HP 150 Terminal
User's Guide

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Chapter 1

INTRODUCTION

Your HP 150 can be operated as a terminal as well as a computer. As a terminal, your HP 150 can communicate with a remote computer or process data locally. When operating as a terminal, you can access printers, alternate character sets, and user defined keys.

Installation and configuration information is provided in the HP 150 Owner's Manual.

How To Use This Manual

This manual describes the use of the HP 150 as a terminal. If you require information on the programmatic control you should refer to Appendix A. If you are familiar with other Hewlett-Packard terminals you may use the index to answer specific questions.

This manual is organized into ten sections and an appendix. Each section describes a group of features or mode of operation. Read the brief description of section content that follows. If you are familiar with the operation of Hewlett-Packard terminals you can begin using the HP 150 as a terminal. If you need information on a particular feature, refer to the section describing the feature or use the index to find related topics. You can then read the remaining sections as your needs dictate.

Section 1 – Introduction. This section contains a description of the manual organization and a short glossary of terms.

Section 2 – The Keyboard. This section locates and describes each of the major key groups.

Section 3 – Function Keys. This section describes how the function keys may simplify your work at the terminal.

Section 4 – Using Your Terminal By Itself. This section shows how your terminal manipulates information.

Section 5 – Using Your Terminal's Alphanumeric Capabilities. This section describes the terminal's enhanced alphanumeric features.

Section 6 – Using Your Terminal in Graphics Applications. This section describes graphics keypad operations and introduces "compatibility mode". Since escape-sequence programming controls graphics design, the Reference Manual provides full details.

Section 7 – Using Your Terminal With A Computer. This section tells how to put your terminal "on line" with a computer.

Section 8 – Using Your Terminal With An External Device. This section provides information on using your terminal with an external printer.

Section 9 – Using Your Terminal With The Integral Printer. This section describes the optional integral printer.

Section 10 – In Case Of Difficulty. This section describes preventive maintenance, the tests which verify your terminal's correct operation, and procedures to follow if you encounter problems.

Appendix A – Escape Sequences. This appendix provides a list of control sequences that can be used to control terminal mode operation.

Terms Used In This Manual

The following table is a brief glossary of terms used in this manual. Being familiar with these words will aid your reading and increase your understanding of the material presented.

ALPHANUMERIC CURSOR	The mark on the screen that shows where the next-entered character will appear. You can select the cursor's form to be either an underline or a rectangular box.
ALPHANUMERIC MEMORY	A storage area that holds alphanumeric information. (Also called display memory because the terminal displays this data upon the screen.) See GRAPHICS MEMORY.
DATA	A general term for describing information. Examples of data are names, numbers, words, and instructions. Computers manipulate data.
DATACOMM	An abbreviation for "data communications". This refers to the transfer of data between the terminal and a computer system.
DATA TRANSFER	The process of transferring (or "copying") data from one device or file to another.
DESTINATION	The device or file that receives data during a data transfer. Also called the "to" device.
DEVICE CONTROL	The process of skipping lines, moving printer paper to the top of the next page, or copying data between devices.
DISPLAY MEMORY	Another term for alphanumeric memory. Display memory is distinct from graphics memory.
ESCAPE SEQUENCE	A sequence of characters beginning with Ec (the ASCII escape character), followed by one or more additional characters. The terminal recognizes these sequences as special commands rather than data. Appendix A contains a list of these escape sequences.
FILE	A collection of text or data. A file normally consists of one or more lines.

FORM — A specially-designed layout that organizes information into fields for easy entry, retrieval, and interpretation.

FORM FEED — A command that advances printer paper to the top of the next page.

FORMAT MODE — An operating mode where the user is prevented from entering data into "protected" areas (such as a form's outline or its headings).

"FROM" DEVICE — The device that supplies the data in a data transfer operation. Also called the "source" device.

FUNCTION KEYS — The eight keys ([f1] – [f8]) at the top of the keyboard that associate with the eight labels appearing along the bottom of the screen. The function of each key changes as its label changes.

FUNCTION CONTROL KEYS — The [User System], and [Menu] keys. These keys assign initial values to the function key labels. The functions are then accessed using the [f1] through [f8] keys.

GRAPHICS CURSOR — The crosshair on the display, when in graphics mode, that shows where either the next character or vector end point will appear.

GRAPHICS MEMORY — The storage area that holds graphics display data. Graphics data and alphanumeric data are stored in separate memories.

LABEL LINE — The two lines toward the bottom of the screen that display the function key labels. See STATUS LINE.

LINE — A row of characters. You may envision a line as being a row of text in a book.

LOCAL MODE	The operating state where the terminal functions independently from a computer. Also referred to as being "off line".
MEMORY	The internal medium within a computer or terminal that stores information.
NATIONAL LANGUAGE	The language spoken in a particular country or region.
PAGE	The number of data lines that the terminal can display on the screen. The maximum page size is 24 lines.
REMOTE MODE	The operating state where the terminal functions with the aid of a computer. Also referred to as being "on line".
SIMULTANEOUSLY PRESS	Correct use of the Control and Shift keys requires your pressing and continuing to hold down the CTRL or SHIFT key while pressing and releasing another appropriate key. This manual uses the phrase "simultaneously press" to describe this procedure.
SOURCE	The device or file that supplies the data in a data transfer. Also called the "from" device.
STATUS LINE	The screen's last line. It displays information on the current operating state.
"TO" DEVICE	The device that receives data during a data transfer. Also called the "destination" device.
WINDOW	The upper 24 lines on the display screen. These lines may display information stored within workspace memory.
WORD PROCESSING	The interactive entering and editing of text using a computer's resources.
WORKSPACE	A block of display memory that stores information.

Chapter 2

THE KEYBOARD

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Introduction

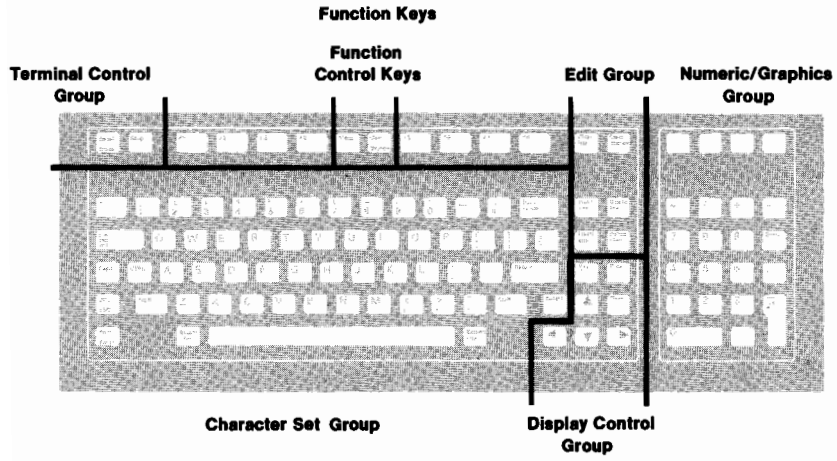
Before learning to control devices and transfer data, you should become familiar with the keyboard. Figure 2-1 shows the basic keyboard layout.

Figure 2-1. Terminal Keyboard

The basic keyboard consists of the following functional groups:

- Character Set Group. This group resembles a standard typewriter keyboard. You use these keys for entering information or for communicating with a host computer.
- Numeric Control Group. This group resembles a calculator keypad. These keys ease the entry of numeric data. These keys are also used in graphics mode to enter graphics commands.
- Display Control Group. This group controls cursor movement and determines which portion of the workspace you see through the viewing window.
- Edit Group. This group modifies text through insert and delete operations.
- Terminal Control Group. This group resets ("initializes") the terminal or breaks ("interrupts") data communications.
- Function Keys Group. This group uses single keystrokes to accomplish complicated tasks. Most tasks are predefined (configuring the terminal, selecting devices, etc.), but you can also program these keys to do tasks of your choosing.
- Function Control Group. This group assigns one of three sets of labels to the function keys group.

The remainder of this section briefly describes each of the keyboard groups.



Character Set Group

The character set group is the largest group of keys and generates the complete ASCII character set. The basic character set includes uppercase and lowercase alphabetic characters, the decimal digits, punctuation marks, and some commercial symbols.

Several non-displaying control characters are also available. As most control characters serve in special applications, see the appropriate application manual for a description of their use.

The keys highlighted in Figure 2-2 have special functions that are described below.

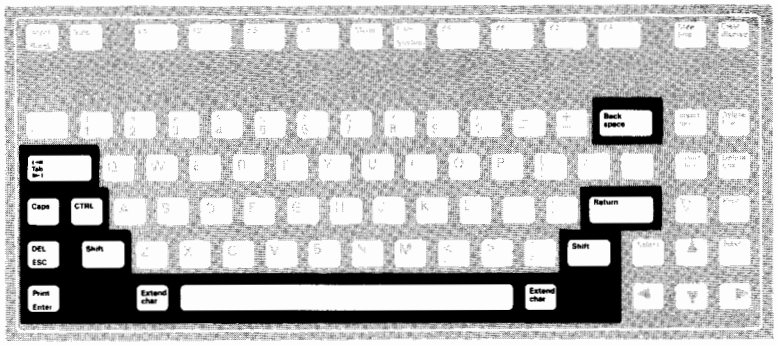


Figure 2-2. Special Character Set Keys

Shift Key

The SHIFT key normally selects uppercase alphabetic characters or the top symbol on keycaps with two symbols. (The CAPS key "reverses" shift-key operations. See the next labeled paragraph for more information.)

Additionally, the SHIFT key extends the function of several other keys (for example, TAB and ↖ keys). Whenever this occurs, the discussion of the affected key explains both the normal and the extended operations.

In any keystroke combination involving the SHIFT key, you must press and continue to hold down the SHIFT key while you press and release the other key. Even though you must fully press the SHIFT key first, the terminal rapidly senses which keys are being activated. Therefore, the remainder of this manual uses the phrase "simultaneously press" to describe this keystroke procedure.

Caps Key

Certain applications require that all alphabetic characters be capitalized. To avoid "shifting" on every keystroke, the CAPS key selects uppercase letters. However, after enabling CAPS mode, you can print lowercase letters by simultaneously pressing the SHIFT key and the desired character key. CAPS mode only affects the alphabetic characters. The number and symbol keys are unaffected.

When you initiate CAPS mode, a "CAPS" indicator appears in the Status Line. Pressing the CAPS key a second time returns the keyboard to its normal operation. (The "CAPS" indicator disappears.)

Tab Keys

Two Tab keys are available. The primary TAB key resides in the character set group. Pressing this key advances the cursor to the next tab stop to the right. Simultaneously pressing the SHIFT key and TAB key moves the cursor to the preceding tab stop on the left. Another Tab key resides within the numeric keypad. This key functions the same as the TAB key in the character set group.

Return, Backspace, And Space Keys

In general, these keys resemble their typewriter counterparts.

The RETURN key positions the cursor to the left margin of the current line. When you are using your terminal "off-line" from a computer, you can direct the terminal to advance to the next line by selecting automatic linefeed (AUTO LF) through the Modes set of function key labels.

The BACK SPACE key moves the cursor back to the left, one space, each time you press this key until the cursor reaches the beginning of that line. It provides an easy way to position the cursor to overwrite typing mistakes.

The Space bar prints a blank character. Although typists use the space bar to position a typewriter's printing head, you should avoid using the keyboard's Space bar for this purpose. Normally, when you "space" over existing text, the original characters are replaced by blanks.

Control And Escape Keys

The CTRL and ESC keys provide additional character codes and generate special control codes for various terminal operations. These keys aid the programmer but have limited use for the keyboard operator.

The CTRL key generates special ASCII control characters. Similar to the SHIFT key, you must continue to press the CTRL key while pressing the other key. For example, Control G is the ASCII ``Bell'' character, and simultaneously pressing the CTRL key and G key "rings" the terminal's bell.

The ESC key extends the terminal's operating functions. Most functions that you can perform manually over the keyboard can also be executed programmatically through escape sequences. Since they are sequences, you must press the ESC key first, then release it, before pressing the remaining character keys.

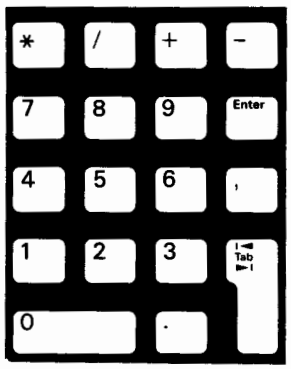
The Reference Manual gives full details on Control Codes and Escape Sequences.

Enter Key

You may use your terminal to enter and edit data, then send an entire "block" of information to the computer. For example, if your terminal is in Remote mode (that is, "on-line" to a computer), you can fill in an entire form, make any corrections, then send the completed form to the computer by pressing the ENTER key. A second Enter key is provided in the numeric key group.

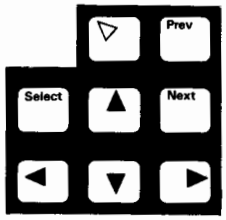
A variety of configuration settings determine what data the terminal sends. (See the Reference Manual for a detailed account of Enter key operation.)

When your terminal is in Local mode ("off-line"), you can press the ENTER key to copy all of display memory to the selected destination device(s).



Numeric Control Group

The numeric keypad resembles the arrangement of keys on an adding machine or calculator. This arrangement eases the entry of numeric data. In addition to the numeric keys, the pad holds a "plus" + key, a "minus" - key, "divide" / and "multiply" * keys, a comma , and decimal . key, an Enter ENTER key, and two tab-positioning keys.



Display Control Group

The display group allows you to "page" or scroll through the workspace to view characters that have rolled off the screen. Since the operation of these keys depends upon the dimensions of the display screen, the following terminology differentiates specific areas. (See Figure 2-3.)

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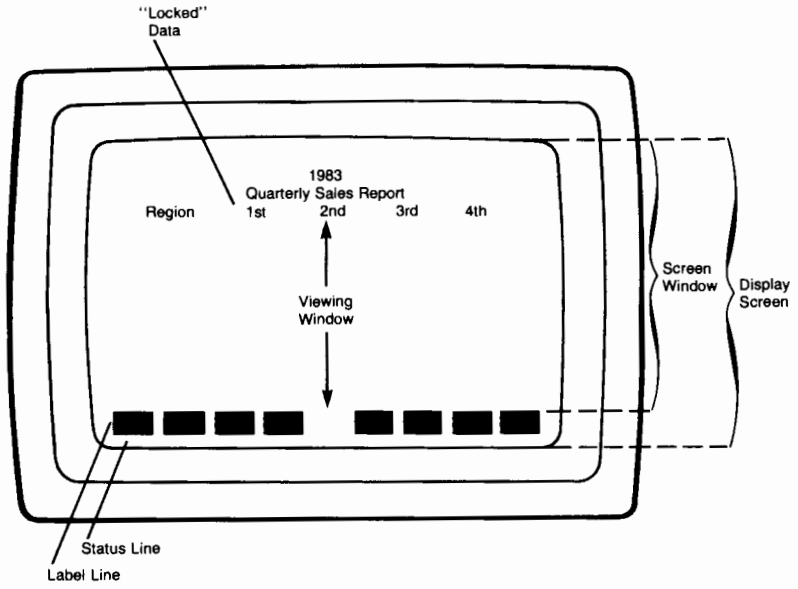


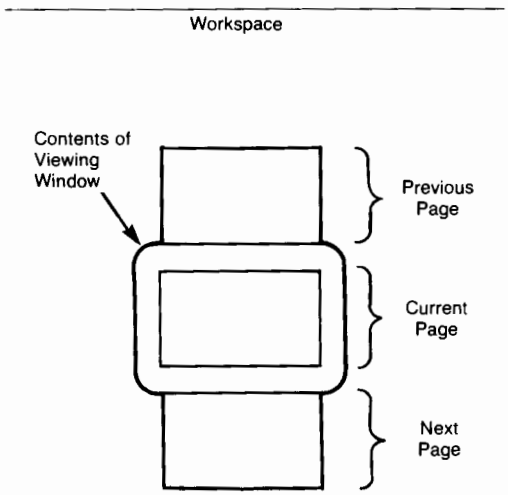
Figure 2-3. Partitioning The Display Screen

The "display screen" contains 27 rows; each row is 80 columns wide. The terminal reserves the bottom three lines for its use. You are prevented, therefore, from displaying your data in this area.

The "screen window" occupies screen rows 1 through 24. This is the maximum size of your viewing area into display memory. However, you can "lock" information (such as column headings) at the top of the screen, thereby restricting the number of rows that display data.

The "viewing window" contains the number of screen rows available for displaying your data. As a minimum, this window contains one line (the line where the terminal displays the cursor). At its fullest extent, the viewing window fills the screen window.

The information displayed within the viewing window forms a "page" of data. "Paging" replaces the viewing window with the next (or previous) set of displayable rows.



The display control keys fall into two categories:

(1) those that move the cursor one position along a row or column
(2) those that select which portion of the terminal workspace appears in the viewing window

Moving The Alphanumeric Cursor

Four keys control the movement of the alphanumeric cursor. These keys operate within the boundaries of the screen window (that is, they can access any character position across the width of the screen between screen rows 1 through 24).

The ∧ and ∨ keys move the cursor vertically along a column. The < and > keys move the cursor horizontally along a row. Even though the ↖ key repositions the cursor, it may also affect which portion of the workspace the terminal displays. Therefore, this key is treated with the other display control keys.

Table 2-1 describes the function of the Cursor Control keys.

Table 2-1. Alphanumeric Cursor Control Key Functions

KEY	FUNCTION
∧	Cursor Up—Moves the cursor up one row each time you press the key. If you hold the key down, the cursor moves up until you release the key or the cursor reaches the top row of the screen window. In this latter case, the cursor wraps around to the bottom of the screen window (screen row 24).
∨	Cursor Down—Moves the cursor down one row each time you press the key. If you hold the key down, the cursor moves down until you release the key or the cursor reaches the bottom row of the screen window. In this latter case, the cursor wraps around to the top of the screen window (screen row 1).
<	Cursor Left—Moves the cursor left one column each time you press the key. If you hold the key down, the cursor moves left until either you release the key or the cursor reaches the first column of the screen window. Continuing to hold down the key moves the cursor to the last column of the preceding row. This action continues as long as you hold the key down or until the cursor reaches column 1 of row 1 in the screen window. In the latter case, pressing this key moves the cursor to column 80 of row 24.
>	Cursor Right—Moves the cursor right one column each time you press the key. If you hold the key down, the cursor moves right until either you release the key or the cursor reaches the last column of the screen window. Continuing to hold down the key moves the cursor to the first column of the following row. This action continues as long as you hold the key down or until the cursor reaches column 80 of the last line in the screen window. In the latter case, pressing this key moves the cursor to column 1 of row 1.

Scanning The Alphanumeric Memory

You can select which portion of the workspace the terminal displays by pressing the ROLL UP / ROLL DOWN keys, the NEXT PAGE / PREV PAGE keys, and the ↖ key. As the window remains stationary, these keys bring different portions of the workspace into view.

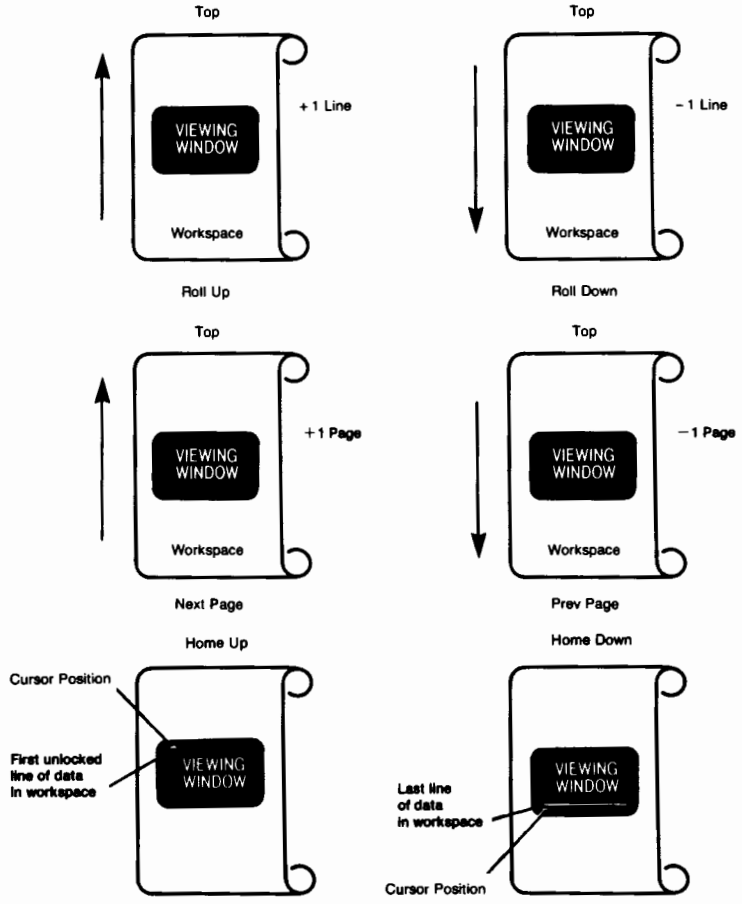


Figure 2-4. ROLL And PAGE Key Operations

Whereas the cursor-control keys operate within the borders of the screen window, the display-control keys operate on the boundaries of the "viewing" window.

Table 2-2 describes the function of the Display Control keys.

Table 2-2. Display Control Key Functions

KEY	FUNCTION
SHIFT ∨	Scrolls the workspace down one row each time you press this key. If you hold the key down, the workspace scrolls down until either you release the key or the first row of the workspace appears as the first row in the viewing window.
SHIFT ∧	Scrolls the workspace up one row each time you press this key. If you hold the key down, the workspace scrolls up until you release the key or the last row of the workspace appears as the first row of the viewing window.
	Allows you to see the next displayable number of lines within the viewing window.
	Allows you to see the previous displayable number of lines within the viewing window.
↖	Home Cursor—Moves the cursor to the first "accessible" character position in workspace memory. It rolls any text down as far as possible so the first line in the workspace appears in the first row of the viewing window.
SHIFT ↖	Home Cursor Down—Moves the cursor to the left margin of the row following the last-used row in the workspace. If the last data line is off the screen when you press these keys, the terminal scrolls up the workspace until the cursor's line appears.

Edit Group

Your terminal has a built-in editing capability that allows you to modify any data within the screen window. Six special keys control the inserting and deleting of text.

Table 2-3 lists the function of the Edit keys.

Table 2-3. Edit Key Functions

KEY	FUNCTION
CLEAR DSPLY	Clears the display from the cursor's position to the end of the current workspace.
CLEAR LINE	Clears the line from the cursor's position to the end of the line.
INS LINE	Inserts a blank line before the line which contains the cursor. To "create" the blank line, the terminal pushes the cursor's line and all subsequent lines down one, then moves the cursor to the left margin of the blank line.
DEL LINE	Deletes the line that contains the cursor. The terminal scrolls up subsequent lines to fill the void, and the cursor moves to the left margin.
INS CHAR	Inserts characters into a line without overwriting existing characters. The terminal inserts all new characters at the cursor's current position. Existing characters are shifted right one character position for each character entered. Characters shifted past the right margin are lost. When you enable this insert character function, the message "`Ins Char`" appears in the Status Line. Pressing the INS CHAR key a second time disables the insert character operation.
SHIFT + INS CHAR	Simultaneously pressing these keys enables Insert Character with Wraparound. In this mode, when the inserting of text forces characters from a line, the terminal "wraps" these characters onto the next line.

When you enable this insert character function, the message "Ins Wrap" appears in the Status Line. To disable the insert wraparound function, simply press the INS CHAR key a second time.

DEL CHAR — Deletes the character at the cursor's position. When you delete a character, all characters to the right of the deleted character (up to the right margin) shift left one character position to fill the void.

SHIFT + DEL CHAR — Simultaneously pressing these keys enables Delete Character with Wraparound. The operation resembles Delete Character since all characters to the right of the deleted character shift left. However, the character at the left margin of the next line moves to the right margin of the cursor's line to keep that line full. (This function only affects the cursor's line and the succeeding line.)

Terminal Control Group

The terminal control group contains two keys: the RESET key and the STOP key.

Reset Key

Soft Reset. Pressing the RESET key once results in a "soft reset". This unlocks the keyboard, clears any error messages, turns off Display Functions mode, stops any printer operations or data communication transfers, and rings the terminal's bell.

Hard Reset. Pressing the SHIFT, CTRL, and RESET keys simultaneously produces a "hard reset". This sets the terminal to its initial power-on state and rings the terminal's bell. Section 10, In Case Of Difficulty, gives more details on soft and hard resets.

WARNING

Reset operations may destroy data. When an error message appears on the screen, you should press the RETURN key to clear the error message and unlock the keyboard. Avoid using the Reset key for this purpose.

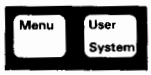
Break Key

The BREAK key signals the computer that you want its attention by "interrupting" the data communications line. See the Reference Manual for additional information.

Function Keys Group

The function keys are the eight keys at the top of the keyboard. Although the physical keys bear the labels "f1" through "f8", the function performed by a key corresponds to the labels displayed on the screen. The relationship between keys and screen labels is positional.

For example, the third screen label from the left associates with the third key from the left (f3). By changing the labels, the terminal assigns multiple functions to these keys. You select the labels' initial value by pressing the USER SYSTEM, key. Within the Aids set of keys, pressing a function key might display another set of labels. Section 4 fully describes the function keys.



Function Control Group

The function control keys consist of the User System and Menu keys. These keys set the labels of the eight function keys.

User System Key

Pressing the USER SYSTEM key accesses a hierarchy of function key labels. You can set most of the terminal's functions through the User System key.

Pressing the Menu key removes the function key labels and the Status Line messages from the display screen. However, the terminal still prevents you from entering data into this area.

NOTE

The Status Line contains a modem indicator. Some countries require that the terminal displays this indicator at all times. If your country has this legal requirement, you should never remove the label display.

Modes

Pressing the User System key displays a selection of terminal functions in the function key label line. The modes function (f4) can then be pressed to access those function key labels that select the terminal's operating modes. These modes are Line Modify, Modify All, Block, Remote, Smooth Scroll, Memory Lock, Display Functions, and Auto Linefeed. When first powered on, or after a hard reset, any terminal operating in its primary HP personality displays the Modes set of function key labels.

User Keys Key

Pressing CNTL USER SYSTEM gives the function key labels their user-defined titles. If you have left these functions undefined, the labels appear with their default titles (`f1` through `f8`). Refer to Section 4 for instructions on defining and executing the user-defined function keys.

National Language Support

Although USASCII characters form the standard base character set, your terminal can access characters from the following languages:

- Danish
- Dutch
- English (United Kingdom)
- English (USASCII)
- Finnish
- French
- French Canadian
- German
- Italian
- Norwegian
- Spanish
- Swedish

Section 5 explains how you can print any of these characters by entering Extended Characters mode.

National Keyboards

National keyboards are available as options for each of the international languages. Not only do the keyboards approximate typewriter keypads for their respective countries, but also the keycap symbols, function key labels, configuration menus, and error messages appear in translated form.

Chapter 3

FUNCTION KEYS

Introduction

From the keyboard, you can perform two basic tasks. The first is entering and editing information. The second task is control. The Break and Reset keys allow direct control. However, you may also select between groups of operating states by using the USER SYSTEM key.

The function control keys, together with the eight function keys, ease the control of complex operations. This section describes these functions and the friendly user interface.

The Function Keys

The function keys are the eight keys (f1 – f8) located along the top of the keyboard. They are associated with the eight function key labels displayed along the bottom of the screen. Pressing a key performs the function that the corresponding label suggests. The association between function keys and labels is positional. For example, f3 (the third key from the left) corresponds to the third label from the left. (See figure 3-1.)

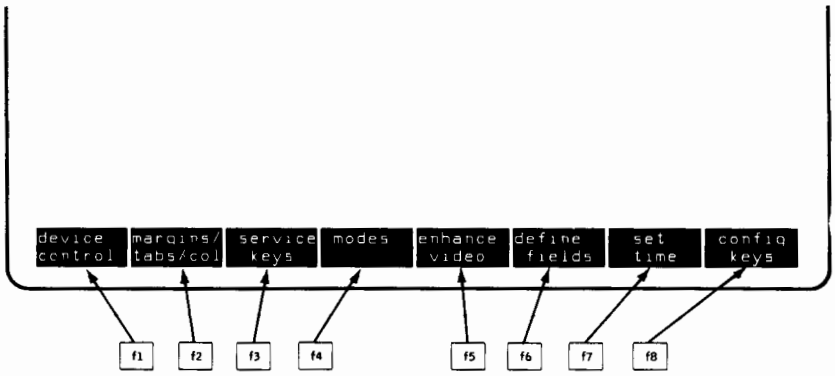


Figure 3-1. Function Keys And Labels

As the labels change, the logical function performed by the physical key also changes. Thus, one key may perform multiple tasks.

Labels

You select the initial label values by pressing the USER SYSTEM key. This displays the initial level of labels. The function key labels appear directly over the Status Line (the screen's bottom line). The terminal displays them in inverse video and blocks them together in two groups of four labels each. The first group corresponds to function keys f1 – f4 ; the second group corresponds to f5 – f8 . As the keyboard similarly places the physical keys in two groups of four keys, you can quickly associate each label to its corresponding key.

Labels—Upper And Lower Case

The titles in the function key labels are written in either uppercase or lowercase letters. Lowercase titles change the value of the function key labels to another set of titles. Uppercase titles perform the function suggested by that label's title.

Labels With An Asterisk

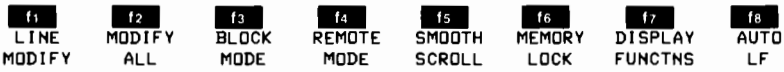
Two types of function key labels might contain an asterisk: those that toggle on and off; and those that are mutually exclusive with other labels. The asterisk indicates that the function named in the label is active. Alternate presses of toggle keys display, then remove, the asterisk in the associated label. Within a control group, several toggle functions may be active simultaneously. For example, within the Modes control group, you could select Block mode, Remote mode, Smooth Scroll, and Auto Linefeed.

Mutually exclusive function keys behave differently. Such keys form sets and only one label in each set can contain an asterisk at any moment. `EXPAND PRINT` and `COMPRESS PRINT` form one set of mutually exclusive labels, while `REPORT PRINT` and `METRIC PRINT` form a different set. Although you may select both `EXPAND PRINT` and `REPORT PRINT` since they occur in different sets, you could, obviously, never simultaneously select `EXPAND PRINT` and `COMPRESS PRINT`.

Once selected, a function remains active, even if you subsequently display another set of labels. To cancel a selection, you must press the corresponding function key to delete the asterisk.

Modes Function Key Labels

The `modes` function key displays the Modes set of function key labels:



These labels activate or deactivate the major terminal modes. The terminal displays them at power on or after a hard reset. All eight labels are toggle functions. An asterisk indicates a particular mode is active.

Table 3-1 describes the functions of the Modes labels.

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Table 3-1. Modes Set Of Function Key Labels

LABEL	FUNCTION
LINE MODIFY*	Used only in Remote mode. Once enabled, this mode allows editing a line of data while in Character mode. When you press either the ENTER or the RETURN key, the terminal transmits the line to the computer as a block. Pressing the ENTER or RETURN key also ends Line Modify mode.
MODIFY ALL*	Modify All mode also transmits characters to the computer as a block. It resembles "Line Modify" except Modify All remains active after you press the ENTER or RETURN key. To deactivate Modify All mode, you must press f2 to remove the asterisk from the MODIFY ALL label.
BLOCK MODE*	Used only in Remote mode. When activated, as you key in data, the terminal displays the information but sends nothing to the computer until you press the ENTER key. When the asterisk is absent, the terminal functions in Character mode; that is, the terminal transmits characters to the computer as you enter them.
REMOTE MODE*	Selecting this mode prepares the terminal for communications with a computer. When the asterisk is absent from the label, the terminal operates in Local mode.
SMOOTH SCROLL*	When activated, directs the terminal to "gradually flow" characters vertically across the screen rather than "jumping" the characters by lines.
MEMORY LOCK*	Operates in two modes: Overflow Protect and Display Lock. Overflow Protect prevents data from being accidently lost when workspace memory becomes full. To achieve overflow protection, you must select Memory Lock while the cursor is positioned within the screen's first line. Then, upon reaching the end of the workspace (by entering text, tabbing, or doing line feeds), the keyboard locks, the bell rings, and the message: MEMORY FULL appears on the screen.

To continue entering text, you must press the RETURN key to clear the error message and unlock the keyboard. Then you may either delete some of the existing text or disable Memory Lock. (In the latter case, you may want to enable top logging to keep a record of the data forced from display memory.)

Display Lock "freezes" selected lines upon the screen. You select Display Lock by pressing f6 to place an asterisk in the MEMORY LOCK label. When you press this key, all lines above the cursor's current line become locked in place. Then, you may enter data in the normal manner. When the viewing window becomes full, entering more data forces the first line of unfrozen text to scroll under the frozen data. All lines scrolled off the screen are inserted in memory immediately preceding the first line of frozen data.

Pressing f6 to remove the asterisk from the label cancels Display Lock.

DISPLAY FUNCTNS* When selected, Display Function mode inhibits the action normally produced by keyboard control keys (such as BACK SPACE, TAB, or ↖, or any control character received over the datacomm line. Instead, the terminal displays the ASCII character or escape sequence that represents this function.

AUTO LF* When selected, Automatic Linefeed mode advances the cursor to the next line whenever you press the RETURN key.

System Function Key Labels

The first set of function keys give keyboard access to most of the unit's features. Some of these features include:

- sending data to a destination device
- setting or clearing margins and tabs
- selecting service tests to verify the terminal's proper operation
- using video enhancements
- defining the fields of a form
- selecting a configuration menu, then altering it

To select any of these features, press the USER SYSTEM key to display the following function key labels:

f1	f2	f3	f4	f5	f6	f7	f8
device control	margins/ tabs/col	service keys	modes	enhance video	define fields		config keys

Since the label for f4 is capitalized, pressing f4 performs the indicated function. As all other labels are in lowercase titles, they form "stepping stones" to deeper levels within the Aids set. Figure 3-2 illustrates how you access each set of labels.

device control	margins/ tabs/col	service keys	modes	enhance video	define fields	set time	config keys
device modes		''to'' devices	ADVANCE PAGE	ADVANCE LINE	COPY ALL	COPY PAGE	COPY LINE
device control	RECORD MODE*	LOG BOTTOM*	LOG TOP*	EXPAND PRINT*	COMPRESS PRINT*	REPORT PRINT*	METRIC PRINT*
device control	SERIAL DEVICE	INTERNAL PRINTER	TO DISPLAY*	HP IB DEVICE			
START COLUMN	SET TAB	CLEAR TAB	CLR ALL TABS	LEFT MARGIN	RIGHT MARGINS	CLR ALL SPACES*	TAB*
POWER ON TEST	MEMORY TEST	TOUCHSCN ALGNMNT		SYSTEM TEST	IDENTIFY ROMS	DATACOMM TEST	INT PRT TEST
define fields	SET ENHNCMNT	SECURITY VIDEO*	INVERSE VIDEO*	BLINK VIDEO*	UNDRLINE VIDEO*	HALF BRIGHT*	etc.
CHANGE TO BASE	CHANGE TO MATH	CHANGE TO LINE					etc.
enhance video	START UNPROTCT	START XMIT FLD	STOP FIELD	ALL CHARS	ONLY ALPHA	ONLY NUMERIC	FORMAT MODE*
global config		datacom1 config	ext dev config	terminal config			

Figure 3-2. Function Key Labels

NOTE

A label shown with an asterisk (*) signifies a function which, when enabled, includes the asterisk to indicate its active state. This does not imply that a similar sequence of labels will appear on your screen. For example, under Device Modes, since LOG BOTTOM and LOG TOP are mutually exclusive, the screen can never simultaneously display both labels with an asterisk.

User System Set

The first set of labels accesses other label sets. For example, `margins/tabs/col` accesses the labels which manipulate margins and tabs. Some sets of labels are only indirectly accessible. For example, it is impossible to select a destination device in a single step. Rather, from the first set, you must select `device control`. From this level, by pressing f3 (`"to" devices`), you enter a third level of labels that allows selection of the destination device. In such cases, the multiple level of labels form a group. Your terminal has two such groups: the Device Modes group and the Config group.

Table 3-2 describes the functions of the Aids set.

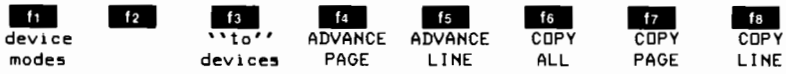
Table 3-2. Aids Set Of Function Key Labels

LABEL	FUNCTION
`device control`	Displays a set of labels that controls the transfer of data to the selected destination device(s).
`margins/ tabs/col`	Displays a set of labels that enables control of margins, tabs, and selection of the start column for data transmission to a host computer.
`service keys`	Displays a set of labels for testing the terminal's proper operation or for selecting Monitor Mode.
`modes`	Displays labels for controlling display operations.
`enhance video`	Displays a set of labels that controls the terminal's video enhancements.
`define fields`	Displays a set of labels that specifies field definitions and edit checks for forms.
`set time`	Displays functions for setting the time display.
`config keys`	Displays a set of labels that allows the selection of the various configuration menus.

Device Control Set

You access the Device Control set of keys by pressing:

This keystroke sequence displays the following set of labels:



The Device Control set of keys selects the amount of data copied to the destination device. This set also allows the proper positioning of printer paper.

Table 3-3 describes the functions of the Device Control set.

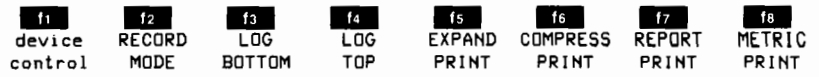
Table 3-3. Device Control Set Of Function Key Labels

LABEL	FUNCTION
device modes	Displays the Device Modes set of labels that governs the way data is transferred or formatted.
''to'' devices	Displays the To Devices set of labels that allows selection of a destination device.
ADVANCE PAGE	If you have selected the integral printer as the destination device and also specified Metric or Report Print, this key "skips" the printer to the top of the next page. When not in Metric or Report Print, the integral printer advances one line. If an external printer is the destination device, pressing this key always generates a form feed.
ADVANCE LINE	If you have selected a destination device, this key causes the printer to leave the next line blank by advancing the paper one line.
COPY ALL	If you have selected a destination device, this key copies the current workspace, starting with the line in which the cursor is positioned, to the destination device.
COPY PAGE	If you have selected a destination device, this key copies all lines in the viewing window, starting with the line in which the cursor is positioned, to the destination device.
COPY LINE	If you have selected a destination device, this key copies the cursor's current line to the destination device.

Device Modes Set

You access the Device Modes set of keys by pressing:

This keystroke sequence displays the following set of labels:



This set allows you to copy the entire screen or transfer a line, by data logging, to a destination device. (Section 8 provides details on top and bottom logging.) If the terminal contains an integral printer, these keys also select expanded or compressed print, and report or metric format.

Table 3-4 describes the functions of the Device Modes set.

Table 3-4. Device Modes Set Of Function Key Labels.

LABEL	FUNCTION
device control	Displays the Device Control set of labels that controls the transfer of data to the destination device.
RECORD MODE*	The way Record mode operates depends upon the Remote mode setting. In Local mode, the RECORD MODE key sends the contents of workspace memory to the selected destination device(s). In Remote mode, the computer sends data directly to the selected destination device(s), bypassing the terminal's display memory, unless display memory was explicitly selected as a destination device. You may end Record mode by again pressing the RECORD MODE function key, or by performing either a soft or hard reset.
LOG BOTTOM*	Log bottom affects the selected destination device. (Multiple selections are permissible.) With bottom logging, when the terminal detects a line feed (whether directly produced or indirectly produced from an end-of-line wraparound), the terminal copies to the selected destination device the line which the cursor just left. The data in alphanumeric memory remains unchanged. LOG BOTTOM and LOG TOP are mutually exclusive. Selecting one cancels any previous selection of the other.

LOG TOP*	Log top affects the selected destination device. (Multiple selections are permissible.) With top logging, when you enter a line of text after a workspace becomes full, the terminal copies the line which is forced from the top of the workspace to the selected destination device. LOG TOP and LOG BOTTOM are mutually exclusive. Selecting one cancels any previous selection of the other.
EXPAND PRINT*	When selected, the integral printer prints five characters per inch (40 characters per line). The vertical height remains the same. EXPAND PRINT and COMPRESS PRINT are mutually exclusive; selecting one cancels any previous selection of the other.
COMPRESS PRINT*	When selected, the integral printer prints 16.4 characters per inch (132 characters per line). The vertical height remains the same. EXPAND PRINT and COMPRESS PRINT are mutually exclusive; selecting one cancels any previous selection of the other.
REPORT PRINT*	When selected, the integral printer produces an 11-inch page. Report format consists of a three-line top margin, 60 lines of text, and a three-line bottom margin. A small tic mark shows the end of one page and the beginning of the next. REPORT PRINT and METRIC PRINT are mutually exclusive; selecting one cancels any previous selection of the other.
METRIC PRINT*	When selected, the integral printer produces a page with 70 lines (a three-line top margin, 64 lines of text, and a three-line bottom margin). A small tic mark shows the end of one page and the beginning of the next. REPORT PRINT and METRIC PRINT are mutually exclusive; selecting one cancels any previous selection of the other.

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To Devices Set

You access the To Devices set of keys by pressing:

This keystroke sequence displays the following set of labels:

This set selects the destination device for data transfers. Since the destination devices are not mutually exclusive, you can make multiple selections.

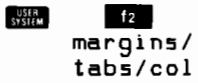
Table 3-5 describes the functions of the To Devices set of keys.

Table 3-5. To Devices Set Of Function Key Labels

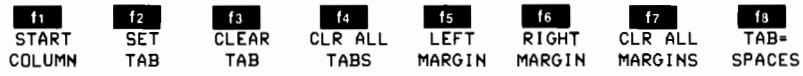
LABEL	FUNCTION
device control	Returns the Device Control set of labels to allow the transferring of data to the destination device.
SERIAL PRINTER	Selects the serial printer as the destination device.
INTERNAL PRINTER	Selects the integral printer as the destination device.
TO DISPLAY*	Selects the screen display as the destination device.
HP-IB PRINTER	Selects a printer on the HP-IB interface as the destination device.

Margins/Tabs/Col Set

You access the margins/tabs/col set of keys by pressing:



This keystroke sequence displays the following set of labels:



These labels set the start column, and set or clear margins and tabs.

Table 3-6 describes the functions of the Margins/Tabs/Col set.

Table 3-6. Margins/Tabs/Col Function Key Labels

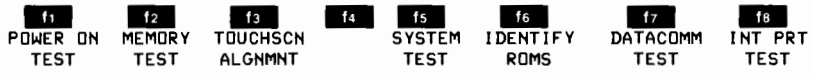
LABEL	FUNCTION
START COLUMN	Sets the Start Column to the cursor's current column. (This value becomes the **Start Column** entry in the Terminal Configuration menu.) When the terminal detects conditions that preclude the use of the logical start-of-text pointer (see below), it transmits text to the host beginning with the Start Column value. The terminal uses the Start Column only if these conditions exists: ■ no logical start-of-text pointer exists. ■ the terminal is in Remote mode but not functioning in Format mode or Block mode. (That is, the terminal is "on-line" and sending data to a computer one character at a time.) ■ you request a retransmission of data by enabling either Line Modify or Modify All. If set, the logical start-of-text pointer overrides the Start Column value. However, the terminal sets the logical start-of-text pointer only if these conditions exist: ■ the terminal is in Remote mode when it receives the data. ■ the data was entered from the keyboard and not received from the computer. ■ the just-entered data is the last-used line in workspace memory.
SET TAB	Sets a tab at the cursor's current column position.
CLEAR TAB	Clears any tab set at the cursor's current column position.
CLR ALL TABS	Clears all tabs.
LEFT MARGIN	Sets the left margin to the cursor's current column position.

RIGHT MARGIN	Sets the right margin to the cursor's current column position.
CLR ALL MARGINS	Sets the left margin at column 1 and the right margin at column 80 (the default settings).
TAB= SPACES*	When an asterisk indicates that this mode is active, a "tab" generates the appropriate number of spaces to move the cursor to the next tab stop while a "backtab" generates the appropriate number of back spaces to move the cursor to the previous tab stop.

Service Keys Set

You access the Service Set of keys by pressing:

This keystroke sequence displays the following set of labels:



This set selects the self-tests shown above.

NOTE

The Service Keys may be programmatically locked to prevent unauthorized access. If your installation has adopted this policy, pressing one of these keys displays an error message and locks the keyboard. You must press the RETURN key to clear this condition. Then contact the appropriate person in your group if you must access these keys.

Table 3-7 describes the functions of the Service set of keys.

Table 3-7. Service Set Of Function Key Labels

LABEL	FUNCTION
POWER ON TEST	Initiates the terminal's power-on test (the test that the terminal automatically performs when you power the terminal on).
TOUCHSCN ALGNMNT	Performs calibration of touch screen.
SYSTEM TEST	Performs a test of the unit.
IDENTIFY ROMS	Lists the ROMs installed in the terminal, giving their part number and a date code.
DATACOMM TEST	Initiates the data communications test.
INT PRT TEST	Initiates the integral printer test.
MEMORY TEST	Performs a test of the unit's internal memory.

Enhance Video Set

You access the Video Enhancement Set of keys by pressing:

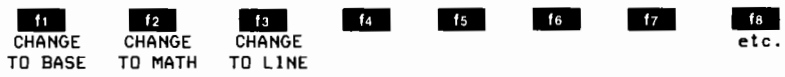
This keystroke sequence displays the following set of labels:

This set enables, or disables, the terminal's video enhancements.

Table 3-8 describes the functions of the Video Enhancement set of keys.

Table 3-8. Video Enhancement Function Key Labels

LABEL	FUNCTION
define fields	Displays the Define Fields set of function key labels which specify field definitions and edit checks for forms.
SET ENHNCMNT	Activates the currently selected state (either on or off) for every enhancement. You must use this key to enable or disable any enhancement.
SECURITY VIDEO	Prevents the characters that are entered in this field from being displayed. (Their place on the screen is left blank.)
INVERSE VIDEO	Inverts the intensity of the background and any characters within its field.
BLINK VIDEO	Causes characters in the field to blink on and off.
UNDRLINE VIDEO	Underscores all characters (including blanks).
HALF BRIGHT	Displays all characters in the field at half intensity (gray).
etc.	Displays the remainder of the enhancement labels:

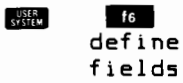


CHANGE TO BASE	Selects the base character set to be the active character set.
CHANGE TO MATH	Selects the math character set to be the active character set. (Simultaneously updates the Alternate Set field in the Terminal Configuration menu to "Math(A)".)
CHANGE TO LINE	Selects the line drawing character set to be the active character set. (Simultaneously updates the Alternate Set field in the Terminal Configuration menu to "Line(B)".)

etc.	Returns the function key labels to the initial Video Enhancement values which select the various display enhancements.

Define Fields Set

You access the Field Definition Set of keys by pressing:



This keystroke sequence displays the following set of labels:

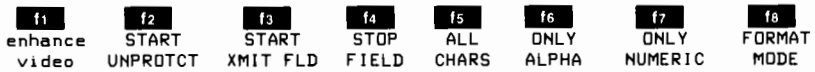


Table 3-9 describes the functions of the Field Definition set of keys.

Table 3-9. Field Definition Function Key Labels

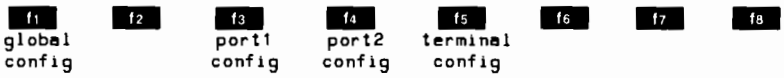
LABEL	FUNCTION
enhance video	Displays the first of two sets of enhancement labels which set the various display enhancements.
START UNPROTCT	Defines all character positions between the cursor and either the start of the next field, a "stop field" marker, or the end of the line (whichever occurs first) as an unprotected field. The terminal transmits all data in unprotected fields to the computer when in Remote and Format modes.
START XMIT FLD	Defines all character positions between the cursor and the start of the next field, a "stop field" marker, or the end of the line (whichever occurs first) as a transmit-only field. The terminal transmits all data in transmit-only fields to the computer when in Remote and Format modes.
STOP FIELD	Defines the end of any unprotected or transmit-only field by generating a "stop field" marker.

ALL CHARS	Defines all character positions between the cursor and the end of the line, the start of the next field, or a "stop field" marker (whichever occurs first) as an "all character" field. Such fields accept any character.
ONLY ALPHA	Defines all character positions between the cursor and the end of the line, the start of the next field, or a "stop field" marker (whichever occurs first) as an "alphabetic" field. Such fields accept both uppercase and lowercase alphabetic characters and also the space character.
ONLY NUMERIC	Defines all character positions between the cursor and the end of the line, the start of the next field, or a "stop field" marker (whichever occurs first) as a "numeric" field. Such fields accept the numeric digits, the space character, the plus sign, the minus sign, the comma, and the period.
FORMAT MODE*	Alternately pressing this key enables and disables Format mode. In Format mode, the terminal enforces field specifications to prevent the accidental overwriting of protected areas. When you enable Format mode, the terminal positions the cursor at the beginning of the first "unprotected" field. If no "unprotected" fields exist, the cursor homes to row 1, column 1.

Config Set

You access the Config Set of keys by pressing:

This keystroke sequence displays the following set of labels:



Configuration information is beyond the scope of this manual. In most instances, someone in your installation will have correctly configured your terminal. However, if you need access to this information, you should consult the Owner's Manual.

Table 3-10 describes the function of the Configuration set.

Table 3-10. Configuration Set Of Function Key Labels

LABEL	FUNCTION
`global config`	Displays the global configuration menu which sets background inverse and key "click".
`port1 config`	Displays the currently configured protocol menu for datacomm port 1. This menu configures the port to communicate with a computer.
`port2 config`	Displays the currently configured protocol menu for datacomm port 2. This menu configures the port to communicate with external devices.
`terminal config`	Displays the terminal configuration menu which selects the terminal operating characteristics for both Local and Remote modes.

User Definable Function Keys

Besides the function keys predefined meanings, you can program each key to accomplish a particular task. Used in this manner, the function keys reduce any repetitive task to a couple of keystrokes. You define the task with a "definition" string that may contain a maximum of 80 characters.

NOTE

User key definitions are not stored in protected memory. They will be lost if the unit power is turned off.

You also assign each key a "type" character that tells the terminal how to interpret the definition string. The three type characters are L, T, and N:

- L (local execution)—the terminal performs the function locally; nothing is transmitted to the computer.
- T (transmit)—the terminal transmits the definition string to the computer; nothing happens locally.
- N (normal keyboard operation)—the terminal interprets the definition string as though you entered it directly from the keyboard.

You can assign your own label to each of the function keys. The label should remind you which function that key performs. (The maximum label size is 16 characters: 8 characters being displayed in the label's upper half and 8 characters in the label's lower half.)

Until you define and save your own definition strings, the User Keys function keys have default assignments that take effect when you power the terminal on, perform a hard reset, or press the DEFAULT VALUES function key while the definition menu is displayed. Figure 3-3 shows the User Keys Definition Menu with its default values.

The default definition string for each of the eight function keys consists of two characters: the escape character (ᴇ) and a lowercase letter. The default definition strings have no preassigned meanings. However, by pressing the appropriate key, you can transmit a message to the computer where an application program may interpret it. For example, the program could output a complex data entry form to the terminal upon receiving the characters "ᴇt".

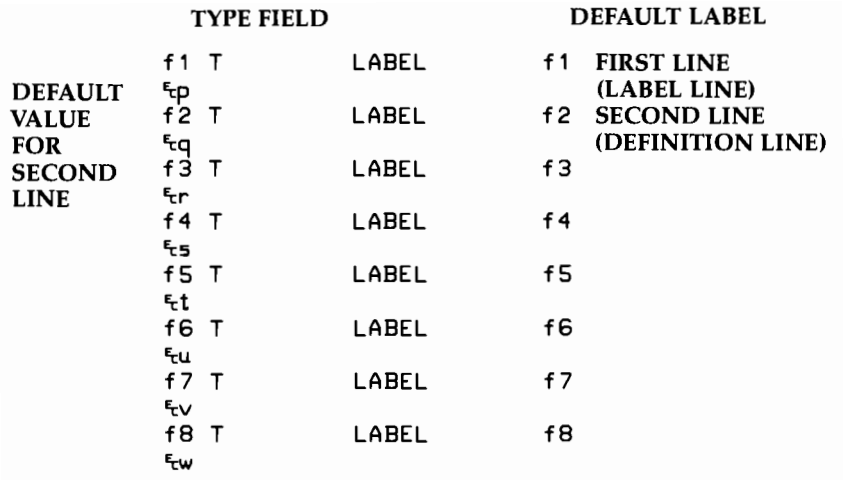


Figure 3-3. User Definable Function Key Menu With Default Values

User Key Modes

Utilizing the user-definable function keys involves two modes of operation. In Definition mode, you assign the function keys their labels, "type" characters, and definition strings. In Use mode, you activate the keys so their labels become the ones currently displayed. Then, by pressing the corresponding function key, the terminal processes the string as the type character directs.

Definition Mode

Initiating Definition Mode. To initiate Definition Mode, simultaneously press the CNTL key and Menu key. The terminal displays the User Key Definition Menu. (If you have made no previous entries to the menu, all fields show their default settings.) By pressing the Tab keys, or using the cursor-positioning keys, you can move the cursor to each menu field.

Defining a Function Key. To define a function key, first choose the type character: L for local use only, T for transmit only, and N for "normal" treatment (as though it were entered through the keyboard). The default type is "T". Use the NEXT CHOICE or PREVIOUS CHOICE function key to make your selection.

Next, enter the function key's label. On the definition menu, the label appears in inverse video as two 8-character blocks. The first block forms the upper half of the label; the second block, the lower half. The default labels for the keys are the titles "f1" through "f8".

Finally, type the definition string on the line below the label blocks. Use the DISPLAY FUNCTNS function key to enter keystrokes from the Edit and Display groups of keys. When entered in Display Functions mode, any keystroke operation is inhibited until you press the function key to which it is assigned. For example, if you include the ↖ key in one of the definition strings, the cursor "homes" when you press the appropriate function key in Use mode.

Leaving Definition Mode. To end Definition mode, press the USER SYSTEM key. This will return the terminal to the window display that was visible before the terminal entered Definition mode. Pressing CNTL USER SYSTEM key displays the labels you just defined.

Use Mode

Initiating Use Mode. You enter Use mode by pressing the CNTL USER SYSTEM keys. The terminal displays the user-defined function key labels across the bottom of the screen. When no labels have been defined, the default values (f1-f8) appear.

Certain application programs may require your entering one of the default definition strings for it to interpret. Regardless of a function key's current value, you can key in the default value by simultaneously pressing the SHIFT key and the appropriate function key. For example, if you have defined function key f1 to be your log-on string and if you must enter ^p (the default string for f1) so an application program will display the next data-entry form, you can press SHIFT f1 to generate this code.

Leaving Use Mode. To end Use mode and also display the previously shown set of labels, simply press the USER SYSTEM key. This ends Use mode and displays the initial set of labels.

An example summarizes the many new concepts presented in this section.

Example: This example assigns your name and address to function key f1. When executed, the key should send nothing to the computer, but print on the terminal screen the following:

```
Your Name
House Number and Street
Your Town, State    ZIP
```

Step 1. Press the USER SYSTEM, `modes` and check whether an asterisk occurs in the `AUTO LF` label. If so, press f8 to disable Auto Linefeed.

Step 2. Simultaneously press the CNTL and Menu keys. This initiates Definition mode by displaying the User Key Definition menu.

Step 3. The terminal positions the cursor in the field where it was left last. If the cursor is not at the type field for function key "`f1`", press ↖ to move the cursor to this field. Then press f2 (the `NEXT CHOICE` function key) until an "`L`" appears in that field. This makes the definition string executable at the terminal only.

Step 4. Tab the cursor to the label line and enter a title for the function key; for example, `RETURN ADDRESS`.

Step 5. Tab the cursor to the left margin of the definition string field.

Step 6. Enable Display Functions by pressing f7. (An asterisk appears in the `DISPLAY FUNCTNS` label.) This will inhibit the action of the RETURN key as you enter the address.

NOTE

If you mistype a character while doing Step 7, you must disable Display Functions by pressing f7 before you can use the cursor-control or edit keys. After correcting the entry, press f7 to reactive Display Function mode.

Step 7. Type:

```
Your Name [RETURN] House Number and Street [RETURN]
Your Town, State  ZIP [RETURN].
```

Step 8. Press the DISPLAY FUNCTNS function key to disable Display Function mode. Now when the terminal encounters the "Return" character, it executes it.

Step 9. Press [USER SYSTEM] and then the modes function key to display the Modes labels. Press [f8] to enable Auto Linefeed. After this mode is activated, each carriage return advances the cursor to the left margin of the next line.

Step 10. Press [CNTL] [f10] to enter Use mode. (Notice that your title has replaced the "f1" label.)

Step 11. Press the [f1] function key. The address, as you entered it, appears on the screen.

LABEL	FUNCTION
[MENU]	Causes current function key labels to toggle on and off.
[CNTL] [MENU]	Selects user key definition mode definition.
[CNTL] [USER SYSTEM]	Selects the user key mode and displays the user function key labels.

Chapter 4

USING YOUR TERMINAL BY ITSELF

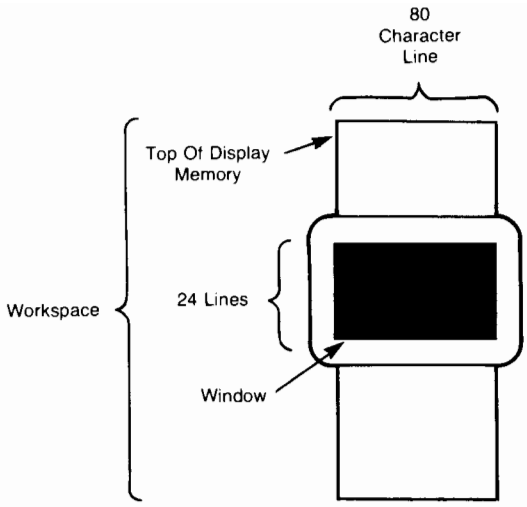
Introduction

You may use many of your terminal's features without being connected to a computer. This is called putting the terminal "off-line" or operating in Local mode. You select Local mode by not activating Remote mode. That is, one of these two modes always takes effect. Later on, this section tells how to select Remote mode through the Modes function key labels. Failing to do so puts the terminal in Local Mode.

Throughout this section, you will use your unit in Local mode to gain familiarity with basic keyboard operations. In this regard, several of your unit's features parallel the capabilities of a typewriter. Section 6 describes your graphics capabilities.

Display Memory

Local mode is possible because the unit stores and maintains the data being manipulated on the screen in the unit's display memory. This workspace area is 80 characters wide. The length is 48 lines.



Display Screen

The screen consists of 27 lines (figure 4-1). The unit reserves the three bottom lines for its use. The 27th line is the Status Line. The 25th and 26th lines display the function key labels. You control the remaining 24 lines.

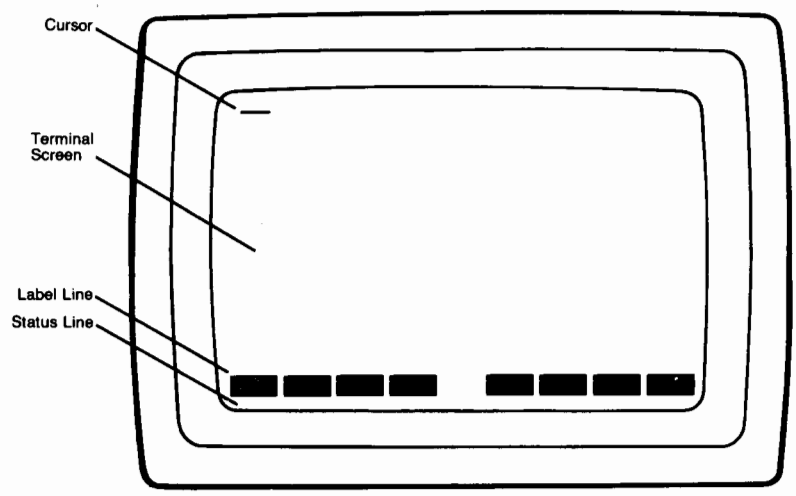


Figure 4-1. Screen Layout

The screen always displays the cursor's current line. (This is the line where you are actively adding text or editing existing text.) Therefore, after the screen fills, the addition of more text forces the top line off the screen. You may enter a minimum of 48 lines of text without worrying about any information being lost. (The discussion of Memory Lock in this section describes ways to safeguard information.) As the workspace stores more information than the screen can display, the screen, in essence, becomes a viewing window. By scrolling and paging, you bring different portions of the workspace into view.

Status Line Indicators

The Status Line gives information concerning the terminal's operating state. The line consists of nine sections:

Table 4-1 lists the various functions and their corresponding indicator.

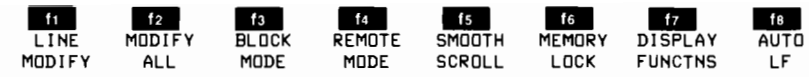
Table 4-1. Status Line Indicators

FUNCTION	SYMBOL
Keyboard Locked	KB Lockd
Equating Tab to Spaces	Tab=Spac
Function of Number Pad:	
Numeric Operations	Num Pad
Graphics Operations	Grph Pad
Activity Field:	
24 Hour Time Display	XX:XX
Transmit Indicators	*
CAPS Mode	CAPS
Insert Character	Ins Char
Insert Char/Wraparound	Ins Wrap

Computer Museum

Setting Your Terminal for Local Use

If your terminal is turned off, press the rocker switch on the terminal's rear panel to the "ON" position. When the terminal is ready for use, the Modes function key labels appear at the bottom of the screen.



NOTE

If your terminal has been in use and a different set of HP labels appears on the screen, you can display the Modes labels by pressing the USER SYSTEM key and then `modes`.

The eight Modes labels correspond to the function keys at the top of the keyboard. Pressing a function key selects the logical function named in the label. For example, pressing f1 selects "Line Modify" while pressing f5 selects "Smooth Scroll". An asterisk appears in the label when you select a function to be in its active state. To cancel the selection, simply press the corresponding function key again. That is, the function keys serve as on-off switches. If the logical function is off (no asterisk), pressing the function key turns it on. If the logical function is on (asterisk present), pressing the function key turns it off.

For the remainder of this section, you want your terminal in Local Mode. Therefore, if an asterisk appears in the `REMOTE MODE` label, press f4 to remove it. When the asterisk is absent, Remote mode is "off", and the terminal operates in Local mode. You should also activate automatic linefeed. Auto linefeed advances the cursor to a new line whenever you press the RETURN key. Press f8, as required, to display an asterisk in the `AUTO LF` label.

Entering Data

A basic use of your terminal is entering information. While the terminal is set for Local mode, you can enter data only from the keyboard. But once data becomes stored in terminal memory, you may copy this information to a printer, or you may change the terminal to Remote mode and send the information to a computer.

For a simple example of entering text, type the following name and date:

```
John Hancock      July, 1776
```

Editing Data

Whenever you want to change an entry, you choose the appropriate cursor-positioning and edit keys (as described in Section 3). For example, to add the day "4" to the above date, proceed as follows:

Step 1. Use the cursor-positioning ("arrow") keys to move the cursor under the comma.

Step 2. Press the INS CHAR key. (The message "`Ins Char`" appears in the Status Line.)

Step 3. Press the Space bar, then the 4 key. The line should appear as follows:

```
John Hancock     July 4, 1776
```

Step 4. Pressing the INS CHAR key again turns off Insert Character Mode. ("`Ins Char`" disappears from the Status Line, and the terminal resumes overwrite operation.)

Techniques of Data Entry

In many instances, you must enter data within specific bounds. To simplify this procedure, your terminal provides margin settings and tab stops.

Tabs

Setting Tabs. Setting a tab stop requires access to the "Margins/Tabs/Col" function key labels. Follow this simple procedure:

Step 1. Press the USER SYSTEM key.

The function key labels assume the following values:

f1	f2	f3	f4	f5	f6	f7	f8
device control	margins/ tabs/col	service keys	modes	enhance video	define fields	set time	config keys

NOTE

Those labels which appear "darker" in relationship to other labels indicate that the corresponding label depends upon that option being installed in your terminal. If your terminal lacks this option, the corresponding label on your screen will be blank.

Step 2. Press f2 (the function key corresponding to the `margins/tabs/col` label.)

The function key labels change to the following values:

f1	f2	f3	f4	f5	f6	f7	f8
START COLUMN	SET TAB	CLEAR TAB	CLR ALL TABS	LEFT MARGIN	RIGHT MARGIN	CLR ALL MARGINS	TAB= SPACES

Step 3. Move the cursor to the desired column.

Step 4. Press f7 to set the tab stop. (Although you have pressed f2 twice in this procedure, notice that its logical function has changed.)

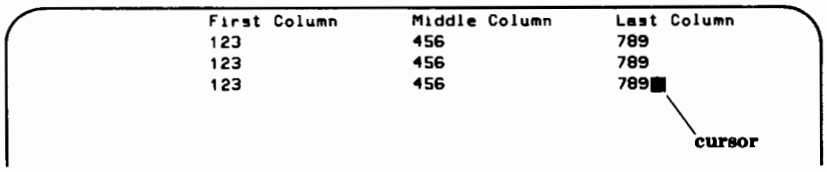
Using Tabs. Once you have set the desired tab stops, you can use the Tab keys as you would on a typewriter. You tab forward by using the TAB key in the character set group, or by using the TAB► key in the numeric keypad. You can tab backwards by simultaneously pressing the SHIFT key and the TAB key. (Alternatively, you may back-tab by using the ◄TAB key in the numeric keypad.) When the cursor rests on the first tab position in a line and you backtab, the cursor moves to the last tab position in the previous line. Once the cursor reaches the first tab position of the first line in memory, further backtabbing is impossible.

NOTE

The left margin always serves as a tab stop.

Clearing Tabs. Clearing tab stops also requires access to the "Margins/Tabs/Col" function key labels. (If these labels are not displayed, follow the first two steps in the procedure under "SETTING TABS".) Once the labels are present, you clear an individual tab by moving the cursor to the tab's location, then pressing f3 (CLEAR TAB). To clear all tab stops with a single keystroke, simply press f4 (CLR ALL TABS).

Example: This example sets tab stops to ease the entry of numeric data into columns. For your reference while doing this example, the following illustration shows the way your screen should appear after you enter the last number.



Step 1. If the "Margins/Tabs/Col" labels are not displayed, press the USER SYSTEM key and then f2 to display these labels.

Step 2. To ensure that no previous margins or tab stops exist, press f4 to clear all tabs and f7 to clear all margins.

Step 3. Press the ↖ key. This positions the cursor at the beginning of workspace memory.

Step 4. Press the CLEAR DSPLY key. This action clears the screen as pressing this key "erases" any information stored in workspace memory.

Step 5. Use the → key to move the cursor to column 20. Notice that the cursor's row/column location appears in the label line between the fourth and fifth function key labels. Therefore, it is unnecessary to "count spaces" when positioning the cursor.

Step 6. Press f2 (SET TAB). This sets a tab stop at column 20. Then enter the text: `First Column`

Step 7. Use the → key to move the cursor to column 40 and press f2 to set a tab stop at this location. Then enter the text: `Middle Column`

Step 8. Use the → key to move the cursor to column 60 and press f2 to set a tab stop at this location. Then enter the text: `Last Column`

Step 9. Press the RETURN key. Observe that the cursor returns to the left margin (column 1) of the next line.

Step 10. On this line and the following two lines, do the following:

- Press the TAB key and enter the numbers "123" beginning at column 20.
- Press the TAB key and enter the numbers "456" beginning at column 40.
- Press the TAB key and enter the numbers "789" beginning at column 60.

For the first two lines, after entering the "9", press the RETURN key to advance to the next line.

Step 11. Experiment with the TAB key in the character set group and the TAB key in the numeric keypad. Also try back-tabbing with the TAB key or by simultaneously pressing the SHIFT and TAB keys. In particular, notice that the left margin serves as a tab stop but the right margin does not.

Margins

When you power on the terminal, or after a hard reset, the terminal sets the left and right margins to the width of the screen. That is, column 1 becomes the left margin and column 80 becomes the right margin. However, you may change these settings to ease data-entry.

Left Margin. Setting margins requires access to the "Margins/Tabs/Col" function key labels. Follow this simple procedure:

Step 1. Press the USER SYSTEM key.

The function key labels assume the following values:

f1	f2	f3	f4	f5	f6	f7	f8
device control	margins/ tabs/col	service keys	modes	enhance video	define fields		config keys

Step 2. Press f2 (margins/tabs/col).

The function key labels take on the following values:

f1	f2	f3	f4	f5	f6	f7	f8
START COLUMN	SET TAB	CLEAR TAB	CLR ALL TABS	LEFT MARGIN	RIGHT MARGIN	CLR ALL MARGINS	TAB = SPACES

Step 3. Move the cursor to the desired column.

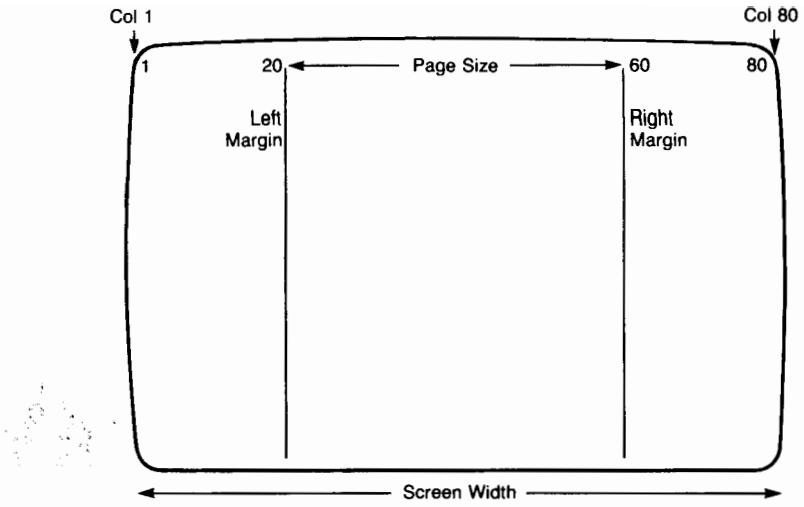
Step 4. To set the left margin, simply press f5 (LEFT MARGIN).

Right Margin. To set the right margin, follow a similar procedure. However, a new rule applies: the right margin can never be to the left of the left margin setting. (The terminal rejects any invalid selection with an audible "beep".) After positioning the cursor to the desired column, press f6 (RIGHT MARGIN) to set the right margin.

The terminal bell sounds a warning when the cursor reaches a position eight character spaces from the right margin. Upon reaching the right margin, if "end-of-line wraparound" is in effect, the cursor automatically moves to the left margin of the next line. ("End-of-line wraparound" is the normal (default) setting for the InhEolWrp(C) field in the Terminal Configuration menu. Unless you specifically change this field, your terminal functions as described above.)

When you position the cursor with the ► key, the terminal bell remains silent as the cursor nears the right margin. Upon reaching column 80, the cursor moves to the left margin of the new line regardless of the setting of the end-of-line wraparound field. That is, the cursor-positioning keys ignore margin settings and operate on the boundaries of the screen window.

Example: This example sets the margins for a "40-column page", centered on the screen. (Since the page width includes both margins, the actual page size is 41 columns.)



Step 1. Display the "Margins/Tabs/Col" labels by pressing:

USER SYSTEM f2

```
margins/
tabs/col
```

Step 2. To set the left margin, use the cursor-positioning keys to move the cursor to column 20. Press f5 (LEFT MARGIN).

Step 3. To set the right margin, use the cursor-positioning keys to move the cursor to column 60. Press f6 (RIGHT MARGIN). Both margins are now set.

Step 4. Press the RETURN key. Notice that the cursor returns to the left margin, not to the edge of the screen window.

Step 5. To see how the terminal confines data within these boundaries, enter the following sentence:

```
Through margins, this examples forces textual data to the next line.
```

Your final results should resemble:

```
Through margins, this example forces text
ual data to the next line.
```

Clearing Margins. You change margins by setting new margins. You clear margins by pressing function key f7 (CLR ALL MARGINS). This returns the terminal to its normal state where the left margin is column 1 and the right margin is column 80. (The margins also assume this default setting whenever you enter Format mode. See Section 6.)

Memory Lock

You select Memory Lock through the Modes function key labels. You may do this as a two-step procedure. First press the USER SYSTEM, modes, and then press f6 (MEMORY LOCK) if no asterisk appears in the Memory Lock label.

You may use Memory Lock in three different ways:

- to provide overflow protection for display memory
- to "lock" lines (instructions, headings, etc.) on the screen
- to relocate blocks of text

Overflow Protection. To enable Overflow Protection, you must position the cursor within the screen's first row. Therefore follow this procedure:

Step 1. Using the "up-arrow" (▲) key, move the the cursor to the top of the display screen.

Step 2. Press the USER SYSTEM key and select modes to display the Modes function key labels.

Step 3. Press f6 to enable Memory Lock. This protects the entire workspace.

Then, when the workspace becomes full, if you attempt to enter more data, the keyboard locks, the bell rings, and the terminal displays the message: MEMORY FULL.

Display Lock. To "lock" lines (such as column headings) on the screen, you activate Memory Lock after you have positioned the cursor on the line below the last line of data that you want retained on the screen. Then, as the viewing window becomes full, these locked lines remain on the screen while unlocked lines continue to roll into the display memory workspace.

Relocating Blocks of Text. You can also use Memory Lock to move blocks of text.

For an example, move the following paragraphs into their proper order.

Initial order:

(Top of screen)

```
I'm paragraph 3.
Although I arrived first, they want me last.

I'm paragraph 2.
I'll be content in the middle.

I'm paragraph 1.
Shouldn't the first be last; and the last, first?
```

(blank line)

■ (cursor's current position)

(As a blank line separates each paragraph, you must enter a blank line after the last paragraph and then press the RETURN key to position the blank line ABOVE the cursor's current line.)

Step 1. Press the **modes** key to display the Modes labels. Verify that Memory Lock is disabled (the label appears without an asterisk).

Step 2. Press the modes function key and type the above paragraphs as shown. Be sure to press the RETURN key twice after entering the question mark. (This creates the necessary spacing between paragraphs.)

Step 3. Move the cursor to the first line of paragraph 2.

Step 4. Press f6 (MEMORY LOCK) to enable Memory Lock mode. (An asterisk appears in the label.)

Step 5. Press the SHIFT ∧ until the remaining lines have rolled under the cursor position and off the screen.

Step 6. Turn off Memory Lock mode by pressing f6. (The asterisk disappears from the MEMORY LOCK label.)

Step 7. Press the ↘ key. The display should appear as follows:

(Top of screen)

```
I'm paragraph 2.
I'll be content in the middle.

I'm paragraph 1.
Shouldn't the first be last; and the last, first?

I'm paragraph 3.
Although I arrived first, they want me last.
```

Step 8. Now position paragraph 1 by moving the cursor into the first line of paragraph 1 and turning on Memory Lock by pressing f6.

Step 9. Press the SHIFT ↑ until the cursor is in the first line of paragraph 3.

Step 10. Turn off Memory Lock mode by repressing f6, then press the ↘ key. This puts the bickering paragraphs into their proper place:

(Top of screen)

```
I'm paragraph 1.
Shouldn't the first be last; and the last, first?

I'm paragraph 2.
I'll be content in the middle.

I'm paragraph 3.
Although I arrived first, they want me last.
```

If the data were not at the beginning of the workspace, you could use the SHIFT ↑, instead of the ↘ key, to view the rearranged text.

Chapter 5

USING YOUR TERMINAL'S ALPHANUMERIC CAPABILITIES

Introduction

Your terminal can display data in a variety of ways to highlight certain information or, conversely, to conceal information. Additionally, it gives access to special character sets containing mathematical symbols or line-drawing elements. With the line-drawing set, for example, you could create a form's layout. Then you could divide the form into logical fields, where each field accepts specific data. When you set your terminal for Format mode, the terminal channels incoming data to designated fields thus preventing you from overwriting "protected" areas. Such features ease data-entry and reduce the chances for error. This section describes these features.

Using Display Enhancements

As a standard feature, your terminal includes the following display enhancements:

- Half Bright: The terminal displays characters at half intensity (gray).
- Underline: The terminal highlights a character by underscoring it.
- Inverse Video: The terminal inverts the intensity of the background and the corresponding characters within this field. (See Background Inverse.)
- Blinking: Characters blink.

- Security: The terminal accepts characters but displays nothing on the screen. (This feature is commonly used for "passwords".)
- Background Inverse: This feature selects dark characters on a light background. (The screen normally displays light characters on a dark background.)

From the keyboard, you access the video enhancement function key labels by pressing:

This keystroke sequence displays the following set of labels:

You may set all the display enhancements except Background Inverse by using these keys. As Background Inverse affects the terminal's operation, you select this enhancement through the Global Configuration menu.

Pressing f8 (etc.) accesses the labels that activate the terminal's different character sets. These labels are:

At this level, pressing f8 (etc.) returns the previous set of labels. That is, by using the etc. function key, you may cycle through all the display enhancements then return to the initial "enhance video" set.

The "function-key" video enhancements (Half Bright, Underline, Inverse Video, Blinking, and Security) are toggle functions. An asterisk appears in the corresponding label when you select that enhancement. If you change your mind, you can cancel the selection by pressing the appropriate function key to remove the asterisk from the label.

When you press f2 (SET ENHNCMNT), all "starred" enhancements take effect and the asterisks disappear from the corresponding labels. (The latter action prepares the labels for the next round of selections.)

The cursor's current position determines where an enhancement begins. An enhancement lasts until (1) another enhancement begins, (2) the current line ends, or (3) you explicitly turn off the enhancement. You turn off an enhancement by setting no enhancements. That is, you press f2 (SET ENHNCMNT) when none of the enhancement labels contain an asterisk. Since the terminal automatically removes the asterisks when you set the enhancements, it is an easy procedure to position the cursor, make your selections, press f2, move the cursor to the end of the field, and press f2 to terminate the enhancement. The following example illustrates these steps.

Example: This example defines columns 10 through 14 of line 5 to be inverse video and blinking.

Step 1. Press the USER SYSTEM key to display the User System set of function key labels. Then press f5 (enhance video) to display the video enhancement labels.

Step 2. Use the cursor-positioning ("arrow") keys, to move the cursor to line 5, column 10.

Step 3. Press f4 (INVERSE VIDEO) and f5 (BLINK VIDEO) to select these enhancements. (Once activated, an asterisk appears in the label.)

Step 4. Press f2 (SET ENHNCMNT). The "starred" enhancements take effect. (Notice that the asterisks have disappeared from the labels.)

Step 5. Using the Space bar, move the cursor to column 15. Notice that the field appears in inverse video.

Step 6. Press f2 (SET ENHNCMNT). From column 15 on, since no enhancements were starred, none take effect. In essence, this defines the desired enhancement field between columns 10 and 14.

Step 7. Move the cursor back to column 9 of line 5. Type the word: TERMINAL. The display should appear as shown with the characters in the enhancement field blinking.

Using Alternate Character Sets

At any given moment, you may access one of two character sets from the keyboard. These sets are called the "base" set and the "alternate character" set.

You can select between these sets by using control codes. Simultaneously pressing the Control key and "N" key (CTRL N) selects the alternate character set, while simultaneously pressing "Control O" (CTRL O) selects the base set. Appendix A lists control codes and escape sequences to print characters from the alternate character sets. The following paragraphs tell how you may use the function keys to achieve similar results.

The function keys that activate the different character sets are a subset of the video enhancement function key labels. You access these labels by pressing:

This keystroke sequence displays the following labels:

By pressing f2 or f3 , you may select either the math set or the line-drawing set to be the "active" character set. (The terminal determines what symbol to display depending upon which character set is active.)

When you activate either of these sets, characters from that set propagate through the line until:

- they encounter a video enhancement that currently exists within that line
- you select another character set to be the active set
- the current line ends

Base Character Set

The base character set consists of the characters that you normally access when you press the alphanumeric keys. The standard keyboard generates the USASCII character set. For the national languages, the keyboard option determines which characters the base set contains.

The base set is usually the active set. However, if you have previously activated another set, you can return to the base set by pressing:

USER SYSTEM		:	displays the User System label set
f5	(enhance video)	:	displays the video enhancement label set.
f8	(etc.)	:	displays the alternate character set labels.
f1	(CHANGE TO BASE)	:	activates the base set so that subsequent keystrokes display the corresponding symbols from this set.

Line-Drawing Set

The line-drawing set contains various line segments. You can combine these segments to construct complex data entry forms (see figure 5-1).

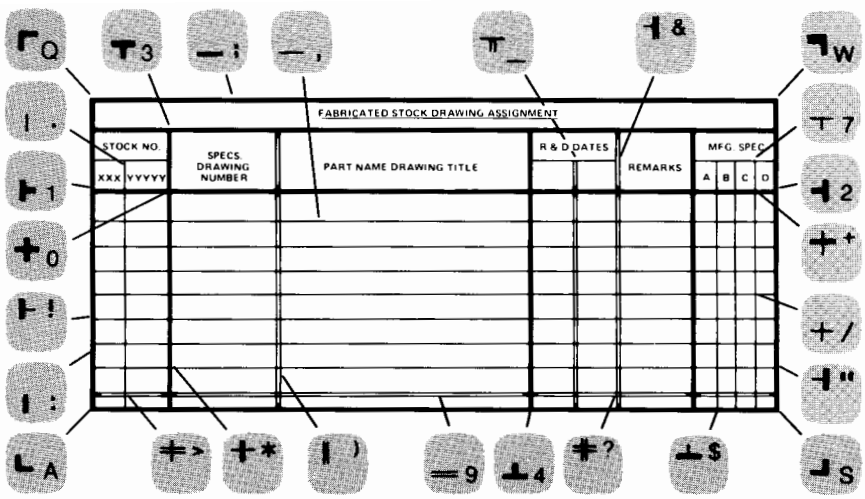


Figure 5-1. Sample Data Entry Form

Figure 5-2 shows the keycap location for each line segment character. To access these characters, you must make the line-drawing set the active character set. To do so, sequentially press the following keys:

USER SYSTEM		:	displays the User System label set.
f5	(enhance video)	:	displays the video enhancement label set.
f8	(etc.)	:	displays the alternate character set labels.
f3	(CHANGE TO LINE)	:	activates the line-drawing set so that subsequent keystrokes display the corresponding symbols from this set.

To access these symbols, you must select the math set to be the active set. You accomplish this by sequentially pressing the following keys:

USER SYSTEM		:	displays the User System label set.
f5	(enhance video)	:	displays the video enhancement label set.
f8	(etc.)	:	displays the alternate character set labels.
f2	(CHANGE TO MATH)	:	activates the math set so that subsequent keystrokes display the corresponding symbols from this set.

Example: This example demonstrates how you may "mix" characters from two different character sets. The task is to display the basic trigonometric identity ``$\sin^2\theta + \cos^2\theta = 1$''

Step 1. Display the function key labels that select the alternate character sets by pressing:

USER SYSTEM f5 enhance video f8 etc.

This displays the following labels:

Step 2. At the beginning of a new line, press the following keys:

S , I , N

NOTE

Although the letters are shown as being capitalized, the case of the letters is immaterial. Therefore, you needn't press the SHIFT key. Whenever you MUST hold the SHIFT key to display the correct symbol, the text explicitly shows both keys.

Step 3. Activate the Math character set by pressing f2 . Then press these keys:

2 , R

Step 4. Return to the base character set by pressing f1 . Then press these keys:

BACK SPACE , SHIFT + , BACK SPACE , C , O , S

Step 5. Activate the Math character set by pressing f2 . Then press:

2 R

Step 6. To finish the equation, return to the base set by pressing f1 and enter:

BACK SPACE = , BACK SPACE , 1

Extended Characters Mode

The unit normally restricts your choice of alphanumeric characters to those symbols contained within your base character set. By pressing the [redacted] key, however, you may generate all the standard characters from any of the national languages.

To use Extended Characters, you must configure the terminal for "8-bit" operation. After you have properly configured your unit, you enter Extended Characters mode by pressing and holding the [redacted] key. Now, when you press a key, the unit uses the characters on the left side of the keycaps as shown in figure 5-4. (This assumes USASCII is the base character set.) For example, if you tried printing a capital "W" (SHIFT W), the screen displays an "æ". Pressing 6 prints "Ñ", while pressing SHIFT [redacted] (the shifted symbol on the "6" key) prints "β". Pressing a key combination that has no left-hand symbol (for example, a lowercase "w" or a "per cent" sign) prints a blank character.

To leave Extended Characters mode and return the keyboard to its normal operation, simply release the [redacted] key.

Format Mode

Defining Fields

With the line-drawing set, you can physically draw a form. However, you can also create a form by logically defining its fields. You specify field definitions through the Field Definition function key labels. To display these labels, press:

This keystroke sequence displays the following set of labels:

Function key f2 starts an "Unprotected" field; f3 starts a "transmit-only" field. All areas on the screen that are not one of these two fields become "Protected" fields. These three fields are the only ones the terminal recognizes when in Format mode.

When you press f2 or f3, the cursor's position determines where the field begins. One of three conditions (whichever occurs first) ends the field. These conditions are:

- a "stop field" marker is encountered.
- another field begins.
- the current line ends, unless the first character position of the next line redefines the same field. In this case, the field continues across line boundaries.

Protected Fields. When the terminal is in Format mode, it safeguards any information that occurs in a protected field. You cannot enter data into these fields. If you press a character key, the cursor advances to the next unprotected field before the terminal accepts the character. All areas that you do not explicitly define as either unprotected or transmit-only fields become protected fields.

Unprotected Fields. These fields accept data. The terminal positions the cursor to the next unprotected field under these conditions:

- you request the next field by pressing the TAB key.
- you have entered a character in the last character position of the current field.
- you attempt to enter data in a protected area.

Transmit-Only Fields. The information in these fields rarely changes. Each time you transmit data to the computer, the terminal sends this information, but it also "retains" a copy on the terminal screen in preparation for the next transfer. Thus, you need not fill in these fields on every form. (Common examples might be the day's date or the identification number of the keyboard operator who is filling out the forms.) Most cursor movements (such as those "automatically" generated by the terminal or your pressing the TAB key) skip transmit-only fields. To change the entry in a transmit-only field, you must move the cursor to the field by using the cursor-positioning keys.

Data Checking

Your terminal can test incoming data to verify that it is either alphabetic or numeric. If an input character fails the test, the terminal gives a warning "beep", displays an error message indicating what type of data this field accepts, and locks the keyboard. Pressing the RETURN key clears the error condition. You may then enter the correct information.

To have the terminal perform edit checks, you must define fields with edit-checking capabilities. This also involves displaying the Define Fields set of labels.

You display the Field Definition labels by pressing:

This keystroke sequence displays the following set of labels:

Pressing f5 allows a field to accept any character.
Pressing f6 defines a field as being "alphabetic".
Pressing f7 defines a field as being "numeric".

If you omit specifying an edit check, an unprotected field accepts any character.

All Chars. These fields accept any keyboard character.

Only Alpha. Alphabetic fields only accept uppercase letters ("A" through "Z"), lowercase letters ("a" through "z"), and the space character.

Only Numeric. Numeric fields only accept the decimal digits ("0" through "9"), the space character, the plus sign "+", the minus sign "−", and the decimal point character (either period "." or comma ",").

Entering Format Mode

By pressing f8 (FORMAT MODE), you place the terminal in Format mode. When the terminal is in Format mode, all character positions on the screen are protected except those fields that you have specifically defined as "unprotected" or "transmit-only". The terminal prevents you from entering data into protected fields. If you try, the cursor automatically moves to the next unprotected field before the terminal accepts the character. When an unprotected field becomes full, the cursor automatically moves to the next unprotected field. You must use the cursor-positioning keys to access transmit-only fields. Pressing the Tab key advances the cursor to the next unprotected field.

Chapter 6

USING YOUR TERMINAL IN GRAPHICS APPLICATIONS

Introducing Graphics Mode

As an option, your terminal can support graphics applications. In such cases, the terminal maintains distinct memories for alphanumeric and graphics data. It provides separate control of each allowing you to display the contents of either memory alone or both simultaneously. Through the "graphics" keypad, you have limited control over the terminal's graphics features. Escape sequences provide complete control. This section describes the graphics keys and summarizes some of the graphics capabilities. The Reference Manual describes escape-sequence programming.

Graphics Keypad

With the graphics option, the numeric keypad assumes an extended role. A plastic template overlays the numeric keypad and shows the various keys' operation when they are functioning in graphics mode. Where the template lacks a label, the corresponding key has no extended function. For example, both tab-positioning keys are inoperable in graphics mode.

Figure 6-1 depicts the correspondence between the graphics keys and the numeric keypad.

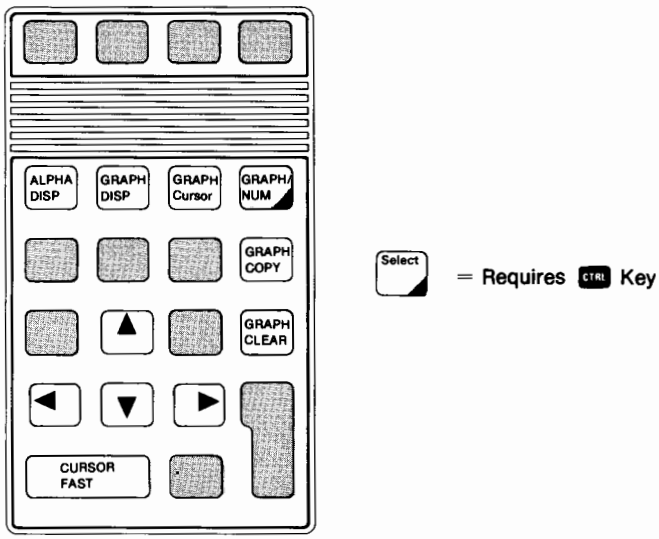


Figure 6-1. Graphics Operations Of The Numeric Keypad

The terminal stores the keypad's operating state in non-volatile memory. Thus, when you power the terminal on (or do a hard reset), the terminal "remembers" the mode in which you last left the keypad.

The Status Line shows the keypad's current operating state. You change the keypad to graphics operation by simultaneously pressing the Shift and "Minus" keys. When set for graphics operation, you return the keypad to numeric operation by again pressing the Shift and "Minus" keys. That is, these two keys switch the keypad between both modes of operation.

Table 6-1 lists the function for the graphics keys when the keypad is in graphics mode.

Table 6-1. Graphics Keypad Functions

KEY	FUNCTION
G. DISPLAY	A toggle switch that alternately turns the graphics display off then on. The graphics display views the contents—both text and vectors—of graphics memory.
G. CURSOR	A toggle switch that alternately turns the graphics cursor off then on. However, to view the cursor, the graphics display must be on.
SHIFT - NUM PAD	A toggle switch that alternates the numeric keypad between graphic operations and its normal numeric state. The Status Line indicates the keypad's current mode of operation.
ALPHA DSPLY	A toggle switch that alternately turns the alphanumeric display off then on.
G. CLEAR	Pressing this key clears the contents of graphics memory.
GRAPH COPY	Pressing this key copies the contents of graphics memory to the selected destination device(s).
↑, ↓, ←, and →	Pressing these keys moves the graphics cursor in the direction indicated by the symbol shown on the key. Simultaneously pressing two orthogonal keys moves the cursor in a diagonal direction. (An example of orthogonal keys is the ↓ and → keys.)
CURSOR FAST	Simultaneously pressing this key with any of the four cursor movement keys speeds cursor movement.

Graphics Control from a Program

The Reference Manual gives complete instructions on programming the terminal for graphics operations. This includes drawing vectors since no keys provide this function.

Computer Museum

Graphics Text Mode

Graphics memory may contain vectors, graphics characters, or both. You may enter any displayable character from the terminal's base character set into graphics memory. (You may also enter the special characters for each of the local languages.) You specify whether the characters should be upright ("normal" print) or slanted ("italicized") and choose between eight character sizes. The smallest size is the default selection. See figure 6-2.

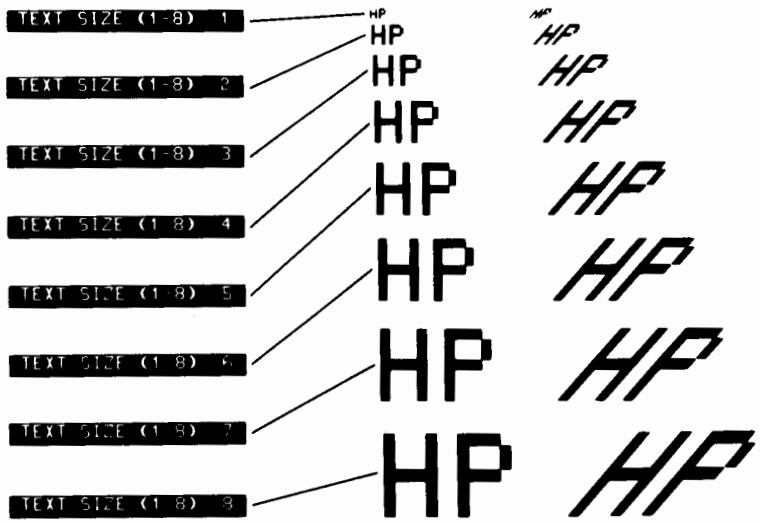


Figure 6-2. Graphics Text Sizes

Additionally, you can display lines of text at four different angles (in 90-degree increments.) See figure 6-3. The Reference Manual provides further information on both text size and slant control and also information on graphics text origin/justification.

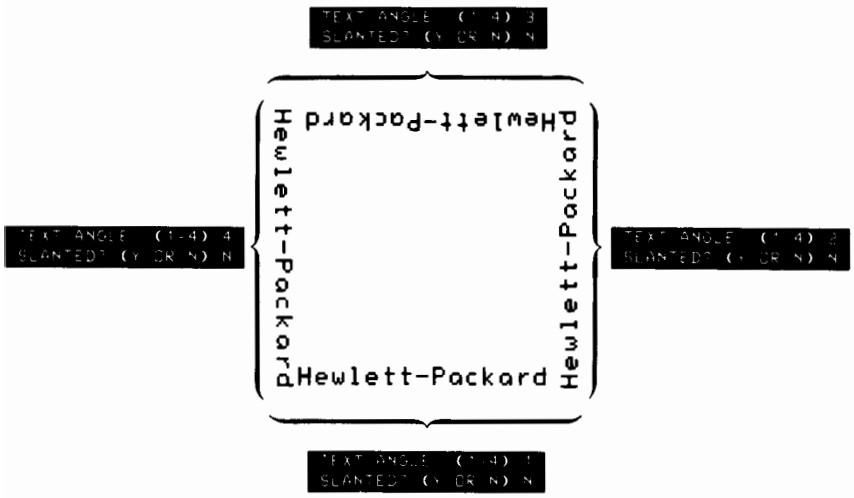


Figure 6-3. Graphics Text Orientation

Display Control

You can manipulate the graphics and alphanumeric displays so they are displayed separately or simultaneously.

Remember: Turning a video display window on or off differs radically from clearing the respective workspace. (See following paragraphs.)

Graphics/Alphanumeric Video On/Off

You turn the graphics display on and off by pressing the **G. DISPLAY** key. You turn the alphanumeric display on and off by pressing the **ALPHA DSPLY** key.

The terminal maintains the data for both displays in separate memory areas. Under no circumstance is information lost when you turn off the video for either display.

Erasing the Graphics Display

As one keystroke (CLEAR DSPLY) clears the alphanumeric workspace, you may also clear graphics memory with a single keystroke.

Pressing the G. CLEAR key clears graphics memory. This erases the entire graphics workspace (including any graphics text). Once erased, the data is lost. You cannot recover it.

Cursor Control

Alphanumeric Cursor

The alphanumeric cursor is tied to the alphanumeric display. Using the ALPHA DSPLY key to turn the alphanumeric video on and off also turns the alphanumeric cursor on and off. (However, through an escape sequence, you may turn the cursor on and off independently from the alphanumeric display. See the Reference Manual for details.)

Graphics Cursor

You can turn the graphics cursor on and off by pressing the G. CURSOR key. The cursor is visible, however, only when graphics video is turned on. The arrows on the graphics/numeric keypad move the cursor to any position on the display window. Simultaneously pressing the CURSOR FAST key and the cursor keys increases the speed at which the cursor travels. Simultaneously pressing two cursor arrow keys that occur at right angles to each other moves the cursor diagonally.

Copying Graphics Data

You can copy the contents of graphics memory to a selected destination device. You select the destination device by pressing:

After the "To Device" set of labels appears, you can enable an external device, the integral printer, or both.

The HP-IB interface provides Decision Support Graphics (DSG) compatibility for the following devices:

- printers: 2602, 2631, 2671, and 9876
- plotters: 7225, 7245, 9872, and the 7580

Pressing the G. COPY key initiates the data transfer. You can cancel the operation by pressing the RETURN key. Otherwise, the terminal copies the entire contents of graphics memory to the destination device.

Compatibility Mode

Compatibility mode enables your terminal to use graphics packages designed for terminals that have more addressable points on their display screen. Tek 4010 mode supports applications designed for screens with twice the linear dimensions of your screen (four times the area). See figure 6-4. Tek 4014 mode supports applications designed for screens with four times the linear dimensions of your screen (16 times the area). While the following discussion pertains to Tek 4010, similar concepts apply to Tek 4014.

Your terminal accomplishes Compatibility mode in one of two ways. In Scaled mode, the terminal scales the incoming data so the entire image fits onto the display screen. In Unscaled mode, the terminal only displays a portion of the entire image. However, through movements of the viewing window, you can display the different portions of the image.

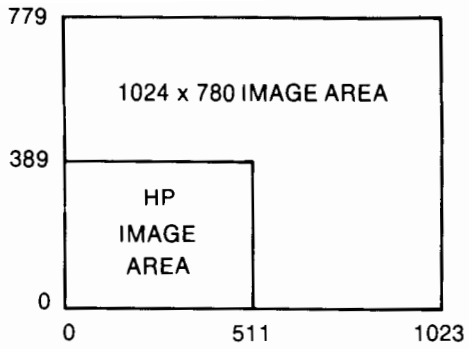


Figure 6-4. Display Area Comparison

Turning Compatibility Mode On and Off

You select Compatibility mode through the Terminal Configuration menu. Setting the `Graph Compat` field to either `Scaled`, `Scl 4014`, `Uns`, or `Unscaled 4014` enables Compatibility mode. Compatibility mode is disabled when you set the `Graph Compat` field to `"Off"`. (This is the default setting.) To change the field entry, display the Terminal Configuration menu by pressing:

USER SYSTEM f8 config keys f5 terminal config

Once the menu appears, use the TAB key to position the cursor in the `Graph Compat` field. Then use the `NEXT CHOICE` or `PREVIOUS CHOICE` keys to choose between `"Scaled"`, `"Scl 4014"`, `"Unscaled"`, or `"Uns 4014"`.

Scaled Mode

Scaled mode halves a 1024 X 780 image so the image fits onto your terminal's screen. (Figure 6-5 depicts this scaling technique.) Characters are also scaled.

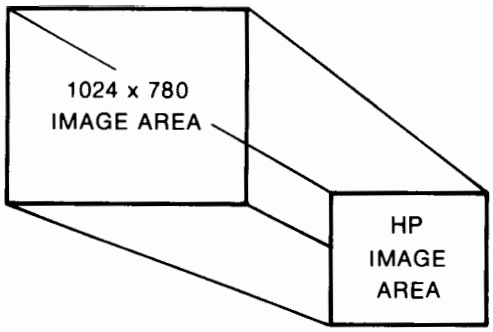


Figure 6-5. 1024 X 780 Image Area Scaled To Fit Your Terminal's Image Area

Setting the terminal for Scaled mode forces graphics text mode. Furthermore, the terminal fixes the text size to "1" and the angle of the characters to "0" to accommodate 35 lines of text.

Unscaled Mode

Unscaled mode displays a 512 X 390 subset of a 1024 X 780 display. The terminal "clips" any vectors going off the screen. This mode allows full use of the terminal's resolution but requires you to modify scaling statements in the software package if you want to display the complete image on the terminal screen.

By moving the relocatable origin, you can change which subset of the image the terminal displays. The terminal subtracts the relocatable origin from all incoming coordinates. If the origin is set to 0,0 (the default setting), the terminal displays the area between x = 0 to 511, and y = 0 to 389 (figure 6-6). Setting the origin to 0,390 covers the area between x = 0 to 511, and y = 390 to 779. To display an area larger than 512 X 390 requires your changing the program's scaling statements.

If you enter alphanumeric characters into graphics memory, the terminal uses the currently selected size and angle. You may subsequently change these values by using escape sequences. This gives you maximum flexibility for writing labels. (See the Reference Manual for details on these features.)

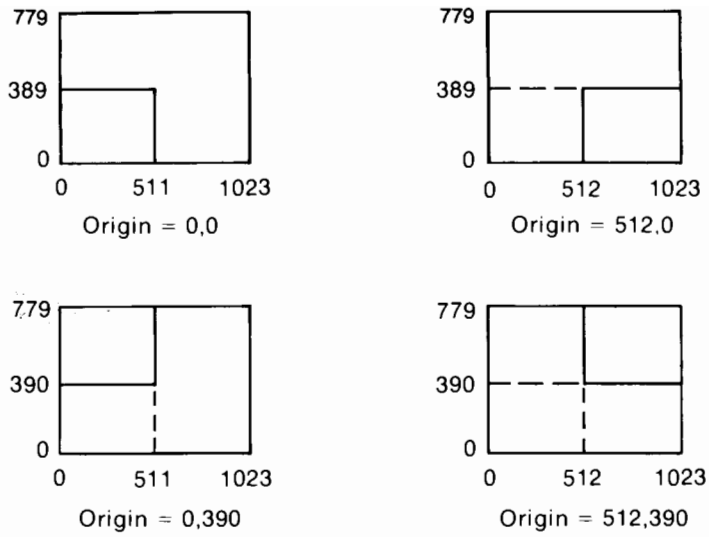


Figure 6-6. Using The Relocatable Origin To Cover The 1024 X 780 Display

In summary, you turn Compatibility mode on by selecting either a "scaled" or "unscaled" mode. When Graphics Text mode is off, the terminal stores all text into alphanumeric memory. When Graphics Text mode is on, the terminal stores alphanumeric characters in graphics memory. In Unscaled mode, you may vary the size and angle of characters. In Scaled mode, the terminal fixes both of these values.

Chapter 7

USING YOUR TERMINAL WITH A COMPUTER

Introduction

Your terminal may be directly connected to a computer system through a datacomm line, or indirectly connected to the system through a modem. In either case, the terminal and computer must be in complete agreement concerning the format of all data passed between them. To ensure that this occurs, you must configure the datacomm port and select the proper operating modes.

As most configuration information lies beyond the scope of this manual, this section stresses the selection of operating modes. In all likelihood, someone else has already made the proper configuration selections for you. If you ever require this information, the Reference Manual provides complete details.

If a Modem Is Used

Your installation should have a standard procedure to follow when modems are being used. This may consist of turning on the modem, making proper modem speed and parity settings, and dialing a telephone number.

Selecting Operating Modes

The terminal has several operating modes that interface with a computer. Subsequent paragraphs discuss the following modes: Remote, Block or Character, Line Modify, Modify All, Auto Lf, and Caps Lock.

You access Caps Lock through the Terminal Configuration menu. You access the remaining modes through the Modes function key labels.

The terminal must be in Remote mode to communicate with the computer. In Remote mode, it can operate in either Character mode or Block mode. While in Character mode, however, you may select two forms of Block mode (Line Modify or Modify All) for the retransmission of data. Caps Lock mode "forces" teletype compatibility. Depending upon the application, Auto Lf may be disabled when operating in Remote mode.

Remote Mode

Remote Mode enables communication between your terminal and its host computer. To select Remote mode, press the USER SYSTEM key and select `modes` to display the Modes labels. Then, if no asterisk appears in the `REMOTE MODE` label, press f4 to activate Remote mode.

While operating in Remote mode, the terminal may send data to the computer character-by-character or in blocks. When the computer transmits data to the terminal, the terminal normally displays this information upon the screen. (See "RECEIVING DATA FROM THE COMPUTER" later in this section for further information.)

Auto Lf Mode

Auto linefeed appends a linefeed character to every Return character you enter from the keyboard.

When operating in Character mode, this is probably extraneous information. Therefore, under these circumstances, you should disable automatic linefeed. To determine the state of Auto Linefeed mode, press the USER SYSTEM key and select `modes` to display the Modes labels. If an asterisk indicates Auto Lf is active, press f8 to disable it. (The asterisk disappears from the label.)

Caps Lock Mode

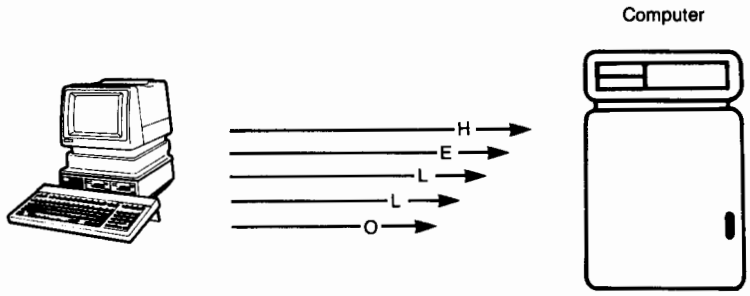
Some computer systems only accept "teletype-compatible" codes. If your terminal is connected to such a system, you should select Caps Lock mode in the Terminal Configuration menu. (See the Reference Manual for details on setting this field.)

Once Caps Lock mode becomes active, the terminal generates only teletype-compatible codes. The terminal converts unshifted alphabetic keys ("a"–"z") to their uppercase equivalents. It maps the "{" and "}" keys into the "[" and "]" characters, and the "|" key to the "\" character. The terminal does not generate codes for either the "~" or "`" keys. Pressing either of these keys rings the terminal's bell.

Caps Lock mode differs from CAPS mode. You enable CAPS mode by pressing the CAPS key. When CAPS mode is active, all unshifted alphabetic keys generate uppercase letters and all shifted alphabetic keys generate lowercase letters. CAPS mode is a typing convenience and only affects the 26 alphabetic keys.

Character Mode

When the terminal is operating in Character mode, it sends characters to the computer as you type them. This allows constant interaction between you and the computer. The terminal operates in Character mode unless you explicitly select Block mode.

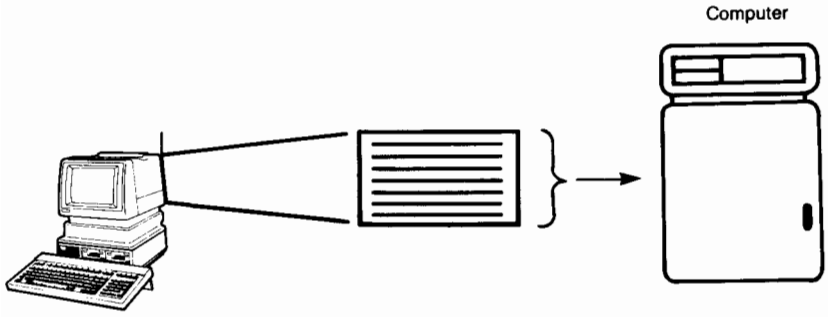


Block Mode

The state of the BLOCK MODE function key label determines whether the terminal sends data to the computer character-by-character or in blocks of characters.

To enter Block mode, press the USER SYSTEM key and select modes to display the Modes labels. If no asterisk appears in the BLOCK MODE label, the terminal is in Character mode. To select Block mode, press f3. (The asterisk in the BLOCK MODE label indicates that Block mode is active.) Certain Block mode applications may require your selecting Auto Lf. When this is necessary, press f8, as required, to display an asterisk in the AUTO LF label.

In Block mode, the terminal stores the characters as you enter them. This allows you to edit your data before transmission. Pressing the ENTER key sends the selected block of data to the computer. Two block sizes are possible: line or page. You specify the block size in the Terminal Configuration menu



Modify Modes

While operating in Character mode, you can enter two Modify modes to edit data before retransmitting it to the computer. These modes are Line Modify and Modify All. For example, if you send an erroneous string of data to the computer and the computer returns an error message, you can enter Line Modify mode, correct the error using the keyboard edit keys, then press the RETURN or ENTER key to retransmit the string.

To enter Line Modify mode, press:

```
modes    f1
         LINE
         MODIFY
```

Line Modify mode ends when you press the RETURN or ENTER key.

To enter Modify All mode, press:

```
modes    f2
         MODIFY
           ALL
```

Modify All mode resembles Line Modify except Modify All remains active after you press the ENTER or RETURN key. An astrisk appears in the `MODIFY ALL` label when the mode is active. Pressing the f2 key while in Modify All mode ends the mode and removes the asterisk from the label.

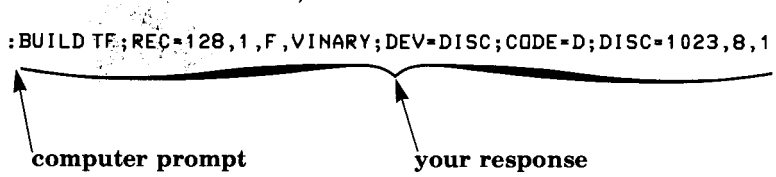
Using Start Column. The Start Column feature only applies in Line Modify or Modify All modes. Provided certain conditions are met, the terminal uses this value when it retransmits data to the computer. The terminal ignores any characters (such as computer prompts) that occur to the left of the Start Column.

Under most circumstances, a start-of-text pointer marks the first character that is typed within a line of text. The terminal sets the logical start-of-text pointer if these conditions exist:

- When it receives the data, the terminal is in Remote mode, but not operating in Block or Format mode.
- The data comes from the keyboard, not from the computer.
- When the line is entered, it represents the last-used line in the workspace.

However, when the terminal fails to set the logical start-of-text pointer because improper conditions exist, transmission begins from the Start Column value.

Example: Assume the computer prompts with a colon (:) and you enter a BUILD command, as follows:



The terminal establishes the logical start-of-text pointer when you enter the "B" in "BUILD".

Upon transmitting the command, the computer returns the error message:

```
EXPECTED "ASCII" OR "BINARY".   (CIERR 274)
```

Realizing that you misspelled "BINARY", you enter Line Modify mode, position the cursor under the "V" in "VINARY", and enter a "B". When you press the RETURN key, the terminal transmits the line, beginning from the second character position. It does not transmit the prompt character to the computer.

Receiving Data from the Computer

As you have seen, you can assert considerable control over the way the terminal transmits data to the computer. The following paragraphs describe your ways of controlling data reception.

To the Display

Once you have configured the terminal for Remote operation, no futher action is necessary to receive data transmissions. Unless directed to do differently, the computer always sends its data to the display screen.

To a Destination Device

You can set the terminal to perform "on-line" data logging. Under these circumstances, the terminal not only displays the data upon the screen but also automatically routes any data it receives from the computer to a destination device. Section ? describes logging data to an external printer while Section ? describes logging data to the integral printer.

Record Mode

You enable Record mode through the Device Modes function key labels.

To display the Device Modes labels, press:

If no asterisk appears in the RECORD MODE label, pressing f2 enables Record mode. You can end Record mode by pressing f2 again, or by performing a soft or hard reset. Except for these keys, the Break key, and the Return key (the latter with special restrictions), selecting Record mode disables the keyboard.

The operation of Record mode depends upon the Remote mode setting. In Local mode, pressing the RECORD MODE function key sends the contents of workspace memory to the selected destination device(s). If you have omitted selecting a destination device, the terminal inhibits the transmission of the data and displays an error message.

In Remote mode, pressing the RECORD MODE function key transfers data directly from the datacomm line to the selected destination device(s).

Example: To demonstrate Record mode, this example prints a listing of your files to a selected destination device.

The HP 3000 command "LISTF,2" generates a detailed listing of your files. The computer responds when you press the RETURN key. Therefore, to utilize Record mode requires your selecting Record mode after you type the command but before you press the RETURN key.

Step 1. To the computer prompt, type the command:

```
LISTF,2
```

Step 2. Display the Device Modes labels by pressing:

Step 3. Activate Record mode by pressing f2 . Hereafter, the only valid keystrokes are the Break key (to signal the host), the "f2" function key (to cancel Record mode), the keys necessary to generate a soft reset or a hard reset, or the Return key.

Step 4. Press the RETURN key. This "enters" the command and the computer sends the requested data to both the screen and the selected destination device.

NOTE

After you press the RETURN key, the terminal disables subsequent use of this key until you cancel Record mode.

Chapter 8

USING YOUR TERMINAL WITH AN EXTERNAL DEVICE

Introduction

You can copy both alphanumeric and graphic data from the display to a selected destination device. This section describes copying alphanumeric data to an external printer. Section 9 describes copying alphanumeric data to the integral printer. Appendix A covers graphics copy operations.

NOTE

You must ensure that the "straps" on the external printer match the settings in the External Device Configuration menu. Consult the HP 150 Owner's Guide for the necessary details.

Copying Alphanumeric Data

You may select between two methods for copying alphanumeric data. Data logging copies data while it is being entered. Screen copy operations copy data after data entry is complete. The procedure is similar for both methods.

Selecting an External Printer

In any copy operation, the first task is selecting a destination device.

You select a destination device by pressing:

This keystroke sequence displays the following set of labels:

Pressing f2 (SERIAL PRINTER) selects a printer with an RS-232-C interface; whereas pressing f5 (HP-IB PRINTER) selects a printer connected to an alternate peripheral interface. The HP-IB peripheral interface supports the following printers: 2602, 2631, 2671, and the 9876.

Data Logging

When you set the terminal to perform data logging, the terminal automatically routes data to the external printer. Two methods of data logging are available: top logging and bottom logging.

In top logging, the terminal copies the top line in display memory to the printer when the line is forced from the workspace by lines being added at the bottom. In bottom logging, the terminal copies the cursor's current line to the printer whenever the cursor leaves that line and begins the next. Thus, bottom logging progressively copies the entire workspace. If you have selected top logging, any data not forced from the workspace remains in display memory and is left uncopied to the printer.

To perform either top or bottom logging, follow this procedure:

Step 1. Select the external printer as the destination device. (See discussion in previous paragraph on "Selecting an External Printer".)

Step 2. After selecting the destination device(s), you must access the Device Modes labels to enable data logging. If the "To" Device labels are displayed, you should press f1 (`device control`). This returns the labels to their previous values:

f1	f2	f3	f4	f5	f6	f7	f8
device modes		''to'' devices	ADVANCE PAGE	ADVANCE LINE	COPY ALL	COPY PAGE	COPY LINE

Alternatively, you may press USER SYSTEM, f1 (`device control`) to access these same values, regardless of the initial label set.

Step 3. Press f1 to display the Device Modes label set:

f1	f2	f3	f4	f5	f6	f7	f8
device control	RECORD MODE	LOG BOTTOM	LOG TOP	EXPAND PRINT	COMPRESS PRINT	REPORT PRINT	METRIC PRINT

At this level, pressing f3 enables bottom logging. (If top logging had been active, enabling bottom logging cancels the top logging selection.)

Alternatively, pressing f4 enables top logging. (If bottom logging were active, enabling top logging cancels the bottom logging selection.)

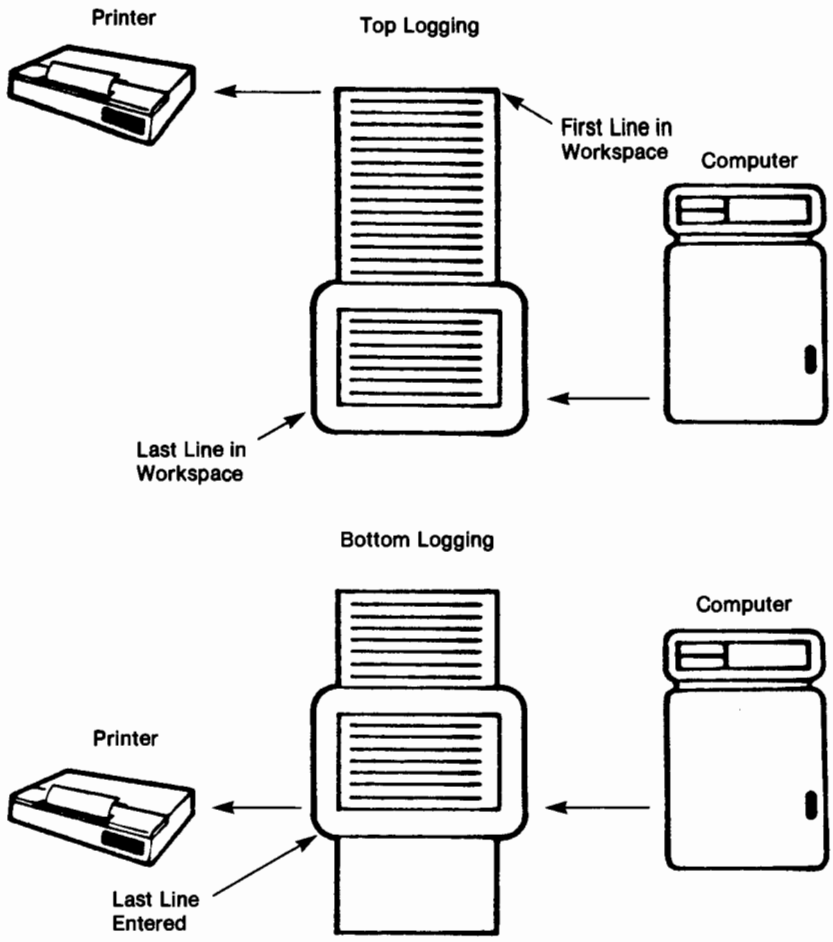


Figure 8-1. Data Logging

This completes the set-up procedure for data logging. You then enter data, as normal. The terminal automatically routes the information to the selected destination device(s).

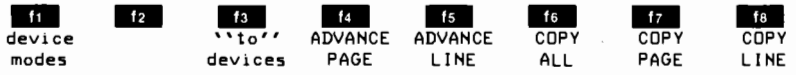
To disengage the printer after you have completed the data entry task, press f3 (LOG BOTTOM) or f4 (LOG TOP) to disable the mode. (The asterisk disappears from the corresponding label.)

Screen Copy

In many instances, you want to copy data that currently appears on the screen. (Also, after a top logging operation, you may want to copy the remainder of the workspace to obtain a complete listing of the file.) The keyboard provides two methods: (1) using the function key labels or (2) pressing the ENTER key.

Using the Function Keys. After selecting a destination device, you must return to the Device Control set of labels to initiate screen copy operations.

If the "To Device" set of labels are visible, press f1 (`device control`) to return the labels to the Device Control values:



Alternatively, if another set of labels are displayed, you may access the Device Control labels by pressing USER SYSTEM, f1 (`device control`).

If you wish the printer to skip a line before printing begins, you can press f5 (`ADVANCE LINE`). Likewise, if you want to skip the paper to the top of the next page (a "form feed"), press f4 (`ADVANCE PAGE`).

Next, determine the amount of information you want printed, then press f6 (`COPY ALL`), f7 (`COPY PAGE`), or f8 (`COPY LINE`) to initiate the copy operation.

These operations accomplish the following:

- Copy All copies all the data from the cursor's current line to the end of the workspace. (To copy the entire workspace, you must "home" the cursor before pressing f6.)
- Copy Page copies all the data from the cursor's current line to the end of the viewing window.
- Copy Line copies the line that contains the cursor.

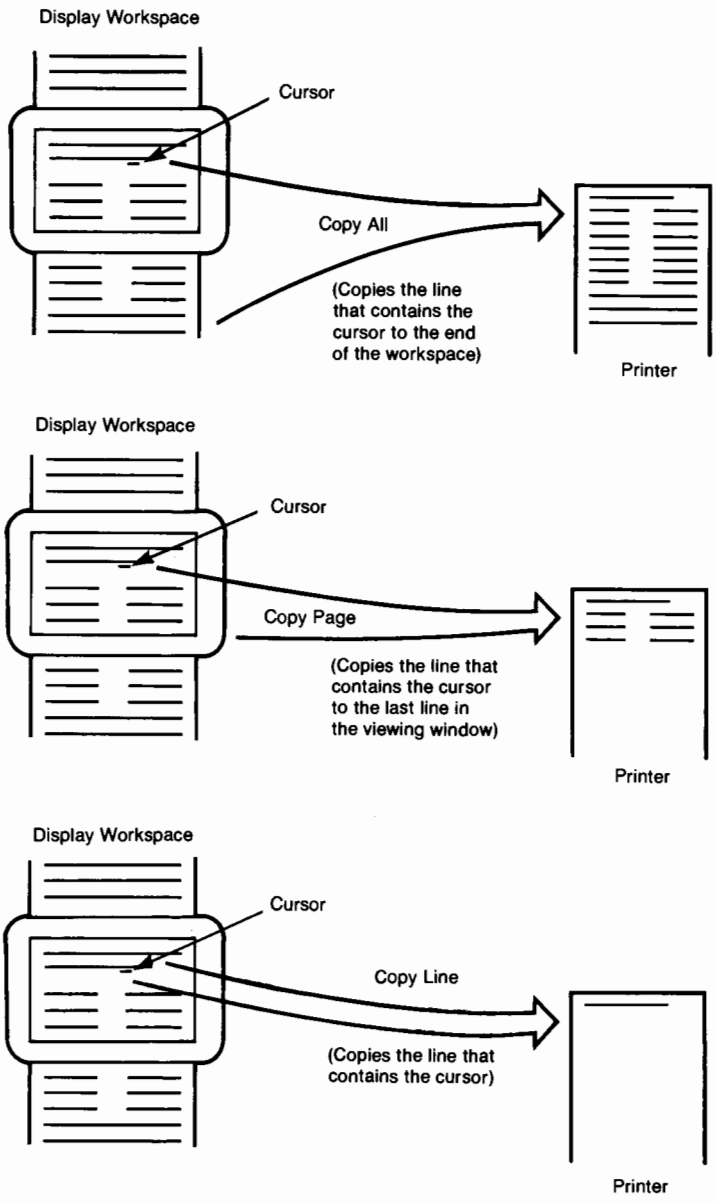


Figure 8-2. Copy All, Copy Page, Copy Line

Using the Enter Key. If the terminal is set for Local mode, pressing the ENTER key copies the contents of display memory to the selected destination devices(s).

Chapter 9

USING YOUR TERMINAL WITH THE INTEGRAL PRINTER

Introduction

As an added convenience, your terminal may have the optional integral printer which can provide printed copies of any data that you display on the screen. Additionally, you may direct the computer to print directly to this printer. Although the integral printer can copy graphics data, this section only addresses alphanumeric text. Section 6 covers graphics operations, including the copying of graphic images.

Copying Alphanumeric Data

The terminal provides two methods for copying alphanumeric data. Data logging copies data while you enter it. Screen copy operations copy data after it has been entered. The procedure is similar for both methods.

Selecting the Integral Printer

Your first task is selecting the integral printer as the destination device.

To set the destination device, press:

This keystroke sequence displays the following set of labels:

Pressing f3 (INTERNAL PRINTER) selects the integral printer as the destination device.

Data Logging

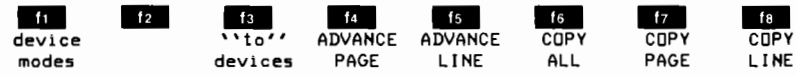
When you set the terminal to perform data logging, the terminal automatically routes data to the integral printer. Two methods of data logging are available: top logging and bottom logging.

In top logging, the terminal copies the top line in display memory to the printer when that line is forced from the workspace by lines being added at the bottom. In bottom logging, the terminal copies the cursor's current line to the printer whenever the cursor leaves that line and begins the next. Thus, bottom logging progressively copies the entire workspace. With top logging, any data remaining in display memory is left uncopied to the printer.

To perform either top or bottom logging, follow this procedure:

Step 1. Select the integral printer as the destination device. (See discussion in previous paragraph on selecting the integral printer.)

Step 2. After selecting the destination device, you must access the Device Modes labels to enable data logging. If the "To" Device labels are displayed, you should press f1 (device control). This returns the labels to their previous values:



Alternatively, you may press USER SYSTEM, f1 (device control) to access these same values, regardless of the initial label set.

Step 3. Press f1 to display the Device Modes label set:

f1	f2	f3	f4	f5	f6	f2	f8
device control	RECORD MODE	LOG BOTTOM	LOG TOP	EXPAND PRINT	COMPRESS PRINT	REPORT PRINT	METRIC PRINT

At this level, pressing f3 enables bottom logging. (If top logging had been active, enabling bottom logging cancels the top logging selection.)

Alternatively, pressing f4 enables top logging. (If bottom logging were active, enabling top logging cancels the bottom logging selection.)

This completes the set-up procedure for data logging. You then enter data, as normal. The terminal automatically routes the information to the integral printer.

To disengage the printer after you have completed the data entry task, press f3 (LOG BOTTOM) or f4 (LOG TOP) to disable the mode. The asterisk disappears from the corresponding label.

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Screen Copy

You may select between two screen copy operations. By using the function keys, you have considerable control over both the format and the quantity of data that is transferred. By using the ENTER key, you copy the entire contents of the memory workspace to the integral printer.

Using the Function Keys. After selecting the integral printer as the destination device, you must return to the Device Control set of labels to initiate screen copy operations.

If the "To" Device set of labels is visible, press f1 (device control) to return the labels to the Device Control values:

f1	f2	f3	f4	f5	f6	f2	f8
device modes		''to'' devices	ADVANCE PAGE	ADVANCE LINE	COPY ALL	COPY PAGE	COPY LINE

Alternatively, if another set of labels are displayed, you may access the Device Control labels by pressing USER SYSTEM, f1 (device control).

If you wish to skip a line on the printer before initiating a copy operation, you can press f5 (ADVANCE LINE).

When the integral printer is operating in Report or Metric Print, you can direct the printer to go to the top of the next page by pressing f4 (ADVANCE PAGE). When neither Report Print nor Metric Print is active, the integral printer advances one line if you press this key.

After correctly positioning the paper, you may copy the selected amount of information by pressing f6 (COPY ALL), f7 (COPY PAGE), or f8 (COPY LINE).

Using the Enter Key. If the terminal is set for Local mode, pressing the ENTER key copies the contents of workspace memory to the integral printer. For example, this method can be used to obtain copies of the various configuration menus since it is impossible to access the necessary Device Control labels while a menu is being displayed.

Printer Test and Maintenance Procedures

The following paragraphs describe the printer test and the procedure for changing the roll of printer paper. Additional information on maintaining the printer may be found in the Owner's Manual.

Printer Test

The printer test verifies the proper operation of the integral printer. It does not test external devices. You initiate this test by pressing:

USER SYSTEM f3 service keys f8 INT PRT TEST

How Do I Test the Printer?

To verify that your printer is ready to use, run the system self-test for your internal printer using the following steps:

Step 1. Press AUTO LF twice to display the following function keys:

f1	f2	f3	f4	f5	f6	f7	f8
device control	margins/ tabs/col	service keys	modes	enhance video	define fields	set time	config keys

Step 2. Press `service keys` to display the following function keys:

f1	f2	f3	f4	f5	f6	f7	f8
POWER ON TEST		TOUCHSCN ALGNMNT	MONITOR MODE	SYSTEM TEST	IDENTIFY ROMS	DATACOMM TEST	INT PRT TEST

NOTE

`INT PRT TEST` only appears on the screen after you install the printer.

Step 3. Press `INT PRT TEST` to print the following self-test example:

```
0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ
[\]^_`abcdefghijklmnopqrstuvwxyz{|}~■
PROM CODE DATE: 07/15/83
```

Figure 9-1. Printer Test Pattern

When the test completes successfully, the printer prints the test pattern illustrated in figure 9-1. If the test fails, the terminal displays the message: `INTERNAL PRINTER ERROR, PRESS RETURN TO CLEAR.` This could mean the printer is out of paper, or the test was unsuccessful. In the latter case, contact your nearest Hewlett-Packard sales and service center for help. Refer to the Owner's Manual for additional information.

Maintaining the Integral Printer

Printer Paper. The integral printer uses a special form of thermal printing paper. You may purchase this paper through HP's Computer Supplies Operation (CSO) as follows:

Part Number 92160	A —blue ink
Part Number 92160	B —black ink
Part Number 92160	C —black ink with page perforations
Part Number 92160	M —blue ink with page perforations and fanfolded at 11" lengths
Part Number 92160	N —black ink with page perforations and fanfolded at 11" lengths

---

CAUTION

We recommend that you use only HP Thermal Paper in your integral printer. Using other paper can shorten the life of the print head and reduce the print quality. Also, if you have an HP Warranty Service Contract, you must use HP Thermal Paper to keep the contract valid.

Loading Printer Paper. To load the printer paper, follow the instructions given in Chapter 7 of the Owner's Manual.

Chapter 10

IN CASE OF DIFFICULTY

Introduction

The HP 150 does not require preventive maintenance. Simple procedures for cleaning, adjusting the display, and maintaining the backup battery are given in the Owner's Manual. You may, however, observe a condition such as an error message or improperly executed function. The remainder of this section describes briefly what to do if this occurs.

NOTE

A qualified service engineer should perform all maintenance procedures that require opening this unit. The controls available to you are readily accessible. Under no circumstances should you open your unit to expose its internal circuitry.

Error Messages

At certain times, error messages may be displayed across the bottom of the screen. Some errors diagnose wrong keyboard input. Other errors indicate improper configuration settings. A few errors show a unit malfunction. Most user-error messages occur when you enter data that the unit was not expecting or request a service that the unit cannot perform. Also, some errors result from incompatible settings in the configuration menus.

The error messages appear on lines 25 and 26; they replace the function key labels. Normally, pressing the RETURN key clears the error message, restores the labels, and unlocks the keyboard. Refer to the Owner's Manual for a list of error messages and recovery procedures.

If your keyboard is locked, you must do a soft reset (by pressing the RESET key) to unlock the keyboard before undertaking the above procedure. (See the following discussion for further details on "soft" and "hard" resets.)

Malfunction at Power On

When you power the unit on, the unit performs a power-on test. The test lasts for approximately 45 seconds. After successful completion of the test, the unit "beeps" once and displays the initial screen image. Figure 10-1 shows the initial screen display.

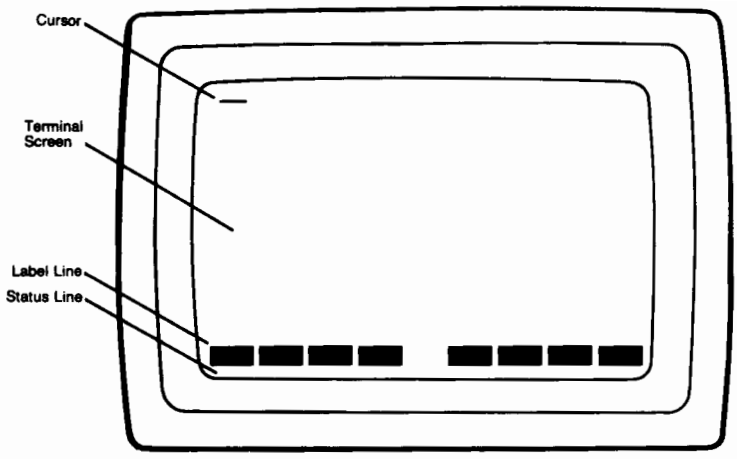


Figure 10.1. Initial HP Screen Display

If the unit fails to reach this state, turn the power switch off and call your nearest Hewlett-Packard sales and service office for help.

"Default Configurations Used"

If the unit displays the message: `Default Configurations Used`, the battery protecting non-volatile memory may have jarred loose. Follow the procedure given in the Owner's Manual for removing, inspecting, then replacing the battery support. Now, turn off the power, then turn it back on. If the same message reappears, perform a System Test.

Trouble-Shooting Procedures

Other problems may arise during normal operation. You should conduct the following procedures (in their presentation order) before calling a service representative.

Configuration Checking

What sometimes appears to be a malfunction may be an incorrect HP 150 computer configuration. When the unit appears to malfunction, before resetting or conducting any tests, you should verify that the parameters in each configuration menu are correct for the task at hand. If you believe configuration settings may be the problem, see the Owner's Manual, or the appropriate person within your installation, for help.

Resetting The Terminal

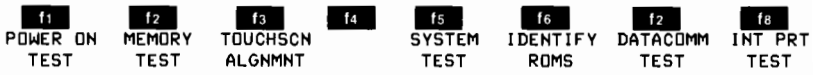
Occassionally, you may find it necessary to reset to clear an error condition. There are two types of reset: a soft reset and a hard reset. Both types stop printer and datacomm operations. Additionally, a hard reset activates the configuration values stored in non-volatile memory and destroys all data in workspace memory. (That is, a hard reset returns to the power-on condition.) For these reasons, you should use discretion when considering a reset operation. Refer to the Owner's Manual for additional information.

Self-Tests

Your unit can test itself. You may select between several tests by displaying the Service Set of function key labels.

You display these labels by pressing:

This keystroke sequence displays the following labels:



If your installation has not programmatically locked the Service Keys, you can initiate a test by pressing the appropriate key. Refer to the Owner's Manual for descriptions of the various tests.

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Appendix A

ESCAPE CODES

Introduction

Escape codes are a device which allows terminal operations to be executed from a program. When a terminal receives an escape code from an executing program, it performs the operation specified in the escape code.

Escape codes consist of most of the operations performable at the terminal using the non-alphanumeric keyboard keys. Such operations include control of the following:

- Cursor location, sensing and selection
- Display and workspaces (next page, insert line, etc)
- Margins and tabs
- Display enhancements
- User-defined keys
- Terminal modes (auto linefeed, local echo, etc)
- Alternate character set selection
- Graphics status request
- Terminal status request
- Terminal self test and reset
- Peripheral devices

All escape codes begin with the escape character "Ec" (produced with the ESC key), followed by the body of the escape code. The body of the code can consist of one or more of the keyboard letters and symbols. Most escape codes can also be performed by entering them from the keyboard. However, if the terminal is in Remote mode, the escape code will be executed only if the host computer is echoing the terminal input (the "Local Echo" field of the Terminal Configuration menu set to No).

NOTE

If the body of an escape code consists of more than one character and ends in a letter, THE TERMINATING LETTER MUST BE CAPITALIZED; otherwise, the escape code will not be recognized as such. For example, `Ec&dA` (not `Ec&da`).

To set configuration parameters using escape codes, you must use an `Ec &k`, `Ec &s`, or `Ec )` sequence, depending upon which parameters you wish to set.

Parameter Name As Shown in Menu	Type of Escape Sequence Used
LocalEcho Caps Lock SPOW	`Ec &k`
XmitFnctn(A) SPOW(B) InhEolWrp(C) Line/Page(D) InhHndShk(G) Inh DC2(H)	`Ec &s`

The `Ec &k` and `Ec &s` sequences alter the particular parameter in the menu, but they do not alter the content of non-volatile memory.

If a configuration menu is displayed on the screen when the escape sequence is received, the sequence is stored in the terminal's datacomm buffer, and is not executed until the menu is cleared from the screen.

As an example of escape code use, you can change the values of the "Local Echo", "Caps Lock", and "SPOW" parameters using an escape sequence of the following form:

LocalEcho = No:	Ec &k 0L
LocalEcho = Yes:	Ec &k 1L
Caps Lock = No:	Ec &k 0C
Caps Lock = Yes:	Ec &k 1C
SPOW	Ec &k 0N
	Ec &k 1N

You may combine these and other Ec &k parameters within one escape sequence. If you do, the final identifier (such as L or C or N) must be uppercase and all preceding identifiers must be lowercase. For example, to set LocalEcho=Yes and Caps Lock=Yes, you could use either of the following escape sequences:

```
Ec &k 1l 1C
Ec &k 1c 1L
```

Terminal Control

KEY(S)			CODE	FUNCTION
	(as used in Local mode)		Ec 0	Copy memory to destination
USER SYSTEM	margins tabs/col	SET TAB	Ec 1	Set tab
USER SYSTEM	margins tabs/col	CLEAR TAB	Ec 2	Clear tab
USER SYSTEM	margins tabs/col	CLR ALL TABS	Ec 3	Clear all tabs
USER SYSTEM	margins tabs/col	LEFT MARGIN	Ec 4	Set left margin
USER SYSTEM	margins tabs/col	RIGHT MARGIN	Ec 5	Set right margin

USER SYSTEM	define fields	ONLY ALPHA	Ec 6	Define alphabetic-only field
USER SYSTEM	define fields	ONLY NUMERIC	Ec 7	Define numeric-only field
USER SYSTEM	define fields	ALL CHARS	Ec 8	Define unrestricted (all characters) field
USER SYSTEM	margins tabs/col	CLR ALL MARGINS	Ec 9	Clear all margins
----			Ec :	Delay one second
^			Ec A	Cursor up
v			Ec B	Cursor down
>			Ec C	Cursor right
<			Ec D	Cursor left
CTRL	SHIFT	RESET	Ec E	Hard reset (power on reset)
SHIFT	^		Ec F	Cursor home down
RETURN	(with Auto LF disabled)		Ec G	Move cursor to left margin
----			Ec H	Cursor home up
TAB			Ec I	Horizontal tab
CLEAR DSPLY			Ec J	Clear display from cursor to end of memory
CLEAR LINE			Ec K	Clear line from cursor to end of line
INS LINE			Ec L	Insert line
DEL LINE			Ec M	Delete line
SHIFT	INS CHAR		Ec N	Start "Insert Character with Wraparound" mode

SHIFT	DEL CHAR		Ec O	Delete character with wraparound
DEL CHAR			Ec P	Delete character (without wraparound)
INS CHAR			Ec Q	Start insert character mode (insert character without wraparound)
INS CHAR			Ec R	End insert character
ROLL ∧			Ec S	Roll up
ROLL ∨			Ec T	Roll down
NEXT PAGE			Ec U	Next page
PREV PAGE			Ec V	Previous page
USER SYSTEM	define fields	FORMAT MODE	Ec W	Format mode on
USER SYSTEM	define fields	FORMAT MODE*	Ec X	Format mode off
USER SYSTEM	modes,	DISPLAY FUNCTNS	Ec Y	Display Functions mode on
USER SYSTEM	modes,	DISPLAY FUNCTNS	Ec Z	Display Functions mode off and Monitor mode off
USER SYSTEM	define fields	START FIELD	Ec [	Start unprotected field
USER SYSTEM	define fields	STOP FIELD	Ec]	End unprotected/ transmit-only field
----			Ec ^	Primary terminal status request
----			Ec _	Write non-displaying terminator
----			Ec `	Sense cursor position (relative)

----			Ec a	Sense cursor position (absolute)
----			Ec b	Unlock keyboard
----			Ec c	Lock keyboard
----			Ec d	Transmit a block of text to computer
----			Ec f	Modem disconnect
RESET			Ec g	Soft reset
↖			Ec h	Cursor home up (ignoring transmit fields)
TAB◄ or	SHIFT	TAB►	Ec i	Backtab
CNTL	MENU		Ec j	Display User Key Menu and begin User Key Definition Mode
CNTL	USER SYSTEM		Ec k	Restore normal display and end User Key Definition Mode
USER SYSTEM	modes ,	MEMORY LOCK	Ec l	Begin Memory Lock mode
USER SYSTEM	modes ,	MEMORY LOCK	Ec m	End Memory Lock mode
f1			Ec p	Default definition for user definable function key f1
f2			Ec q	Default definition for user definable function key f2
f3			Ec r	Default definition for user definable function key f3
f4			Ec s	Default definition for user definable function key f4
f5			Ec t	Default definition for user definable function key f5

f6			Ec u	Default definition for user definable function key f6
f7			Ec v	Default definition for user definable function key f7
f8			Ec w	Default definition for user definable function key f8
USER SYSTEM,	service keys ,	DATACOMM TEST	Ec x	Initiate datacomm self test
USER SYSTEM,	service keys ,	MONITOR MODE	Ec y	Turn on Monitor Mode
USER SYSTEM,	service keys ,	TERMINAL TEST	Ec z	Initiate terminal self test
USER SYSTEM,	define fields ,	START XMIT FLD	Ec {	Start transmit only field
----			Ec |	Erase non-displaying terminator
----			Ec ~	Secondary terminal status request

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Cursor Control Operations

NOTE

Columns and rows are numbered starting with 0 as the leftmost column and the top row.

`Ec &a <col>c <row>Y`	Moves the cursor to column "`col`" and screen row "`row`" on the screen (screen relative addressing).
`Ec &a <col>c <row>R`	Moves the cursor to column "`col`" and row "`row`" in memory (absolute addressing).
`Ec &a ±<col>c ± <row>Y`	Moves the cursor to column "`col`" and row "`row`" (on the screen) relative to its present position ("`col`" and "`row`" are signed integers). A positive number indicates right or upward movement and a negative number indicates left or downward movement.
`Ec &a ±<col>c ± <row>R`	Moves the cursor to column "`col`" and row "`row`" relative to its present position in memory ("`col`" and "`row`" are signed integers). A positive number indicates right or upward movement and a negative number indicates left or downward movement.

Status

`Ec ^`	Return terminal primary status.
`Ec ~`	Return terminal secondary status.
`Ec *s <x>^`	Returns terminal capabilities

x	CAPABILITY
-1	Alphanumeric capabilities
-2	Graphics capabilities
-3	Amount of RAM memory
-4	Interface capabilities

`Ec &p <x>^`	Requests the status of device "`x`"

x	DEVICE
4	Integral or external printer depending on the "PrinterCode4" entry on the Terminal Configuration Menu.
5	Alternate I/O
6	Integral printer
10	Downloader

Mode Selections

Ec &q 0L	Unlock configuration.
Ec &q 1L	Lock configuration.

These escape sequences select active values (without changing the values in non-volatile memory).

NOTE

Only those entries in the MENU FIELD column which are marked with an asterisk are represented on a configuration menu.

ESCAPE SEQUENCE	MENU FIELD	ENTRY VALUE	x
Ec &k <x>A	AUTO LF	OFF	x=0
		ON	x=1
Ec &k <x>B	BLOCK MODE	OFF	x=0
		ON	x=1
Ec &k <x>C	*Caps Lock	OFF	x=0
		ON	x=1
Ec &k <x>D	*Bell	OFF	x=0
		ON	x=1

Ec &k <x>I	*ASCII 8 Bits	NO	x=0
		YES	x=1
Ec &k <x>K	Auto Keyboard Lock Mode	OFF	x=0
		ON	x=1
Ec &k <x>L	*LocalEcho	OFF	x=0
		ON	x=1
Ec &k <x>M	MODIFY ALL	OFF	x=0
		ON	x=1
Ec &k <x>N	SPOW(B)	OFF	x=0
		ON	x=1
Ec &k <x>O	Numeric pad	---	x=0
	Graphics pad	---	x=1
Ec &k <x>P	Caps Mode	OFF	x=0
		ON	x=1
Ec &k <x>Q	*Click	OFF	x=0
		ON	x=1
Ec &k <x>R	REMOTE MODE	OFF	x=0
		ON	x=1
Ec &s <x>A	*XmitFnctn(A)	NO	x=0
		YES	x=1
Ec &s <x>B	*SPOW(B)	NO	x=0
		YES	x=1
Ec &s <x>C	*InhEolWrp(C)	NO	x=0
		YES	x=1
Ec &s <x>D	*Line/Page(D)	LINE	x=0
		PAGE	x=1
Ec &s <x>G	*InhHndShk(G)	NO	x=0
		YES	x=1
Ec &s <x>H	*Inh DC2(H)	NO	x=0
		YES	x=1
Ec &s <x>J	*Auto Term(J)	NO	x=0
		YES	x=1

Ec &s <x>K	*ClearTerm(K)	NO	x=0
		YES	x=1
Ec &s <x>L	*InhSlfTst(L)	NO	x=0
		YES	x=1
Ec &s <x>N	*Esc Xfer(N)	NO	x=0
		YES	x=1
Ec &s <x>W	*InhDcTst(W)	NO	x=0
		YES	x=1
Ec &x <x>C	Send Cursor Position mode	OFF	x=0
		ON	x=1

Data Operations

The following escape sequences control data transfer to and from the integral and external printers and display memory.

Ec &p <x>S

Selects device "x" as the source device.

x	DEVICE
3	Display screen.
5	Alternate Peripheral Interface.
7	Graphics display (raster dump to selected destination device).
10	Downloader device.

`Ec &p <x>D`

Selects device "`x`" as the destination device.

`a,b,c`	DESTINATION DEVICE
3	Display.
4	Integral or external printer depending on the "PrinterCode4" entry on the Terminal Configuration Menu.
5	Alternate Peripheral Interface.
6	Integral printer.
10	Downloader device.

`Ec &p <Y> <a>d <b>d<c>D`

Copies "`Y`" amount of data to destination devices "`a`", "`b`", and "`c`". As many destinations as desired can be specified.

`Y`	AMOUNT
b	The line in which the cursor is located.
f	From the line in which the cursor is located to the last displayed line.
m	From the line in which the cursor is located to the end of display memory.

`a,b,c`	DESTINATION DEVICE
3	Display.
4	Integral or external printer depending on the "`PrinterCode4`" entry on the Terminal Configuration Menu.
5	Alternate Peripheral Interface
6	Integral printer.
10	Downloader device.

`Ec &p <x>^` Requests the status of device "`x`".

`x`	DEVICE
4	Internal or external printer depending on the `PrinterCode4` entry on the Terminal Configuration menu.
6	Integral printer.

`Ec &p <x>p <y>u <z>C`	Performs the action specified by "`z`" on device "`y`".

`z`	ACTION
0	Generates "`x`" form feeds.
1	Space "`x`" lines.
2-10	Generates "`x`" form feeds.
11	Turn on Log Bottom mode.
12	Turn on Log Top mode.
13	Turn off any logging mode.
14	Print normal characters. (Integral printer only)
15	Print expanded characters. (Integral printer only.)
16	Print compressed characters. (Integral printer only.)
17	Turn on normal Report mode. (Integral printer only.)
18	Turn on Metric Report mode. (Integral printer only.)
19	Turn off any Report mode. (Integral printer only.)
20	Turn on Record mode; "`x`" is the ASCII decimal value (1-127) used to end Record mode.

"`y`"	DEVICE
3	Display.
4	Internal or external printer depending on the "`PrinterCode4`" entry on the Terminal Configuration menu.
6	Integral printer.

`Ec &p <x>p 5u <z>C`

The action is selected by "z", as shown below ("5u" selects the Alternate Peripheral Interface network as the "device").

z	ACTION
1	Selects "x" as the Alternate Peripheral Interface address of the "talk" device.
2	Selects "x" as the Alternate Peripheral Interface address of the "listen" device

`Ec &p 5u <z>C`

The action is selected by "z", as shown below ("5u" selects the Alternate Peripheral Interface network as the "device").

z	ACTION
3	Enable Alternate Peripheral Interface timeout.
4	Disable Alternate Peripheral Interface timeout.
7	Initializes Alternate Peripheral Interface network to power-on configuration.

`Ec &p <x> W`
`<data string>`

Transfers "x" bytes of the data string from the computer to the selected destination device in binary form ("x" is a decimal value in the range 1-256).

`Ec &p W <data string>`

Transfers the data string, in ASCII form, from the computer to the printer selected as the destination device. The string is terminated either by the 256th byte or by an ASCII line feed character.

`Ec &k <x>S`

Enables Compressed or Normal Character mode for the integral printer as designated by the character "x".

x	ACTION
0	Disable Compressed Character mode.
1	Initiate Compressed Character mode.

Format Mode

`Ec [`

Starts an unprotected field.

`Ec {`

Starts a transmit-only field.

`Ec ]`

Ends a field.

`Ec &k <x>Z`

The data transmitted when the ENTER key is pressed is selected by "x".

x	MEANING
0	Transmits data within the Unprotected and Transmit-Only fields (default).
1	Transmits data from only the following fields: a. Transmit-Only fields. b. Any Unprotected fields which have been modified.

Function Key and Error Message Operations

To enable and disable the function keys (F1 thru F8), use the following escape sequence:

```
Ec &j <x>
```

x	MEANING
A	Display the Modes set of function key labels.
B	Enable the User function keys. (The user key labels are displayed.)
C	Disable screen messages (turn off message window and redisplay function key labels.
@	Disable the function keys and remove the function key labels from the screen.

To enable or disable the Function Control keys:

S	Disables the AIDS, MODES, and USER KEYS keys.
R	Enables the AIDS, MODES, and USER KEYS keys.

To define functions for the function keys:

```
Ec &f <attribute>a <key>k <enhancement>v <label half>x
<label length>d <string length>l <label> <string>
```

TERM	SYMBOL	MEANING	DEFAULT
Attribute	0	Normal (N)	0
	1	Local only (L)	
	2	Transmit only (T)	
Key	1	F1 function key	1
	2	F2 function key	
	3	F3 function key	
	4	F4 function key	
	5	F5 function key	
	6	F6 function key	
	7	F7 function key	
	8	F8 function key	

Enhancement	0	None	10
	1	Blinking	
	2	Inverse video	
	3	Blinking and inverse video	
	4	Underline	
	5	Blinking and underline	
	6	Inverse video and underline	
	7	Blinking, inverse video, and underline	
	8	Half-bright	
	9	Blinking and half-bright	
	10	Inverse video and half-bright	
	11	Blinking, inverse video, and half-bright	
	12	Underline and half-bright	
	13	Blinking, underline, and half-bright	
	14	Inverse video, underline, and half-bright	
	15	Blinking, inverse video, underline, and half-bright	
Label half	1	Top half of label	9
	9	Bottom half of label	
Label length	0 thru 255	Number of characters in the label. The label length plus the string length must be <= 255 characters. Only the first 16 characters (32 if all are muted characters) are used in the label.	0
String length	-1 thru 255	Number of characters in the string. A length of -1 clears the label. The label length plus the string length must be <= 255 characters. Only the first 80 characters (160 if all are muted characters) are used in the string.	1
Label	(none)	The label is entered at this point in the sequence. It may contain display enhancement and character set changes.	

String	(none)	The character string is entered at this point in the sequence. It may contain display enhancement and character set changes.

To execute functions assigned to the function keys:

```
Ec &f <x>E
```

x	KEY
1	F1
2	F2
3	F3
4	F4
5	F5
6	F6
7	F7
8	F8

To replace the function key labels with your own message:

```
Ec &j <string length>L <message>
```

``String length'' - A number (up to 160) indicating the number of characters in the string.

``Message'' - The content of the message.

Display Enhancements Operations

To start and end display enhancements:

`Ec &d <char>` Selects the display enhancement indicated by `char"` to begin at the present cursor position.

"char"	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	S
Half-bright								x	x	x	x	x	x	x	x		
Under-line				x	x	x	x					x	x	x	x		
Inverse Video			x	x			x	x			x	x			x	x	
Blinking		x		x		x		x		x		x		x			
Security																	x
End Enhancement	x																

Alternate Character Set Selection

`Ec )<x>` Selects one of the character sets to be the active alternate set.

x	CHARACTER SET
@	Base set
A	Math set
B	Line drawing set

`Ec (s0B` Turn off Bold primary character set (External printer)

`Ec (s1B` Turn on Bold primary character set (External printer)

`Ec )s0B` Turn off Bold secondary character set (External printer)

`Ec )s0B` Turn on Bold secondary character set (External printer)

Alphanumeric Display Control

`EC &w 12F` Turns on alphanumeric display.

`Ec &w 13F` Turns off alphanumeric display.

Graphics Display Control

The following escape sequence controls the graphics display.

`Ec *d <z>` Performs the indicated action "`z`" on the graphics display.

	z	ACTION
	a	Clear graphics memory
	b	Set graphics memory
	c	Turn on graphics display
	d	Turn off graphics display
	e	Turn on alphanumeric display
	f	Turn off alphanumeric display
	k	Turn on graphics cursor
	l	Turn off graphics cursor
	m	Turn on rubber band line
	n	Turn off rubber band line
`<x,y>`	o	Move graphics cursor to horizontal position "`x`" and vertical position "`y`" (relative to the origin)
`<x,y>`	p	Move graphics cursor to horizontal position "`x`" and vertical position "`y`" (relative to its present location)
	q	Turn on alphanumeric cursor
	r	Turn off alphanumeric cursor
	s	Turn on graphic text mode
	t	Turn off graphics text mode
	z	No operation

Graphics Label Transmission

This escape sequence is used for transmission of a graphics text label from a program to the terminal.

`Ec *l <text> CR, CR LF, LF CR, or LF`	The characters contained in "text" are printed on the display starting at the pen position

Vector Drawing

The following escape sequences are used to draw vectors.

`Ec *m <x>a` Selects drawing mode "x".

x	MODE
0	No effect
1	Clear
2	Set
3	Complement
4	Jam

`Ec *m <x>b` Selects line type "x".

x	LINE TYPE	x	LINE TYPE
1	Solid line	7	Line #4
2	User line pattern	8	Line #5
3	Current area pattern	9	Line #6
4	line #1	10	Line #7
5	line #2	11	Point plot
6	line #3		

`Ec *m <x><y>c`	Defines an eight-bit segment of line pattern and a scale; where: "`x`" is a number from 0 to 255 which, when converted to its binary form, illustrates the segment of line pattern. "`y`" is a number from 0 to 255 which indicates the nuber of times the line pattern should be repeated.
`Ec *m <a b c d e f g h>d`	Defines an 8 x 8 pattern where "`a`" through "`h`" are numbers from 0 through 255 which, when converted to their binary values and stacked, illustrate the pattern.
`Ec *m <x1,y1, x2,y2,>e`	Defines a rectangular area to be filled, where "`x1, y1`" and "`x2,y2`" define the rectangle located with respect to the absolute origin.
`Ec *m <x1,y1, x2,y2>f`	Defines a rectangular area to be filled, where "`x1, y1`" and "`x2,y2`" define the rectangle with respect to the relocatable origin.
`Ec *m <x,y>j`	Locates the relocatable origin at coordinates "`x,y`" with respect to the absolute origin.

`Ec *m <x>g` Selects area pattern "x":

x	AREA PATTERN
1	Solid area fill.
2	User-defined area fill (default).
3	Predefined pattern 0 (short dashed hatching).
4	Predefined pattern 1 (long dashed hatching).
5	Predefined pattern 2 (hatching).
6	Predefined pattern 3 (cross hatching).
7	Predefined pattern 4 (fine cross hatching).
8	Predefined pattern 5 (medium checkerboard.)
9	Predefined pattern 6 (fine checkerboard, 1:1 blend).
10	Predefined pattern 7 (3:1 blend).

`Ec *m <x>h` Set area boundary pen "x"; where "x" is an integer in the range -32767 through 32767. The three low bits of the binary form of the integer is used to select the pen (0...7).

`Ec *m k` Locates the relocatable origin at the current pen position.

`Ec *m l` Locates the relocatable origin at the graphics cursor position.

`Ec *m <x>m` Sets the graphics text size to "x", where "x" is a number from 1 to 8.

`Ec *m <x>n` Sets the graphics text orientation to "x".

x	ROTATION (DEGREES)
1	0
2	90
3	180
4	270

`Ec *m o` Turns on text slant.

`Ec *m p` Turns off text slant.

`Ec *m <x>q` Sets the origin of graphics text at location "x" on the display.

x	LOCATION	x	LOCATION
0	left/baseline	5	center/middle
1	left/bottom	6	center/top
2	left/middle	7	right/bottom
3	left/top	8	right/middle
4	center/bottom	9	right/top

`Ec *m r` Set graphics defaults:

PARAMETER	DEFAULT
*Pen Condition	Down
*Line Type	1 (solid)
*Drawing Mode	2 (JAM 1)
*User Defined Line Pattern	255, 1
*Area Fill Type	2 (User Defined Pattern)
*User Defined Area Fill Pattern	255, 255,..., (Solid)

*Background Pen	0 (Black)
*Primary Pen	7 (White)
*Secondary Pen	0 (Black)
*Boundary Pen	Off
*Graphics Text	Off
*Text Size	1
*Text Direction	1
*Text Origin	1 (left, bottom)
*Text Slant	Off
*Text Color	Primary Pen
Relocatable Origin	0,0
Alpha Video	On
Graphics Video	On
Alpha Cursor	On
Graphics Cursor	Off
Graphics Cursor Address	0,0
Rubberband Line	Off
Compatibility Mode:	
Page Full Straps	0 (Out)
GIN Strap	0 (CR Only)

NOTE

Parameters marked with an asterisk are those affected by the sequence "`Ec *m <1>r`".

`Ec *m <1>r`	Sets the graphics defaults which are marked with an asterisk in the list above.
`Ec *m z`	No operation.

Plotting Commands

This escape sequence is used in plotting vectors.

`Ec *p <x>` Performs action "x".

x	ACTION
a	Lift the pen
b	Lower the pen
c	Use graphics cursor position as new point
d	Draw a point at the current pen position and lift the pen
e	Set relocatable origin at the current pen position
f	Data is ASCII absolute
g	Data is ASCII incremental
h	Datais ASCII relocatable
i	Data is absolute
j	Data is short incremental
k	Data is incremental
l	Data is relocatable
s	Start area fill
t	End area fill
u	Lift area boundary pen
v	Lower area boundary pen
z	No operation

Graphics Status

This escape sequence reads the graphics status.

`Ec *s <x>^` Reads status type "x".

x	STATUS
1	Terminal I.D.
2	Pen position
3	Graphics cursor position
4	Read cursor position and wait for key
5	Display size
6	Graphics capabilities
7	Graphics text status
8	Read zoom status
9	Relocatable origin
10	Reset status
11	Area shading
12	Dynamics

Compatibility Mode

These escape sequences are used in Compatibility mode.

Ec *t <x>a Selects graphics terminator.

x	TERMINATOR
0	CR
1	CR EOT
2	None

Ec *t <x>b Sets or clears Page Full Break strap.

x	ACTION
0	Clear
1	Set

Ec *t <x>c Sets or clears Page Full Busy strap.

x	ACTION
0	Clear
1	Set

Ec *t <x>d Sets or clears 4014 mode:

x	ACTION
0	4010 mode
1	4014 mode

Ec *t z No operation.

Ec *w r Graphics hard reset.

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