up with normal character sequences. Very short lines and multiple form feeds cannot be printed this fast. Fill characters may be used to slow the effective data transmission speed in these cases. Fill time formulas are given below.

2. Limit the length of your message to the LA120's input buffer size. If the buffer is empty at the beginning of your transmission, you can end a message of about 1000 characters without having to worry about buffer overflow.

3. Use a terminal synchronization protocol, such as **XON/XOFF** or restraint mode. Using a synchronization protocol, the LA120 can tell the data source when to pause in sending data and when to resume. Synchronization allows maximum throughput and eliminates the need for fill character calculations and message size limits.

When synchronization is used, the LA120 constantly monitors the number of characters stored in its input buffer. When the number of characters exceeds a "high water mark," the LA120 signals the data source to temporarily pause. Meanwhile, the printer continues to take characters out of the input buffer. When the number of characters remaining is less than a "low water mark," the LA120 signals that transmission may resume. The values used for the high and low water marks are selected by the buffer control set-up command.

The LA120 also sends a pause signal when the printer is not ready due to error conditions or operator actions. Running out of paper or detecting a print head jam can cause a pause request to be sent. The operator can induce a pause request by opening the cover or entering set-up mode.

The pause and resume signals to the data source are sent either or both of two ways:

1. Using the control characters **XON** (octal code 021) and **XOFF** (octal code 023)

2. Using the EIA-level line called restraint.

Restraint mode operation is suited for local, hardwired installations, especially when the LA120 is used as a serial line printer replacement. Restraint mode is selected using set-up commands: "S" (secondary channel) must be "1" (enabled) and "M" (modem/protocol) must be "1" (full duplex, no EIA controls).

XON/XOFF is suitable for either local or remote operation, so long as the connection is full duplex. To select **XON/XOFF** operation the "X" set-up must be set to "1" (enabled). The **XON/XOFF** protocol is complicated by the fact that the synchronization characters may be interspersed between the characters typed at the LA120 keyboard. The operator can tell the data source to pause by typing **XOFF** (control S) and to resume by typing **XON** (control Q). To make sure that neither the buffer controller's nor the operator's pause requests are lost, typed characters may be transmitted with an **XOFF** character immediately following.

SYNCHRONIZATION LIMITS

"B" set-up choice	Low limit	High limit
0 (small)	50 chars	60 chars
1 (large)	256 chars	576 chars

FILL TIME FORMULAS

Horizontal Movement –

Includes horizontal tabs and horizontal positioning escape sequences. First convert to actual number of columns moved, then allow:

15 milliseconds for each of the first ten columns
(30 milliseconds in double-width pitches)
5.5 milliseconds for each additional column
(11 milliseconds in double-width pitches).

Vertical Movement –

Includes linefeeds, vertical tabs, form feeds, and vertical positioning escape sequences. First convert to actual number of lines moved, then allow:

33 milliseconds for the first line moved up to 1/6 inch
135 milliseconds for each additional inch.

Communication

COMMUNICATIONS

• MODEM CONTROL PROTOCOLS

FULL DUPLEX

There are two basic modes of full duplex operation – full duplex w/EIA control and full duplex w/o EIA control. While on line both modes allow simultaneous transmit and receive with the LA120 generating the signals DTR and RTS. Full duplex w/EIA control subjects the line to valid modem signals before enabling receive of transmit, and the hang up conditions listed below. In full duplex w/o EIA control, transmission and receive are always enabled if on line.

FULL DUPLEX BREAK

A full duplex break asserts a 233 ms space on the transmit data line if transmission is enabled. If transmission is disabled, the break will remain pending until transmission is enabled or a disconnect is generated.

FULL DUPLEX HANG UP

Hanging up the phone to disconnect from the line is accomplished by dropping DTR for 70 ms, and resetting all control lines to their initial state.

There are three functions that can generate a disconnect.

1. Connection is not established within 20 seconds of a ring indication. (Connection is defined as the assertion of DSR and RLSD.)
2. Connections are established, and either ring asserts, DSR drops, or RLSD drops for 5 seconds.
3. An EOT is received while auto disconnect is selected.

Also a long break disconnect can be generated from the keyboard. This produces a space on the transmit data line and the dropping of DTR for 3.5 seconds.

RESTRAINT MODE

When in either of the full duplex modes, the restraint line (determined by secondary channel setup = 1) is controlled. With restraint mode selected, the LA120 controls the secondary request to send line to signal an approaching input buffer overflow. This function is analogous to x-on/x-off. This signal represents the status of the input buffer only, not a receive ready state. DTR and restraint are used to determine the receive state of the LA120.

When the speed control lines are to be used, restraint is disabled. These lines exchange speed information between the LA120 and the modem.

• SPEED CONTROL MODE

SPEED CONTROL MODE

The speed lines are controlled when secondary channel setup = 0.

The LA120 will assert the secondary request to send line if the operator selected baud rate is 1200 baud or higher. The LA120 will force an operating baud rate of 1200 baud if the secondary carrier signal is asserted via the modem. These speed selects are intended for Bell 212A modem operation.

HALF DUPLEX

Due to the 'one at a time' definition of half duplex, elaborate protocols (compared to full duplex) are needed to define who should transmit at any given time. Each time the transmitter and receiver exchange functions, the line is "turned around." This basically consists of the switching of who asserts RTS, which reverses the transmit/receive mode of the modem and switches the carrier generation from one end to the other.

Also, when echo suppressors are on the line, it is necessary to turn them around in order to attenuate in the opposite direction. The LA120 incorporates three methods of controlling line turnaround. In supervisory control mode the host controls all line turnarounds by manipulating the secondary control lines. Reverse channel is mandatory for this mode. The two other protocols (coded control w/reverse channel and coded control w/o reverse channel) allow the transmitting device to control line turnaround, using specific control characters. If reverse channel is used, these lines provide confidence as to the fate of the transmitted data. Without these signals the transmission is "blind."

INITIAL DIRECTION DETERMINATION

When the terminal is initially put on line, data can neither be transmitted or received. When the terminal is called, ring will assert before DSR. In auto answer mode most modems will answer the call (go off hook) before asserting DSR, although some modems allow DSR to assert after a couple of rings but before the call is answered. With this sequence the terminal attempts to establish receive mode. If the terminal operator is initiating the call, DSR will assert when the modem is placed into data mode. Since DSR is asserted without ring indicator the terminal attempts to enter transmit mode.

REVERSE CHANNEL

Reverse channel is used for transmission of supervisory or error control signals. These signals flow in the opposite direction to which data is being transferred. Due to the relative lower bandwidth of the reverse channel (to the forward channel), it is not used for data exchange.

TURNAROUND CHARACTERS

There are two turnaround characters currently in use – EOT or ETX. These characters initiate the line turnaround when received or transmitted. Any character sent after the turnaround character will be lost. To eliminate the operator from generating the turnaround control code, the terminal may automatically send the control code after a carriage return is keyed.

HALF DUPLEX BREAK

The half duplex break operates in three modes:

1. Transmit mode (RTS true) – a space on the transmit data line for 233 ms.

2. Receive mode (RTS false) – a space on the SRTS line for 233 ms. When operating with 'coded-no reverse channel' the break is ignored when in receive mode.

3. While switching modes – if neither receive or transmit is enabled, the break will not be processed until a definite line direction is established.

LOSS OF DATA SET READY

When DSR is lost, all control lines are set to their initial state.

HALF DUPLEX HANG UP

Hanging up the phone to disconnect from the line is accomplished by dropping DTR for 70 ms, and resetting all control lines to their initial state.

There are five line conditions that will cause a DTR disconnect.

1. Line connection is not established within 20 seconds of a ring indication. (Connection is defined by the assertion of DSR and RSLD.)

2. When initiating a call with reverse channel, SRLSD is not asserted within 5 seconds.

3. Line turnaround is not complete within 5 seconds.

4. Valid line direction is established and ring asserts or DSR drops.

• MODEM SETUP FEATURE DESCRIPTION

GENERAL

The LA120 modem feature offers five different communication choices. Choices 1 and 2 are full duplex while 3, 4, and 5 are half duplex. For each choice there are several possible combinations of setup features. The following is a description of each modem choice, followed by a table illustrating the modem choices in combination with other applicable setup features.

MODEM 1

This full duplex choice is to be used when there are no meaningful modem signals being sent to the LA120, with the exception of receive data. With this choice the LA120 constantly asserts DTR and RTS. The primary situations for this mode are:

1. Current loop interface on LA120
2. Null modem operation
3. Full duplex modems or acoustic couplers where data set ready or carrier detect are not available.

NOTE
If modem = 1, the modem will not recognize paper out, head jam, cover open or any other disconnect associated with data terminal ready.

MODEM 2

This full duplex choice supports a full modem interface. Some of the equipment commonly used in this mode are the following.

1. Bell 103 modems and acoustic couplers/modems that emulate 103 modems with regard to DSR, carrier and ring.
2. Vadic 3400 full duplex modems.
3. Bell 212A modems (see Speed Control information in this chapter).

In this mode DTR is always asserted, except during the 70 ms or 3.5 second disconnects (described previously in the Full Duplex Hang Up paragraph). The terminal will not be ready to receive or transmit until a valid terminal/modem link is established using the proper modem signals.

NOTE
Local Echo (setup E) – The majority of full duplex systems (hosts) echo the character keyed back to the terminal in order to have it printed. However, this is totally a host system configuration parameter and not a function of the full or half duplex communication link. If the system does not echo the characters keyed, local echo should be enabled.

HALF DUPLEX

The following three half duplex modes require a Bell 202C, 202S or equivalent modem/acoustic coupler. The M setup defines the actual protocol to control line turnaround. The proper protocol is totally dependent on the host computer and the following questions should be asked of a knowledgeable host computer representative:

1. Is the turnaround controlled by the host (supervisory) or are control codes used to control the line (coded control)?

   If Supervisory is used, set Modem = 3 and skip questions 2 and 3.
   If coded control ask:

2. Which character is used for turnaround?

   If the character is EOT set Modem = 4.
   If the character is ETX set Modem = 5.

3. Is the secondary channel used?

   Yes – set S = 1
   No – set S = 0

MODEM 3

This is the first of three half duplex modes, commonly referred to as supervisory mode. The host controls all line turnarounds by controlling the primary and secondary channels. The LA120 responds by switching between receive and transmit states and indicating that state to the host. No turnaround characters are sent or interpreted with this mode. Secondary channel is mandatory for this mode, therefore setup S is ignored.

MODEM 4

In this half duplex mode, line direction is controlled by the transmitting device. When an EOT is sent from the transmitter (host or terminal), both ends change state. An EOT is sent after a carriage return code is sent via the RETURN key on the LA120 in order to cause a turnaround without the operator having to enter the control code. A disconnect will be generated whenever a DLE/EOT pair is received or transmitted.

MODEM 5

The final half duplex mode is basically the same as modem 4, but the character used to control line turnaround is an ETX. This character is transmitted for each line turnaround and is appended to a carriage return code generated via the RETURN key. A disconnect will be generated whenever an EOT is received or transmitted.

Summary of Modem Features

LA120 Setup Features								
Modem Setup Choices	**Auto Answer-back**	**Buffer Control**	**XON/ XOFF**	**Auto Disconnect**	**Local Echo**	**HDX Initial Calling State**	**Secondary Channel**	**Break Action**
1 (FDX No Modem, XON/XOFF Enabled)	Off	As required	Enabled	Off	As required	No effect	As required	As required
1 (FDX No Modem, XON/XOFF Enabled)	Off	No effect	Disabled	Off	As required	No effect	As required	As required
2 (FDX Modem, XON/XOFF Enabled)	As required	As required	Enabled	As required	As required	No effect	As required	As required
2 (FDX M Modem, XON/XOFF Disabled)	As required	No effect	Disabled	As required	As required	No effect	As required	As required
3 (HDX Modem	As required	No effect	Disabled	As required	On	Transmit	No effect	As required
4 (HDX Modem)	As required	No effect	Disabled	As required	On	As required	As required	As required
5 (HDX Modem)	As required	No effect	Disabled	As required	On	As required	As required	As required

Options

20 mA LA12X-AL OPTION

• INTRODUCTION

The 20 mA loop option allows the terminal to communicate directly with the computer up to a distance of 304.8 m (1000 ft) without the use of a modem.

• INSTALLATION

The 20 mA LA12X-AL option kit contains the following items.

Item No.	Quantity	Description	Part Number
1	1	20 mA External interface cable	BC05F
2	1	20 mA Assembly (logic board)	AD-7016059-0-0
3	1	20 mA Harness assembly	AD-7016186-0-0
4	2	Screw, hex head slotted #8-32, 0.38 long	9009988-08
5	2	Washer, lock, ext. tooth #8	9008072-00

Install the 20 mA option as described in the following steps:

1. Set the TRANS switch (following figure) on the 20 mA assembly to the NORMAL position. (If the LA120 must provide the current to the transmit line set the switch to the ACT position.)

2. Set the REC switch to the NORMAL position. (If the LA120 must provide current on the receive line set switch to the ACT position.)

3. Lower the rear cabinet door on the LA120.

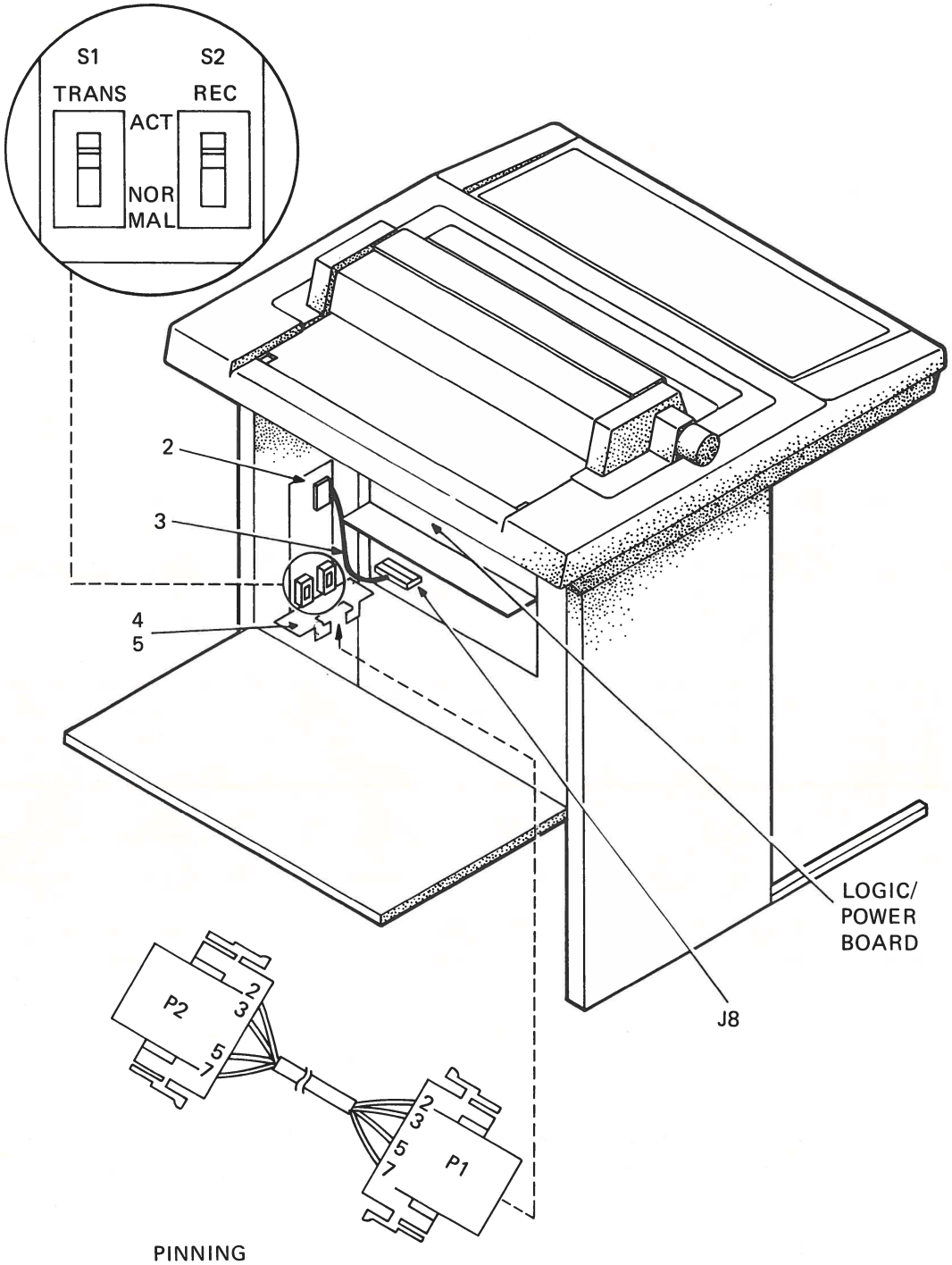
4. Disconnect and remove any previously connected plug from J8 on logic/power board.

5. Slip the 20 mA assembly (2) up through the hole in the floor of the cabinet and secure with two hex head screws (4) and washers (5).

6. Connect the 20 mA harness assembly (3) between the jack on the 20 mA logic board and J8 on the logic/power board.

7. Place the LA120 in setup and select the following features:

   Modem = 1 (FDX, no modem)
   Auto Disconnect = 0 (OFF)



PINNING

FROM	TO
P1-2	P2-3
P1-3	P2-2
P1-5	P2-7
P1-7	P2-5

MA-2320

TEST AFTER INSTALLATION

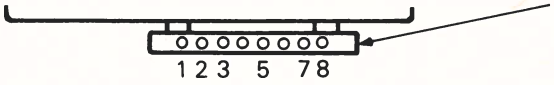
Send data to the LA120. The printout should verify a correct installation.

ELECTRICAL CHARACTERISTICS

The electrical characteristics of the 20 mA current loop interface are shown below.

PIN ASSIGNMENTS

1 – TEST NEGATIVE
2 – TRANSMIT –
3 – RECEIVE –
5 – TRANSMIT +
7 – RECEIVE +
8 – PROTECTIVE GROUND



20mA CURRENT
LOOP CONNECTOR

MA-2323

Transmitter

	Min	Max
Open circuit voltage	5.0 V	50 V
Voltage drop marking	–	4.0 V
Spacing current	–	2.0 mA
Marking current	20 mA	50 mA

Receiver

	Min	Max
Voltage drop marking	–	2.5 V
Spacing current	–	3.0 mA
Marking current	15 mA	50 mA

Pin Assignments

1 – Ground
2 – Transmit –
3 – Receive –
5 – Transmit +
7 – Receive +
8 – Protective ground

Ordering Information

HOW TO ORDER SUPPLIES AND ACCESSORIES

• GENERAL

All DIGITAL printer terminals offer improved quality printing and forms-handling versatility. DIGITAL offers a variety of supplies to enhance terminal reliability and make operation easier.

DIGITAL's dye-based ribbon is especially matched to the print heads to eliminate the abrasive problems of carbon- and clay-based ribbons. A carbon-based ribbon tends to wear print head wires and eventually causes poor character legibility. Precise matching of ribbon material characteristics and the printing method serve to further lengthen print head operating life.

DIGITAL has the paper needed to accommodate up to 132-column print capability and multipart paper adjustments.

To eliminate costly printer down-time associated with improperly stacked paper, DIGITAL offers paper collectors that increase printer and operator efficiency by automatically folding and stacking fanfold paper.

LAXX-KB CASTERS

This set of casters attaches to the rear of the cabinet to facilitate terminal mobility.

LAXX-NC PAPER BASKET

New deep basket is designed to fit all the DECwriter terminals. The basket neatly collects and stacks printer paper as it feeds through the printer. The steel constructed unit is 12 inches long, 16 inches wide, and 13 inches high. It holds up to one complete box of paper. It is shipped with brackets and instructions for easy attachment.

LAXX-KD WIRE SHELF

Wire paper shelf is designed specifically for the LA36 terminal and collects fanfold paper as it feeds through the printer. The shelf is 10-1/2 inches long, 18 inches wide, and 2 inches high. No tools or screws are required for attachment, and instructions are included.

LAXX-KC WORK SURFACE SHELF

Durable surface shelf attaches to either the left or right side of the terminal and provides convenient work space to accommodate data printouts, printer paper, manuals, etc. The shelf is 24 inches long and 15-1/4 inches wide. It is shipped with the necessary bars, screws, and instructions for easy attachment.

LAXX-KA ACCESSORIES KIT

Kit includes the following accessories

1 LAXX-KB caster set
1 LAXX-KD work surface shelf
1 LAXX-KD wire shelf

The kit is shipped with necessary brackets, screws, and instructions for easy attachment.

H981-A COPY HOLDER

Copy holder improves efficiency, accuracy, and typing speed by furnishing space for viewing reference data at eye-level. The copy holder clamps on a desk or table. Minimum eye movement is required as the flexible arm adjusts to the desired position. Attach the copy holder to the LAXX-KC work surface shelf for convenient data reference while using the printer.

12-12375 DUST COVER

The clear vinyl dust cover protects the terminal when not in use.

36-09141-00 PAPER

Single-part, white, lined, fanfold 132-column, 14-7/8 X 11 inches, 2000 sheets per box.

36-09829 PAPER

Single-part, white, lined, fanfold, 80-column, 9-7/8 X 11 inches, 2000 sheets per box.

36-05361 PAPER

Single-part, white, lined, fanfold, 72-column, 8-1/2 X 11 inches, 2000 sheets per box.

MULTIPART FORMS

All forms are white, lined, fanfold, 14-7/8 X 11 inches.

36-09141-01	Two-part paper (1600 sets/box)
36-09141-02	Three-part paper (1000 sets/box)
36-09141-03	Four-part paper (750 sets/box)
36-09141-04	Six-part paper (500 sets/box)

36-12153-01 RIBBON

DIGITAL-specified nylon ribbon is designed to produce excellent print quality and lengthen print head operating life. Ribbon measures 0.5 inch wide and 60 yards long. Ribbons come individually sealed, 12 per box.

• ORDERING

Purchase orders for supplies and accessories should be forwarded to:

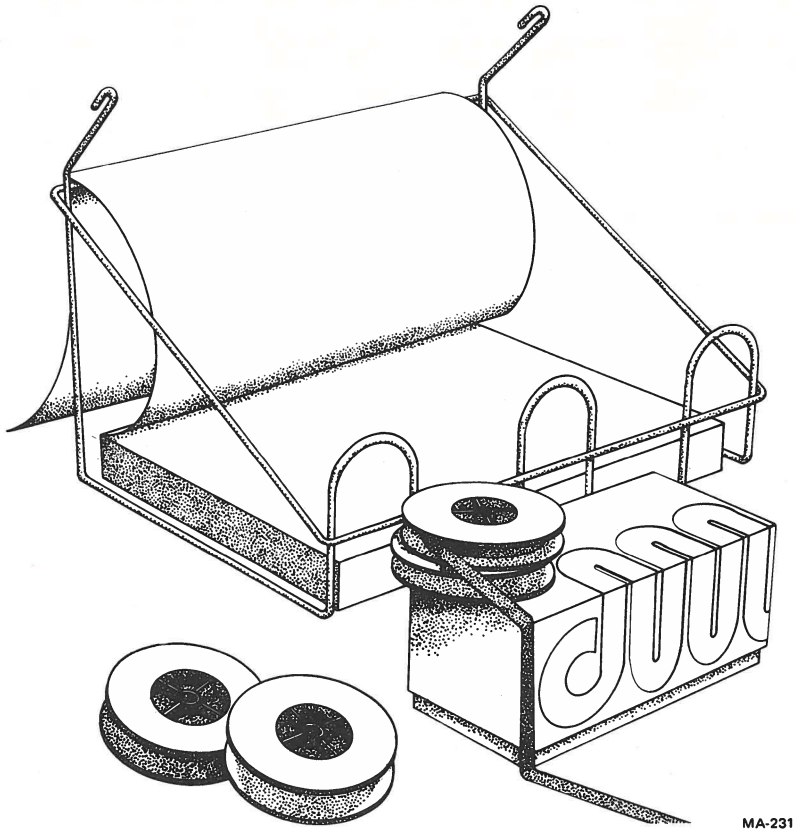
Digital Equipment Corporation
Supplies and Accessories Group
125 Northeastern Boulevard
Nashua, New Hampshire 03060

Contact your local sales office or call DIGITAL Direct Catalog Sales toll-free (800-225-9480) from 8:30 a.m. to 5:00 p.m. Eastern Standard Time (U.S. customers only). Massachusetts customers should dial (617) 481-7400.

Terms and conditions include net 30 days and FOB DIGITAL plant. Freight charges will be prepaid by DIGITAL and added to the invoice.

Minimum order is $35.00. Minimum does not apply when full payment is submitted with an order.

Checks and money orders should be made out to Digital Equipment Corporation.



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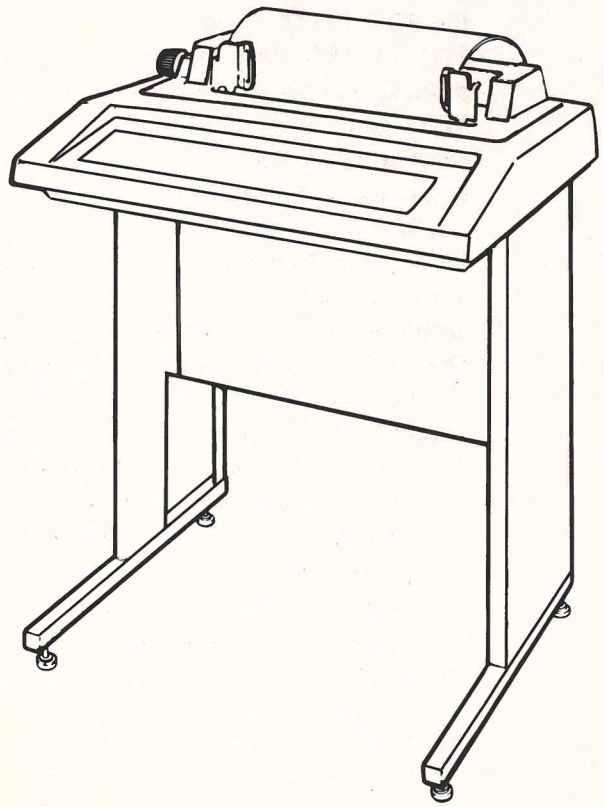
OTHER TERMINALS

The terminal is the vital link between the user and the power of the computer. Often the right terminal, or the right enhancement to your terminal can make your work easier, or more efficient, or more cost effective. For that reason, Digital offers a full range of video and teleprinter terminals and options that can help you tackle any application.



30 CHARACTER PER SECOND KEYBOARD PRINTER

The LA36 DECwriter II Keyboard/Printer Terminal is a fast, reliable operation with the best price/performance ratio of any 30-cps teleprinter in the industry. It's equally at home in communications applications or computer console applications. True 30-cps throughout, quiet 48 db operation, variable vertical forms adjustment, up to six-part, variable-width forms handling, and lots more.

VIDEO TERMINAL

For the ultimate in video terminals, look to Digital's VT100. It combines exceptional versatility with simplicity of operation. And it's designed to allow a wide range of fast and easy field upgrades to meet your changing needs.
There's a detached typewriter-style keyboard with a flexible, 3-wire coiled cord. An 18 key numeric/function keypad on the keyboard permits single keystroke control of

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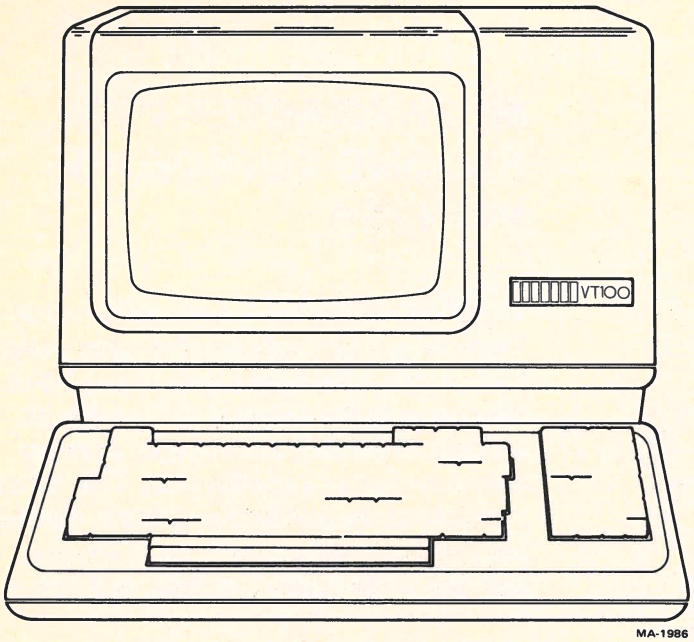
Components Group
One Iron Way
Marlboro, MA 01752

ATTN: Marketing Manager
MR2-2/M70



application-specific functions. The VT100 fits easily on a standard typewriter table.
There's an advanced video option that provides 132-column lines on the screen for easy viewing of wide-line printer reports. Double height/double width characters are selectable line by line for easier reading and text formatting. Smooth scrolling a scan at a time lets your operators read new lines at a reasonable speed. Divided-screen displays; blinking, underlining, double intensity and normal or reverse video character attributes; keyboard and/or computer-settable tab stops; built-in, self-test diagnostics; pictorial capability; and many, many more.

INTELLIGENT VIDEO TERMINAL

At the head of the VT100 class are Digital's intelligent PDT-11 terminals. The PDT family includes three programmable data terminals: the PDT-11/110, the PDT-11/130, and the PDT-11/150. With their PDP-11 compatible processors and RT-11 operating system, the PDTs permit you to draw on a wide range of existing software.
Local mass storage is available on the PDT-11/30 in the form of 511K bytes of storage provided in dual mini-cartridges. Housed within the same VT100 shell, these mini-cartridges are file-structured system devices.
The PDT-11/150 lets you combine the functionality of the PDT-11 with the dual floppy disk storage of any Digital terminal. With its 4 ports, the 11/150 allows considerable system expansion. Add a terminal controller if you want the flexibility of up to 4 terminals. For hardcopy, add a printer to the printer port. There's a third port for an EIA link to a host computer.
There's lots more to tell about these exciting terminal products. If you'd like more information on any of these products, just fill out the card below.

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I'd like to know more about the products checked below.

- ☐ LA36 DECwriter II
- ☐ VT100
- ☐ PDT Intelligent Terminal Family
- ☐ Please keep me on your mailing list for new products.

NAME_____

TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____ ZIP_____

INSTALLATION, WARRANTY, AND SERVICE INFORMATION

INSTALLATION/WARRANTY

If purchased directly from DIGITAL: Reference the sales agreement for installation and warranty terms purchased with this TERMINAL.

If purchased, leased, or rented from a vendor other than DIGITAL: Contact your vendor for information regarding installation and warranty terms purchased with this TERMINAL.

DIGITAL SERVICES

A wide range of maintenance and customer services are available from DIGITAL for your TERMINAL. Through use of these services, you can design a plan which meets your service needs, from complete DIGITAL maintenance to complete self-maintenance. Vendors supplying DIGITAL PRODUCTS may use these services as factory backup support.

On-Site Service

Repairs are performed at the equipment site by a Terminal Service Specialist. These specialists, located in our field offices, are specially trained to provide responsive, high quality maintenance on DIGITAL terminals.

Service Agreement – Provides a fixed monthly charge which covers all maintenance needs. Includes: priority response; all repairs performed during the contracted hours of coverage; materials, labor, and travel.

Per Call – Service provided on a time and materials basis.

Off-Site Service

Field Service has two types of facilities that provide off-site repair services. The Customer Returns Area (CRA) in Woburn, Massachusetts, and 17 Field Product Repair Centers (PRCs) located worldwide. These repair facilities have been designed for those DIGITAL customers who have a level of technical expertise but require Field Service assistance for repairing components. The following post-warranty services are provided through these facilities:

- Module Mailer (CRA)
- Loose Piece Module Repair (CRA)
- Fixed Price Repair (CRA/PRC)
- Refurbishment (PRC)

Spare Parts – DIGITAL's Customer Spares group offers support to our customers performing any level of TERMINAL maintenance. Available through this group are:

- Spare parts, spares kits, tools, and test equipment
- Recommended spares listings, developed specifically for your need and equipment. This service is at no charge.
- Maintenance documentation
- Emergency parts service.

Training – Educational Services offers hardware maintenance courses in any of the 17 worldwide training centers or on your site depending on your location.

Terminal Supplies – DIGITAL offers a variety of supplies to enhance terminal reliability and make operation easier. Everything from furniture accessories, (cabinets, tables, etc.) to terminal supplies such as paper, ribbons, diskettes, cassettes, labels, and many other items as illustrated in the Supplies Brochure. All orders may be placed via a toll-free number (800-258-1710) and will be processed within 24 hours (U.S. only with the exception of Hawaii and Alaska).

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