MODEL 1251 /1245

USER'S MANUAL

MODEL 1251/MODEL 1245
CRT Terminal
Manual

Publication 59300-0052-00

September, 1980
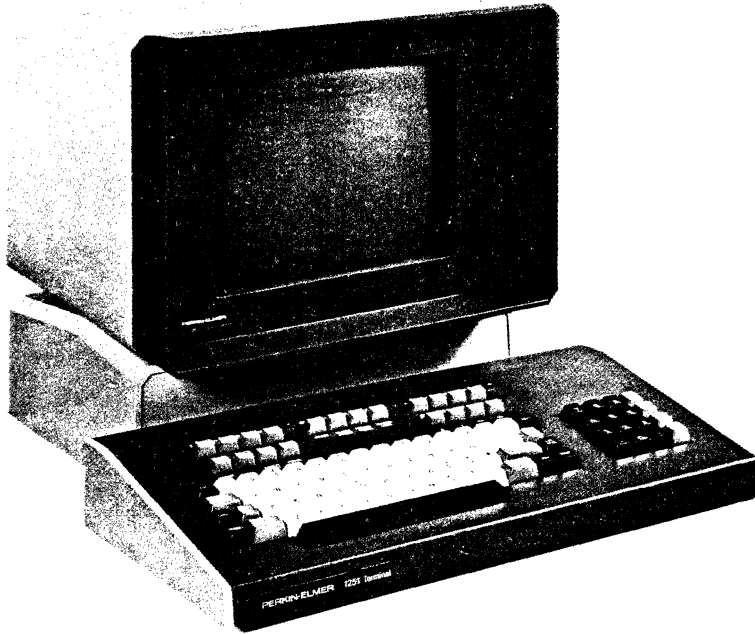
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Model 1251 and the Model 1245 CRT Terminals.
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Related Model 1251/1245 Documentation:
Model 1251/1245 Maintenance Manual 59300-0053-00

MODEL 1251/1245

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Model 1251

SECTION 1
INTRODUCTION

1.1 General Description

The Perkin-Elmer Model 1251/1245 is a sophisticated micro-processor driven video display editing terminal that combines thoughtful "human engineering" with numerous advanced features.

The Model 1251/1245 offers:

* Eye-level, tiltable screen for minimum muscle strain.

* White or optional green CRT screen, etched and hooded for unsurpassed glare rejection.

* Descenders on lower case letters for easy reading.

* Full set of video attributes for maximum highlighting, including underlined fields.

* Forms drawing character set for depiction of familiar business forms.

* A Status Line indicating terminal status as well as allowing two-way communications with the host without interfering the current operation.

* Your choice of two optional detachable keyboards.

* Optional Locking Keyswitch on the Extended Keyboard.

* Embedded numeric pad or dedicated numeric pad for fast, accurate numeric entry.

* Light Pen Option for quick data selection.

* Attractive but conservative styling.

* Silent operation.

* "Request To Send" Block Mode Transmission eliminates the need to reserve 2KB of host main memory for each CRT.

* "Read Modified Only" capability - by line, by message, or by page - reduces host time needed to determine what data the operator entered or changed.

* Truly programmable function keys eliminate the host time required to decode and issue the program calls; the function keys may be reconfigured by the operator or by the host (Model 1251 only).

* Control Protection (requires the simultaneous depression of the Control Key) or Lock Out provisions on various groups of keys prevent "accidental" key depressions.

* SELF TESTS

* "Read Status" transmission so that the host can detect if the keyboard is locked, optional printer is busy, parity error has occurred, etc.

* "Transparent" debugging mode, in which the Model 1251/1245 displays all the characters it receives, including control characters.

The Model 1251 features a non-volatile, configuration EAROM. On power-up, the Model 1251 operates according to configuration data that can either be entered by the operator or transmitted by the host. Four hundred characters in EAROM memory are reserved for definition of Function Key messages.

The Model 1245 features a configuration PROM. Upon power-up, the Model 1245 operates according to the configuration data stored in the PROM.

1.2 General Specifications

Physical

Dimensions	Monitor	Standard Keyboard	Extended Keyboard
Height	17 in.	3.25 in.	3.25 in.
Width	15 in.	15 in.	19 in.
Depth	14 in.	9 in.	9 in.

Weight

Unpacked	40 lbs. (18 kg.)
Shipping	50 lbs. (23 kg.)

Screen

Screen Capacity	2000 characters
Characters per line	80
Number of lines	25
Data Lines 24	
Status Line 1	
Screen Size	12 inches (diagonal)
Screen Color	Dark bodied P4 phosphor, high contrast (white).
Screen Surface	Direct etch with filter glass.
Displayable characters	160; Full 128 character ASCII set including control characters in transparent mode and 32 business form-drawing characters.
Character Matrix	9 X 12
Character Generation	7 X 11
Scans per line	12
Refresh Rate	60/50Hz non-interlaced
Tilt Range	+/- 5 degrees from vertical

Display

Normal	light characters on dark screen
Inverse	dark characters on light screen

Keyboard

Character Code	ASCII
Keyboard Layout	ASCII
Repeat Key Rate	15cps

Communications

Baud Rate	110, 300, 600, 1200, 2400, 4800, or 9600 (EIA or 20ma Current Loop)
Stop Bits	One or Two
Transmission	Full Duplex or Half Duplex
Parity	Space, Mark, Even, or Odd
Modem types supported:	Acoustic Coupler, 103J, 113D, 212A, and Direct Communication to the host.

Environmental

Operational	Ambient temperature range 0 to 45 degrees C up to 80% relative humidity.
Non-operational	Ambient temperature range -40 to 65 degrees C up to 95% relative humidity

Power

Standard	115V (90V-135V) @ 1.5 amp. 47Hz-63Hz. Consumption typically 100 watts (342 BTUs).
European	115V (90V-135V) @ 1.5 amp. or 230V (180V-270V) @ 0.7 amp. 47Hz-63Hz. Consumption typically 100 watts (342 BTUs).

1.3 Options

T70-202	Standard (sized) Keyboard includes embedded NUMERIC PAD
T70-203	Extended Keyboard includes separate NUMERIC PAD and four (shiftable to eight) additional Function Keys.
T70-204	Extended Keyboard with four-position Security Locking Keyswitch.
T70-221	Green Anti-Glare CRT
T70-240	Light Pen (includes four foot cord)
T70-293	20ma Current Loop Interface Adapter (requires T70-292)
T70-292	Current Loop Cable
T70-260/T70-270	FRENCH (AZERTY) Character Set/Keyboard capabilities (Extended Keyboard)
T70-261/T70-271	SWEDISH Character Set/Keyboard capabilities (Extended Keyboard)
T70-262/T70-272	DANISH Character Set/Keyboard capabilities (Extended Keyboard)
T70-263/T70-273	GERMAN Character Set/Keyboard capabilities (Extended Keyboard)
T70-264/T70-274	UNITED KINGDOM Character Set/Keyboard capabilities (Extended Keyboard)
T70-265/T70-275	SPANISH Character Set/Keyboard capabilities (Extended Keyboard)

1.4 Modes of Operation

Operation of the Model 1251/1245 terminal is controlled by the host computer and/or the keyboard and dependent on the various modes of operation available. Although several operating modes are mutually exclusive, the Model 1251/1245 may function within several modes concurrently.

CONVERSATIONAL MODE

This mode enables the terminal to transmit and receive data character-by-character in the same manner as a teletype.

In the CONVERSATIONAL Mode, a scroll type of representation may be employed. When the cursor is at the bottom line of the display and an attempt is made to advance to a new line, all data lines are advanced upward. The visual effect is an upward scroll with new data entered from the bottom line moving upward one line at a time.

When in the CONVERSATIONAL Mode, the terminal can be set to operate in half duplex or full duplex. In full duplex, the data transmitted through the keyboard does not appear on the screen unless the host computer is programmed to echo back the characters (Echoplex).

In half duplex, Echoplex is not required since a direct tie to the display electronics is effected. Queries and acknowledgements from both the host computer and the keyboard are displayed as entered. However, if the keyboard and host generate data simultaneously, the resultant display shows intermixed characters.

BLOCK MODE

In this mode, an entire block of data can be entered in display memory, edited, and then transmitted to the host. Transmission does not take place until the terminal receives a specific transmit command from either the keyboard (SEND) or the host computer (Read).

Editing, effected through the EDIT Mode (see below), consists of insertions and deletions of characters and/or lines, clearing and setting tab stops, and clearing a line, field, or page. Data transmission is effected as a line, a message, or an entire page depending on the configuration of the SEND key condition.

Within Block Mode, operation can be either Block Mode-Immediate or Block Mode-Request To Send.

REQUEST TO SEND

A special application of BLOCK Mode is Request To Send.

Request To Send is initiated by the receipt of the Multicode R sequence, from the host or via the keyboard.

As in BLOCK Mode-Immediate operation, data is entered and edited on the keyboard; data is stored in terminal memory. When the SEND key is depressed, however, the Request To Send terminator (defined in the Model 1251/1245 configuration) followed by an attention identifier (AID) character indicating the SEND key condition (Line, Message, or Page) is transmitted to the host.

At its convenience, the host program allocates necessary buffer storage and issues the proper READ Multicode sequence to initiate transmission.

The Request To Send application of BLOCK Mode allows the system designer to optimize fully the allocation of host time and memory.

Unless Request To Send is specified, the Model 1251/1245 remains in Block Mode-Immediate.

Polled Environment

The Model 1251/1245 terminals can perform within a system of polled terminals, thereby, utilizing many terminals. This does not require physical modification of the terminal or the purchase of any extra options. However, additional hardware (not provided by Perkin-Elmer), e.g., a modem splitter, may be required, according to the needs of the installation. Figure 1-1 is a flowchart that shows the host/terminal interaction in a polled environment. Further information is provided in Section 4.9.

Figure 1-1 Host/Terminal Interaction in Polled Environment
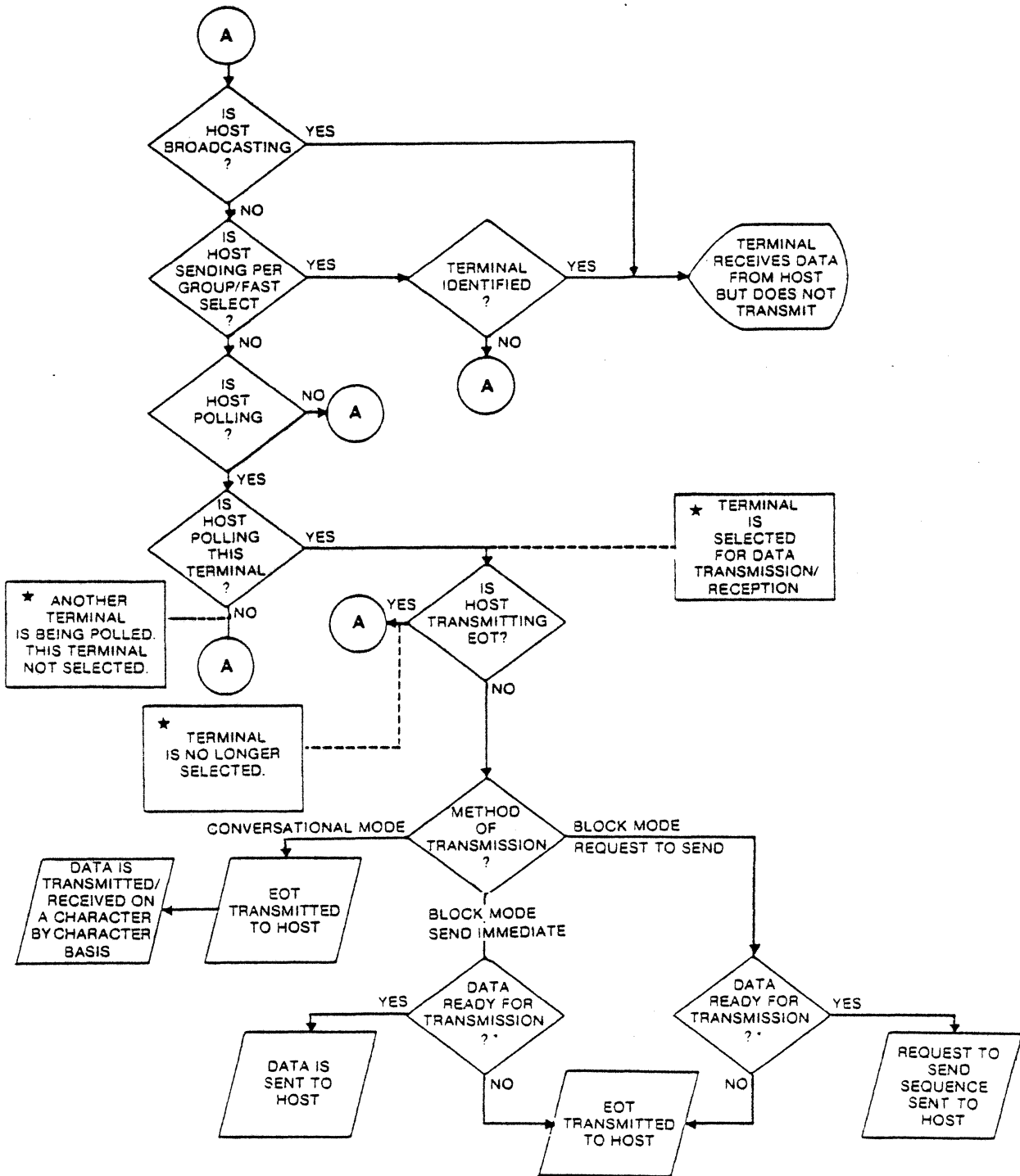
*Send Key Depressed?

LOCAL "MODE"

In the Local "mode", no data is transmitted or received over the line. Keyboard entries cause the appropriate action directly on the display. In all cases, display memory stores and displays all displayable input characters. The DEL character will be stored if it is preceded by the Multicode character. Control codes are displayed only in the TRANSPARENT Mode (see below).

EDIT MODE

Upon depression of the Edit key, the Model 1251/1245 terminal assumes the EDIT Mode. In this mode, Function keys F5, F6, F7, F8, F9, F10, F11, F12, and the shifted Function keys F17, F18, F19, F20, F21, F22, F23, F24, F25, F26, F27, and F28 take on Edit Mode operations upon depression. Through the EDIT Mode, the operator can perform editing functions as well as:

    alternately place the Model 1251/1245 on-line or off-line,

    enter the CONFIGURATION Mode,

    enter the PROGRAM Mode,

    enter the TRANSPARENT Mode,

    alternately place the Model 1251/1245 in BLOCK Mode or CONVERSATIONAL Mode,

    alternately enable or disable the Upper Case, Auto Line Feed, New Line, and Scroll features.

    transmit data to a printer, i.e., a PRINT key.

CONFIGURATION MODE

The operation of the Model 1251 terminal can be determined by entries made in the CONFIGURATION Mode. Furthermore, the CONFIGURATION Mode may be entered by either the operator through the EDIT Mode or the host computer through Multicode sequences. The Configuration of the terminal takes into account Mode options, Systems options, Communications options, Keyboard options, Printer Port options, Communication Terminator Definitions, and Function Key Definitions. For further information on the CONFIGURATION Mode, see Section 3.3.

TRANSPARENT MODE

In the TRANSPARENT Mode, control characters are displayed but
not acted upon, e.g., carriage return and line feed are
displayed as "CR" and "LF" respectively, but the cursor is only
advanced to the next position, not moved to column 1 nor
advanced by a line. The TRANSPARENT Mode is a useful
communications debugging tool.

Control characters are displayed as

         (illegible control character glyphs)   (Control Character; X '00' — X '1F')

The TRANSPARENT Mode may be entered through the EDIT Mode by a
depression of Function key F19 (F3 shifted) and exited in the
same manner. Control-P (DLE) followed by Control-B (STX) also
initiates the TRANSPARENT Mode; Control-P (DLE) followed by
Control-C (ETX) ends the TRANSPARENT Mode.

In the TRANSPARENT Mode, the screen is filled with either null
characters or spaces, depending on the Model 1251/1245
configuration. Also, the Scroll feature is disabled and the New
Line feature is enabled, regardless of configuration or
settings. All attribute characters are displayed in the
TRANSPARENT Mode. To display a DLE character, two DLE
characters must be entered.

NUMERIC MODE

For Model 1251/1245 terminals with the Standard Keyboard, a
ten-key numeric pad is superimposed on the ASCII keyboard. When
the NUMERIC Mode key is depressed, the ASCII functions of these
keys are disabled and the numeric values superimposed on these
keys are enabled.

The numeric pad superimposed on the ASCII keyboard is shown in
Figure 1-2.

Standard Keyboard

Extended Keyboard

Figure 1-2 Model 1251/1245 Keyboards

PROGRAM MODE

The PROGRAM Mode enables the programmer to arrange and organize
display data into fields, thus making transfer and display
operations easier for the operator. Fields are designated by
attribute characters which define the start of the field and,
consequently, the end of the previous field.

The PROGRAM Mode is initiated via the Edit Mode by a depression
of Function Key 18 (F2 shifted).

Using the Cursor Control keys, the programmer moves the cursor
to the desired positions to create attribute characters. In the
PROGRAM Mode, the SEND key may be used to create an attribtute
character. The programmer then enters a mnemonic indicating the
type of attribute character desired; more than one mnemonic may
be entered for combinations of field types.

The mnemonic or combinations of mnemonics selected determine the
type of field, specifying video and operational characteristics.
For example, the programmer may designate inverse video fields,
half intensity fields, non-display (security) fields, light pen
detectable fields, etc. Further information on screen fields is
provided in Section 4.6.

Another depression of Function Key 18 while the Model 1251/1245
is in the EDIT Mode alternately causes Model 1251/1245 to exit
the PROGRAM Mode.

FORM DRAWING

The Model 1251/1245, upon receipt of the ASCII SO character
(Control-N), enters a mode in which special form drawing
characters are displayed. These characters, thirty-two in all,
can be used to depict facsimiles of business forms on the
screen. When used in tandem with the various field types
acquired through the PROGRAM Mode, the Model 1251/1245 offers a
powerful repertoire of display techniques to increase operator
effeciency. This special mode is exited upon receipt of the
ASCII SI character (Control-O).

The form drawing character set is shown in Table 1-1.

Table 1-1 Form Drawing Character Set

b4	b3	b2	b1		X X O 0/2/4/6		X X 1 1/3/5/7	
O	O	O	O	0	@	—	P	└
O	O	O	I	1	A	│	Q	┌
O	O	I	O	2	B	┼	R	┐
O	O	I	I	3	C	┴	S	┘
O	I	O	O	4	D	┬	T	├
O	I	O	I	5	E	└	U	┤
O	I	I	O	6	F	┌	V	¢
O	I	I	I	7	G	┐	W	£
I	O	O	O	8	H	┘	X	÷
I	O	O	I	9	I	├	Y	>
I	O	I	O	A	J	┤	Z	<
I	O	I	I	B	K	—	[	→
I	I	O	O	C	L	¥	\	←
I	I	O	I	D	M	┼	]	↑
I	I	I	O	E	N	┴	^	↓
I	I	I	I	F	O	┬	─	

1.5 Optional Security Locking Keyswitch (T70-204)

The optional Security Locking Keyswitch, available only on the Extended Keyboard, provides a means of locking or unlocking the entire keyboard, only the EDIT key, or only the Function Keys without entering the Configuration Mode (in the case of the Model 1251).

The Security Locking Keyswitch is the only means the operator has of locking the entire keyboard. Also, the Security Locking Keyswitch is the only means the operator has of locking-out the EDIT key or the Function keys on the Model 1245.

The Security Locking Keyswitch is illustrated in Figure 1-3, below.

Figure 1-3. Optional Security Locking Keyswitch


```
                         KEYBD ON

KEYBD DISABLE ─┤    ( ● )    ├─ EDIT DISABLE

                       FUNC KEYS
                        DISABLE
```
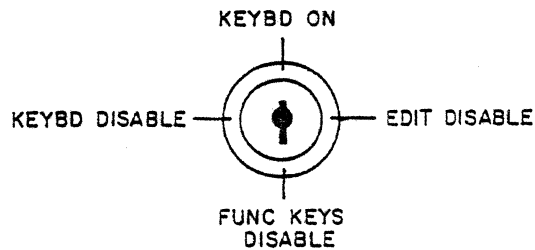
There are four positions:

KEYBD ON   All keyboard functions are operational.

KEYBD DISABLE   No keyboard functions are operational.

FUNC KEYS DISABLE   No Function Keys are operational.

                    NOTE: EDIT Mode functions will be disabled
                    because they involve the use of Function
                    Keys.

EDIT DISABLE   The EDIT key is not operational; Edit Mode
                    operations are, therefore, locked-out.

The key may be removed in any of these four locking positions.

SECTION 2
SELF TESTS

2.1 Introduction

The Model 1251/1245 features two Self-Test capabilities: one
for RAM and one for the keyboard. The terminal also features a
Diagnostic Test.

Note: To ensure proper Self-Test operation, the terminal should
be configured not to Control-Protect or Lock-Out the Carriage
Return and Line Feed keys.

2.2 RAM Self Test

The Model 1251/1245 RAM Self-Test is initialized by the sequence
Multicode ´ (apostrophe, i.e., SHIFT 7 - hex 27).

NOTE: The display of the Status Line should be enabled for the
Model 1251/1245 RAM Self Test.

The RAM Self Test tests screen and memory RAM. The test is
comprised of two parts: a Data test and an Address test.

DATA TEST
RAM is filled with a repeating pattern of characters. Each
character differs by one bit from the character immediately
preceding it and from the character immediately following it.

ADDRESS TEST
A hexadecimal mask is written into a specific address. All
other RAM addresses are filled with another character. Memory
is then searched for the mask. If the mask is found at any
other address, the test has been failed. The test is repeated
for every RAM address.

During the RAM Self Test, the screen will display various
patterns in the course of the test. These patterns are
displayed repeatedly and serve as an indication that the
terminal is currently performing the test.

There is an automatic loop to the beginning of the Self Test.
Any keyboard entry will terminate the RAM Self-Test.

A failed test terminates the RAM Self Test automatically. The
last pattern displayed will remain on the screen.

2.3 Keyboard Self Test

The Model 1251/1245 Keyboard Self-Test tests the keyboard encoder. This Self-Test should be performed with the terminal in "Local" Mode. If the Keyboard Self-Test is desired with the terminal on-line, then the terminal should be in Conversational Mode and the Communication Baud Rate should exceed 1200 baud for a true screen representation.

To enter the the Keyboard Self-Test, depress the Escape (ESC) and Backspace keys simultaneously.

The screen will fill with a scrolling display of 95 characters plus the non-display character, DEL.

To terminate the Keyboard Self-Test, depress the Escape (ESC) and Line Feed keys simultaneously.

2.4 Diagnostic Test

From the keyboard, the sequence Multicode : (character) fills the screen (including the Status Line) with the character entered. The next keyboard entry terminates this test.

From the Communication Line, the sequence MULTICODE : MULTICODE : activates a diagnostic test function used by Perkin-Elmer Test Personnel only. In the event that this sequence has been transmitted by the host, the terminal must be powered-down, then powered-up.

SECTION 3
Configuration

3.1 Introduction

The operation of the terminal is determined by its
configuration. The Model 1251 can be configured either by the
operator via keyboard entries or by the host through a sequence
of encoded data transmitted through the communication line. For
configuration by the host, the Model 1251 allows the host to
store the configuration parameters in either RAM (for temporary
use) or the EAROM (for permanent use).

The Model 1245 can only be RAM-configued (for temporary use)
only by the host through a sequence of encoded data transmitted
through the communication line. The configuration may also be
predetermined by an optional, factory-installed, Configuration
PROM. Upon power-up, the Model 1245 will be configured to the
parameters specified by the Configuration PROM.

In the event of various instances, e.g., an EAROM Checksum
Error, the terminal will assume Default Configuration
parameters. These are detailed in Section 3.5.

This Section deals with Configuration both by the operator and
by the host.

Section 3.2 describes the Configuration Options for both of
these cases.

Section 3.3 deals with Configuration by the operator.

Section 3.4 deals with Configuration by the host.

3.2 Description of Configuration Options

There are several types of options that are configured for terminal operation. The types of options are

      Keyboard Options
      Mode Options
      Systems Options
      Communications Options
      Printer Port Options
      Terminator Options
      Special Characters
      Function Key Definitions

These options are discussed in detail in the follwing pages. For convenience, the Configuraion options follow the Configuration Menu, Figure 3-1.

Keyboard Control
-------- -------

Certain keygroups may be designated as Control-Protected, that is, to operate, the Control Key must be depressed simultaneously with that key.

NOTE: The special use of Function Keys for operations in the Edit Mode, e.g., DEL CHAR, INS MODE, can not be Control-Protected.

   EDIT, ESC
   -------- ---

   Y: The EDIT and the ESC keys are control-protected.

   N: The EDIT and the ESC keys are not control-protected.

   CURSOR POSITION

   Y: The Cursor Position keys* are control-protected.

   N: The Cursor Position keys* are not control-protected.

----

* The HOME, Cursor Up, Cursor Down, Cursor Left, and Cursor Right keys.

TAB and BACKTAB

Y: The TAB and BACKTAB keys are control-protected.

N: The TAB and BACKTAB keys are not control-protected.

CR LF **

Y: The CARRIAGE RETURN and LINE FEED keys are control-protected.

N: The CARRIAGE RETURN and LINE FEED keys are not control-protected.

F01 - F04

Y: Function Keys F1, F2, F3, and F4 (shifted and unshifted) are control-protected.

N: Functions Keys F1, F2, F3, and F4 (shifted and unshifted) are not control-protected.

F05 - F08

Y: Function Keys F5, F6, F7, and F8 (shifted and unshifted) are control-protected.

N: Functions Keys F5, F6, F7, and F8 (shifted and unshifted) are not control-protected.

F09 - F12

Y: Function Keys F9, F10, F11, and F12 (shifted and unshifted) are control-protected.

N: Functions Keys F9, F10, F11, and F12 (shifted and unshifted) are not control-protected.

** This keygroup must not be Control-Protected for Self-Test operation.

F13 - F16

Y: Function Keys F13, F14, F15, and F16 (shifted and unshifted) are control-protected.

N: Functions Keys F13, F14, F15, and F16 (shifted and unshifted) are not control-protected.

Keyboard Lock
--------- ----

Certain keygroups may be designated as Locked Out, that is, a depression of that key causes no action.

NOTE: The special use of Function Keys for operations in the Edit Mode, e.g., DEL CHAR, INS MODE, can not be Locked-Out.

ESC

Y: The ESC key is locked out.

N: The ESC key is not locked out.

CURSOR POSITION

Y: The Cursor Position keys* are locked out.

N: The Cursor Position keys* are not locked out.

TAB and BACKTAB

Y: The TAB and BACKTAB keys are locked out.

N: The TAB and BACKTAB keys are not locked out.

----

* The HOME, Cursor Up, Cursor Down, Cursor Left, and Cursor Right keys.

CR LF **

Y: The CARRIAGE RETURN and LINE FEED keys are locked out.

N: The CARRIAGE RETURN and LINE FEED keys are not locked out.

F 01 - F 04

Y: Function Keys F1, F2, F3, and F4 (shifted and unshifted) are locked out.

N: Functions Keys F1, F2, F3, and F4 (shifted and unshifted) are not locked out.

F 05 - F 08

Y: Function Keys F5, F6, F7, and F8 (shifted and unshifted) are locked out.

N: Functions Keys F5, F6, F7, and F8 (shifted and unshifted) are not locked out.

F 09 - F 12

Y: Function Keys F9, F10, F11, and F12 (shifted and unshifted) are locked out.

N: Functions Keys F9, F10, F11, and F12 (shifted and unshifted) are not locked out.

F 13 - F 16

Y: Function Keys F13, F14, F15, and F16 (shifted and unshifted) are locked out.

N: Functions Keys F13, F14, F15, and F16 (shifted and unshifted) are not locked out.

** This keygroup must not be Locked-Out for Self-Test operation.

Mode Options

SCROLL

Y: From line 24, shifts display up one line for each new line. Line 24 will be cleared to nulls or spaces depending on Configuration.

N: From line 24, the next data line is line 1.

AUTO LINE FEED

Y: Automatically advances the cursor to the next line on a carriage return.

N: The carriage return returns the cursor to column 1 of the same line.

AUTO TAB (Formatted Screen)

Y: The cursor will automatically skip over protected fields (without causing a keyboard lockout) and attribute characters.

N: The operator is restricted to tabbing past attribute characters in order to access fields.

NEW LINE

Y: Automatic carriage return and line feed upon advancement of the cursor past the 80th character position (column).

N: The cursor can not be advanced past the 80th column of a line.

UPPER CASE

Y: Lower case characters (entered from the keyboard) are converted to their upper case counterparts. This excludes the following punctuation:

@   ['   ]   and   ^.

Lower case characters received via the communications line are not affected by this option.

N: Lower case characters (and punctuation) are not converted to their upper-case counterparts.

INVERSE VIDEO

Y: Inverse Display Screen. (dark characters on a light screen)

N: Normal Display Screen (light characters on a dark screen).

BLINK CURSOR

Y: Cursor blinks.

N: Cursor does not blink.

BLOCK CURSOR

Y: The cursor appears as an inverse video (assuming a normal screen display - see above) block.

N: The cursor appears as an inverse video (assuming a normal screen display) underline character.

System Options

DISPLAY STATUS LINE

Y: The Status Line is displayed; Status Line operations are operational.

N: The Status Line is not displayed. Status Line operations are no longer operational.

SEND STATUS LINE

Y: In BLOCK Mode, and when the cursor is in the User Area of the Status Line, a depression of the SEND key transmits the data entered on the Status Line. In CONVERSATIONAL Mode, data is transmitted character-by-character as it is entered.

N: A depression of the SEND key does not transmit data entered in the User Area of the Status Line.

POWER UP ON LINE

Y: Upon power-up, the terminal is on-line.

N: Upon power-up, the terminal is in Local Mode; the terminal must be placed on-line through the EDIT Mode.

RETURN = SEND (Block Mode operation)

Y: The RETURN key operates in the same manner as the SEND key.

N: The RETURN key retains its function.

60 HZ.

Y: The AC Line Frequency is 60 Hertz.

N: The AC Line Frequency is 50 Hertz.

CLEAR TO NULLS

Y: For appropriate clearing operations, the terminal and screen memory are cleared to nulls.

N: For appropriate clearing operations, the screen and terminal memory are cleared to spaces.

   NOTE: Different results occur from editing when the terminal is set to clear to spaces as opposed to clear to nulls (see Section 4.4).

SEND POSITION CODE

Y: For a depression of a Cursor Position key, the terminal will transmit the appropriate Multicode sequences to the host automatically as well as move the cursor accordingly on the screen. For example: if the Cursor Up key were depressed, the sequence Multicode A will be transmitted to the host and the cursor would be moved up one line.

N: No automatic Multicode sequences will be transmitted to the host for a depression of a Cursor Position key.

SEND CLEAR ALL

Y: Upon encountering the CLEAR ALL Edit Mode Operation, the terminal will transmit the following sequence to the host:

                    Multicode
                    R
         _ (underline character - hex 5F)
           (the Request to Send Terminator)

   If the host responds with any read response, the screen is cleared. If the host does not respond with a read response, the screen will not be cleared.

N: Upon encountering the CLEAR ALL Edit Mode operation, the screen is cleared.

Communication Options

POLLED

Y: The terminal is designated as a polled terminal.

N: The terminal is designated as not a polled terminal.

BLOCK

Y: The transmission mode of the terminal is BLOCK MODE.

N: The transmission mode of the terminal is CONVERSATIONAL MODE.

HALF DUPLEX

Y: All keyboard input is displayed on the screen and transmitted on the communication line.

N: All keyboard input is transmitted over the communication line only.

ONE STOP BIT

Y: The number of stop bits is ONE.

N: The number of stop bits is TWO.

NULL SUPPRESSION ON UNFORMATTED TRANSMISSION

Y: Nulls are suppressed in transmission of an unformatted screen.

N: Nulls are not suppressed in transmission of an unformatted screen.

NULL SUPPRESSION ON FORMATTED TRANSMISSION

Y: Nulls are suppressed in transmission of a formatted screen.

N: Nulls are not suppressed in transmission of a formatted screen.

XON/XOFF

Y: The following protocol will be in effect. The host may send the XOFF character (the ASCII DC3 character) to the terminal in order to pause transmission from the terminal. The terminal will not make any further transmission until it receives an XON character (the ASCII DC1 character).

N: This protocol is not in effect.

103J

Y: The Carrier ON signal (pin #8) is automatically tied to +12V so that the terminal may operate in conjunction with the 103J modem (see Section 7).

N: The Carrier On signal (pin #8) is not tied to +12V as discussed above.

NOTE: This designation is required only for the 103J modem. Other types of modems, e.g., 212A, should be configured as N.

Printer Options

LINE DRAWING

Y: Attribute characters and form-drawing characters are transmitted to the printer as such.

N: Attribute characters and form-drawing characters are converted to spaces before they are transmitted to the printer.

READY (-)

Y: Indicates Minus Ready, i.e., CTS Low for the Ready State, CTS High for the Busy State.

N: Indicates Plus Ready, i.e., CTS High for the Ready State, CTS Low for the Busy State.

ONE STOP BIT

Y: The number of stop bits is ONE.

N: The number of stop bits is TWO.

COM - Communication Port Settings
--- - ------------- ---- --------

LINE,MSG,PG (The Block Mode SEND Condition)

LINE: Initiates transmission of the line on which the cursor is located, starting with column 1.

MSG: (Message) Initiates transmission of the message starting at the character following the previous message sent (or the start of the page) and ending at the current cursor position.

PG: (Page) Initiates transmission of the screen contents, starting with either the HOME position or the present cursor position (as defined by the Multicode E or Multicode F sequences, respectively).

PARITY

ODD: Odd

EVN: Even

MRK: Always Marking

SPC: Always Spacing

BAUD RATE
- - - - - - - - -

Enter the required Baud Rate setting from the list shown
(110, 300, 600, 1200, 2400, 4800, 9600).

PRNT - Printer Port Settings
- - - - - - - - - - - - - - - - - - -

LINE,MSG,PG (The Print Condition)
- - - - - - - - - - - -

LINE: Upon depression of the PRINT key, the line of data
on which the cursor is located is transmitted to the
peripheral device.

MSG: (Message) Upon depression of the PRINT key, a local
print-out - starting at the character following the
end of the previously sent message (or else, the
start of the page) and ending at the current cursor
position - is transmitted to the peripheral device.

PG: (Page) Upon depression of the PRINT key, a local
print-out of the screen is transmitted to the
peripheral device.

PARITY
- - - - - -

ODD: Odd

EVN: Even

MRK: Always Marking

SPC: Always Spacing

BAUD RATE
- - - - - - - - -

Enter the required Baud Rate setting from the list shown
(110, 300, 600, 1200, 2400, 4800, 9600).

Terminators

Up to four ASCII Characters (in a field of four) may be
designated for each communication terminator listed below. Up
to eight ASCII Characters (in a field of eight) may be
designated for the Print Line terminator also shown below. The
terminators are listed here and subsequently described.

      SEND LINE Terminator
      FIELD Terminator
      UNFORMATTED LINE Terminator
      UNFORMATTED PAGE Terminator
      FORMATTED PAGE Terminator
      REQUEST TO SEND Terminator
      PRINT LINE Terminator

   SEND LINE
   This terminator is automatically appended to each line for
   the SEND LINE condition for both formatted and unformatted
   screens. This terminator is automatically appended to the
   transmission of a message of a Function Key (except the
   Function Key designated as the HERE IS key) that has been
   defined in configuration.

   FIELD Terminator
   This terminator is automatically appended to each field on
   the transmission of formatted screens.

   UNFORMATTED LINE Terminator
   This terminator is automatically appended to each line for
   the SEND MESSAGE and SEND PAGE conditions on the
   transmission of unformatted screens.

   UNFORMATTED PAGE Terminator
   This terminator is automatically appended to each message
   or page for the SEND MESSAGE and SEND PAGE conditions on
   the transmission of unformatted screens.

   FORMATTED PAGE Terminator
   This terminator is automatically appended to each message
   or page for the SEND MESSAGE and SEND PAGE conditions on
   the transmission of formatted screens.

   REQUEST TO SEND Terminator
   This terminator is automatically appended to each
   transmission of a Request To Send Multicode sequence.
   This includes a transmission as a result of a Function Key
   that has not been defined in configuration.

PRINT LINE Terminator
This terminator is automatically appended to each line of
data that is transmitted through the terminal's printer
port.

Special Characters
------- ----------

The following characters are designated by a single ASCII
character:

    the RING BELL Character
    the MULTICODE Character
    the POLLING/SELECTION ADDRESS Character
    the PAUSE Character
    the RESUME Character.

These are discussed subsequently.

    The RING BELL portion of configuration establishes the
column number where the bell will be rung when the cursor
reaches the column. (This is equivalent to the typewriter
bell which rings when the typist is about to reach the
right margin).

    The Multicode Character
The ASCII character designated as the Multicode character
will be used to enable the implementation of a wide range
of special functions. These functions are detailed in
Section 5.

    The Polling/Selection Address Character
In the event that the terminal will be utilized in a
system of polled terminals, the ASCII character designated
as the Polling/Selection Address character will be used to
distinguish one terminal from another. Section 4-9
provides specific information as to the use of the
Polling/Selection Address character.

    The Pause Character
The ASCII character designated as the Pause character
indicates to the host a request to temporarily halt data
transmission for printing.

    The Resume Character
The ASCII character designated as the Resume character
indicates to the host a request to resume data
transmission for printing.

Function Keys
-------- ----

For the Model 1251, the operator or the host may designate any one of the Function Keys as the HERE IS key. The message of the HERE IS key is transmitted in response to the ASCII ENQ (Enquiry) character sent by the host.

For the Model 1245, Function Key F1 is preset as the HERE IS key.

Four hundred characters of the Model 1251 EAROM are provided for the definition of all of the Function Keys. The definition of each Function Key must include five characters to designate a) the Function Key and b) the end of the message. The Function Key is designated by the letter F and a two digit reference to the number. For example, the Function Key labeled F1 on the keyboard is designated by "F01"; the same key, shifted, is designated as "F17".

Function Keys in any order, e.g., F07 may be defined before F02.

Function Keys F01, F02, F03,and F04 remain accessible while the terminal is in the Edit Mode.

Function Keys F13, F14, F15, and F16 and their shifted counterparts F29, F30, F31, and F32 do not transmit their associated messages to the host in BLOCK Mode. Rather, their messages are displayed on the screen. In CONVERSATIONAL Mode, these messages are sent on a character-by-character basis to the host.

In the event the operator wishes to add Function Key Definitions in subsequent configurations, the Cursor Position keys should be used to access the next starting point without changing any previous definitions.

3.3 Configuration by the Operator

The Model 1251 may be configured by the operator through the Configuration Mode. To enter the Configuration Mode, depress the EDIT Key then Function Key F1 (shifted) labeled CONF MODE. At this time, the Model 1251 is placed off-line. The mnemonics CG LCL are displayed on the Status Line (if enabled).

The "Configuration Menu" is displayed (see Figure 3-1).

The Model 1245 may not be configured through the Configuration Mode; the configuration parameters may not be read by the operator through the Configuration Mode.

For the Model 1251, the desired options may be selected by entering a proper response in the field immediately preceding the individual option. These options have been defined in Section 3.2. For most options, the entry may either be a Y for yes or a N for no. For others the entry is either a choice from a list of option settings shown immediately to the right of the entry field or one or more ASCII characters.

In the Configuration Mode, Function Key F21 (Function key F5 shifted) labeled CONF TAB is used to access options within the Configuration Menu.

The presently configured option parameter is displayed to the left of the parentheses. The operator may either change that option or bypass the option with a depression of the CONF TAB key.

NOTE: Data entered in the Configuration Mode is displayed as in the Transparent Mode. (See Section 1.4 for details).

The reconfigured options will take effect upon exit from the Configuration Mode.

KBD CTRL	N ESC,EDIT	N CURSOR POSITION	N TAB BACKTAB	N CR,LF
	F01-F04	F05-F08	F09-F12	F13-F16
KBD LOCK	N ESC	N CURSOR POSITION	N TAB BACKTAB	N CR,LF
	F01-F04	F05-F08	F09-F12	F13-F16
MODE	Y SCROLL	Y AUTO LINE FEED	Y AUTO TAB	Y NEW LINE
	Y UPPER CASE	Y INVERS VIDEO	Y BLINK CURSOR	Y BLOCK CURSOR
SYSTEM	Y SEND STAT LINE	Y DSPLAY STAT LN	Y PWR UP ON LINE	N RETURN = SEND
	Y 60 HZ.	Y CLEAR TO SPACES	N SEND POSIT COD	N SEND CLEAR ALL
COMM.	Y BLOCK	Y POLLED	Y ONE STOP BIT	Y HALF DUPLEX
	Y NULL SUPP UNFOR	Y NULL SUPP FORMT	Y XON/OFF	Y 103J
PRINTER	Y LINE DRAWING	Y READY (-)	Y ONE STOP BIT	

COM **PAG** LINE,MSG,PAG **MRK** ODD,EVN,MRK,SPC **9600** 110,300,600,1200,2400,4800,9600
PRNT **PAG** LINE,MSG,PAG **ODD** ODD,EVN,MRK,SPC **9600** 110,300,600,1200,2400,4800,9600

TERMINATOR: █ SEND LINE   █ FIELD   █ UNFORMAT LINE   █ UNFORMAT PG
             █ FORMAT PG   █ REQ TO SEND   █ PRINT LINE
SPCL CHAR █ MULTCODE CHAR █ POLL CHAR █ PAUSE CHAR █ RESUME CHAR █ RING BELL
FUNCTION KEYS: HERE IS = █

Figure 3-1 Model 1251 Configuration Menu
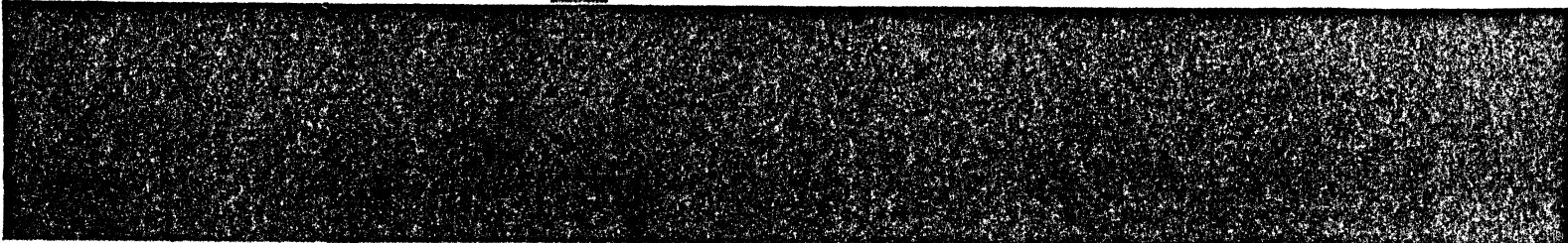
Function Key Definition
-------- --- ----------

Initially, the operator can designate one of the Function Keys as the HERE IS Key by entering F and the two digit number of the Function Key (leading zeroes must be entered).

For the Model 1251, an Inverse Field of five lines in length (representing 400 characters of EAROM memory) is provided for Function Key Definition. The operator may define the Function Keys as follows:

1. Enter F
2. Enter the two digit number of the Function Key
    (Leading zeroes must be entered).
3. Enter the Equals Character, =
4. Enter the desired message
5. Terminate the Function Key Definition with the
    ASCII CANCEL Character (Control X).

    Example: F02 = A SPECIAL MESSAGE (Control-X)

    Note: The CANCEL character is not a part of the message.

In the event that the operator wishes to add Function Key Definitions in subsequent configurations, the Cursor Position Keys should be used to access the next starting point without changing any previous definitions.

Function Keys may be defined in any order, e.g., F07 may be defined before F02.

Function Keys F01, F02, F03, and F04 remain accessible while the terminal is in the Edit Mode.

NOTE: When undefined, Function Keys transmit a Request-To-Send/Attention Identifier Character/Request-To-Send Terminator sequence to the host (see Section 4.3).

When defined in configuration, Function Keys F13, F14, F15, and F16 and their shifted counterparts F29, F30, F31, and F32 do not transmit their associated messages to the host in BLOCK Mode; rather, their messages are displayed on the screen. In CONVERSATIONAL Mode, the message is transmitted.

The Function Key Definitions will take effect upon exit from the Configuration Mode.

3.4 Configuration by the Host

The Model 1251/1245 terminal may be configured by the host through Multicode sequences and the transmission of sequenced encoded data.

Furthermore, for the Model 1251, the host may designate that the Configuation parameters be held temporarily in RAM or stored in the Model 1251's non-volatile EAROM.

For the Model 1245, configuration by the host is stored in RAM only. This configuration data is used instead of the configuration parameters stored in the Model 1245 Configuration PROM. The configuration parameters stored in the Model 1245 Configuration PROM are not over-written by host configuration.

The configuration parameters are defined in Section 3.2.

Upon receipt of the Multicode # (Configuration Ready) sequence, the terminal is prepared to receive encoded ASCII characters, ranging from 0 (Hex 30) to ? (Hex 3F), denoting the configuration parameters. Figure 3-2 shows the progression of host configuration.

It is mandatory that Multicode sequences for locking the keyboard and positioning the cursor at Column 1 of Line 2 precede the Multicode # sequence. sequence. It is also recommended that the host either blank the screen entirely or display a message such as "Configuration in Progress" or "Please Stand By" on Line 1 prior to the Multicode # sequence.

Figure 3-2 shows the sequence of data required for the configuration of the terminal by the host. Tables are provided in this section to indicate the precise configuration data for the designated option(s). Table 3-3, in particular, shows the two bytes required to generate any one ASCII character. This table is of use for "Special Characters", Terminators, and Function Key definitions.

NOTE: Host configuration of the terminal requires 24 seconds; i.e., after the Multicode sequence to configure the terminal is transmitted, 24 seconds must elapse before the host should transmit any other data.

Figure 3-2 Host Configuration - Parameter Format

MULTICODE	LOCK
(	KEYBOARD
PRINT MESSAGE "CONFIGURATION IN PROGRESS"	
MULTICODE	POSITION CURSOR LINE 2, COLUMN 1
H	
MULTICODE	
B	

MULTICODE	LOCK KEYBOARD
(	
MULTICODE	POSITION CURSOR LINE 2, COLUMN 1
H	
MULTICODE	
B	
MULTICODE	BLANK SCREEN
SPACE	

		MULTICODE	
		#	READY CONFIGURATION
DATA BYTES	1	SCROLL/AUTO LINE FEED/ AUTO TAB/NEW LINE FEATURES	
	2	UPPER CASE/INVERSE VIDEO BLINKING CURSOR/BLOCK OR INVERSE CURSOR FEATURES	
	3		
	4	RING BELL ON COLUMN NUMBER	MODE CONTROL OPTIONS (SIX BYTES)
	5		
	6		
	7	BLOCK/CONVERSATIONAL MODE POLLED DEVICE	
	8	SEND CONDITION	
	9	BAUD RATE	
	10	PARITY	COMMUNICATIONS OPTIONS (ELEVEN BYTES)
	11	NUMBER OF STOP BITS	
	12	103J	
	13	POLLING CHARACTER	
	14		
	15	MULTICODE CHARACTER	
	16		
	17	HALF OR FULL DUPLEX/NULL SUPPRESSION ON UNFORMATTED DATA/NULL SUPPRESSION ON FORMATTED DATA/XON-XOFF	
	18	SEND STATUS LINE/STATUS LINE DISPLAY/ON-LINE WHEN POWERED UP/RETURN = SEND IN BLOCK MODE	SYSTEM OPTIONS (TWO BYTES)
	19	AC FREQUENCY/CLEAR TO SPACES OR NULLS/SEND CURSOR POSITION CODE/SEND CLEAR ALL CODE	
	20	CONTROL PROTECTION	
	21	CONTROL PROTECTION	KEYBOARD OPTIONS (FOUR BYTES)
	22	LOCK-OUT	
	23	LOCK-OUT	

Figure 3-2 Host Configuration - Parameter Format continued

24	PRINT LINE. MESSAGE, PAGE
25	BAUD RATE
26	PARITY
27	NUMBER OF STOP BITS
28	
29	
30	
31	
32	
33	
34	PRINT LINE
35	TERMINATOR .
36	
37	
38	
39	
40	
41	
42	
43	
44	PRINT FORM DRAWING CHARACTERS, READY IS MINUS (ALWAYS) READY OR PLUS READY
45	PAUSE
46	CHARACTER
47	RESUME
48	CHARACTER

PRINTER PORT OPTIONS
(TWENTY FIVE BYTES)

49	
50	
51	
52	SEND LINE
53	TERMINATOR
54	
55	
56	
57	
58	
59	
60	UNFORMATTED
61	PAGE
62	TERMINATOR
63	
64	
65	
66	
67	
68	UNFORMATTED
69	LINE
70	TERMINATOR
71	
72	
73	
74	
75	FORMATTED
76	PAGE
77	TERMINATOR
78	
79	
80	

TERMINATOR OPTIONS
(FORTY-EIGHT BYTES)

Figure 3-2 Host Configuration - Parameter Format continued

81	
82	
83	FIELD
84	TERMINATOR
85	
86	
87	
88	
89	
90	
91	REQUEST TO
92	SEND TERMINATOR
93	
94	
95	
96	

TERMINATOR OPTIONS, CONTINUED
(FORTY-EIGHT BYTES)

Figure 3-2 Host Configuration - Parameter Format continued

RAM CONFIGURATION	(REQUIRED FOR MODEL 1245)	
	MULTICODE	
	7	
	24 SECONDS	

97	
98	
99	HERE IS KEY
100	
101	
102	
103	
104	
105	
106	
107	
108	
109	
110	DEFINE INDIVIDUAL FUNCTION KEYS
111	
112	
113	
114	
115	
116	FUNCTION KEY DEFINITION (EIGHT HUNDRED SIX BYTES MUST BE TRANSMITTED FOR FOUR HUNDRED BYTES OF EAROM)
117	
118	
119	
120	

899	FUNCTION KEY DEFINITIONS [continued]
900	
901	
902	

EAROM CONFIGURATION	MULTICODE
	—
	24 SECONDS
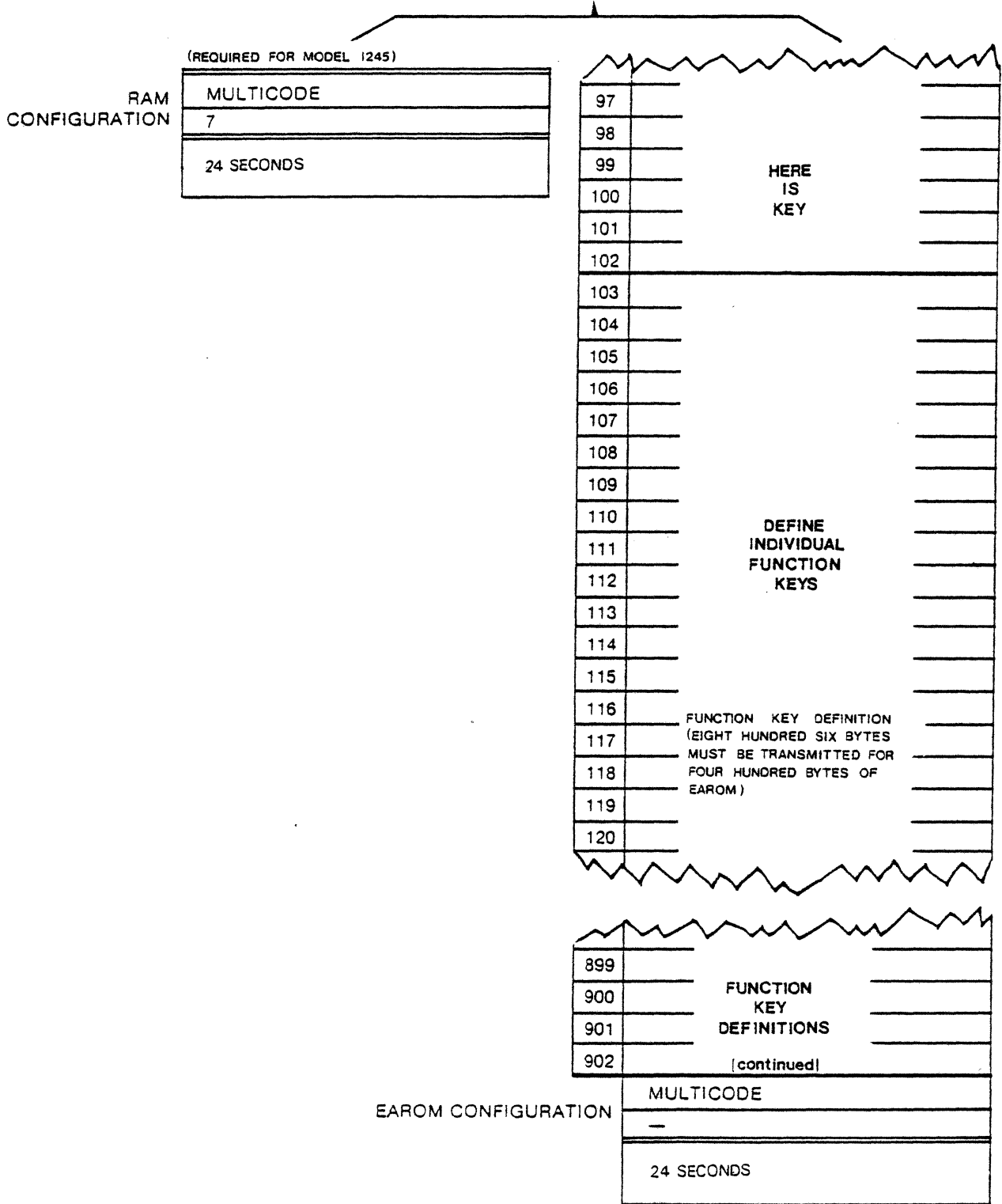
MODE OPTIONS

Following the Multicode ‡ sequence, the next six bytes of data designate the Mode Option parameters.

The 1st byte indicates the status (Y/N) of the

      Scroll
      Auto Line Feed
      Auto Tab   and
      New Line   features.

See Table 3-1.

The 2nd byte indicates the status (Y/N) of the

      Upper Case
      Inverse Video
      Blink Cursor   and
      Block Cursor   features.

See Table 3-1.

The 3rd through the 6th byte inclusive designate the Ring Bell 'Special Character' (see Table 3-1).

Table 3-1 Mode Options (Configuration by Host)

BYTE 1

ASCII	HEX	SCROLL	AUTO LF	AUTO TAB	NEW LINE
0	30	NO	NO	NO	NO
1	31	NO	NO	NO	YES
2	32	NO	NO	YES	NO
3	33	NO	NO	YES	YES
4	34	NO	YES	NO	NO
5	35	NO	YES	NO	YES
6	36	NO	YES	YES	NO
7	37	NO	YES	YES	YES
8	38	YES	NO	NO	NO
9	39	YES	NO	NO	YES
:	3A	YES	NO	YES	NO
;	3B	YES	NO	YES	YES
<	3C	YES	YES	NO	NO
=	3D	YES	YES	NO	YES
>	3E	YES	YES	YES	NO
?	3F	YES	YES	YES	YES

BYTE 2

ASCII	HEX	UPPER CASE	INVERSE VIDEO	BLINKING CURSOR	BLOCK CURSOR
0	30	NO	NO	NO	NO
1	31	NO	NO	NO	YES
2	32	NO	NO	YES	NO
3	33	NO	NO	YES	YES
4	34	NO	YES	NO	NO
5	35	NO	YES	NO	YES
6	36	NO	YES	YES	NO
7	37	NO	YES	YES	YES
8	38	YES	NO	NO	NO
9	39	YES	NO	NO	YES
:	3A	YES	NO	YES	NO
;	3B	YES	NO	YES	YES
<	3C	YES	YES	NO	NO
=	3D	YES	YES	NO	YES
>	3E	YES	YES	YES	NO
?	3F	YES	YES	YES	YES

Table 3-1 Mode Options (Configuration by Host) - continued

BYTES 3, 4, 5, 6

ASCII	HEX	COLUMN
3 0 3 1	33 30 33 31	1
3 0 3 2	33 30 33 31	2
3 0 3 3	33 30 33 33	3
3 0 3 4	33 30 33 34	4
3 0 3 5	33 30 33 35	5
3 0 3 6	33 30 33 36	6
3 0 3 7	33 30 33 37	7
3 0 3 8	33 30 33 38	8
3 0 3 9	33 30 33 39	9
3 1 3 0	33 31 33 30	10
3 1 3 1	33 31 33 31	11
3 1 3 2	33 31 33 31	12
3 1 3 3	33 31 33 33	13
3 1 3 4	33 31 33 34	14
3 1 3 5	33 31 33 35	15
3 1 3 6	33 31 33 36	16
3 1 3 7	33 31 33 37	17
3 1 3 8	33 31 33 38	18
3 1 3 9	33 31 33 39	19
3 2 3 0	33 32 33 30	20
3 2 3 1	33 32 33 31	21
3 2 3 2	33 32 33 32	22
3 2 3 3	33 32 33 33	23
3 2 3 4	33 32 33 34	24
3 2 3 5	33 32 33 35	25
3 2 3 6	33 32 33 36	26
3 2 3 7	33 32 33 37	27
3 2 3 8	33 32 33 38	28
3 2 3 9	33 32 33 39	29
3 3 3 0	33 33 33 30	30
3 3 3 1	33 33 33 31	31
3 3 3 2	33 33 33 32	32
3 3 3 3	33 33 33 33	33
3 3 3 4	33 33 33 34	34
3 3 3 5	33 33 33 35	35
3 3 3 6	33 33 33 36	36
3 3 3 7	33 33 33 37	37
3 3 3 8	33 33 33 38	38
3 3 3 9	33 33 33 39	39
3 4 3 0	33 34 33 30	40

Table 3-1 Mode Options (Configuration by Host) - continued

BYTES 3, 4, 5, 6

ASCII	HEX	COLUMN
3 4 3 1	33 34 33 31	41
3 4 3 2	33 34 33 32	42
3 4 3 3	33 34 33 33	43
3 4 3 4	33 34 33 34	44
3 4 3 5	33 34 33 35	45
3 4 3 6	33 34 33 36	46
3 4 3 7	33 34 33 37	47
3 4 3 8	33 34 33 38	48
3 4 3 9	33 34 33 39	49
3 5 3 0	33 35 33 30	50
3 5 3 1	33 35 33 31	51
3 5 3 2	33 35 33 32	52
3 5 3 3	33 35 33 33	53
3 5 3 4	33 35 33 34	54
3 5 3 5	33 35 33 35	55
3 5 3 6	33 35 33 36	56
3 5 3 7	33 35 33 37	57
3 5 3 8	33 35 33 38	58
3 5 3 9	33 35 33 39	59
3 6 3 0	33 36 33 30	60
3 6 3 1	33 36 33 31	61
3 6 3 2	33 36 33 32	62
3 6 3 3	33 36 33 33	63
3 6 3 4	33 36 33 34	64
3 6 3 5	33 36 33 35	65
3 6 3 6	33 36 33 36	66
3 6 3 7	33 36 33 37	67
3 6 3 8	33 36 33 38	68
3 6 3 9	33 36 33 39	69
3 7 3 0	33 37 33 30	70
3 7 3 1	33 37 33 31	71
3 7 3 2	33 37 33 32	72
3 7 3 3	33 37 33 33	73
3 7 3 4	33 37 33 34	74
3 7 3 5	33 37 33 35	75
3 7 3 6	33 37 33 36	76
3 7 3 7	33 37 33 37	77
3 7 3 8	33 37 33 38	78
3 7 3 9	33 37 33 39	79
3 8 3 0	33 38 33 30	80

COMMUNICATIONS OPTIONS

The next eleven bytes of data designate the Communications Options.

The 7th byte of the configuration data designates the following:

    Polled and
    Block.

The 8th byte indicates the disposition of the SEND Key in Block Mode, i.e., COM: Send LINE, MSG, PG. Table 3-2 illustrates the data characters for each available setting.

The 9th byte designates the communications baud rate. Table 3-2 illustrates the data characters for each available setting.

The 10th byte designates the communications parity. Table 3-2 illustrates the data characters for each available setting.

The 11th byte designates One Stop Bit. Table 3-2 illustrates the data characters for both available settings.

The 12th byte designates 103J. Table 3-2 illustrates the data characters for both available settings.

The 13th and 14h bytes of the Communications Options designate the Polling/Selection Address 'special character'. Table 3-3 provides, for each desired character, the two ASCII characters (and their hexadecimal equivalents) required. For example, if the desired polled character were A, the host must transmit 4 1 to designate that character.

The 15th and 16th bytes designate the Multicode character. Table 3-3 provides, for each character, the two ASCII characters (and their hexadecimal equivalents) required. For example, if the desired Multicode character were ESC, the host must transmit 1 ; to designate that character.

The 17th byte designates the the following:

    Half Duplex
    Null Suppression - Unformatted
    Null Suppression - Formatted   and
    XON/XOFF.

Table 3-2 illustrates the data characters for each available setting.

Table 3-2 Communications Options (Configuration By Host)

BYTE 7

ASCII	HEX	BLOCK OR CONV MODE	POLLED DEVICE?
0	30	CONV	NO
4	34	CONV	YES
8	38	BLOCK	NO
<	3C	BLOCK	YES

BYTE 8

ASCII	HEX	SEND CONDITION
1	31	LINE
2	32	MESSAGE
3	33	PAGE

BYTE 9

ASCII	HEX	BAUD RATE
1	31	110
2	32	300
3	33	600
4	34	1200
5	35	2400
6	36	4800
7	37	9600

Table 3-2 Communications Options (Configuration by Host) - continued

BYTE 10

ASCII	HEX	PARITY
1	31	ODD
2	32	EVEN
3	33	MARK
4	34	SPACE

BYTE 11

ASCII	HEX	NUMBER OF STOP BITS
1	31	ONE
2	32	TWO

BYTE 12

ASCII	HEX	103J
1	31	NO
2	32	YES

Table 3-2 Communications Options (Configuration by Host) - continued

BYTE 17

| ASCII | HEX | DUPLEX | NULL SUPPRESSION ON | | XON/ |
			FRMTD	UNFRMTD	XOFF
0	30	FULL	NO	NO	NO
1	31	FULL	NO	NO	YES
2	32	FULL	NO	YES	NO
3	33	FULL	NO	YES	YES
4	34	FULL	YES	NO	NO
5	35	FULL	YES	NO	YES
6	36	FULL	YES	YES	NO
7	37	FULL	YES	YES	YES
8	38	HALF	NO	NO	NO
9	39	HALF	NO	NO	YES
:	3A	HALF	NO	YES	NO
;	3B	HALF	NO	YES	YES
<	3C	HALF	YES	NO	NO
=	3D	HALF	YES	NO	YES
>	3E	HALF	YES	YES	NO
?	3F	HALF	YES	YES	YES

Table 3-3 ASCII Character Conversion for Configuration

ASCII	HEX	DESIRED ASCII CHARACTER
0 0	30 30	NULL
0 1	30 31	SOH
0 2	30 32	STX
0 3	30 33	ETX
0 4	30 34	EOT
0 5	30 35	ENQ
0 6	30 36	ACK
0 7	30 37	BELL
0 8	30 38	BS
0 9	30 39	HT
0 :	30 3A	LF
0 ;	30 3B	VT
0 <	30 3C	FF
0 =	30 3D	CR
0 >	30 3E	SO
0 ?	30 3F	SI
1 0	31 30	DLE
1 1	31 31	DC1
1 2	31 32	DC2
1 3	31 33	DC3
1 4	31 34	DC4
1 5	31 35	NAK
1 6	31 36	SYN
1 7	31 37	ETB
1 8	31 38	CAN
1 9	31 39	EM
1 :	31 3A	SUB
1 ;	31 3B	ESC
1 <	31 3C	FS
1 =	31 3D	GS
1 >	31 3E	RS
1 ?	31 3F	US

Table 3-3 ASCII Character Conversion for Configuration - continued

ASCII	HEX	DESIRED ASCII CHARACTER
2 0	32 30	space
2 1	32 31	!
2 2	32 32	"
2 3	32 33	#
2 4	32 34	$
2 5	32 35	%
2 6	32 36	&
2 7	32 37	'
2 8	32 38	(
2 9	32 39	)
2 :	32 3A	*
2 ;	32 3B	+
2 <	32 3C	,
2 =	32 3D	-
2 >	32 3E	.
2 ?	32 3F	/
3 0	33 30	0
3 1	33 31	1
3 2	33 32	2
3 3	33 33	3
3 4	33 34	4
3 5	33 35	5
3 6	33 36	6
3 7	33 37	7
3 8	33 38	8
3 9	33 39	9
3 :	33 3A	:
3 ;	33 3B	;
3 <	33 3C	<
3 =	33 3D	=
3 >	33 3E	>
3 ?	33 3F	?

Table 3-3 ASCII Character Conversion for Configuration - continued

ASCII	HEX	DESIRED ASCII CHARACTER
4 0	34 30	@
4 1	34 31	A
4 2	34 32	B
4 3	34 33	C
4 4	34 34	D
4 5	34 35	E
4 6	34 36	F
4 7	34 37	G
4 8	34 38	H
4 9	34 39	I
4 :	34 3A	J
4 ;	34 3B	K
4 <	34 3C	L
4 =	34 3D	M
4 >	34 3E	N
4 ?	34 3F	O
5 0	35 30	P
5 1	35 31	Q
5 2	35 32	R
5 3	35 33	S
5 4	35 34	T
5 5	35 35	U
5 6	35 36	V
5 7	35 37	W
5 8	35 38	X
5 9	35 39	Y
5 :	35 3A	Z
5 ;	35 3B	[
5 <	35 3C	\
5 =	35 3D	]
5 >	35 3E	^
5 ?	35 3F	_

Table 3-3 ASCII Character Conversion for Configuration - continued

ASCII	HEX	DESIRED ASCII CHARACTER
6 0	36 30	`
6 1	36 31	a
6 2	36 32	b
6 3	36 33	c
6 4	36 34	d
6 5	36 35	e
6 6	36 36	f
6 7	36 37	g
6 8	36 38	h
6 9	36 39	i
6 :	36 3A	j
6 ;	36 3B	k
6 <	36 3C	l
6 =	36 3D	m
6 >	36 3E	n
6 ?	36 3F	o
7 0	37 30	p
7 1	37 31	q
7 2	37 32	r
7 3	37 33	s
7 4	37 34	t
7 5	37 35	u
7 6	37 36	v
7 7	37 37	w
7 8	37 38	x
7 9	37 39	y
7 :	37 3A	z
7 ;	37 3B	{
7 <	37 3C	|
7 =	37 3D	}
7 >	37 3E	~
7 ?	37 3F	DEL

SYSTEM OPTIONS

The next two bytes (the 18th and 19th bytes of the Configuration data) designate the Systems Options.

The 18 byte indicates the status (Y/N) of the following features:

    Send Status Line
    Display Status Line
    Power Up On-Line   and
    RETURN = SEND

Table 3-4 illustrates the data characters for each available setting.

The 19th byte indicates the status (Y/N) of the following features:

    60 HZ
    Clear to Nulls
    Send Position Code   and
    Send Clear All Code.

Table 3-4 illustrates the data characters for each available setting.

Table 3-4 System Options (Configuration by Host)

BYTE 18

ASCII	HEX	SEND STATUS LINE	STATUS LINE DISPLAY	POWER UP ON-LINE	RETURN = SEND
0	30	NO	NO	NO	NO
1	31	NO	NO	NO	YES
2	32	NO	NO	YES	NO
3	33	NO	NO	YES	YES
4	34	NO	YES	NO	NO
5	35	NO	YES	NO	YES
6	36	NO	YES	YES	NO
7	37	NO	YES	YES	YES
8	38	YES	NO	NO	NO
9	39	YES	NO	NO	YES
:	3A	YES	NO	YES	NO
;	3B	YES	NO	YES	YES
<	3C	YES	YES	NO	NO
=	3D	YES	YES	NO	YES
>	3E	YES	YES	YES	NO
?	3F	YES	YES	YES	YES

Table 3-4 System Options (Configuration by Host) - continued

BYTE 19

ASCII	HEX	HERTZ SETTING	CLEAR SCREEN TO:	SEND CURSOR POSITION CODE	SEND CLEAR ALL CODE
0	30	50 HZ	NULLS	NO	NO
1	31	50 HZ	NULLS	NO	YES
2	32	50 HZ	NULLS	YES	NO
3	33	50 HZ	NULLS	YES	YES
4	34	50 HZ	SPACES	NO	NO
5	35	50 HZ	SPACES	NO	YES
6	36	50 HZ	SPACES	YES	NO
7	37	50 HZ	SPACES	YES	YES
8	38	60 HZ	NULLS	NO	NO
9	39	60 HZ	NULLS	NO	YES
:	3A	60 HZ	NULLS	YES	NO
;	3B	60 HZ	NULLS	YES	YES
<	3C	60 HZ	SPACES	NO	NO
=	3D	60 HZ	SPACES	NO	YES
>	3E	60 HZ	SPACES	YES	NO
?	3F	60 HZ	SPACES	YES	YES

KEYBOARD OPTIONS

The next four bytes (the 20th, 21st, 22nd, and 23rd bytes of configuration data) designate the Keyboard Control and the Keyboard Lock options.

The 20th byte designates Control-Protection (i.e., the simultaneous depression of the Control Key is required) on any or all of the following key groups:

1) EDIT and ESC
2) The Cursor Position Keys (Home, Cursor Up, Cursor Down, Cursor Left, Cursor Right).
3) Tab and Backtab
4) Return and Line Feed

Table 3-5 illustrates the data characters for each available setting.

The 21st byte designates Control-Protection on any or all of the following Function key groupings:

1) F1, F2, F3, F4 and their shifted counterparts F17, F18, F19, F20.
2) F5, F6, F7, F8 and their shifted counterparts F21, F22, F23, F24.
3) F9, F10, F11, F12 and their shifted counterparts F25, F26, F27, F28.
4) F13, F14, F15, F16 and their shifted counterparts F29, F30, F31, F32.

Table 3-5 illustrates the data characters for each available setting.

The 22nd byte designates the lock-out condition (i.e.,a depression of a "Locked-Out" key does not initiate an operation) on any or all of the following keygroups:

1) ESC
2) The Cursor Position Keys (Home, Cursor Up, Cursor Down, Cursor Left, Cursor Right).
3) Tab and Backtab
4) Return and Line Feed

Table 3-5 illustrates the data characters for each available setting.

The 23rd byte designates the lock-out condition on any or all of the following Function Key groupings:

1) F1, F2, F3, F4 and their shifted counterparts F17, F18, F19, F20.
2) F5, F6, F7, F8 and their shifted counterparts F21, F22, F23, F24.
3) F9, F10, F11, F12 and their shifted counterparts F25, F26, F27, F28.
4) F13, F14, F15, F16 and their shifted counterparts F29, F30, F31, F32.

Table 3-5 illustrates the data characters for each available setting.

Table 3-5 Keyboard Options (Configuration by Host)

BYTE 20

CONTROL PROTECTION

ASCII	HEX	EDIT, ESC	CURSOR POSITION GROUP	TAB, BACKTAB	RETURN, LINE FEED
0	30	NO	NO	NO	NO
1	31	NO	NO	NO	YES
2	32	NO	NO	YES	NO
3	33	NO	NO	YES	YES
4	34	NO	YES	NO	NO
5	35	NO	YES	NO	YES
6	36	NO	YES	YES	NO
7	37	NO	YES	YES	YES
8	38	YES	NO	NO	NO
9	39	YES	NO	NO	YES
:	3A	YES	NO	YES	NO
;	3B	YES	NO	YES	YES
<	3C	YES	YES	NO	NO
=	3D	YES	YES	NO	YES
>	3E	YES	YES	YES	NO
?	3F	YES	YES	YES	YES

Table 3-5 Keyboard Options (Configuration by Host) - continued

BYTE 21

CONTROL PROTECTION

ASCII	HEX	F1-F4, F17-F20	F5-F8, F21-F24	F9-F12, F25-F28	F13-F16, F29-F32
0	30	NO	NO	NO	NO
1	31	NO	NO	NO	YES
2	32	NO	NO	YES	NO
3	33	NO	NO	YES	YES
4	34	NO	YES	NO	NO
5	35	NO	YES	NO	YES
6	36	NO	YES	YES	NO
7	37	NO	YES	YES	YES
8	38	YES	NO	NO	NO
9	39	YES	NO	NO	YES
:	3A	YES	NO	YES	NO
;	3B	YES	NO	YES	YES
<	3C	YES	YES	NO	NO
=	3D	YES	YES	NO	YES
>	3E	YES	YES	YES	NO
?	3F	YES	YES	YES	YES

Table 3-5 Keyboard Options (Configuration by Host) - continued

BYTE 22

		LOCK-OUT	CURSOR POSITION	TAB,	RETURN,
ASCII	HEX	ESC	GROUP	BACKTAB	LINE FEED
-----	---	---	-------	--------	--------
0	30	NO	NO	NO	NO
1	31	NO	NO	NO	YES
2	32	NO	NO	YES	NO
3	33	NO	NO	YES	YES
4	34	NO	YES	NO	NO
5	35	NO	YES	NO	YES
6	36	NO	YES	YES	NO
7	37	NO	YES	YES	YES
8	38	YES	NO	NO	NO
9	39	YES	NO	NO	YES
:	3A	YES	NO	YES	NO
;	3B	YES	NO	YES	YES
<	3C	YES	YES	NO	NO
=	3D	YES	YES	NO	YES
>	3E	YES	YES	YES	NO
?	3F	YES	YES	YES	YES

Table 3-5 Keyboard Options (Configuration by Host) - continued

BYTE 23

LOCK-OUT

ASCII	HEX	F1-F4, F17-F20	F5-F8, F21-F24	F9-F12, F25-F28	F13-F16, F29-F32
0	30	NO	NO	NO	NO
1	31	NO	NO	NO	YES
2	32	NO	NO	YES	NO
3	33	NO	NO	YES	YES
4	34	NO	YES	NO	NO
5	35	NO	YES	NO	YES
6	36	NO	YES	YES	NO
7	37	NO	YES	YES	YES
8	38	YES	NO	NO	NO
9	39	YES	NO	NO	YES
:	3A	YES	NO	YES	NO
;	3B	YES	NO	YES	YES
<	3C	YES	YES	NO	NO
=	3D	YES	YES	NO	YES
>	3E	YES	YES	YES	NO
?	3F	YES	YES	YES	YES

PRINTER PORT OPTIONS

The next twelve bytes (bytes 24 through 35 of configuration data) designate the Printer Port operations.

The 24th byte designates the Print Line, Print Message, or Print Page condition on depression of the Print Key (F5 in the Edit Mode). Table 3-6 illustrates the Data Characters for each condition.

The 25th byte specifies the Printer Port Baud Rate. Table 3-6 illustrates the data characters for each available setting.

The 26th byte specifies the parity for the Printer Port. Table 3-6 illustrates the data characters for each available setting.

The 27th byte specifies the One Stop Bit option. Table 3-6 illustrates the data characters for each available setting.

The 28th through 43rd bytes indicate the Print Line terminator. For each character of the Print Line Terminator, two encoded bytes must be transmitted; Figure 3-4 provides, for each character, the two ASCII Characters (and their hexadecimal equivalents) required. Up to eight characters may designate the Print Line Terminator. The ASCII CANCEL Character (Control-X) must follow the last character the Print Line Terminator if the Print Line Terminator is seven characters or less. In this case, the host must transmit:

> Two bytes for each character of the
> Print Line Terminator.
>
> Two bytes for the CANCEL Character, and
>
> Two bytes for each space character
> to fill the sixteen-byte allotment.

For example, if the Print Line terminator were CR, LF, LF, then
the host must transmit:

0	(HEX 30)	CR
=	(HEX 3D)	
0	(HEX 30)	LF
:	(HEX 3B)	
0	(HEX 30)	LF
:	(HEX 3B)	
1	(HEX 31)	CANCEL
8	(HEX 38)	
2	(HEX 32)	SP
0	(HEX 30)	
2	(HEX 32)	SP
0	(HEX 30)	
2	(HEX 32)	SP
0	(HEX 30)	
2	(HEX 32)	SP
0	(HEX 30)	

The 44th byte designates the

    Ready (-)   and
    Line Drawing

options. Table 3-6 illustrates the data character for each
setting.

The next two bytes (45 and 46) designate the Pause Character.
Table 3-3 provides, for each desired character, the two ASCII
characters (and their hexadecimal equivalents) required. For
example, if the desired Pause Character were DC3, the host must
transmit 1 3 to designate that character.

The last two bytes (47 and 48) of the Print Port Options
designate the Resume Character. Table 3-3 provides, for each
desired character, the two ASCII characters (and their
hexadecimal equivalents) required. For example, if the desired
Resume character were DC1, the host must transmit 1 1 to
designate that character.

Table 3-6 Printer Port Options (Configuration by Host)

BYTE 24

ASCII	HEX	PRINT CONDITION
1	31	LINE
2	32	MESSAGE
3	33	PAGE

BYTE 25

ASCII	HEX	BAUD RATE
1	31	110
2	32	300
3	33	600
4	34	1200
5	35	2400
6	36	4800
7	37	9600

BYTE 26

ASCII	HEX	PARITY
1	31	ODD
2	32	EVEN
3	33	MARK
4	34	SPACE

BYTE 27

ASCII	HEX	NUMBER OF STOP BITS
1	31	ONE
2	32	TWO

Table 3-6 Printer Port Options (Configuration by Host) - continued

BYTE 44

ASCII	HEX	LINE DRAWING	READY MINUS
0	30	NO	NO
4	34	NO	YES
8	38	YES	NO
<	3C	YES	YES

TERMINATORS

The forty-ninth to ninety-sixth bytes of configuration data designate the terminator characters for each terminator sequence specified below.

For each character of a terminator sequence, two encoded bytes must be transmitted; Table 3-3 provides, for each character, the two ASCII characters (and their hexadecimal equivalents) required. Up to three characters (in a field of four) may designate the required terminator. The ASCII CANCEL character (Control-X) must follow the last character of the terminator sequence. If a terminator is less than three characters, then the host must transmit:

    Two bytes for each character of the terminator sequence,

    Two bytes for the CANCEL Character, and

    Two bytes for each Space character to fill the eight-byte allotment.

For example, if a terminator were CR LF, then the host must transmit

0	(HEX 30)	CR
=	(HEX 3D)	
0	(HEX 30)	LF
:	(HEX 3B)	
1	(HEX 31)	CANCEL
8	(HEX 38)	
2	(HEX 32)	SPACE
0	(HEX 30)	

The Terminator Sequences in order are:

Send Line Terminator	Bytes 49-56
Unformatted Page Terminator	Bytes 57-64
Unformatted Line Terminator	Bytes 65-72
Formatted Page Terminator	Bytes 73-80
Field Terminator	Bytes 81-88
Request to Send Terminator	Bytes 89-96

See Sections 3.2 and 4.8 for further information.

TERMINATING RAM CONFIGURATION

After the Terminator Options have been transmitted, the host may either:

        Store the configuration parameters in the terminal RAM for temporary configuration via the Multicode 7 sequence or

        in the case of the Model 1251, continue on to configure the Function Keys.

Function Key definitions can not be stored in terminal RAM.

This temporary RAM configuration will remain in effect until the terminal is powered down.

For the Model 1245, RAM configuration does not overwrite the Configuration PROM.

NOTE: Host configuration of the terminal requires 24 seconds; i.e., after the Multicode sequence to configure the terminal is transmitted, 24 seconds must elapse before the host should transmit any other data.

The terminal is re-initialized after configuration.

FUNCTION KEY DEFINITION

The next 806 bytes of configuration data provide for the designation of the HERE IS key and the definition of the individual function keys; four hundred characters of the Model 1251 EAROM are provided for Function Key definition - eight hundred encoded bytes must be transmitted for these 400 characters. These are the 97th through the 902nd bytes of configuration data.

The first six bytes, bytes 97 through 102, designate which of the function keys, from F01 to F32, will be utilized as the HERE IS Key. For each character (F and two digits for the key number) two encoded ASCII Characters must be transmitted by the host. Table 3-3 provides, for each character, the two ASCII characters (and their hexadecimal equivalents) required. For example, if F01 is to be the HERE IS key, the host must transmit:

4	(HEX 34)	F
6	(HEX 36)	
3	(HEX 33)	0
0	(HEX 30)	
3	(HEX 33)	1
1	(HEX 31)	

Bytes 103 through 902 provide for Function Key Definition. Unlike all other variable length configuration parameters (e.g., Terminators), the host need not transmit exactly the number of bytes.

Function Keys are defined by the host in much the same manner as by the operator, except that for each character desired, two encoded ASCII characters must be transmitted by the host. Table 3-3 provides, for each character the two ASCII characters (and their hexadecimal equivalents) required. Function key Definition is in the format:

      FUNCTION KEY NUMBER   (F01 through F32)
      the EQUALS SIGN
      MESSAGE
      the ASCII CANCEL character

It is important to keep in mind Function Keys F01 through F12 and their shifter counterparts F17 through F28 transmit their messages to the host, whereas Function Keys F13 through F16 and their shifted counterparts F29 through F32 (available only on the Optional Extended Keyboard) write their messages to the screen at the cursor position.

The ASCII CANCEL Character (Control-X) must be used to end the Function Key Definition.

An example of Function Key definition is shown here. The programmer wishes the Model 1251 to transmit the message EDIT 32 CR LF to the host upon depression of Function Key F5. For this example the following configuration data bytes are required:

4	(HEX 34)	F
6	(HEX 36)	
3	(HEX 33)	0
0	(HEX 30)	
3	(HEX 33)	5
5	(HEX 35)	
3	(HEX 33)	=
=	(HEX 3D)	
4	(HEX 34)	E
5	(HEX 35)	
4	(HEX 34)	D
4	(HEX 34)	
4	(HEX 34)	I
9	(HEX 39)	
5	(HEX 35)	T
4	(HEX 34)	
3	(HEX 33)	3
3	(HEX 33)	
3	(HEX 33)	2
2	(HEX 32)	
0	(HEX 30)	CR
=	(HEX 3D)	
0	(HEX 30)	LF
:	(HEX 3A)	
1	(HEX 31)	CANCEL
8	(HEX 38)	

NOTE: The CANCEL Character is not a character in the Function Key Message.

TERMINATING EAROM CONFIGURATION

After the Function Key definitions configuration data have· been
transmitted, the host must terminate configuration with the
Multicode - sequence. The Model 1251 will now take on the
configuration parameters.

NOTE: Host configuration of the terminal requires 24 seconds;
i.e., after the Multicode sequence to configure the terminal is
transmitted, 24 seconds must elapse before the host should
transmit any other data.

The terminal is re-initialized after configuration.

3.5 Configuration Default Assignments

In the event of an EAROM Checksum Error, the Model 1251 will take on the following emergency configuration parameters so that the terminal can be operational as a minimal system for an EAROM or RAM Configuration transmission. Under this minimal system, printing operations are not operational.

NOTE: For some of the various settings shown below, NOT ASSIGNED indicates that the Configuration Parameter is not assigned reliable data.

MODE CONTROL OPTIONS

          SCROLL   YES
          AUTO - LF   YES
          AUTO TAB   YES
          NEW LINE   YES
          UPPER CASE ONLY   YES
          INVERSE VIDEO   YES
          BLINK CURSOR   YES
          BLOCK CURSOR   YES
          RING BELL COLUMN #   NOT ASSIGNED

SYSTEM OPTIONS

          SEND STATUS LINE   YES
          STATUS LINE DISPLAY   YES
          ON-LINE WHEN POWERED UP   YES
          RETURN=SEND IN BLOCK MODE   YES
          60 HZ (AC Line Frequency)   YES
          CLEAR SCREEN TO   SPACES
          SEND CURSOR POSITION CODE   YES
          SEND CLEAR ALL CODE   YES

KEYBOARD OPTIONS

NOTE: No keyboard options are Control-Protected nor locked-out.

COMMUNICATION OPTIONS

TRANSMISSION MODE	CONVERSATIONAL
POLLED TERMINAL	NO
SEND LINE, MESSAGE, OR PAGE	LINE
BAUD RATE	300
PARITY	MARK
ONE STOP BIT	NO
103J	NOT ASSIGNED
MULTICODE CHARACTER	ESC
POLL/SELECT CHARACTER	NOT ASSIGNED
NULL SUPPRESSION ON	
UNFORMATTED TRANSMISSION	YES
NULL SUPPRESSION ON	
FORMATTED TRANSMISSION	YES

PRINTER PORT OPTIONS

PRINT LINE, MESSAGE, OR PAGE	NOT ASSIGNED
BAUD RATE	9600
PARITY	SPACE
ONE STOP BIT	NO
PRINT LINE TERMINATOR	NOT ASSIGNED
LINE DRAWING	YES
READY (-)	NOT ASSIGNED
PAUSE CHARACTER	NOT ASSIGNED
RESUME CHARACTER	NOT ASSIGNED

TERMINATORS	NOT ASSIGNED

FUNCTION KEYS	NOT ASSIGNED

3.6 Reading Configuration parameters (HOST)

Upon receipt of the Multicode 6 sequence, the terminal will transmit a series of Encoded ASCII Characters designating the terminal Configuration parameters. This sequence is exactly the same as the sequence for Host Configuration. The Data Bytes shown in Figure 3-2 indicate precisely each configuration parameter.

If the programmer only wishes to change one or several parameters, then

    1) the Multicode 6 sequence may be used to transmit this data into a Buffer,

    2) The changes may be made within the Buffer, and

    3) The host may transmit this data prefaced by a Multicode # to reconfigure the terminal.

SECTION 4
FUNDAMENTAL OPERATIONS

4.1 The ASCII Character Set

In addition to a set of displayable characters, the American
Standard Code of Information Interchange (ASCII) provides a set
of transmittable characters which are generated by
simultaneously depressing the CTRL key and the character key as
indicated in Table 4-1. The characters are functionally grouped
as follows:

    Communication Control Characters:
    Functional characters that control or facilitate
    transmission of information over communications networks.

    Format Effector Codes:
    Functional characters that control the layout or position
    of information in printing or display devices.

    Information Separator Codes:
    A group of four characters used in graded order that
    separate and qualify information.

Table 4-1 ASCII Control Characters

HEX   CTRL   CONTROL CHARACTER
---   ----   --

00   @   NULL

             All-zeroes character which can be used to
             accomplish time and media fill.

01   A   SOH (Start of Heading)

             Communications control character used at beginning
             of sequence of characters constituting
             machine-sensible address or routing information.

02   B   STX (Start of Text)

             Communications control character which precedes
             transmission of message text. Used, following DLE,
             to enter the transparent mode.

Table 4-1 ASCII Control Characters - continued

HEX   CTRL   CONTROL CHARACTER
---   ----   ---

03   C   ETX (End of Text)

             Communications control character used to terminate
             a message. Used, following DLE, to exit the
             transparent mode.

04   D   EOT (End of Transmission)

             Communications control character used to indicate
             conclusion of message transmission. Used,
             following DLE, to initiate a modem disconnect.

05   E   ENQ (Enquiry)

             Communications control character used as request
             for response from remote station. Triggers the
             HERE IS message stored in the Model 1251 EAROM or
             the Model 1245 PROM.

06   F   ACK (Acknowledge)

             Communications control character transmitted by
             receiver as affirmative response to sender.

07   G   BEL (Bell)

             Character used to cause audible alarm to sound.

08   H   BS (Backspace)

             Format effector causing movement of cursor one
             space backward on same line.

09   I   HT (Horizontal Tabulation)

             Format effector causing movement of cursor to
             next-in-series of predetermined positions along
             line.

0A   J   LF (Line Feed)

             Format effector causing advancement of cursor to
             next line.

Table 4-1 ASCII Control Characters - continued

HEX	CTRL	CONTROL CHARACTER

OB   K   VT* (Vertical Tabulation)

Format effector causing movement of cursor to first predetermined line on next form or page.

OC   L   FF (Form Feed)

Format effector causing all unprotected fields to clear and the cursor to move to the home position. For Scroll Enabled feature, this is equivalent to line feed.

OD   M   CR (Carriage Return)

Format effector causing the cursor to move to column 1 of the current line.

OE   N   SO (Shift Out)

Code used to indicate that code combinations which follow will be interpreted as outside the Standard ASCII Character Set until the SI (Shift In) character is encountered. Used to enter the form-drawing character set.

OF   O   SI (Shift In)

Code used to indicate that code combinations which follow will conform to Standard ASCII Codes. Used to exit the form-drawing character set.

10   P   DLE (Data Link Escape)

Communications control character which will change the meaning of limited number of continuously following characters. May be used to enter and exit the transparent mode.

Table 4-1 ASCII Control Characters - continued

```
HEX   CTRL   CONTROL CHARACTER
---   ----   ------------------------------------------------
```

HEX	CTRL	CONTROL CHARACTER
11	Q	DC1
12	R	DC2* Device
13	S	DC3 Controls
14	T	DC4*

Used for control of auxiliary devices associated with communications systems, especially switching devices on or off. The DC1 and DC3 characters are used for XON/XOFF protocol.

15	U	NAK* (Negative Acknowledgement)

Communications control character transmitted by receiving station as negative response to sending station.

16	V	SYN* (Synchronous Idle)

Communications control character used by synchronous transmission system.

17	W	ETB* (End of Transmission Block)

Communications control character used to indicate end of block of data.

18	X	CAN (Cancel)

Control character used to indicate that the data with which it is sent is in error or is to be disregarded. Used to terminate definition of Function keys and terminator sequences in the configuration mode.

19	Y	EM* (End of Medium)

Control character used to indicate physical end of medium, or end of unwanted portion of information recorded on medium.

----

*Ignored when received by the terminal.

Table 4-1 ASCII Control Characters - continued

HEX	CTRL	CONTROL CHARACTER

1A   Z   SUB* (Substitute)

Character used for substition of character
determined to be invalid or in error.

1B   [ESC (Escape)

Control character used to provide code extension.
The Escape character itself is a prefix affecting
interpretation of limited number of suffix
characters.

1C   \   FS* (File Separator)
1D   ]   GS* (Group Separator)
1E   ^   RS* (Record Separator)
1F   _   US* (Unit Separator)

Information separators used within data, in
optional fashion.

7F   DEL (Delete)

Character used for time or media fill or to request
deletion of a character by the host.

----

*Ignored when received by the terminal.

Multi-Character Functions

The following describes terminal functions that are generated by a combination of ASCII characters.

DLE STX   Enter Transparent Mode

           This mode is entered by depressing CTRL-P followed by
           CTRL-B.   All subsequent characters, including control
           codes, are stored in memory and displayed.   No control
           action takes place.   The New Line feature is enabled and
           the Scroll feature is disabled, regardless of the
           settings in configuration of the terminal.

DLE ETX   Exit Transparent Mode

           Depressing CTRL-P followed by CTRL-C returns the terminal
           to the normal mode.

DLE EOT   Disconnect

           Upon processing of a CTRL-P followed by CTRL-D, the
           terminal drops the Data Terminal Ready (DTR) lead to the
           modem for one (1) second, disconnecting a switched
           connection.

ESC BS   Enter Keyboard Self Test

           Upon the simultaneous depression of the ESC and BACK
           SPACE keys, the terminal enters the Keyboard Self-Test
           (see Section 2).

ESC LF   Exit Keyboard Self Test

           Upon the simultaneous depression of the ESC and LINE FEED
           keys, the terminal exits the Keyboard Self-Test (see
           Section 2).

ESC   Enter RAM Self Test

           Upon the simultaneous depression of the ESC and ' (SHIFT
           + 7) keys, the terminal enters the RAM Self-Test (see
           Section 2).

The Model 1251/1245 terminal offers additional multi-character
functions, described in Section 7.

Table 4-2 Standard ASCII Character Set

					Control codes							
b7 b6 b5 →					$0\,0\,0$	$0\,0\,1$	$0\,1\,0$	$0\,1\,1$	$1\,0\,0$	$1\,0\,1$	$1\,1\,0$	$1\,1\,1$
b4	b3	b2	b1	COLUMN / ROW ↓	0	1	2	3	4	5	6	7
0	0	0	0	0	NUL	DLE	SP	0	@	P	`	p
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	10	LF	SUB	*	:	J	Z	j	z
1	0	1	1	11	VT	ESC	+	;	K	[	k	{
1	1	0	0	12	FF	FS	,	<	L	\	l	|
1	1	0	1	13	CR	GS	—	=	M	]	m	}
1	1	1	0	14	SO	RS	.	>	N	^	n	~
1	1	1	1	15	SI	US	/	?	O	—	o	DEL

4.2 Keyboard Functions

The following pages describe the keyboard functions of the Model
1251/1245 keyboard. Also, since the operation of certain keys
may vary with different operator features, such as SCROLL
Enable, notes pertaining to the keyboard functions in
conjunction with these features are provided.

BREAK
Presents the communication line with a space (BREAK) for 1/2
second for each key depression. The REPEAT key does not operate
in conjunction with the BREAK key.

NUMERIC MODE *
Enables the numeric pad superimposed on the keyboard. All other
alphanumeric keys are locked out. The # character appears on
the Status Line, if the Status Line display is enabled. Another
depression of this key disables the numeric mode.

ERROR RESET
Clears the Error Field of the Status Line and unlocks the
keyboard, which has been locked because of an operator error.
This key does not unlock the keyboard when the keyboard has been
locked by the host with the Multicode (sequence.

HOME
Moves the cursor to the HOME position (Line 1, Column 1)

Cursor Up
Moves the cursor up by one line. If the cursor is on line 1, it
will be wrapped around to line 24.

Cursor Down
Moves the cursor down by one line. If the cursor is currently
on line 24, it will be wrapped around to line 1.

----

* Standard Keyboard Only

Cursor Left
Moves the cursor one position to the left.

> NEW LINE Enabled:
> If the cursor is currently in column 1 of lines 2 through 24, the cursor will be wrapped around to column 80 of the previous line. The cursor can not be moved to the left of the HOME position.

> NEW LINE Disabled:
> The cursor cannot be moved to the left of column 1.

Cursor Right
Moves the cursor one position to the right.

> NEW LINE Enabled/SCROLL Enabled:
> If the cursor is currently on column 80 of line 24, lines 2 through 24 will each be moved up by one line (line 1 will be lost) and the cursor will be positioned at column 1 of line 24.

> NEW LINE Enabled/SCROLL Disabled:
> If the cursor is currently in column 80 of line 24, then the cursor will be wrapped around to the HOME position.

> NEW LINE Disabled:
> The cursor cannot be moved past column 80 of the current line.

ESC
Generates ASCII ESC character which is used sequentially with other characters to enable special functions. ESC is the Multicode default assignment; any ASCII character may be assigned as the Multicode character in configuration. (Some DEC computers do not permit this use of ESC).

CTRL (Control Key)
Used simultaneously with @, A-Z, [,/], ^, and _ keys to enable ASCII SOH (Start of Heading) control character.

REPEAT
Used simultaneously with other keys to provide a continuous repitition of the depressed key. Repeat rate is 15 characters per second.

SHIFT LOCK
Maintains the Shift Key in a depressed state. A second depression releases the SHIFT LOCK key. This key operates just like a typewriter SHIFT LOCK key.

SHIFT
Permits the entry of all upper case characters depicted on the keyboard. This key operates just like a typewriter SHIFT key.

BACK SPACE
Moves the cursor one position to the left. The cursor cannot be backspaced from the HOME position.

    NEW LINE Enabled:
    If the cursor is in column 1 of lines 2 through 24, it will be wrapped around to column 80 of the previous line.

    NEW LINE Disabled:
    The cursor cannot be backspaced from column 1.

LINE FEED
Generates the ASCII LF character which moves the cursor down by one line without changing the cursor column position.

    SCROLL Enabled:
    If the cursor is on line 24, lines 2 through 24 will each be moved up by one line (line 1 will be lost) and the cursor will remain in the same column of line 24. Line 24 will be cleared to nulls or spaces depending on Configuration.

    SCROLL Disabled:
    If the cursor is on line 24, it will be wrapped around to the same column on line 1.

RETURN
Returns the cursor to column 1 of the current line.

    AUTO LF Enabled/SCROLL Enabled:
    If the cursor is on line 1 through 23, it will be moved to column 1 of the next line.
    If the cursor is on line 24, lines 2 through 24 will each be moved up by one line (line 1 will be lost) and the cursor is moved to the first column of the current line.

    AUTO LF Enabled/SCROLL Disabled:
    If the cursor is on line 1 through 23, it will be moved to column 1 of the next line.
    If the cursor is on line 24, it will be moved to the HOME position.

    AUTO LF Disabled:
    The cursor is returned to column 1 of the current line.

SPACE and Displayable Characters (Ivory Keys)
Displays the designated character at the current cursor position
and moves the cursor one column to the right (Half Duplex or
Local Mode). In Half Duplex, these characters are also
transmitted to the host. In Full Duplex, these characters are
transmitted to the host only.

NEW LINE Enabled/SCROLL Enabled:
If the cursor is in column 80 of line 24, lines 2 through
24 will each be moved up by one line (line 1 will be lost)
and the cursor is moved to column 1 of line 24. Line 24
will be cleared to nulls or spaces depending on
Configuration.

NEW LINE Enabled/SCROLL Disabled:
If the cursor is in column 80 of line 24, it will be
wrapped around to the HOME position.

NEW LINE Disabled:
The cursor cannot be moved past column 80 of the current
line. Subsequent characters will be displayed in column 80
of the current line.

DEL
(Shifted) Generates the ASCII DEL character which is transmitted
in Conversational mode only but is not displayed or stored. The
DEL character may be stored and displayed on the screen by
preceeding it with the Multicode character.

SEND
Operates according to mode:

CONVERSATIONAL MODE:
Alternately enables and disables the Status Line display
provided the Status Line has been enabled in configuration;
otherwise no action will occur.

BLOCK MODE:
Initiates transmission to the host in a manner according to
configuration (i.e., SEND LINE, SEND MESSAGE OR SEND PAGE)

SEND LINE:
The line on which the cursor is located (starting with
column 1) is transmitted.

SEND MESSAGE:
The message, starting at the character following the
previous message sent (or the start of the page) and
ending at the current cursor position, is transmitted.

SEND PAGE:
The screen contents, starting with either the HOME position (as defined by MULTICODE E or MULTICODE F sequence respectively) or the present cursor position are transmitted.

PROGRAM MODE:
Enables the user to create an attribute character. (See Section 4.6).

EDIT
Alternately places the terminal into and out of the EDIT Mode. Function Keys F05-F12 and F17-28 are redefined (see Section 4.4).

TAB
Moves the cursor to the next tab stop. (The first data character of an unprotected field is also a tab stop.)

NEW LINE Enabled:
If the next tab stop is on the next line, the cursor will proceed to that tab stop.

NEW LINE Disabled:
The cursor will not proceed beyond column 30 when the screen is unformatted. For a formatted screen, the cursor will proceed to the next tab stop, the beginning of the next unprotected field.

BACKTAB
Moves the cursor to the previous tab stop.

4.3 Function Keys

The Model 1251/1245 features twelve (shiftable to twenty-four) Function Keys for transmission to the host. The optional Extended Keyboard features an additional four (shiftable to eight) Function keys.

The Function Keys are labeled for your convenience: F1 through F12 and, on the Optional Extended Keyboard, F13 through F13 through F16. The depression of the SHIFT key specifies a different Function Key from the label. For example, Function Key F1 unshifted responds as Function Key F01. When Function Key F1 is shifted, however, it responds as F17.

The SHIFT key, in effect, calls the Function Key depressed plus a value of 16:

```
             F1  + SHIFT = F17
             F2  + SHIFT = F18
             F3  + SHIFT = F19
             F4  + SHIFT = F20
             F5  + SHIFT = F21
             F6  + SHIFT = F22
             F7  + SHIFT = F23
             F8  + SHIFT = F24
             F9  + SHIFT = F25
             F10 + SHIFT = F26
             F11 + SHIFT = F27
             F12 + SHIFT = F28
             F13 + SHIFT = F29
             F14 + SHIFT = F30
             F15 + SHIFT = F31
             F16 + SHIFT = F32
```

Function Keys act as message keys and editing keys.

When the terminal is in the EDIT Mode, some of the Function Keys are not used as message keys, but for editing. For further information on this aspect, see Section 4.4.

When the terminal is not in the EDIT Mode, a depression of a Function Key transmits a pre-defined message to the host. If the Function Key has not been defined, a Request-To-Send sequence and an AID character is sent to the host. Some Function Keys also transmit even while the terminal is in the EDIT Mode.

Any of the Function Keys when undefined in configuration, transmits a Request-To-Send sequence (Multicode-R) and an Attention Identifier Character to the host. Table 4-3 gives for each of these Function Keys, the AID character transmitted. The AID character is appended by the "Request-To-Send terminator". In Block Mode, the keyboard is locked after this sequence is transmitted; the host must reply with a Read sequence.

Function Keys are defined in the configuration of the terminal.

On transmission, Function Keys (except the HERE IS key) are automatically appended with the "Send Line Terminator".

Function Keys F13 through F16 and F29 through F32 operate differently from other Function Keys in that they actually simulate keyboard entry. Transmission and display of their associated messages operate as if that message were entered on the keyboard, following the current operating modes of the terminal.
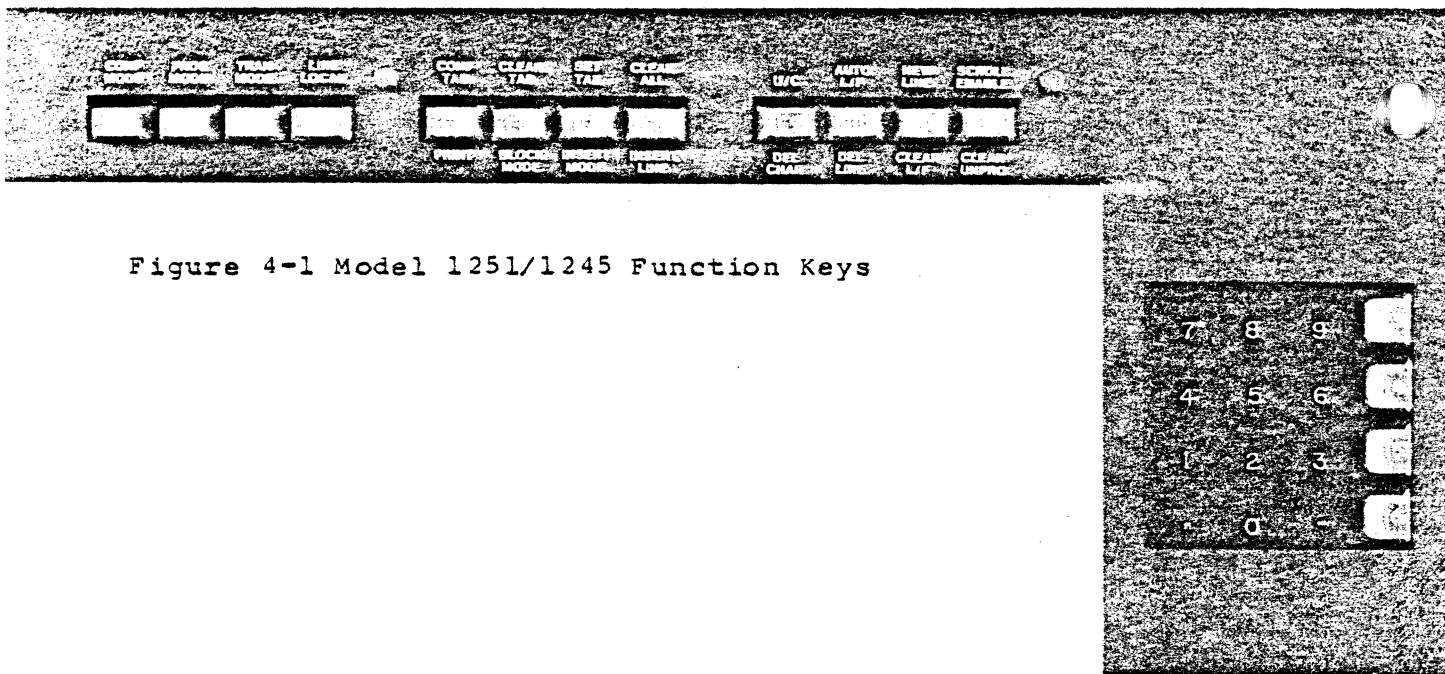
Figure 4-1 Model 1251/1245 Function Keys

Table 4-3 Model 1251/1245 Function Key/Attention Identifier
Characters

Function Key	ASCII Character	Hex
F 01	A	41
F 02	B	42
F 03	C	43
F 04	D	44
F 05	E	45
F 06	F	46
F 07	G	47
F 08	H	48
F 09	I	49
F 10	J	4A
F 11	K	4B
F 12	L	4C
F 13	M	4D
F 14	N	4E
F 15	O	4F
F 16	P	50
F 17	a	61
F 18	b	62
F 19	c	63
F 20	d	64
F 21	e	66
F 22	f	66
F 23	g	67
F 24	h	68
F 25	i	69
F 26	j	6A
F 27	k	6B
F 28	l	6C
F 29	m	6D
F 30	n	6E
F 31	o	6F
F 32	p	70

4.4 EDIT Mode Operations

The Edit Mode allows the operator to perform editing functions, set various features, access several modes of operation and more.

These are accomplished by Function Key depression. In the EDIT Mode, Function Keys F05 through F12 and their shifted counterparts F17 through F28 have new meaning. Depressing any of these does not generate its associated message, rather, it functions as a new key entirely. When the terminal exits the EDIT Mode, the Function Keys take on their associated messages (see Section 4.3).

NOTE: Function Keys F1 to F4 transmit to the host during EDIT Mode operations (see Section 4.3).

To enter the Edit Mode, depress the EDIT key. An inverse video block at the end of the Status Line (if enabled) will be shown. Also, an audible signal will sound upon entry to the Edit Mode.

The subsequent depression of the EDIT key causes the terminal to exit the Edit Mode. The EDIT Mode is exited automatically only in the case of the CONF MODE function.

Figure 4-1 illustrates the operations assigned to the function keys in the Edit Mode.

The Edit Mode functions are described through the following pages.

NOTE: Edit Mode functions indicated with an asterisk (*) operate as alternate action keys.

F05 PRINT
initiates a local printout (i.e., transmits to the printer port) the Line, Message, or Page, depending on the Print Condition.

    Print Line: The line on which the cursor is located is
                   transmitted.
    Print Message: The message, starting with the HOME
                   position or the character following the end
                   of the previous message and ending at the
                   current cursor position, is transmitted.
    Print Page: The screen contents are transmitted.

F 06 BLOCK MODE *
alternately places the terminal in Block Mode or Conversational
Mode. If the display of the Status Line has been enabled,
mnemonics will be shown to reflect the Block Mode or the
Conversational Mode (see Section 4.5).

F 07 INSERT MODE *
allows the insertion of alphanumeric characters at the current
cursor position. If the display of the Status Line has enabled,
an I character will be displayed in the Edit Mode block. The
character at the cursor position and the characters to its right
are shifted one position to the right for each character
inserted. Characters are inserted so that the shifted
characters do not intrude on another field or (for an
unformatted screen) the end of the screen; either of these
generates a KBD LOCKD error.

    If the terminal has been configured to clear to nulls,
    this right shift will be at the expense of the first null
    character encountered.

    If the terminal has been configured to clear to spaces,
    each right shift is at the expense of a space character at
    the end of the field or (for an unformatted screen) the
    end of the screen (not the Status Line). If no space
    characters remain at the end of the screen (regardless
    whether there are space characters between the cursor and
    the end of the screen), a KBD LOCKD error will occur.

F 08 INSERT LINE
inserts a line of nulls or spaces (depending on Configuration)
at the current cursor location. The cursor remains at the same
position.

The INSERT LINE operation differs for unformatted and formatted
screens:

    Unformatted Screen

    All data on and below the line will be moved down by one
    line. The last line of the screen is lost.

Formatted Screen

The INSERT LINE operation is confined to the current field, as long as there are enough lines to accomodate the data that will be moved and the line on which the cursor is located does not contain an attribute character (see Section 4.6). Otherwise, a KBD LOCKD error will occur.

All data on and below the line on which the cursor is located is moved down by one line. This operation is at the expense of the first line of clear characters (nulls or spaces, depending on Configuration) encountered before the end of the field.

The INSERT LINE operation functions only if the line on which the cursor is located contains data characters.

Two successive lines of data will be combined if there are at least 80 clear characters between the last data character of the current line and the first data character of the next line.

NOTE: The INSERT LINE operation functions differently depending on the clear character. If the terminal has been configured to clear to nulls, then spaces are treated as data characters; any lines containing only (one or more) spaces are preserved during this operation. If the terminal has been configured to clear to spaces, then spaces are not treated as data characters; any lines containing only spaces may be subject to deletion.

F09 DEL CHAR (Delete character)
deletes characters under the cursor. Characters to the right of the cursor are moved one character to the left. The trailing edge of this left shift movement generates nulls or spaces (depending on configuration) in the vacated positions.

For deleting characters within a formatted screen, this left shift occurs only until the end of the field. If the field encompasses more than one line, a wrap-around will occur.

An attempt to delete an attribute character or to delete a character in a protected field generates a keyboard lockout error.

F10 DEL LINE (Delete Line)
deletes the line at which the cursor is currently located. All
lines (if a formatted screen, all lines within a field) below
are moved up. The last line of the display (or field) is
cleared to nulls or spaces depending on configuration. An
attempt to delete a line containing an attribute character
generates a keyboard lockout error.

F11 CLEAR L/F (Clear line/field)
Clears the line on which the cursor is located from the cursor
position to the end of the line or field.

F12 CLEAR UNPRO (Clear unprotected)
Clears all unprotected data starting with the current cursor
position through the end of the display. Clear Unprotected does
not reset tab stops. Clear Unprotected does reset Modify Data
Tags.

F17 CONF MODE (Configuration Mode)
initiates the Configuration Mode. For further information, see
Section 3.

F18 PROG MODE * (Program Mode)
Alternately initiates and terminates the Program Mode. For
further information, see Section 4.6.

F19 TRANS MODE * (Transparent Mode)
Alternately initiates and terminates the Transparent Mode (see
Section 1.4).

F20 LINE/LOCAL *
alternately places the terminal on-line and off-line.

F21 CONF TAB (Configuration Tab)
sequences the cursor through data entry fields in the "menu"
display in the Configuration Mode.

F22 CLEAR TABS
clears all tab stops.

F23 SET TAB
sets a tab stop at the current cursor position.

F24 CLEAR ALL
clears display memory, resets the tab stops (tabs are set at every eighth position, i.e., 1, 8, 16, etc.), places the cursor in places the HOME position.

> If the terminal has been configured for the SEND CLEAR ALL CODE feature, a Request-To-Send sequence is transmitted to the host. Until the host responds with a READ sequence, screen data will not be cleared.

F25 U/C * (Upper Case)
alternately enables or disables the UPPER CASE feature. Lower case characters are converted to upper case. The following punctuation is also converted:

$$\begin{array}{l} ' \text{ to } @ \\ \{ \text{ to } [\\ | \text{ to } \backslash \\ \} \text{ to }] \\ \text{and} \sim \text{ to } \char`\^. \end{array}$$

F26 AUTO L/F* (Auto Line Feed)
alternately enables and disables the Auto Line Feed feature which automatically advances the cursor to the next line on a depression of the RETURN key.

F27 NEW LINE *
alternately enables and disables the New Line feature which automatically appends the 80th character on a line with Carriage Return and Line Feed characters. The next character entered is displayed in column 1 of the next line.

F28 SCROLL ENABLE *
alternately enables and disables the Scroll feature which automatically permits additional lines to be entered on the display (when capacity is exhausted) by shifting the display up by one line for each new line entered. Each shift destroys the topmost data line. The Scroll feature will not operate on a formatted screen.

4.5 Status Line

The Model 1251/1245 features a Status Line so that the operator can visually monitor the modem interface and current transmission mode as well as indicate the current operator option settings and several operating modes of the terminal.

The Status Line also permits communication with the host without disturbing work in progress.

The Status Line may be configured so that it is displayed or not displayed. In the event the terminal is configured for non-display of the Status Line, operations concerning the Status Line are consequently ignored. The only exception to this is that an audible signal will be sounded for entry into the EDIT Mode and for each EDIT Mode operation. For further information on the Configuration Mode, see Section 3.

The Status Line is divided into separate fields. These fields are described in order as follows.

The User Area
(columns 2 to 31)

The operator may enter in the User area messages to the host and vice versa.

If the terminal is in Block mode, the cursor is in the User Area (the sequence MULTICODE 4 moves the cursor from a display position to column 2 of the User Area), and the SEND key is depressed, only the data entered in the User Area is sent to the host.

In Conversational mode, a depression of the SEND key is not required to send characters to the host; in fact, a depression

of the SEND key alternately disables and enables the display of the Status Line. Also, upon the first application of the Scroll feature on the 24th line of data, the Status Line is automatically disabled so that the operator may concentrate on the data.

The Column Number Field
(columns 32 to 34)

The letter C and the number of the column where the cursor is currently located are displayed in this field.

The Error Indicator Field

(columns 35 to 46)

Error messages, defined below, are displayed in this field until cleared with a depression of the ERROR/RESET key.

    EAROM CKSUM   EAROM Checksum Error
    KBD LOCKED   Keyboard Locked
    NUMRC FLD   An alpha entry was attempted
                   in a numeric field.
    PROTCT FLD   An entry was attempted in a
                   protected field.

The Modem Status Field
(columns 47 to 52)

In this field mnemonics indicating the "on" state of the transmit and receive lines are displayed. These mnemonics are:

    CS   (Clear To Send)   Data Being Transmitted
    DR   (Data Set Ready)   Data Being Received

The Communication Status Field
(columns 53 to 59)

Mnemonics indicating the operating mode of the terminal are displayed in this field. They are:

    CG   Configuration Mode
    PG   Program Mode
    LN   The terminal is currently on-line.
    LCL   Local. The terminal is currently
                   off-line.

LN and LCL are toggled since this an either-or condition.

The Send Mode Field
(columns 60 to 68)

Mnemonics indicating the current SEND condition of the terminal are displayed in this field. They are:

    CV   Conversational Mode
    BL   Block Mode

When the terminal is in the Block Mode, additional mnemonics are displayed in this field. These mnemonics, listed here, detail the SEND condition for Block mode transmission.

    RS Request To Send
    IM Send Immediate

```
AL   Send All
UN   Send Unprotected
M    Send Modified
```

When the terminal is in Block Mode, then mnemonic BL will be
displayed with either the RS or IM mnemonic and either the AL,
UN, or M mnemonic in this field.

The Operator Features Field
(columns 69 to 76)

Mnemonics in this field indicate the operator features that are
currently enabled (in the "on" state).
These mnemonics are:

```
S          Scroll
U          Upper Case
L          Auto Line Feed
N          New Line
```

The absence of a mnemonic for a given feature indicates the
disabled ("off") state.

For the operator's convenience, the Operator Features Field is
displayed in half intensity, differentiating it from the rest of
the Status Line display.

The EDIT Mode Block
(columns 77-80)

When the terminal enters the EDIT Mode, an audible signal sounds
and an inverse video block appears in this field of the Status
Line. (If the screen has been configured for inverse video,
then this block will appear as a normal, light characters on a
dark background, field).

Furthermore, when the terminal enters the Insert Mode, a subset
of the EDIT Mode, the letter I will appear in this block.

For terminals with the Standard Keyboard, a depression of the
NUMERIC MODE key places the # indicator in this field, whether
or not the terminal is presently in the EDIT Mode.

4.6 Setting Formatted Fields

The terminal screen may be subdivided into two or more fields. Each field may be characterized by visual or operational attributes. The types of fields are:

    Normal
    Inverse Video
    Non-Display
    Half Intensity
    Blink
    Numeric
    Protected
    Underlined
    Light Pen Detectable.

Furthermore, many combinations of the above types may be utilized.

The field types are defined below.

Normal
White data characters are displayed on a dark field. Or, if the Model 1251/1245 has been configured to enable the Inverse Video feature, dark data characters are displayed on a light field.

Inverse Video
Dark data characters are displayed on a light field. Or, if the Model 1251/1245 has been configured to enable the Inverse Video feature, white data characters are displayed on a dark field.

Non-display
Data characters entered in a non-display field are not displayed on the screen. This type of field is useful for security situations, e.g.,passwords for signing on.

Half Intensity
For a field combining normal and half intensity attributes, half intensity characters are displayed on a dark screen. For example, grey characters are displayed on a charcoal screen. For a field combining inverse video and half intensity attributes, dark characters are displayed on a half intensity field. For example, charcoal characters are displayed on a grey screen.

Blink
Characters entered in a blinking field blink on and off. This type of field is desirable for bringing a message to the attention of an operator.

Figure 4-2 Formatted Screen

Numeric
Only numeric data is accepted in this field type.

Underlined
Data is displayed on field that also displays an underline.
NOTE: The Underline attribute cannot be used in conjunction
with the Inverse Video, Non-Display, and/or Blink attributes.

Protected
Characters can not be entered in this type of field from the
keyboard. This type of field prevents keyboard overwriting of
data written by the host for light pen detection or for any
other reason. Protected fields are particularly useful when
utilized in conjunction with the Forms Drawing Character Set for
display of form facsimiles.

Light Pen Detectable
This type of field is required for Light Pen operation. For
further information, see Section 4.7.

Screen fields may be set by the programmer through the keyboard
or by the host over the Communication line.

Defining Fields through the Keyboard (Program Mode)

To set the screen into various fields from the keyboard, the
programmer must enter the EDIT Mode in order to access the
PROGRAM Mode. Depressing EDIT, then PROG MODE accomplishes
this.

The programmer positions the cursor to the desired location for
an attribute character (defining the beginning of the field) by
using the Cursor Position keys.

Next the programmer depresses the SEND key. Data is not sent to
the host in the PROGRAM Mode. The programmer may enter one or
more one character mnemonic indicating the type of field
desired. These mnemonics are:

        B   for Blink Field
        D   for Non-Display Field
        I   for Half Intensity Field
        L   for Light Pen Detectable Field
        N   for Numeric Field
        P   for Protected Field
        U   for Underlined Field and
        V   for Inverse Video Field.

The entry of a legal mnemonic is echoed in the attribute character location.

If no mnemonic is entered, the Model 1251/1245 assumes a normal field.

If the programmer enters the same mnemonic a second time, that particular attribute is negated.

If a character other than the above mnemonics is entered, the Model 1251/1245 ignores it.

After all the mnemonics have been entered, the programmer depresses the SEND key once more. The field is now defined and the programmer may move the cursor to the first position of the next desired field. The mnemonics for the defined field are displayed on the Status Line except for a Light Pen Detectable field which displays the message *LITE PEN on the Status Line to the right of any other mnemonics for the field.

The characteristics of the field do not take effect until the PROGRAM Mode is exited. Depressing PROG MODE once more causes the Model 1251/1245 to exit the PROGRAM Mode. The programmer now depresses the EDIT key to exit the EDIT Mode.

Fields can be defined from the keyboard in the same manner as for the Communication Line, described below.

Defining Fields over the Communication Line

Fields are set through MULTICODE sequences. The host computer sends a MULTICODE sequence to position the cursor at the desired location. Next a MULTICODE sequence establishes that position as a distinct attribute character.

The sequence MULTICODE ! (ch) designates a non-Light Pen detectable field. The character (ch) indicates additional characteristics of the field, e.g., inverse video. Table 4-4 provides for each combination of characteristics, the character required to acquire the desired effects.

The sequence MULTICODE " (ch) designates a Light Pen detectable field. The character (ch) indicates additional characteristics of the field, e.g., normal. Table 4-4 provides for each combination of characteristics, the character required to acquire the desired effects.

Table 4-4 Attribute Characters ASCII/Hexadecimal

Field Attribute	ALPHA-NUMERIC	NUMERIC ONLY	PROTECT	MOD. ALPHA	MOD. NUMERIC
Normal	NULL 00	SOH 01	STX 02	SP 20	! 21
Half Intensity	EOT 04	ENQ 05	ACK 06	$ 24	% 25
Inverse	BS 08	HT 09	LF 0A	(28	) 29
Half + Inverse	FF 0C	CR 0D	SO 0E	, 2C	- 2D
Non-Display	DLE 10	DC1 11	DC2 12	0 30	1 31
Blink	@ 40	A 41	B 42	` 60	a 61
Blink + Half	D 44	E 45	F 46	d 64	e 65
Blink + Inverse	H 48	I 49	J 4A	h 68	i 69
Blink + Half + Inverse	L 4C	M 4D	N 4E	l 6C	m 6D
Underline	P 50	Q 51	R 52	p 70	q 71
Underline + Half	T 54	U 55	V 57	t 74	u 75

4.7 Light Pen Operation

The Model 1251/1245 terminal may be purchased with an optional Light Pen, a light sensitive pen connected to the monitor. This Light Pen gives the operator the ability to select data options by pointing or pressing this pen at data fields defined as "Light Pen Detectable". The Light Pen operates by detecting variations in light emitted by the data characters on the screen. Detection of light by the Light Pen results in a hardware interrupt, whereupon the terminal retrieves the location of the Light Pen detected character from the CRT controller. Subsequent action is dependent on the pre-defined field.

DEFINING LIGHT PEN FIELDS

Screen displays containing Light Pen detectable fields may be formatted by the host via the communications line with the Multicode " sequence or by the operator via the keyboard while the terminal is in the Program Mode. Two types of Light Pen Fields may be defined by virtue of the designator character in the field. These two types are Selector Fields and Attention Fields.

As with any other field, the attribute character defines the start of a new field (and, consequently, the end of the previous field). The attribute character is established in Program Mode or by the Multicode sequence described above.

The next character in a Light Pen Detectable field is the Designator Character. The designator character is a visual representation of the Light Pen field. There are three characters that are Light Pen designator characters: ?, >, and *. If the designator character is a question mark, "?", the field is a Light Pen Selector field and, upon selection by the Light Pen, the character will be changed to a greater than sign, ">". If the designator character is an asterisk, "*", the field is a Light Pen Attention field. This field, upon selection by the Light Pen, is equivalent to the depression of the SEND key in Block Mode transmission.

NOTE: Even if the terminal is in Conversational mode, the terminal will transmit as if the SEND key were depressed for Block Mode transmission.

It is the responsibility of the screen formatter, whether operator or host programmer, to include the Designator Character.

The next characters in the Light Pen field are padding characters. There must be at least three padding characters to the Light Pen field before a new field (Light Pen or non-Light Pen) can be established; these padding characters must be space characters. Padding characters may contain data to be read by the operator (as long as there are three space characters before the next field).

An important distinction to make is that the entire field is light pen detectable (including padding characters) - not just the Designator character.

LIGHT PEN FIELD OPERATION

The selection of a Light Pen Selector field alternately changes the Modify Data Tag of the attribute character and, as mentioned above, the ? Designator Character to > and vice versa. The Modify Data Tag may be altered by either Light Pen selection or by keyboard entry. A keyboard entry will not change the designator character as would Light Pen selection.

TRANSMISSION

Line transmission of the screen may be initiated by either Light Pen selection of an Attention field or by the depression of the SEND key on the keyboard.

Transmission occurs as if the terminal were in Block Mode.

Transmission of data takes place as "Send Immediate" unless "Request To Send" has been stipulated. Data transmission also depends on the read condition (Read All, Read Unprotected, or Read Modified).

For Read All, the entire screen (including attribute characters) is sent.

For Read Unprotected, the addresses of all unprotected non-Light Pen fields and the adresses of all Light Pen fields are transmitted according to the data format for Read Unprotected (see Section 4.8). This differs from non-Light Pen transmission for Read Unprotected where the data and the addresses are transmitted.

For Read Modify, the cursor position precedes the transmission of the addresses of all fields whose Modify Data Tags have been altered. This differs from non-Light Pen transmission for Read Modified where the data and the addresses are transmitted.

The Attention Field is always considered a Read Modify condition.

GENERAL OPERATIONAL INFORMATION

Light Pen detection occurs on all characters with sufficient light resolution. The following should be used with caution for Light Pen detection:

    Half Intensity Fields
    A line of space characters
    A sequence of characters with low contrast matrix:
        . , ´ : ^ —

Multiple Light Pen fields are permitted on a line or one beneath the other on a series of lines.

Light Pen and keyboard are locked out during transmission regardless of whether the transmission resulted from a depression of the SEND key or by Light Pen selection of an Attention Field.

4.8 Block Mode Transmission Formats

For transmission in BLOCK Mode, transmission may take place as "Send Immediate" or "Request To Send".

For "Send Immediate", the terminal sends the data immediately upon depression of the SEND key or upon a Read request from the host. Depending on configuration, the data will be sent as a line, a message, or a page unless the host had previously changed the SEND Condition by transmitting a SEND Key Override (Multicode < x) sequence. The Read request from the host may be READ ALL, READ UNPROTECTED, or READ MODIFIED depending on the Muticode sequence issued by the host. Using Multicode sequences, the programmer can specify data sent as Send All, Send Unprotected, or Send Modified.

For "Request To Send", upon depression of the SEND key, the terminal sends only a Multicode R sequence followed by a 1 (for SEND PAGE), 2 (for SEND LINE), or 3 (for SEND MESSAGE) and the Request to Send Terminator. The Attention Identifier (AID) character following the Multicode R sequence depends on the SEND Condition of the terminal (designated in configuration) unless the host had previously transmitted a SEND Key Override (Multicode < x) sequence. The host replies with a Read request, READ ALL, READ UNPROTECTED, OR READ MODIFIED depending on the Multicode sequence issued.

The format of the data transmitted depends on the Read request issued by the host.

FROM TERMINAL   FROM HOST

```
┌─────────────────────┐
│     DEPRESSION      │
│         OF          │
│    SEND KEY *       │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│   MULTICODE  R      │
├─────────────────────┤
│ AID CHARACTER **    │
├─────────────────────┤
│ REQUEST TO SEND     │
│ TERMINATOR          │
└─────────────────────┘
```

SENT TO HOST

```
┌─────────────────────┐
│ NOTE:               │
│                     │
│ KEYBOARD IS         │
│ LOCKED.             │
└─────────────────────┘
```

```
┌──────────────────────────────────────┐
│ READ SEQUENCE                         │
│              ⎧ =  READ ALL            │
│  MULTICODE  ⎨  >  READ UNPROTECTED    │
│              ⎩ ?  READ MODIFIED       │
└──────────────────────────────────────┘
```

SENT TO TERMINAL

```
┌─────────────────────┐
│ DATA FROM           │
│ TERMINAL            │
│ ( ACCORDING TO      │
│   SEND CONDITION )  │
├─────────────────────┤
│ TERMINATOR ***      │
└─────────────────────┘
```

SENT TO HOST

```
┌─────────────────────┐
│ NOTE:               │
│                     │
│ KEYBOARD IS         │
│ UNLOCKED            │
└─────────────────────┘
```

From Terminal

```
┌─────────────────────┐
│    Depression       │
│        of           │
│    SEND Key *       │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│     Data            │
│     From            │
│   Terminal          │
│ ( According To      │
│   Send Condition)   │
├─────────────────────┤
│ Terminator ***      │
└─────────────────────┘
```

Sent To HOST

* RETURN MAY BE CONFIGURED AS SEND KEY.

** AID CHARACTER DESIGNATED BY SEND TYPE IN CONFIGURATION:

SEND PAGE	1 (ASCII),	31 (HEX)
SEND LINE	2 (ASCII),	32 (HEX)
SEND MESSAGE	3 (ASCII),	33 (HEX)

*** SEE TABLE 4-5

Figure 4-3 Read and Send Command Sequences

Read All

Data is read according to the Send Condition (Line, Message, or Page) and transmitted to the host.

For the Send Line Condition, regardless whether the screen is formatted or not, the "Send Line Terminator" is appended automatically to the data.

For the Send Message condition, the data is sent initially from the HOME position to the current cursor position and subsequently from the end of the last message to the current cursor position.

For the Send Message condition on an unformatted screen, the "Unformatted Line Terminator" is appended automatically to each line and the "Unformatted Page Terminator" is appended to the message.

For the Send Page condition on an unformatted screen, the "Unformatted Line Terminator" is a appended automatically to each line and the "Unformatted Page Terminator" is appended to the page.

For a formatted page, the screen is thought of in terms of fields, rather than of lines. Fields are created through the Program Mode.

For the Send Message condition on an formatted screen, the "Formatted Page Terminator" is appended automatically to the message.

For the Send Page condition on an formatted screen, the "Formatted Page Terminator" is appended automatically to the page.

Read Unprotected

If the screen is unformatted, this operation has the same effect as "Read All", discussed above. If the screen is formatted, only data from unprotected fields is transmitted (nulls are suppressed) prefaced by the "Field Terminator". If a field contains all nulls, its presence is indicated by the transmission of a single "Field Terminator". This data format is illustrated in Figure 4-4.

For the Send Line Condition, only the first field following the cursor is transmitted.

For the Send Line Condition, the "Send Line Terminator" is appended automatically to the data. For the Send Message condition, the data is sent initially from the HOME position to the current cursor position and subsequently from the end of the last message to the current cursor position.

For the Send Message condition, the "Field Terminator" is appended automatically to each field and the "Formatted Page Terminator" is appended to the message.

For the Send Page condition, the "Field Terminator" is a appended automatically to each field and the "Formatted Page Terminator" is appended to the page.

Read Modified
---- --------

This operation is valid only for formatted screens. Each attribute character contains a Modify Data Tag, a bit which is set if data is entered in a field or if the designator character of a Light Pen field has been altered by Light Pen detection; otherwise, the bit is clear.

In response to a Read Modified request (Multicode ?), the terminal responds with the ASCII SOH character, followed by the Cursor Address (see Table 5-2), and for each field whose Modify Data Tag has been set:

> the FIELD TERMINATOR,

> the address of the field,

> and (for non-Light Pen fields), the field data.

The Read Modified transmission is terminated with the "Formatted Page Terminator".

NOTE: Light Pen fields transmit the address of the field rather than the address and the data.

Figure 4-5 illustrates the data format for a formatted screen where only the first and third fields had been altered by keyboard entry (the second field was bypassed).

Figure 4-4 Read/Send Unprotected Format

```
+-----------------------+
|        FIELD          |
|    TERMINATOR *        |
+-----------------------+
|        FIELD          |
|          1            |
|        DATA           |
+-----------------------+
|        FIELD          |
|    TERMINATOR *        |
+-----------------------+
|        FIELD          |
|    TERMINATOR *        |
+-----------------------+
|        FIELD          |
|          3            |
|        DATA           |
+-----------------------+
|        FIELD          |
|    TERMINATOR *        |
+~~~~~~~~~~~~~~~~~~~~~~~~+
|        FIELD          |
|    TERMINATOR *        |
+-----------------------+
|        FIELD          |
|          N            |
|        DATA           |
+-----------------------+
|     FORMATTED         |
|       PAGE            |
|    TERMINATOR *        |
+-----------------------+
```
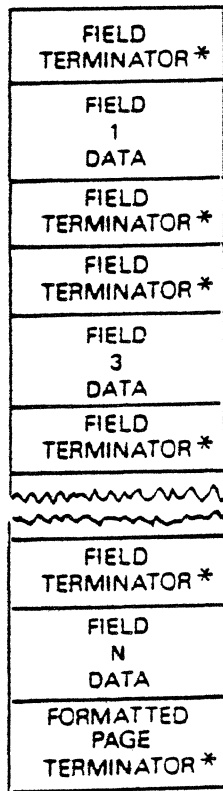
*See Section 3.2-Terminators

NOTE: For this example, there were only
        three fields. Field 2 contains
        all nulls.

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Figure 4-5 Read/Send Modified Format

SOH
CURSOR ADDRESS
FIELD TERMINATOR *
FIELD 1 ADDRESS
FIELD 1 DATA
FIELD TERMINATOR *
FIELD 3 ADDRESS
FIELD 3 DATA
FORMATTED PAGE TERMINATOR *

*See Section 3.2-Terminators

NOTE: For this example, there were only
        three fields. Field 2 was bypassed.

Table 4-5 Communication Terminators

	SEND CONDITION READ/SEND TYPE	LINE	MESSAGE	PAGE
(Unformatted Screen)	R/S All	SEND LINE Terminator appended to line.	Unformatted LINE Terminator appended to each line; Unformatted PAGE Terminator appended to each message.	Unformatted LINE Terminator appended to each line; Unformatted PAGE Terminator appended to each page.
	R/S Unprotected	SEND LINE Terminator appended to line.	Unformatted LINE Terminator appended to each line; Unformatted PAGE Terminator appended to each message.	Unformatted LINE Terminator appended to each line; Unformatted PAGE Terminator appended to each page.
	R/S Modified	Not Applicable	Not Applicable	Not Applicable
(Formatted Screen)	R/S All	SEND LINE Terminator appended to line.	Formatted PAGE Terminator appended to each line.	Formatted PAGE Terminator appended to each line.
	R/S Unprotected	SEND LINE Terminator appended to line.	Formatted FIELD Terminator appended to each field; Formatted PAGE Terminator appended to each message.	Formatted FIELD Terminator appended to each field; Formatted PAGE Terminator appended to each page.
	R/S Modified	SEND LINE Terminator appended to line.	Formatted FIELD Terminator appended to each field; Formatted PAGE Terminator appended to each message.	Formatted FIELD Terminator appended to each field; Formatted PAGE Terminator appended to each page.

4.9 Multi-Drop Polling

In the configuration of the terminal there are two parameters that permit easy integration into a Multi-Drop Polling environment. The first of these parameters simply asks if the Model 1251/1245 is to be a polled terminal. For Multi-Drop Polling, the response must be Y. The other parameter inquires the Polling/Selection Address to be used for the specific terminal. This Polling/Selection Address is used by the host to poll that specific terminal.

The host may issue a general broadcast, a group notification, or poll a single terminal at a time.

Figure 1-1 is a flowchart that shows the host/terminal interaction in a polled environment.

BROADCAST

The Multicode * sequence enables the host to broadcast to all terminals. Figure 4-6 illustrates the Broadcast format.

GROUP/FAST SELECT
---------- ------

The host may transmit data to a specified group of terminals by issuing the Multicode + sequence, then listing the Polling/Selection Addresses of each terminal to receive the data.

NOTE: Each Polling/Selection Address must be repeated. To designate the end of the list, the host must transmit the ASCII STX character; then the host may transmit that data. Only those terminals whose Polling/Selection Addresses were listed receive the data; terminals that are not listed in the Group/Fast Select sequence do not receive data, nor can they transmit. Figure 4-7 illustrates the Group/Fast Select format.

POLL

The host interrogates a terminal to see if it has any data to transmit.

If the terminal is in Conversational Mode, the terminal responds by transmitting the ASCII EOT character.

For Block Mode transmission, the host is effectively enquiring whether or not the SEND key has been depressed, i.e., whether or not there is data to be transmitted to the host. If not, the terminal automatically responds with an ASCII EOT character (indicating NO). If there is data to be sent, then (for Block Mode-Immediate transmission) the data is sent or (for Block Mode-Request To Send transmission) a Request To Send Multicode sequence is transmitted and the host must respond with a read request before data is transmitted. Furthermore, the host may poll a terminal but then immediately transmit an ASCII EOT character indicating that it (the host) has no data to transmit and does not wish to receive.

To poll a terminal, the host must issue a Multicode P sequence followed by the Polling/Selection Address of the terminal in question. NOTE: The Polling/Selection Address must be repeated. For example, if the Polling/Selection Address of the terminal were B, the sequence would be MULTICODE P B B and then the data. Figue 4-8 illustrates the format for polling.

Figure 4-6 Broadcast Format

From HOST

Multicode *   (**Broadcast**   **Select**)
DATA
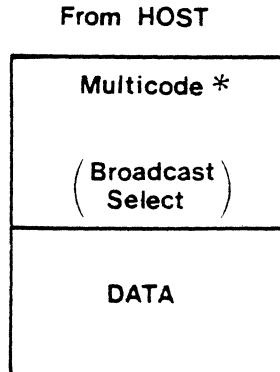
Figure 4-7 Group/Fast Select Format

From HOST

Multicode-+   (GROUP/FAST   SELECT)
Term ID #1   Term ID #1
Term ID #2   Term ID #2
Term ID #3   Term ID #3

Term ID #N   Term ID #N
STX
DATA
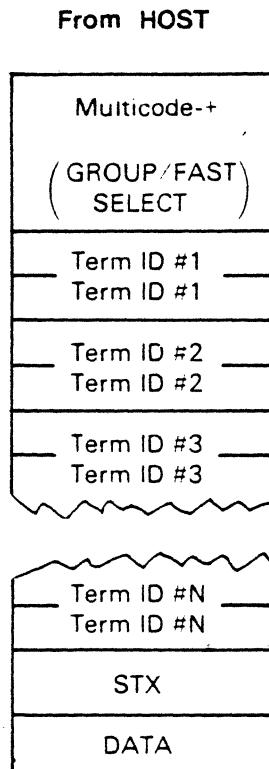
Figure 4-8 Polling Format

From HOST

MULTICODE
P

POLL/SELECT
ADDRESS

POLL/SELECT
ADDRESS

TRANSMITTED TO
TERMINAL

*ALL OTHER
TERMINALS
DESELECTED
THIS TERMINAL
SELECTED

IS
HOST
TRANSMITTING
EOT
?

HOST

YES

NO

* TERMINAL
IS
DESELECTED

TRANSMISSION
OCCURS

PRELIMINARY
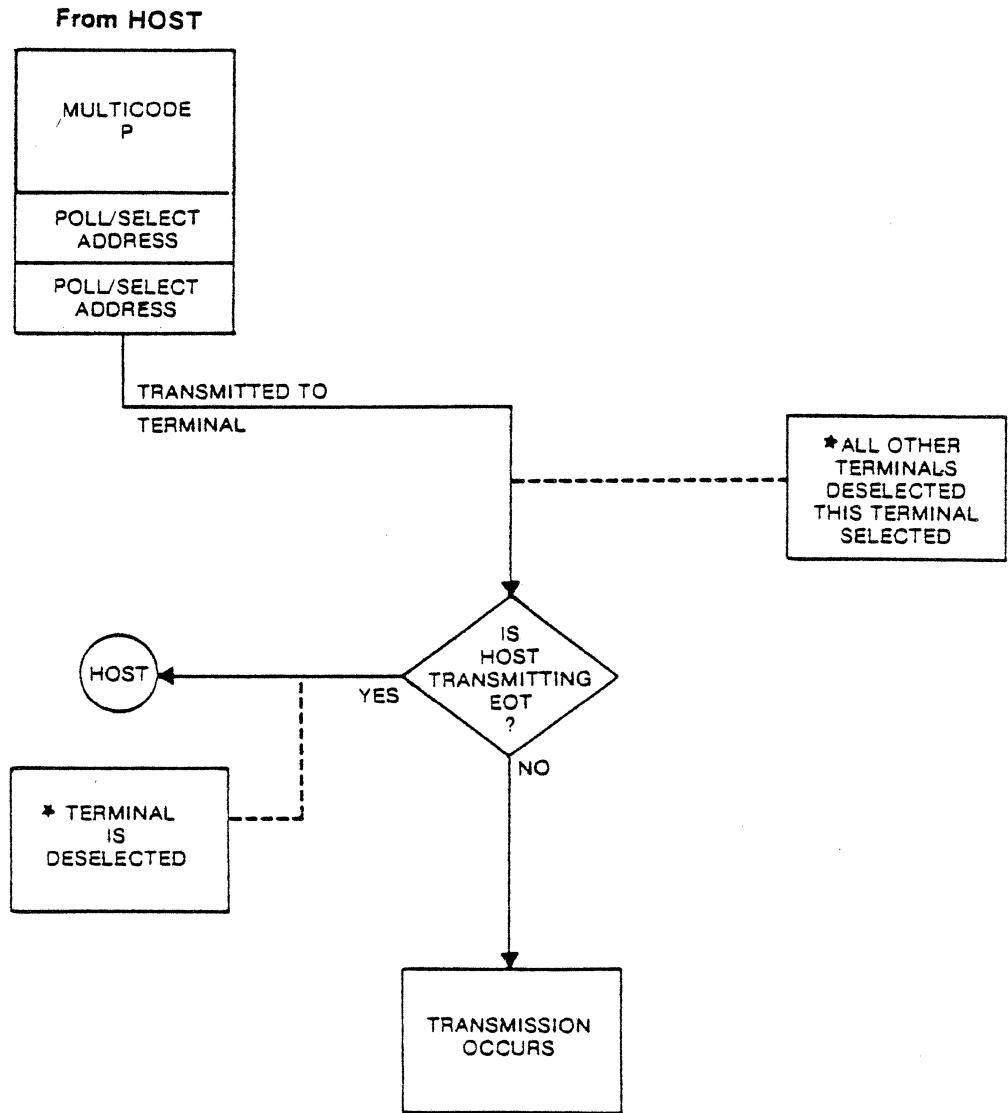
SECTION 5
MULTICODE SEQUENCES

MULTICODE Sequences provide the programmer with a simple means for implementing a wide range of special functions.

The method for executing Multicode operations from the host computer involves the transmission of the character (usually ESC) designated as the Multicode character in Configuration. For example (assuming ESC has been designated as the Multicode character), the transmission of the two ASCII characters ESC and H place the cursor in the HOME postion.

Model 1251/1245 Configuration allows the programmer to designate any ASCII character (except DEL) as the Multicode character in the event that the ESC character is dedicated to another system function.

Multicode sequence characters are displayed only in the Transparent Mode, where all control characters are displayed but not acted upon.

In order to store a Multicode character as itself, it must be entered through the keyboard or transmitted over the Communication line twice, i.e., MULTICODE MULTICODE.

The following Multicode sequence operations are described primarily for the host programmer, although many of these sequences may be accessed by the terminal operator. Those Multicode Sequence operations indicated as "Line Only" may not be executed from the keyboard; a KBD LOCKD error will occur in that event.

For your convenience, the Multicode sequences for similar operations are grouped together.

A summary of the Multicode sequences appears in Table 5-1.

Table 5-1 Model 1251/1245 MULTICODE Sequences

```
MULTICODE (space)              Blank Screen
MULTICODE ! x                  Set Attribute Byte
MULTICODE " x                  Set Attribute Byte/Light Pen Field
MULTICODE #                    Configuration Ready
MULTICODE $                    Read Status Immediate
MULTICODE %                    Read Status When Ready
MULTICODE &                    Read Options
MULTICODE (                    Lock Keyboard
MULTICODE )                    Unlock Keyboard
MULTICODE *                    Broadcast
MULTICODE + XX YY ... STX      Group/Fast Select
MULTICODE -                    EAROM Configuration Update
MULTICODE .                    Disable Attributes
MULTICODE /                    Enable Attributes
MULTICODE 1                    Set Tab
MULTICODE 2                    Clear Tab
MULTICODE 3                    Clear All Tabs
MULTICODE 4                    Move Cursor to Status Line
MULTICODE 5                    Return Cursor from Status Line
MULTICODE 6                    Read Configuration Parameters
MULTICODE 7                    RAM Configuration Update
MULTICODE 8                    Lock Light Pen
MULTICODE 9                    Unlock Light Pen
MULTICODE < X                  Send Condition Override
MULTICODE =                    Read All
MULTICODE >                    Read Unprotected
MULTICODE ?                    Read Modified
MULTICODE @                    Restore Screen
MULTICODE [                    Enable Status Line Display
MULTICODE ]                    Disable Status Line Display
MULTICODE :                    Diagnostic Test
MULTICODE ; n                  Set Print Options
```

(continued on next page)

Table 5-1 Model 1251/1245 MULTICODE Sequences - continued

MULTICODE A		Cursor Up
MULTICODE B		Cursor Down
MULTICODE C		Cursor Right
MULTICODE D		Cursor Left
MULTICODE E		Set Full Screen
MULTICODE F		Set Partial Screen
MULTICODE G		Set Conversational Mode
MULTICODE H		Home Cursor
MULTICODE I		Clear Line/Field
MULTICODE J		Clear Unprotected
MULTICODE K		Clear All
MULTICODE L		Insert Line
MULTICODE M		Delete Line
MULTICODE N		Insert Character
MULTICODE O		Delete Character
MULTICODE P	xx	Poll/Select
MULTICODE Q		Reset Modify Data Tags
MULTICODE R		Request to Send
MULTICODE S	x y	Set Buffer Address
MULTICODE T		Insert Cursor
MULTICODE U		Set Send Immediate All
MULTICODE V		Set Send Immediate Unprotected
MULTICODE W		Set Send Immediate Modified
MULTICODE X	x	Set Cursor - Line
MULTICODE Y	y	Set Cursor - Column
MULTICODE Z		Read Cursor Address

CURSOR FUNCTIONS

MULTICODE A Cursor Up

Moves the cursor up by one line. If the cursor is currently on line 1, the cursor will be wrapped around to line 24.

MULTICODE B Cursor Down

Moves the cursor down by one line. Scroll feature: If the cursor is currently on line 24, lines 2 through 24 will each be moved up by one line (line 1 will be lost) and the cursor will remain on line 24.

MULTICODE C Cursor Right

Moves the cursor by one column to the right.

New Line Enabled: If the cursor is in column 80 of lines 1 through 23, the cursor will be moved to column 1 of the next line.

New Line Enabled/Scroll Enabled: If the cursor is on column 80 of line 24, lines 2 through 23 each will be moved up by one line (line 1 will be lost) and the cursor will be moved to column 1 of line 24.

New Line Enabled/Scroll Disabled: If the cursor is in column 80 of line 24, the cursor will be wrapped around to the home position (line 1, column 1).

New Line Disabled: The cursor can not be moved past column 80 of the current line.

MULTICODE D CURSOR LEFT

Moves the cursor by one column to the left. The cursor can not be moved to the left of the home position (line 1, column 1).

New Line Enabled: If the cursor is in column 1 of lines 2 through 24, the cursor will be wrapped around to column 80 of the previous line.

New Line Disabled: The cursor cannot be moved to the left of column 1.

MULTICODE H HOME CURSOR

Moves the cursor to the Home position (line 1, column 1).

MULTICODE X x SET CURSOR - LINE (Direct Cursor Address)

Moves the cursor to the line indicated by x (the character following MULTICODE X). The cursor remains in the same column. See Table 5-2.

MULTICODE Y y SET CURSOR - COLUMN (Direct Cursor Address)

Moves the cursor to the column indicated by 'y' (The character following MULTICODE Y). The cursor remains on the same line. See Table 5-2.

MULTICODE Z READ CURSOR ADDRESS

In response to this request, the Model 1251/1245 will transmit the line character and the column caracter as specified in Table 5-2.

MULTICODE S x y SET BUFFER ADDRESS

Moves the Buffer address (the screen position into which data is being written from the Communications line) to anywhere on the screen without changing the cursor address to the position at which keyboard data is entered. The character 'x' specifies the line and the 'y' character specifies the column (see Table 5-2).

Any subsequent Multicode sequence involving cursor movement will automatically reset the Buffer Address to the cursor address.

MULTICODE T INSERT CURSOR

Sets the cursor address (row only) to the current Buffer Address.

Table 5-2 Direct Cursor Addressing

ASCII Character	Line or Column	ASCII Character	Column	ASCII Character	Column
(SP)	1	;	28	V	55
!	2	<	29	W	56
..	3	=	30	X	57
#	4	>	31	Y	58
$	5	?	32	Z	59
%	6	@	33	[	60
&	7	A	34	\	61
'	8	B	35	]	62
(	9	C	36	^	63
)	10	D	37	—	64
*	11	E	38	`	65
+	12	F	39		66
,	13	G	40	a	66
-	14	H	41	b	67
.	15	I	42	c	68
/	16	J	43	d	69
0	17	K	44	e	70
1	18	L	45	f	71
2	19	M	46	g	72
3	20	N	47	h	73
				i	74
4	21	O	48	j	75
5	22	P	49	k	76
6	23	Q	50	l	77
7	24	R	51	m	78
8	25	S	52	n	79
9	26	T	53	o	80
:	27	U	54		

Examples:

ESC X   ESC Y > moves the cursor to line 12, position 31.

ESC X 7 ESC YZ moves the cursor to line 24, position 59.

LOCK OUT OPERATIONS

MULTICODE (LOCK KEYBOARD (Line Only)

The keyboard is locked upon receipt of this Multicode sequence.
The message "KBD LOCKD" is displayed in the Error Field of the
Status Line, if the Status Line display had been enabled.

The keyboard can be unlocked by the receipt of the Multicode)
sequence described below.

The ERROR RESET key will not unlock the keyboard for this case.

MULTICODE) UNLOCK KEYBOARD (Line Only)

The keyboard, previously locked by the Multicode (sequence, is
unlocked.

MULTICODE 8 LOCK LIGHT PEN (Line Only)

This Multicode sequence locks out the operation of the Light
Pen.

MULTICODE 9 UNLOCK LIGHT PEN (Line Only)

This Multicode sequence unlocks the operation of the Light Pen,
previously locked out by the Multicode 8 sequence.

MULTICODE (space) BLANK SCREEN

This Multicode sequence blanks the screen display but has no
effects on terminal memory.

The screen display may be restored by
1) the Multicode @ sequence,
2) any insert, delete, or clear operation,
    e.g., INSERT LINE, DELETE LINE, CLEAR LINE/FIELD, or
3) any cursor movement causing a scroll.

MULTICODE @ RESTORE SCREEN

This Multicode sequence restores the screen display previously
blanked by the Multicode (space) sequence.

TAB OPERATIONS

MULTICODE 1 SET TAB STOP

A tab stop is set at the current cursor column position, this tab stop is effective for all display lines.

MULTICODE 2 CLEAR TAB STOP

The tab stop at the current cursor column position is cleared; this is effective for all display lines.

MULTICODE 3 CLEAR ALL TAB STOPS

All tab stops on the screen are cleared.

EDITING AND CLEARING OPERATIONS

Most normal operations take place well within the shortest possible intercharacter interval (1.04ms) and do not require the insertion of null characters for time fill.

There are, however, several operations which do involve the modification of large areas of the screen. These operations, listed here, occupy the microprocessor for a significant period of time.

    Insert Line
    Delete Line
    Insert Character
    Delete Character
    Clear Line/Field
    Clear Unprotected

It should be noted that it is possible to enter data from the line or keyboard while any of the above operations is in progress. However, there is the risk that the data entered may be overwritten if certain time constraints are not honored.

The four editing operation listed above require 5.5ms per line affected, assuming subsequent data does not contain any of the above functions. The entire interval required for a field (or the entire screen - 132ms) should be taken into account before attempting to enter data in an area effected by an Insert or Delete operation.

The "Background Busy" status bit (logical one) indicates that one of the above operations or Clear Unprotected is in progress. To determine when the terminal is ready, the programmer may either perform the actual timing computation and then issue a "Read Status Immediate" command or issue only a "Read Status When Ready" command. For the latter case, the terminal will return status only after any background task and/or print operation is completed.

MULTICODE L INSERT LINE

Operates in the same manner as the Insert Line editing function, see Section 4.4.

MULTICODE M DELETE LINE

Operates in the same manner as the Delete Line editing function, see Section 4.4.

MULTICODE N n INSERT CHARACTER

Inserts the character immediately following N (signified by n) at the current cursor position.

This Multicode sequence differs from the Insert Mode editing function in that only one character may be inserted.

MULTICODE O DELETE CHARACTER

Operates in the same manner as the Delete Character editing function, see Section 4.4.

MULTICODE K CLEAR ALL

Clears all tab stops and attribute characters as well as the contents of display memory (to nulls or spaces depending on configuration). The keyboard, if locked, is unlocked.

This operation is essentially the same as the Clear All edit function described in Section 4.4.

MULTICODE I CLEAR LINE/FIELD

Clears a line or an unprotected field to nulls or spaces (depending on configuration), starting with the current cursor position and continuing to the end of the line.

This operation is essentially the same as the Clear L/F edit function described in Section 4.4.

MULTICODE J CLEAR UNPROTECTED

Clears all unprotected fields to nulls or spaces (depending on configuration), starting with the current cursor position and continuing to the end of the screen.

This operation is essentially the same as the Clear Unpro edit function described in Section 4.4.

STATUS LINE OPERATIONS

NOTE: For these Multicode sequences, the display of the Status Line must have been enabled in Model 1251/1245 configuration.

MULTICODE] DISABLE STATUS LINE DISPLAY

This Multicode sequence allows the host to blank the display of the Status Line without affecting its contents.

MULTICODE [ENABLE STATUS LINE DISPLAY

This Multicode sequence allows the host to restore the Status Line display, previously blanked by the Multicode] sequence.

MULTICODE 4 MOVE CURSOR TO STATUS LINE

This Multicode sequence moves the cursor to column 2 of the User Area of the Status Line as long as the Status Line display has been enabled in Model 1251/1245 configuration. This Multicode sequence may also be used when the cursor is currently in the Status Line to move the cursor back to the first column of the User Area.

MULTICODE 5 RETURN CURSOR FROM STATUS LINE

This Multicode sequence returns the cursor from the User Area of the Status Line to its previous location on a display line. As in Multicode 4, the Status Line display must have been enabled in Model 1251/1245 configuration.

SETTING ATTRIBUTE BYTES

NOTE: Attribute bytes (or characters) define the start of a field and the end of the preceding field. The choice of the defining character determines how the field's contents are displayed and what types of entries are permitted in the field. The defining character of the attribute byte is itself an ASCII character whose bits are interpreted as follows:

MSB	8	7	6	5	4	3	2	1	LSB
MSB		B/N	MDT	ND	IV	LI	ENTRY MODE		LSB

```
BIT        MEANING
---        -------

 8         Parity bit, also used internally.

 7         0 = normal field
           1 = blinking field

 6         Used internally
           (Modify Data Tag)

 5         0 = display field
           1 = nondisplay field (security)

 4         0 = normal video
           1 = inverse video

 3         0 = normal intensity
           1 = low intensity

2-1        00 = alphanumeric
           01 = numeric entry only (1-9.,+-$)
           10 = protected field
           11 = used internally
```

Table 5-3 gives for various attribute combinations, the ASCII character and its hexadecimal equivalent required to produce the required field attribute.

MULTICODE ! x SET ATTRIBUTE BYTE NON-LIGHT PEN FIELD

This Multicode sequence creates an attribute byte for a non-Light Pen field at the current cursor position. The attribute defining character, indicated by x, determines the field characteristics (See Table 5-3).

MULTICODE " x SET ATTRIBUTE BYTE LIGHT PEN FIELD

This Multicode sequence creates an attribute byte for a Light Pen detectable field at the current cursor position. The attribute defining character, indicated by x, determines the field characteristics (See Table 5-3). For accuracy in Light Pen detection, low intensity and non-display should be avoided.

ENABLING AND DISABLING ATTRIBUTE BYTES

The Multicode . and Multicode / sequences allow the host to transmit formatted screen data without the rapid flashing on and off of screen attributes, which may distract the operator.

These Multicode sequences are used by the host in the following manner. First, the Disable Attribute sequence is transmitted. Next, the formatted screen data is transmitted. Finally, the Enable Attribute sequence is transmitted.

MULTICODE . DISABLE ATTRIBUTES

This Multicode sequence disables all screen attribute characteristics. For example, an inverse video field is displayed as a normal field.

This Multicode command remains in effect until the Multicode / Enable Attribute sequence is given.

MULTICODE / ENABLE ATTRIBUTES

This Multicode sequence enables all screen attribute characteristics previously disabled with the Multicode sequence.

Table 5-3 Attribute Characters - ASCII/Hexadecimal

Field Attribute	ALPHA-NUMERIC	NUMERIC ONLY	PROTECT	MOD. ALPHA	MOD. NUMERIC
Normal	NULL 00	SOH 01	STX 02	SP 20	! 21
Low Intensity	EOT 04	ENQ 05	ACK 06	$ 24	% 25
Inverse	BS 08	HT 09	LF 0A	(28	) 29
Low + Inverse	FF 0C	CR 0D	SO 0E	, 2C	- 2D
Non-Display	DLE 10	DC1 11	DC2 12	0 30	1 31
Blink	@ 40	A 41	B 42	´ 60	a 61
Blink + Low	D 44	E 45	F 46	d 64	e 65
Blink + Inverse	H 48	I 49	J 4A	h 68	i 69
Blink + Low + Inverse	L 4C	M 4D	N 4E	l 6C	m 6D
Underline	P 50	Q 51	R 52	p 70	q 71
Underline + Low	T 54	U 55	V 57	t 74	u 75

SET SCREEN

MULTICODE E SET FULL SCREEN

Defines for the SEND Page condition the start of transmission as the HOME position.

MULTICODE F SET PARTIAL SCREEN

Defines for the Send Page condition the start of transmission as the current cursor position.

SET TRANSMISSION MODE

MULTICODE G SET CONVERSATIONAL MODE

This Multicode sequence places the Model 1251/1245 in the Conversational Mode. NOTE: The SEND key does not transmit data in the Conversational Mode.

MULTICODE R REQUEST TO SEND

Upon receipt of this Multicode sequence, Model 1251/1245 is placed in the Request-To-Send mode, an operating mode wthin Block Mode. On subsequent depression of the SEND key in Block Mode, the Model 1251/1245 transmits one of these three-character Request-To-Send Multicode sequences:

        MULTICODE   R   1   Send Page
        MULTICODE   R   2   Send Line
        MULTICODE   R   3   Send Message

according to the configuration of the terminal. The sequence is appended with the Request-To-Send terminator.

The Host computer can initiate transmission by sending one of the following Multicode sequences:

        MULTICODE =   Read All
        MULTICODE >   Read Unprotected
        MULTICODE ?   Read Modified

SEND CONDITION OVERRIDE

MULTICODE < x SEND CONDITION OVERRIDE (Line Only)

The character following this Multicode sequence (designated by x) determines the type of SEND Condition regardless of the SEND Condition configured parameter. This override remains in effect for only one transmission. This Multicode sequence must precede a the Read Multicode sequence for Block Mode-Request To Send transmission.

The type of SEND Condition is determined by x for the following:

    1 (hex 31) = Send Page
    2 (hex 32) = Send Line
    3 (hex 33) = Send Message

NOTE: This Multicode sequence is only useful in Block Mode-Request To Send transmission.

SET SEND IMMEDIATE CONDITIONS

For further information on formatted data transmitted as an indirect result of the SEND Immediate Conditions, see Section 2.11, Block Mode Transmission Formats. For information on formatted data with specific regard to Light Pen operation, see also Section 2.10.

MULTICODE U SET SEND IMMEDIATE ALL

Upon depression of the SEND key in Block Mode, the Model 1251/1245 transmits the contents of the line, message, or page (depending on the current SEND condition). Attribute characters are prefaced by their equivalent Multicode sequence (Multicode ! or Multicode ") and transmitted. Form drawing characters are bracketed by the ASCII characters SO and SI.

MULTICODE V SET SEND IMMEDIATE UNPROTECTED

Upon depression of the SEND key in Block Mode-Immediate, the Model 1251/1245 transmits the contents of all unprotected fields according to the current SEND Condition (Send Line, Send Message, or Send Page). Form drawing characters are bracketed by the ASCII characters SO and SI.

MULTICODE W SET SEND IMMEDIATE MODIFIED

Upon depression of the SEND key in Block Mode-Immediate, the Model 1251/1245 transmits the addresses and contents of fields whose data have been modified by the operator.

NOTE: This action does not reset the Modify Data Tag.

READ DISPLAY MEMORY

These Read requests are used in Block Mode-Request To Send transmission in reply to a Request To Send (Multicode R) sequence.

MULTICODE = READ ALL

This Multicode sequence enables the host to initiate the transmission of all data in display memory.

MULTICODE > READ UNPROTECTED

This Multicode sequence enables the host to initiate the transmission of all data in display memory.

MULTICODE ? READ MODIFIED

This Multicode sequence enables the host to initiate the transmission of all data in display memory.

RESET MODIFY DATA TAGS

MULTICODE Q RESET MODIFY DATA TAGS

This Multicode sequence resets all Modify Data Tags that have been modified either by keyboard entry into the field or by Light Pen selection.

Other than the CLEAR ALL operation, this is the only action that resets the Modify Data Tags. Consequently, it is possible to perform READ MODIFIED or SEND MODIFIED operations from the same field any number of times.

NOTE: This operation is under the same time constraints given for the Editing and Clearing operations (see Pages 5-8 to 5-9).

MULTIDROP POLLING

The following Multicode sequences relate to polled terminals. This designation is made in response to the Configuration parameters Polled Terminal? and Polling/Selection Address (see Section 3 for further information). The Polling/Selection Address is used in two of the following Multicode sequences to designate a specific terminal.

MULTICODE * BROADCAST (Line Only)

All terminals are selected to receive subsequent data from the host. No terminal may transmit.

MULTICODE + xx yy ... STX GROUP/FAST SELECT (Line Only)

The host designates only those terminals that are to receive the subsequent data. The characters following + are the Polling/Selection addresses for those terminals. NOTE: The polling/selection of the terminals must be repeated. The host must append the ASCII character STX to indicate no other terminals are to receive data and only then the host may transmit that data. During this operation, no terminals may transmit.

MULTICODE P x x POLL/SELECT (Line Only)

The character following P in this Multicode sequence is the Polling/Selection address of the terminal currently being polled by the host computer. The Polling/Selection address must be repeated (i.e., issued twice) to poll the terminal. If transmission from the terminal does not occur, the Model 1251/1245 automatically responds with the ASCII character EOT to indicate that to the host.

SETTING PRINT OPTIONS

MULTICODE ; n SET PRINT OPTIONS

Determines the operation of the printer interface indicated by the ASCII character n; n is from 1 to 8 (hex 31 to 38). The print options are defined below.

The Print Option set stays in effect until changed with another Multicode ; n sequence.

OPTION 1 STOP PRINTOUT

The printout currently in progress is allowed to finish, then printing stops. Simulprint is then terminated.

OPTION 2 PRINT SCREEN FROM HOME POSITION

The entire screen, from the home position to the end of the screen, is printed.

OPTION 3 PRINT SCREEN FROM CURSOR POSTION

The screen, from the current cursor position to the end of the screen, is printed.

OPTION 4 SIMULPRINT - FF CONTROL * **

Upon receipt of a form feed character, the contents of the screen are printed.

If "READ STATUS WHEN READY" (MULTICODE %) is in effect, a status byte is transmitted when the background task has completed.

OPTION 5 SIMULPRINT - CONTINUOUS/DISPLAY * **

Characters, as they are received, are simultaneously printed and displayed.

OPTION 6 SIMULPRINT - CONTINUOUS/NON-DISPLAY * **

Characters, as they are received are printed but not dislayed.

OPTION 7 PRINT UNPROTECTED **

The contents of all protected fields from the current cursor position to the end of the screen are printed. Protected fields are printed as spaces.

NOTE: For this option, the Model 1251/1245 must be configured NOT to print form-drawing and attribute characters (see Section 3).

OPTION 8 PRINT MESSAGE **

The screen contents are printed from the end of the previous
PRINT Message operation (or from the HOME position if there were
no previous PRINT MESSAGE operation) to the current cursor
position. This gives the same result as if the terminal were
configured for the Print Message condition.

NOTE: For this option, the Model 1251/1245 must be configured
NOT to print form-drawing and attribute characters (see Section
3).

READ OPTIONS

MULTICODE & READ OPTIONS (Line Only)

In response to this Multicode sequence, the Model 1251/1245
responds with two bytes each with the ASCII null character (hex
00).

NOTE: This Multicode sequence is provided only so that hosts
programmed for Perkin-Elmer Model 1200 OWL terminals may be
provided with with a response. In so far as reading options are
concerned, the host programmer may gain much more through the
use of the Multicode 6 "Read Configuration Parameters" shown
below.

----

* For simulprint operations, the MULTICODE ; 1 sequence should be
  used to terminate printing. This Multicode sequence will be
  sent to the printer for Simulprint operations, the HOST computer
  must implement protocol to avoid either overrunning the printer
  (thereby losing data if the printer data rate is lower than the
  communication line rate) or overloading the Model 1251/1245 (if
  both the communication line and the printer are running at 9600
  baud). The sequence Multicode ; 1 should always be used to
  terminate Simulprint. If a Pause character has been sent and a
  Multicode ; 1 sequence is received, then no Resume character
  will be sent.
** The Model 1251/1245 may be configured to either send spaces to

Model 1251/1245 CONFIGURATION BY HOST

MULTICODE 6 READ CONFIGURATION PARAMETERS

Upon receipt, the Model 1251/1245 transmits to the HOST a sequence of encoded ASCII characters representing the Configuration options. See Section 3 for details.

MULTICODE # CONFIGURATION READY

Prepares the Model 1251/1245 for a configuration transmission from the Host. Immediately following this Multicode sequence, the HOST transfers a sequence of encoded ASCII characters denoting the configuration parameters.

MULTICODE 7 RAM CONFIGURATION UPDATE

This Multicode sequence terminates the configuration by the HOST and indicates that the configuration data is to be stored in RAM.

MULTICODE - EAROM CONFIGURATION UPDATE (Model 1251 only)

This Multicode sequence terminates the configuration by the HOST and indicates that the configuration data is to be stored in the EAROM.

READ STATUS

MULTICODE $ READ STATUS IMMEDATE

Upon receipt of this Multicode sequence, The Model 1251/1245 transmits a status byte (see Figure 5-1) to the host.

----

the printer in lieu of attribute characters (for a formatted screen) and form-drawing characters or to send those characters to the printer. Non-display data will be sent as spaces. When a Perkin-Elmer Model 650 CRT Page Printer equipped with its option T50-380 is attached, the printer will respond to inverse video and non-display attribute characters as well as to print the Model 1251/1245 form-drawing characters. In this case, the printer port baud rate should be configued to 9600 since the Model 650 is fully buffered.

MULTICODE & READ STATUS WHEN READY

When the Model 1251/1245 completes the current or next editing (insertion or delection) or print operation; a status byte (see Figure 5-1) is transmitted to the host. If no operation is in progress, the status byte is transmitted immediately.

Figure 5-1 Status Byte Format

MSB	8	7	6	5	4	3	2	1	LSB

8   Parity bit. Set according to parity
     configuration parameter.

7   0 = No overrun
     1 = Overrun - Data lost because host is
         sending data too quickly.

6   0 = Parity OK
     1 = Parity error detected on incoming data

5   NOT USED

4   0 = Printer ready
     1 = Printer busy

3   0 = Keyboard OK
     1 = Keyboard locked

2   0 =
     1 = Invalid Command eg. Non-existent cursor

1   0 = Terminal ready
     1 =Terminal busy
         e.g., "Clear Unprotected" in operation.

Diagnostic Test

MULTICODE : Diagnostic Function

From the keyboard, the sequence Multicode :   (character) fills the screen (including the Status Line) with the character entered. The next keyboard entry terminates this test.

From the Communication Line, the sequence MULTICODE : MULTICODE : activates a diagnostic test function used by Perkin-Elmer Test Personnel only. In the event that this sequence has been transmitted by the host, the terminal must be powered-down, then powered-up.

SECTION 6
INITIAL CHECKOUT

6.1 Unpacking Procedure

The terminal is shipped in a sturdy cardboard carton. The tools
required are a pair of scissors and a knife. The terminal
unpacking method is as follows (see also Figure 6-1).

Monitor

1. Open carton at top seam with knife.
2. Open carton lid.
3. Remove top cardboard layer.
4. Remove jiffy bag containing cables and User Manual.
5. Lift monitor and place on sturdy surface.

CAUTION
The monitor is HEAVY.
The monitor may need to
be lifted by two or more
individuals.

6. Remove the poly-bag from monitor.
7. Remove filler and glass-reinforced tape from face of
   monitor.
8. Save carton and packing material in the event of
   future shipping.

Keyboard *

1. Open carton at seam with knife.
2. Open carton lid.
3. Remove keyboard.
4. Remove foam packing material from keyboard ends.
5. Save carton and packing material in the event of
   future shipping.

----

* NOTE: The optional Light Pen is packed in bubble-pack wrapping
  with the keyboard.

After removal from shipping carton and location at the operating site, check the contents of the shipping kit against the enclosed shipping list.

If a terminal is received in a damaged carton, unpack the terminal immediately and inspect it for physical damage. Contact the carrier if the terminal was damaged during transit, and request instructions for filing a damage claim. If a shipping kit shortage is discovered, notify Perkin-Elmer immediately.

6.2 Visual Inspection

Perform the visual and mechanical checks listed in Table 6-1 immediately after placing the terminal at the operating location.

Table 6-1 Inspection

INSPECTION	Check
Visual	On terminal cabinet: a. panel surfaces for damage such as dents, paint scratches, cracks and warpage. b. screen for scratches or cracks. c. cable connectors for damaged pins d. keytops for cracks and scratches
Mechanical	All operating keyswitches for smooth operation.

6.3 General

The terminal shipping carton and all shipping packing material should be retained for possible reshipment of the terminal to the factory or another location.
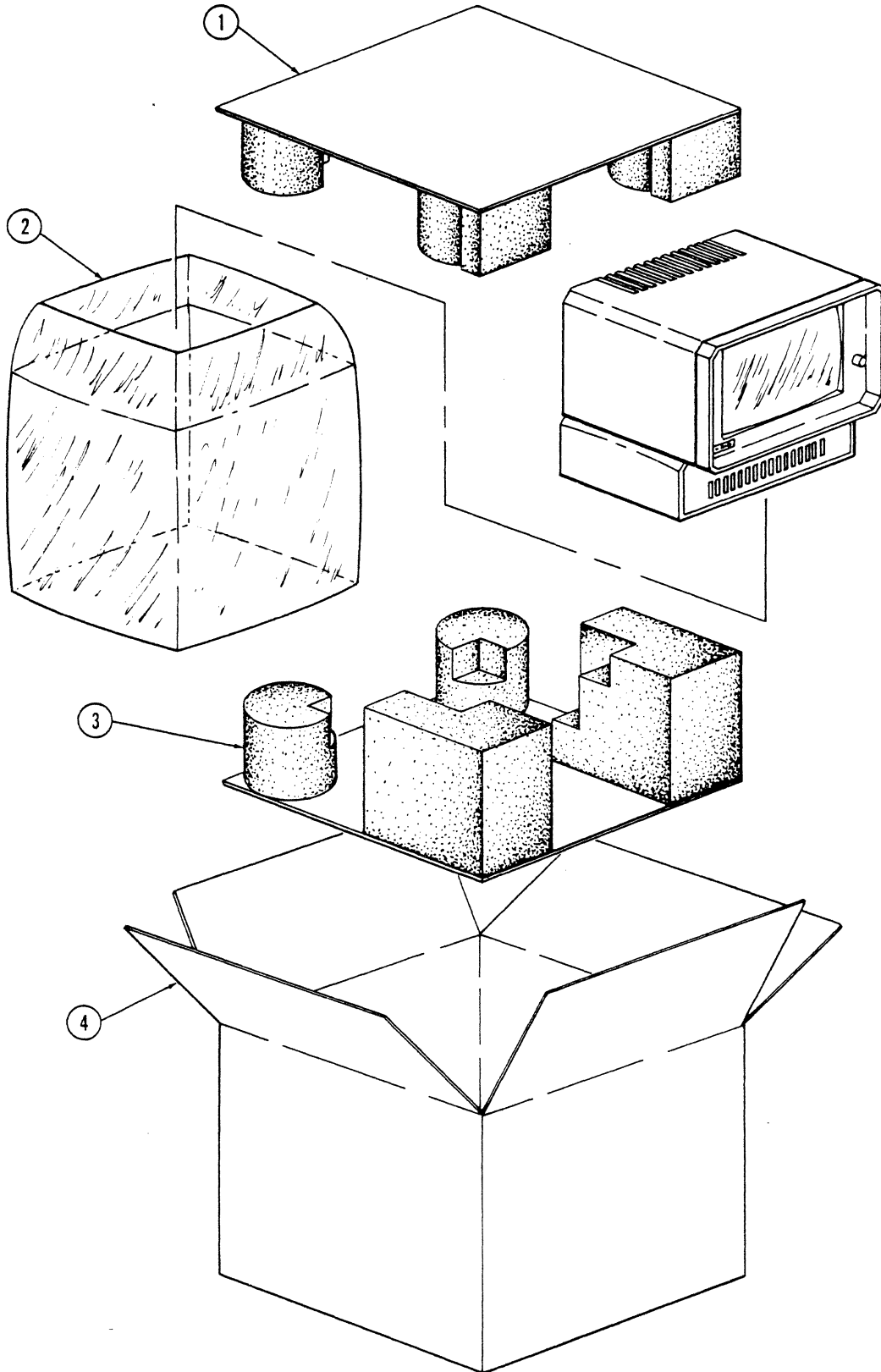
Figure 6-1 Terminal Unpacking Diagram
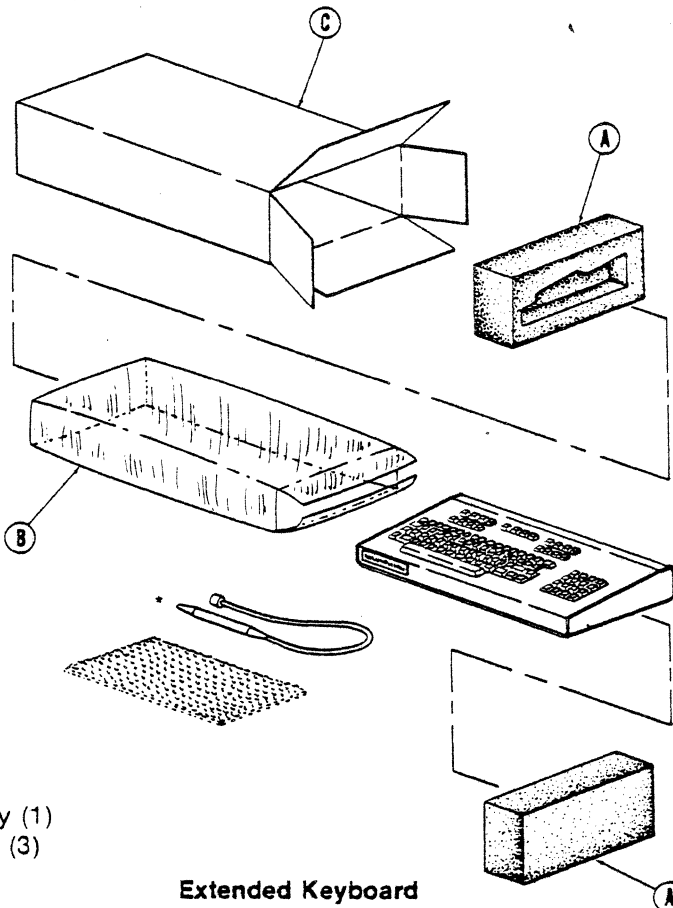
PARTS LIST

Monitor Kit No.   58810-0100-00
includes

PART NO.	DESCRIPTION
58810-0101-00	Carton (4)
58810-0102-00	Cushion Cover Assembly (1)
58810-0103-00	Cushion Base Assembly (3)
58810-0104-00	Poly Bag (2)

Extended Keyboard

Extended Keyboard Kit No.   58810-0082-00
includes

PART NO.	DESCRIPTION
58810-0083-00	Poly Bag (B)
58810-0084-00	End Caps (pair) (A)
58810-0085-00	Carton (C)
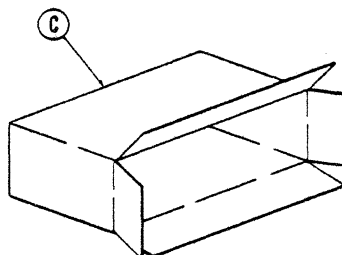
Standard Keyboard Kit No.   58810-0106-00
includes

PART NO.	DESCRIPTION
58810-0107-00	Carton (C)
58810-0108-00	End Cap — LH (A)
58810-0109-00	End Cap — RH (A)
58810-0110-00	Poly Bag (B)
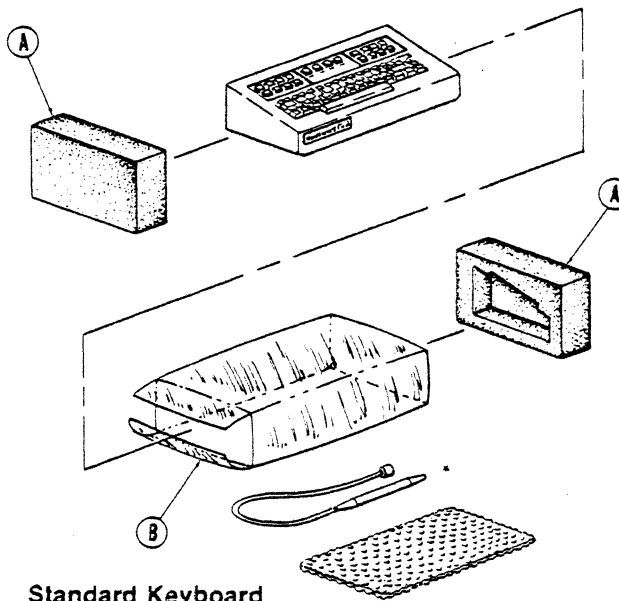
Standard Keyboard

*Optional Light Pen

6 — 4

SECTION 7
INTERFACING

7.1 Peripheral Interface

The Model 1251 is a "Teletype TM-compatible" terminal, utilizing asynchronous serial ASCII-coded data. The number of stop bits, the treatment of the parity bit (space, mark, even or odd), the baud rate setting, and half/full duplex operation are all determined in the configuration of the terminal. See Section 3 of this manual.

The standard Model 1251/1245 RS232C/CCITT-V24 interface cable (T70-250) supports the Bell 103J modem, the Bell 113D modem, the Bell 212A modem, or their strict equivalents only, providing the required modem options/settings shown in Table 7-4, are in effect.

Although the 103J modem itself is limited to 300 baud operation, there are manufacturers, other than Bell, that offer full duplex modems offering the 103J interface operating at higher speeds, notably 1200 baud. Most popular minicomputers, including Perkin-Elmer's, also offer 103J-type intefaces for local connection of terminals at data rates up to 9600 baud.

DISTANCE LIMITATION

The Model 1251/1245 voltage interfaces described so far are designed to conform to EIA RS232C distance limitations. Users may find that reliable operation can be achieved under favorable conditions, despite significantly longer cables, but Perkin-Elmer accepts no responsbility in this area. Where cable runs of a few hundred feet or more are required, the optional 20ma current loop interface offers a reliable and economical alternative to modems.

FUSE CAP

POWER SWITCH

LIGHT PEN SOCKET

KEYBOARD SOCKET

COMMUNICATION PORT

SWITCHES S1 TO S4

PRINTER PORT

POWER CORD

Domestic Model

FUSE HOLDER

POWER SWITCH

LIGHT PEN SOCKET

KEYBOARD SOCKET

COMMUNICATION PORT

SWITCHES S1 TO S4

PRINTER PORT

3 PRONG POWER
CONNECTOR FOR
POWER CORD
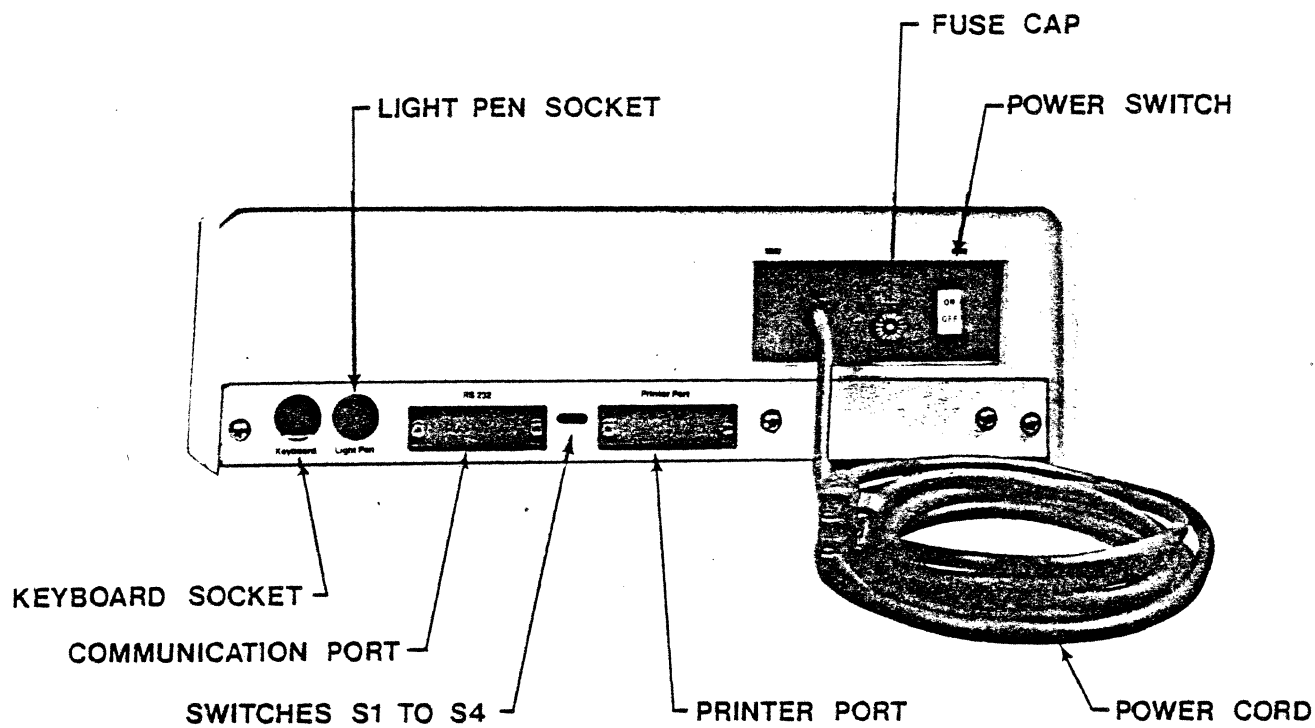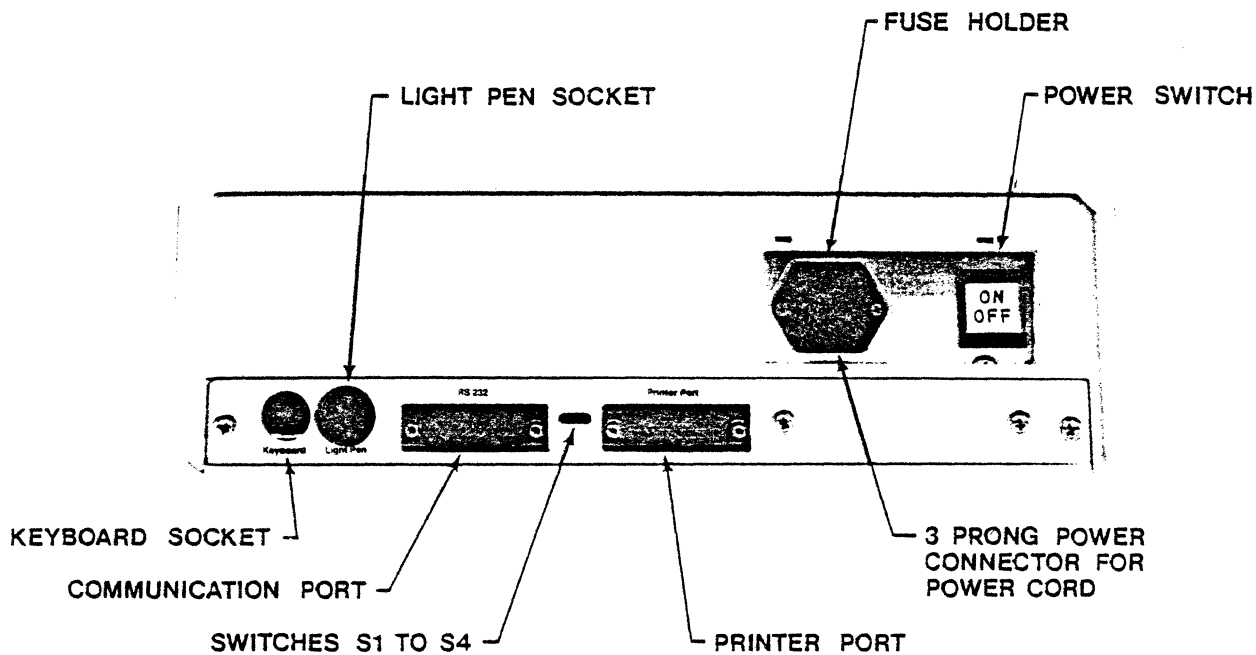
European Model

Figure 7-1 Model 1251/1245 Backpanel

CABLES

The communications and printer interface cables terminate at the
rear of the monitor unit on conventional 25-pin connectors.

EIA DATA INTERFACE

The following table and information provide more background on
the general subject of EIA RS232C interfaces.

The signals which apply to asynchronous data communication are
assigned to pins in accordance with EIA Specification RS232C for
interfacing data communication equipment. Both the standard EIA
circuit name and the circuit name used in Europe (CCITT
Specification V.24) are shown in Table 7-1; the terminal
supplies the signals listed.

Table 7-1   EIA DATA INTERFACE - COMMUNICATIONS LINE

P1 External	EIA RS232C	CCITT V.24	SIGNAL NAME
1	AA	101	Chassis Ground
2	BA	103	Transmit Data
3	BB	104	Receive Data
4	CA	105	Request to Send
5	CB	106	Clear to Send
6	CC	107	Data Set Ready
7	AB	102	Logic Ground
8	CF	109	Carrier On (Receive Line Signal Detector)
9			+12V (switch selectable)*
10			-12V (switch selectable)*
20	CD	108.2	Data Terminal Ready

* Used in conjunction with the Perkin-Elmer Current Loop option.

Table 7-2   EIA DATA INTERFACE - PRINTER PORT

J2 External	SIGNAL NAME
1	Chassis Ground
2	Auxiliary Port Receive Data
3	Auxiliary Port Transmit Data
5	Clear To Send**
6	Data Set Ready
7	Logic Ground
8	Carrier On (Receive Line Signal Detector)
9	+12V (switch selectable)*
10	-12V (switch selectable)*
20	Data Terminal Ready

 * Used in conjunction with the Perkin-Elmer Current Loop option.
** See Section 3.2 - Printer Port Options.

7.2 Optional Current Loop Interface Adapter (T70-293/T70-292)

The current loop interface adapter converter board converts the RS232C signals into 20ma current loop levels. The signals generated by the interface are listed in Table 7-3.

The current loop interface uses optoisolators and can operate at any speed up to 9600 baud, depending on line length and type.

Two techniques for using the current loop are:

1. The terminal supplies the 20ma current for the loop (active).

2. The user's device supplies the 20ma current for the loop (passive).

Frequently, a hybrid of the two is used, e.g., the user provides the 20ma to the terminal but expects "contact closure" outputs from the terminal. (Most teletypewriters accept a loop current and provide "contact closure" outputs.) The adapter box on the optional current loop cable permits the setting of switches (Passive/Active) on both the Send and Receive current loops. See Figure 7-2.

Ensure that switches S1 and S2 are in the correct position for the desired current loop operation for the Communications Port and switches S3 and S4 are in the correct position for the desired current loop operation for the Printer Port; otherwise, the Current Loop interface will not function.

These switches are recessed, but accessible, in a small opening between the Communication Port and the Printer Port.

The switch settings are shown below.

	Communications Port		Printer Port	
	S1	S2	S3	S4
Up position	open	open	open	open
Down position	+12V	-12V	+12V	-12V

Figure 7-2 20ma Current Loop Adapter
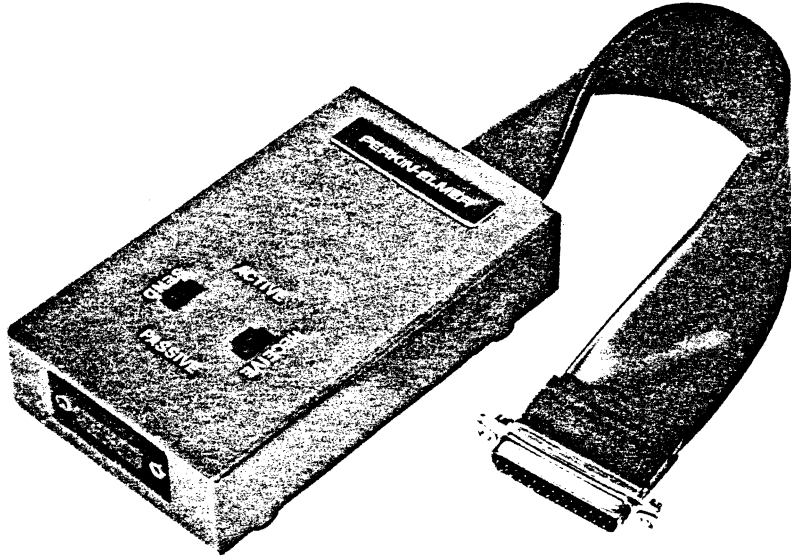
Table 7-3 Current Loop Interface

15-Pin Female Connector	Signal Name
15	Logic ground
14	Busy (-)**
13	Busy (+)**
12	Receive (-)
11	Receive (+)
10	Send (-)
9	Send (+)
7	TDU*
1	Chassis ground

----

* Device Unavailable Signal, derived from Data Terminal Ready.
** Busy signals used by Perkin-Elmer processor systems.

Table 7-4 Required Modem Options/Settings

103J OPTION REQUIREMENTS

Receive Space Disconnect	NO
Send Space Disconnect	NO
Loss of Carrier Disconnect	NO
CC Indication	EARLY
CB and CF Indication	SEPARATE
CC Indication for Analog Loop	ON
Fail-Safe State of CN Circuit	OFF
Automatic Answer	YES
Common Grounds	YES

113D OPTION REQUIREMENTS

Receive Space Disconnect	NO
Send Space Disconnect	NO
Loss of Carrier Disconnect	NO
CB and CF Indications	SEPARATE
CC Indication for Analog Loop	ON
Fail-Safe State of CN Circuit	OFF
Automatic Answer	YES
Common Grounds	YES

Table 7-4 Required Modem Options/Settings
continued

212A OPTIONS/SETTINGS REQUIREMENTS

CC Indication for   ON
Analog Loop   CC Circuit on during AL Test

Speed Control   HS BUTTON

Interface Controlled
Make Busy/AL   OUT

Transmitter Timing   INTERNAL

1200 BPS Operation   ASYNCHRONOUS START/STOP

CHARACTER LENGTH   10 BIT

Receiver Responds
to Digital Loop   OUT

Interface Controlled
Remote Digital Loop   OUT

Loss of Carrier
Disconnect   OUT

Receive Space
Disconnect   OUT

CB and CF
Indications   SEPARATE

Send Space
Disconnect   OUT

Automatic Answer   IN

Answer Mode
Indication - CE   OFF

Speed Mode   HIGH

Interface Speed
Indication   OUT

CN and TM   CN ON PIN 25/TM NOT CONNECTED
Assignments   CN ON PIN 18/TM NOT CONNECTED

Signal Ground to
Frame/Ground Connection   IN

SECTION 8
MAINTENANCE

The solid-state circuitry of the Model 1251 and the Model 1245 terminals and the minimum number of moving parts render the terminal virtually free from required operator maintenance. Preventive maintenance is, therefore, limited to cleaning and troubleshooting.

8.1 Safety Precautions

Under no circumstances should the operator, programmer, etc. attempt to dismantle the terminal or gain access to its interior. There is the definite probability of high voltage shock.

8.2 Cleaning

Brush accumulated dust from active areas of the terminal as required. Care should be exercised that foreign objects such as staples, pins, etc., do not fall into the keyboard or monitor.

Clean the cover case, keyboard and other exterior surfaces with a commercially available liquid cleaner or a mild detergent and lukewarm water. Use liquids sparingly. The Terminal screen should be cleaned with a commercially available glass cleaner.

8.3 Operator Checklist

Table 8-1 lists the various symptoms and possible causes of common procedural or usage errors. These errors are correctable at the operator level, thereby reducing the incidence of unnecessary service calls.

Table 8-1 Troubleshooting

Symptom	Possible Cause and Cure
1. No display.	* Blown fuse * Terminal unplugged * Power switch OFF * INTENSITY too low
2. Display shows excessive delete symbols (DEL).	* Parity erroneously set.
3. Unintelligible data is displayed in on-line mode - operative in local mode.	* Erroneous baud rate setting * Reconfigure and try again.
4. Characters displayed twice.	* DUPLEX set erroneously to HALF. Reconfigure.

8.4 Fuse Replacement

Fuses sometimes blow out of their own accord, just like light bulbs. If a replacement fuse also blows out, then there may be an internal overload requiring the services of a technician.

To replace a fuse, proceed as follows:

Domestic Power Supply Units

1. Set the power switch to OFF. Unplug the terminal from the outlet.

2. Rotate the fuse cap (rear panel) counterclockwise and remove the fuse.

3. Replace the blown fuse with a 1.5 amp, SLO-BLO fuse for 115V.

4. Replace fuse cap.

5. Plug the power cord into the outlet again and turn the power switch ON.

European Power Supply Units

1. Set the power switch to OFF. Unplug the terminal from the outlet.

2. Remove the power cord from the rear panel of the terminal.

3. Using a suitable instrument, e.g., a flat screwdriver, remove the fuse holder. The fuse holder is part of the 3 prong power connector for the power cord: the fuse holder lies directly above the three prongs.

   NOTE: The fuse holder contains a (disconnected) spare fuse.

4. Replace the blown fuse with a 1.25 amp (@125V) fuse for 115V operation or an 2 amp fuse (@250V) for 230V operation.

   NOTE: In both cases, the fuse size is 20mm. in length with a diameter of 5mm.

5. Replace the fuse holder and power cord.

6. Plug the power cord into the outlet and turn the power switch ON.

Appendix A
International Keyboards

ENGLISH Standard Keyboard
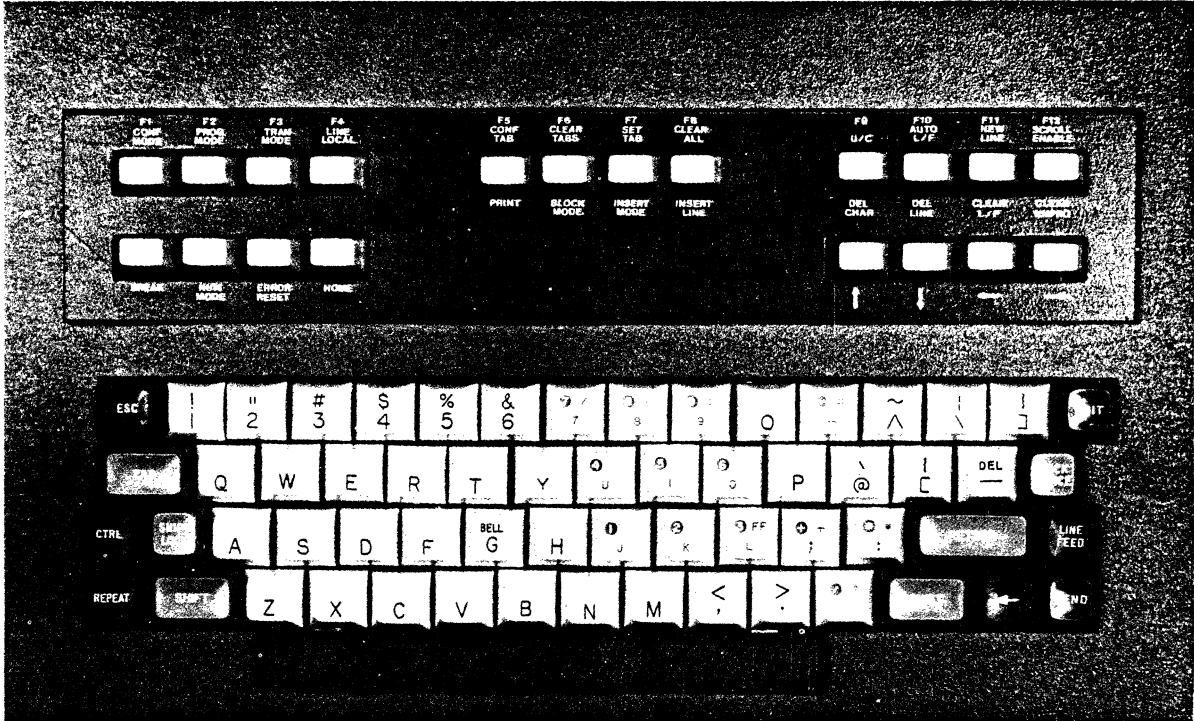
ENGLISH Extended Keyboard
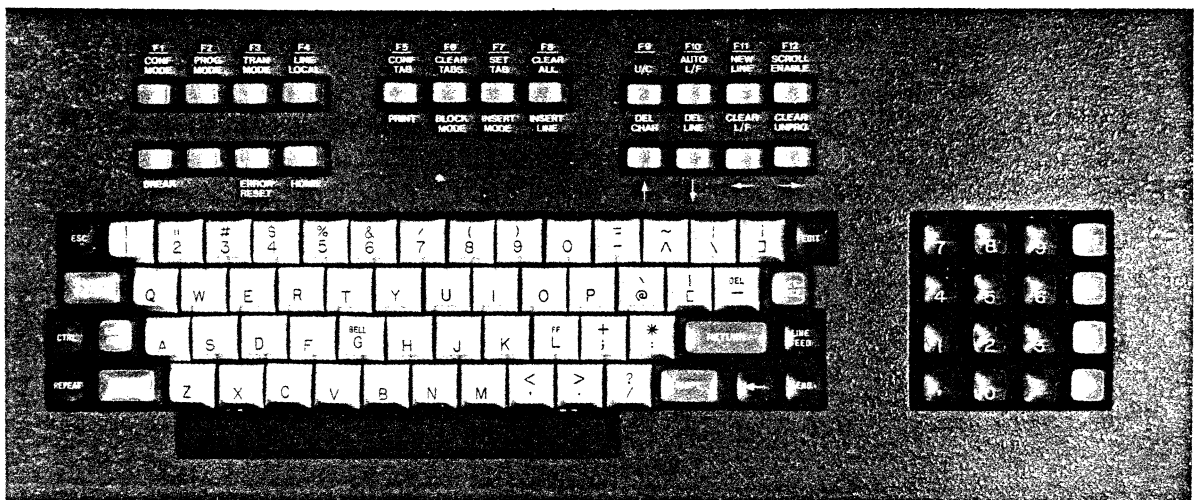
FRENCH Extended Keyboard
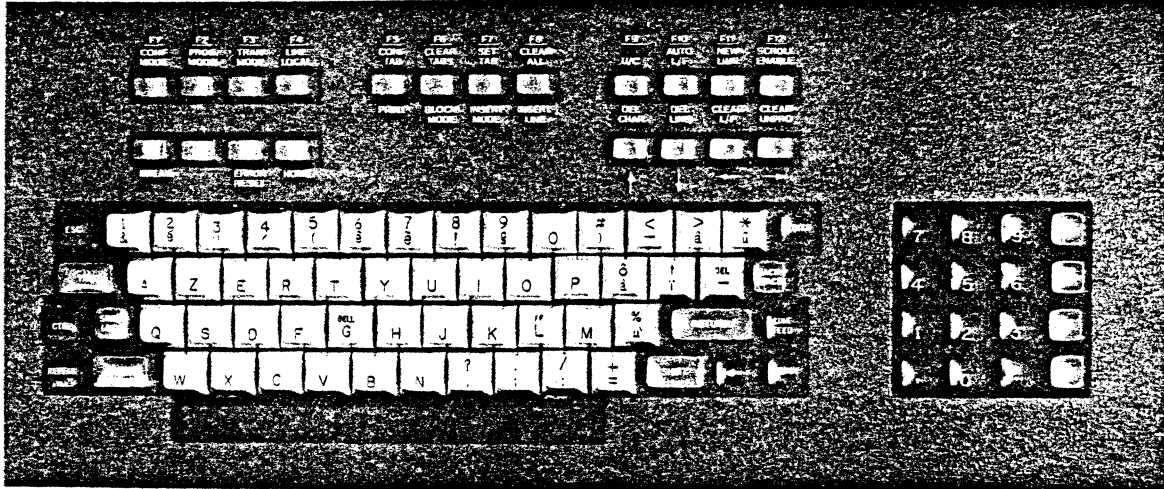
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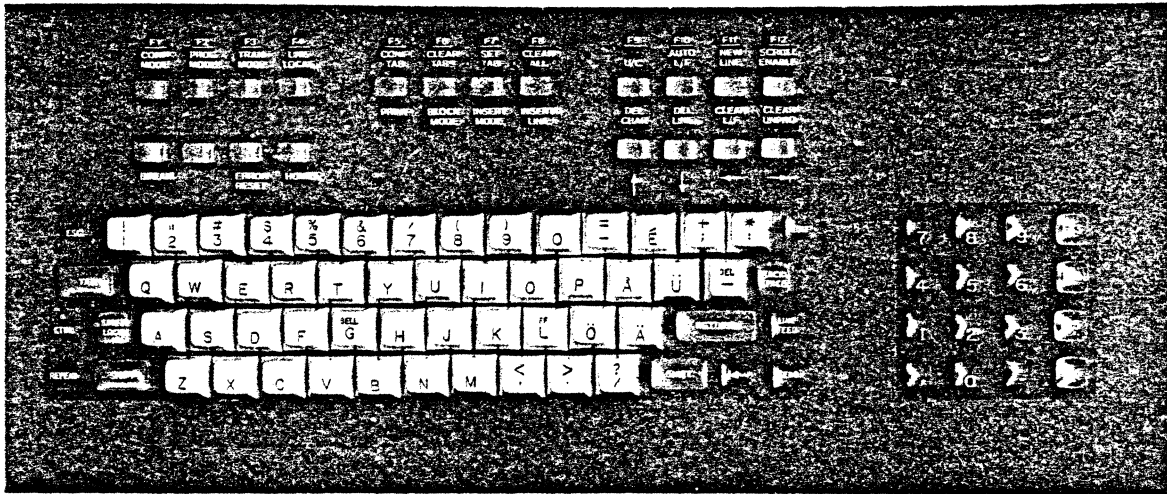
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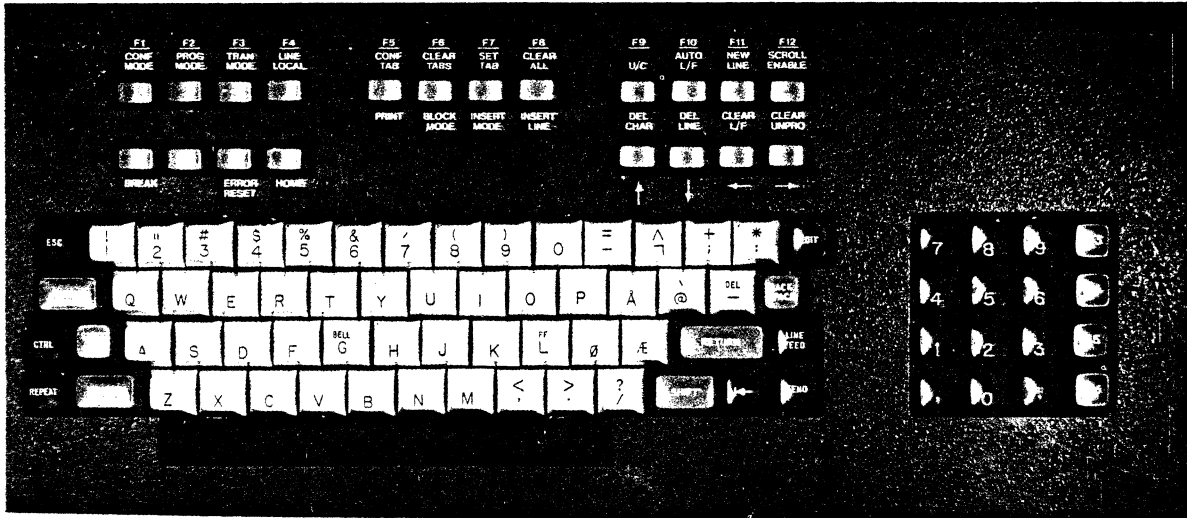
GERMAN Extended Keyboard
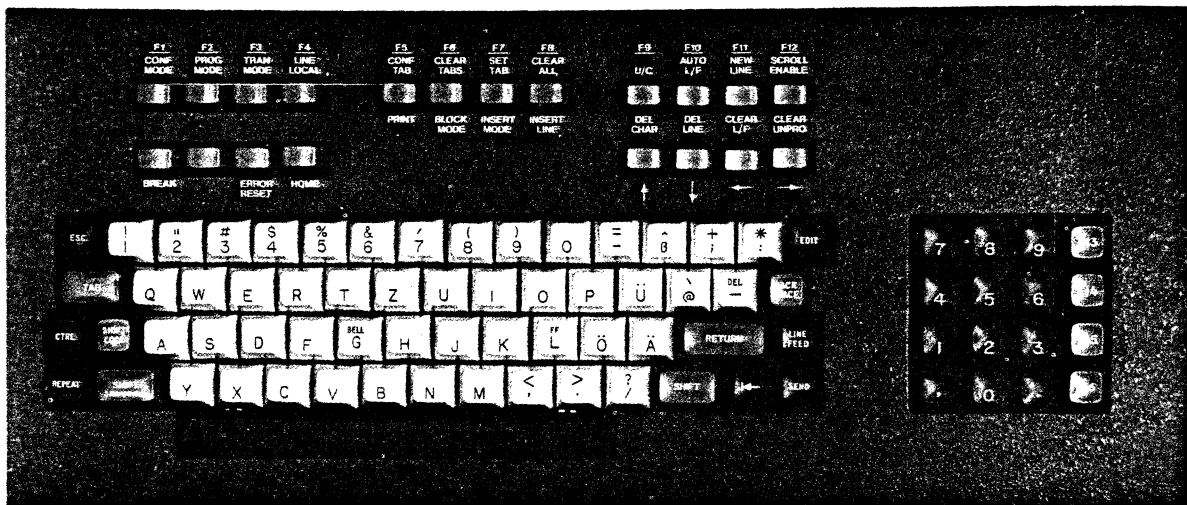
UNITED KINGDOM Extended Keyboard
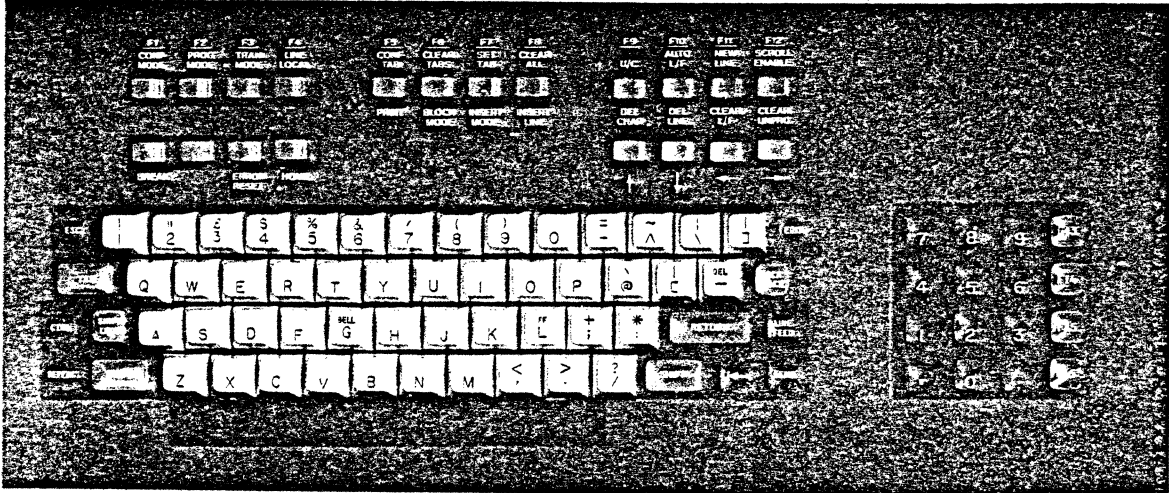
SPANISH Extended Keyboard

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PERKIN-ELMER