HP 2393A Graphics
HP 2397A Color Graphics
Terminal User's Manual

Manual Part Number:
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Preface

Welcome

Welcome to the exciting world of computer graphics!

You don't have to be a computer expert to draw pictures and graphs using your HP 2393A/2397A Graphics Terminal. Now you can enter an exciting world once open to scientists and technologists only.

Use your terminal to produce business graphs, geometrical designs, landforms, wiring diagrams—the list is endless. You'll find performing these tasks on your terminal easy and fun.

Your terminal offers an extensive variety of graphics features:

- Choose your own input devices—HP Touch, Mouse, Tablet, or Bar Code Reader
- Choose between color or monochrome display
- Run software applications like HP DSG/3000, HPDRAW, HPMAP HPEASYCHART, HP Graphics 1000/II, and other Hewlett-Packard graphics software
- Use popular software like ISSCO®'s DISSPLA® and TELL-A-GRAF®, Precision Visual™'s DI-3000™ and GRAFMAKER™, SAS Insititute's SAS/GRAPH™, and Megatek's TEMPLATE®.
- Use Graphics Compatibility Mode to run software written for Tektronix 4010/4014 terminals
- Choose between 512x390 or 640x400 resolution
- Choose your own colors via escape sequences
- Create polygons and fill them with your own patterns
- Control "rubberband line" drawing at the keyboard to see how a line will look before you draw it permanently
- Vary the size and orientation of graphics text

Let this book guide you on your journey into the realm of computer graphics with your HP 2393A/2397A Graphics Terminal.

How To Use This Book

This book is your road map for operating the terminal from the keyboard. It also contains information on using the terminal with a variety of input devices—including touchscreen, mouse, drawing tablet and bar code reader. For instructions on how to control the terminal from a computer program, see the Reference Manual. You'll find the Reference Manual useful for in-depth coverage of the topics discussed in this book.

The User's Guide is organized into chapters and appendices:

Chapter 1—GETTING STARTED describes many of the tasks the terminal can perform for you. Learn here how to get where you want to go —FAST!

Chapter 2—THE KEYBOARD includes information on all special keys.

Chapter 3—THE FUNCTION KEYS describes how to access your terminal's features using screen-labeled function keys.

Chapter 4—GRAPHICS contains instructions on graphics control from the keyboard and other input devices.

Chapter 5—ANSI OPERATION is an overview on how to use the terminal with software on computers supporting the ANSI protocol, such as computers made by Digital Equipment Corporation.

Chapter 6—COLOR explains the differences between monochrome and color operations.

Appendix A—INSTALLATION gives instructions for installing the terminal, datacomm modules, and input devices.

Appendix B—TROUBLESHOOTING AND MAINTENANCE has procedures to follow if the terminal malfunctions.

FCC Statement

Warning:

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For Europe:

Verband Deutscher Elektroniker (VDE)

This equipment has been certified to comply with the German standard VDE level 0871B.

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1 Getting Started

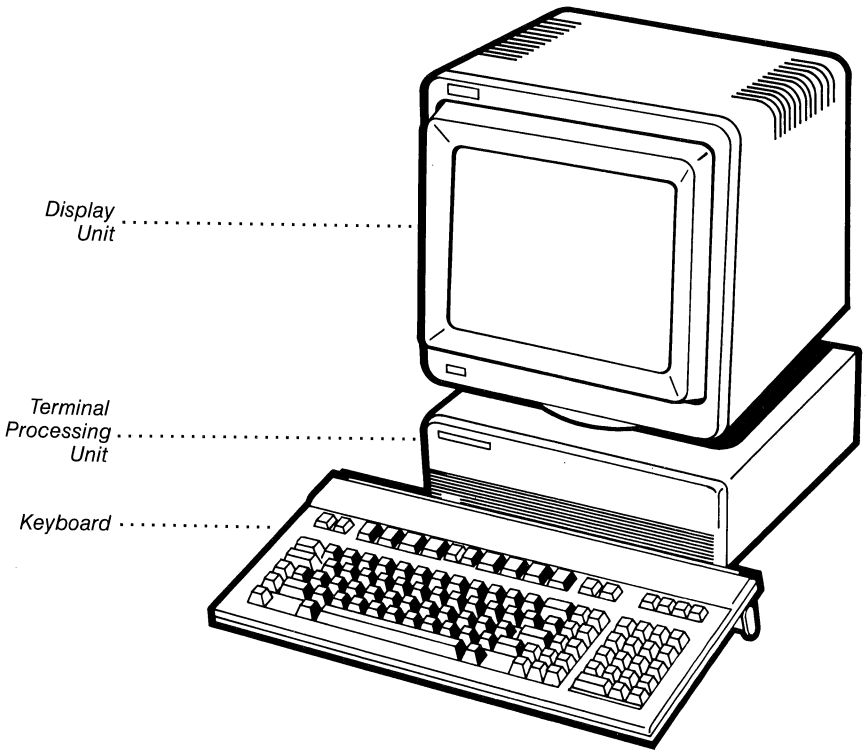
This chapter is an introduction to the terminal and its operating features. Whether you are a new terminal user or an experienced one, you'll find this chapter helpful in acquainting yourself with many of the terminal's functions.

Terminal Components

Your terminal consists of the following items:

- Display Monitor—looks like a television set
- Terminal Processing Unit—houses the terminal's intelligence
- Keyboard—your main avenue of communication to the terminal and through it to your host computer

Figure 1-1. Terminal Components



Display Monitor

The display monitor—also called the display unit—contains the viewing screen. It has several user controls that are discussed in this chapter. The display unit is connected to the terminal processing unit by one or more cables.

Terminal Processing Unit

The terminal processing unit on which the monitor rests contains the intelligence of the terminal. Power and communication cables connect to the unit, and the power button is located at the front.

You can install accessories at the back of the unit for optional communications ports and other features (see Appendix A).

Keyboard

The terminal keyboard—described in detail in Chapter 2—is your main method for entering data onto the screen and sending data to a host computer. Keyboards for 17 national languages are available (Appendix A lists the languages).

Controlling the Terminal

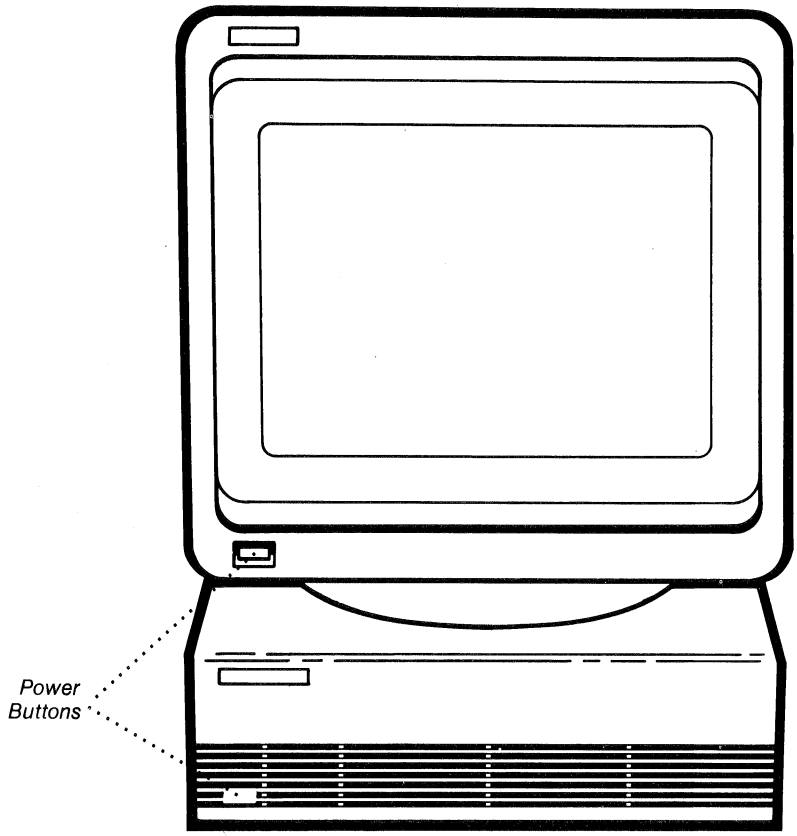
You need only be familiar with a few user controls to get your terminal up and running.

Turning On the Power

You have unpacked and installed the terminal and options (following the procedures outlined in Appendix A) and now you are ready to use it.

To turn on your terminal, make sure the terminal is connected to a power source. Press the power buttons at the front of the terminal processing unit and the display unit (the buttons remain depressed in the ON position).

Figure 1-2. Power Buttons

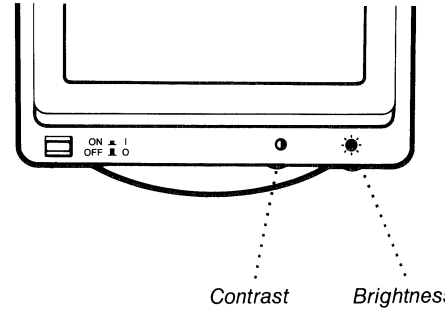


After a few seconds, the terminal beeps and a row of labels appears at the bottom of the screen display. Your terminal is ready for use. If it fails to power on in this manner, or if an error message appears on the screen, see Appendix B (Troubleshooting) for directions on how to proceed.

Brightness and Contrast Controls

The brightness and contrast controls are located at the front of your display monitor. Adjust these two knobs until the screen display is at a comfortable level of brightness and contrast.

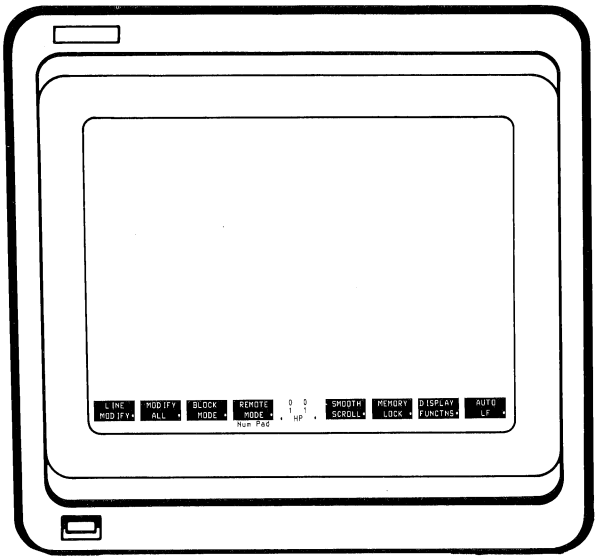
Figure 1-3. Brightness and Contrast Controls



Screen Display

When you turn the terminal on, the screen on your display monitor looks like this:

Figure 1-4. Initial Screen Display



The screen is your window into the terminal, through which you interact with a host computer. The screen display consists of:

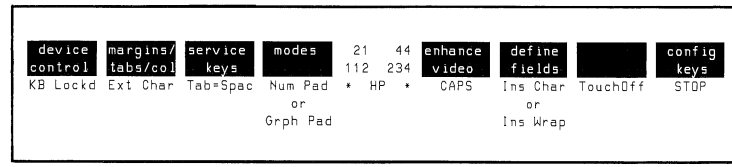
- Your work area. Lines 1 through 24 display your work area; letters and symbols appear here as you type them from the keyboard.
- The cursor. A blinking underline or block that locates your place on the screen as you type.

- Function labels. The active set of eight function key labels appears in the 25th and 26th display lines.
- The status line. The 27th line contains several indicators that show you the current operating state of the terminal.

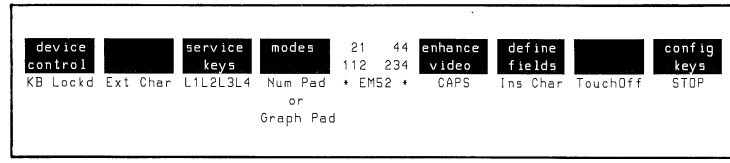
Status Line Indicators

The status line provides you with information concerning the terminal's operating state. The line consists of the following sections:

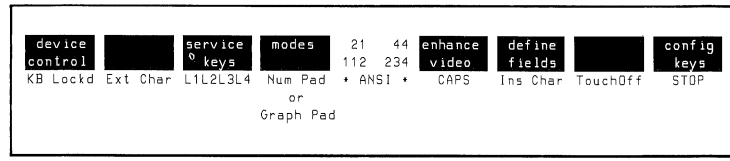
HP Mode Screen Status Line



EM52 Mode Screen Status Line



ANSI Mode Screen Status Line



The following table lists all the indicators and their related functions:

FUNCTION	SYMBOL
Keyboard Locked	KB Lockd
Using Extended Characters	Ext Char
Equating Tab to Spaces	Tab=Spac (HP Mode Operation)
ANSI Mode LED Indicators	L1L2L3L4 (ANSI Mode Operation)
Function of Numeric Pad:	
Numeric Operations	Num Pad
Graphics Operations	Grph Pad
DC Line monitors and Alpha Mode	* ANSI *
CAPS locked mode	CAPS
Insert Character	Ins Char
Insert Character with Wraparound	Ins Wrap
Turn Touchscreen on or off	TouchOff
Stop datacomm reception	STOP

Input Device Accessories

In addition to the keyboard that came with your terminal, there are several input device accessories you can order which provide added flexibility in controlling and operating the terminal by itself or online with your host computer system.

The input devices available to you include:

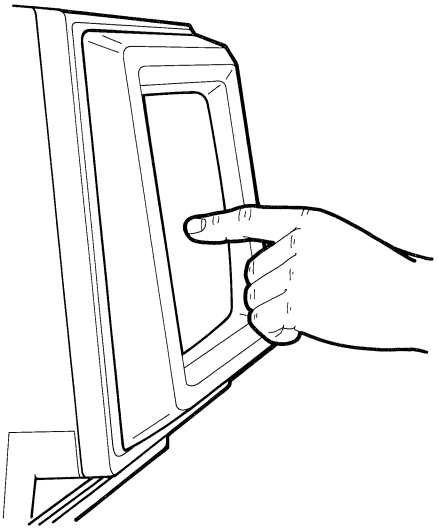
- Touchscreen (HP 35723A)
- Mouse (HP 46060A)
- Graphics Tablet (HP 46087A, HP 46088A)
- Bar Code Reader (HP 92916A)

Refer to Appendix A for instructions on installing input device accessories.

Touchscreen

The HP Touch Touchscreen accessory (HP 35723A) is a truly versatile device that allows you to perform many terminal operations with just the touch of a finger.

Figure 1-5. HP Touch Accessory (HP 35723A)



You can use your touchscreen in many applications, including:

Cursor Movement—As you read this book, you'll discover how to move the cursor with the keyboard cursor movement keys. If your terminal is equipped with the touchscreen accessory, you can move the cursor simply by touching the screen at the desired point. When you remove your finger, you'll see that the cursor has moved to where you just touched. In the examples that follow in this book, you can utilize this feature instead of the cursor movement

keys. Experiment with HP Touch and you'll find you're an expert at it with very little practice.

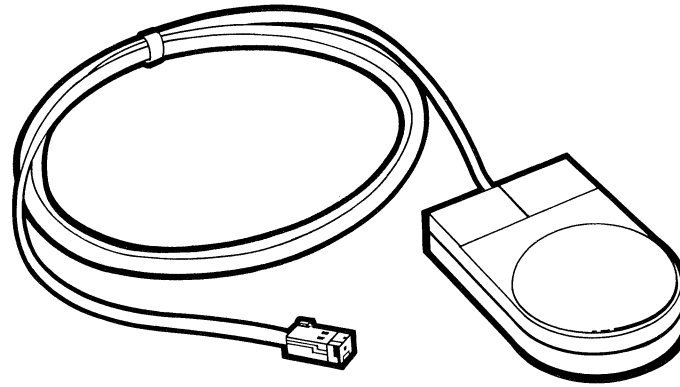
Function Key Operation—In this chapter and in Chapter 3 "Function Keys," you will find many examples that demonstrate how to control various terminal operations via function keys. With HP Touch, you have the added advantage of being able to touch a screen label to perform an operation, rather than press the associated function key.

Forms and Menus—Whether you are in a menu (such as the Terminal Configuration Menu), or in a form displayed by your host computer, you can use HP Touch to position the cursor in the desired field. Touching the screen once is much faster than using the tab or cursor keys to move the cursor.

Mouse

The HP Mouse (HP 46060A) is an input device accessory used to draw graphics on the screen. See Chapter 4 for more information on using the HP Mouse in graphics applications.

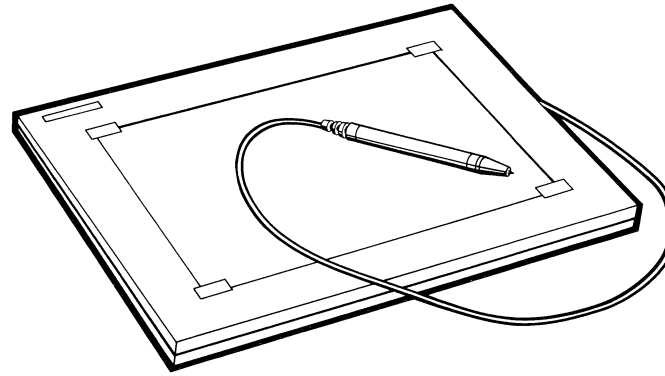
Figure 1-6. HP Mouse (HP 46060A)



Graphics Tablet

The HP 46087A Graphics Tablet is also a graphics input device used for drawing on the screen. See Chapter 4 for graphics applications of the HP Tablet.

Figure 1-7. HP Graphics Tablet (HP 46087A)



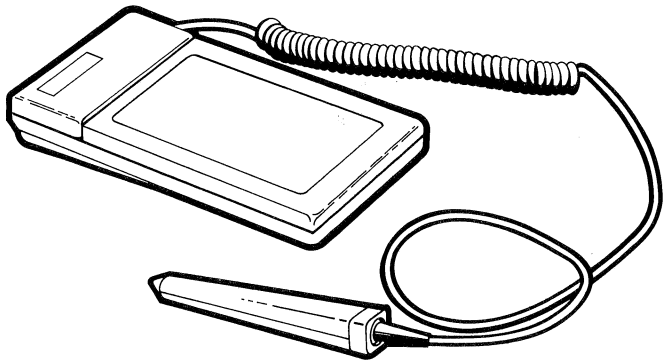
Bar Code Reader

The HP 92916A Bar Code Reader is an accessory that can greatly simplify your data entry or inventory control job. The bar code reader is a wand that reads bar codes. These

codes can be imprinted on a variety of items. In one library application, the bar code reader reads codes off of books, allowing the librarian to keep track of the entire inventory of documents.

Entering data on a keyboard is time-consuming and subject to human error. The bar code reader provides an answer to these problems by giving you extra speed and accuracy.

Figure 1-8. HP Bar Code Reader (HP 92916A)



Using Your Terminal By Itself

You may use many of your terminal's features without connecting it to a computer. This is called putting the terminal "offline" or operating in local mode.

Throughout this chapter, you will use your terminal in local mode to gain familiarity with basic keyboard operations. In this regard, several of your terminal's features parallel the capabilities of a typewriter.

Display Memory

The 24 lines that make up your screen window are only a portion of your total workspace. The workspace contains up to 288 lines of 80-column text. You can also extend the width of your workspace up to 160 characters wide. In

160-column mode, your workspace has up to 144 lines of text.

Setting the Terminal for Local Operation

You set the terminal for local mode operation by performing the following steps:

Step 1. If your terminal is off, press the power button on the front of the terminal processing unit, then press the power button on the front of the display monitor.

Step 2. Press [SYSTEM], then press [f4] (**modes**) to display the labels for the terminal's major operating modes. As the terminal powers on with these labels displayed, you may not need to perform this step.

Step 3. The terminal always powers on with an asterisk in the **REMOTE MODE*** label, indicating that the terminal is operating in Remote Mode. Press [f4] to disable Remote Mode. (Disabling Remote mode activates Local mode.) Press [f8] to turn on Automatic Linefeed.

Step 4. You may select Smooth Scroll if you desire your data to scroll onto the screen slowly. However, do not activate any of the other modes in this label set, as they should remain disabled for the following exercises.

Perform the following steps to clear existing margins and then clear the screen window of any information (by erasing the workspace memory).

Step 1. Press [SYSTEM] to display the System set of function key labels.

Step 2. Press [f2] to display the Margins/Tabs/Col label set, then press [f7] to clear any previous margins.

Step 3. Press [SHIFT] and [CLEAR DISPLAY] and hold both keys down to clear the entire workspace.

Configuring the Terminal

You can configure the terminal for specific applications through the use of several screen menus. The following exercise shows how terminal configuration can change how things appear on your screen.

In this example you type a line of text and observe the terminal's normal operation. ("Normal" implies that the menu's default values are active for the two parameters being tested.) Next, you display two screen menus—first the Global Configuration Menu, then the Terminal Configuration menu—to change two parameters (`Bell` and `InhEolWrp(C)`), then reenter the same line of text and observe any differences.

Step 1. Enter the following text as a continuous stream, without regard to screen boundaries:

```
Starting out there was an abundance of room,
but now I'm at the end of the line with my
terminal.
```

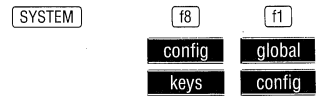
Notice the following:

- As you approach the edge of the screen (the default right margin) a warning bell rings.
- As you continue typing, all excess characters flow over to the next line. (This is known as "wraparound".)

The screen display should appear as follows:

```
Starting out there was an abundance of room, but now I'm at the end of the line
with my terminal.
```

Step 2. Display the Global Configuration menu by pressing:

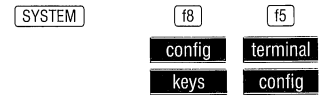


Once the menu appears, do Step 3 to change the entry in the `Bell` field to "`Off`".

Step 3. Using the TAB key, move the cursor to the Bell field. Press f2 (NEXT CHOICE) to change the Bell value from "`On`" to "`Off`". Since the field is underlined, you must use the function keys to make your selection. If you try typing "Off", the terminal "beeps", the keyboard locks, and an error message appears in the label line.

Step 4. Save the new configuration setting for the Bell field by pressing f1 (SAVE CONFIG). Notice that the menu disappears and the previous window display returns to the screen.

Step 5. Display the Terminal Configuration menu by pressing:



Step 6. Using the TAB key, move the cursor to the `InhEolWrp(C)` field. (This field inhibits end-of-wraparound.) The default (normal) setting is "`No`". Press f2 (NEXT CHOICE) to change this value to "`Yes`".

Step 7. Save these new configuration settings by pressing f1 (SAVE CONFIG). Upon saving the values, the menu disappears and the previous window display returns to the screen.

Step 8. Press the [RETURN] key twice (to skip a line and advance to the beginning of the next line), then reenter the same line of text. This time notice that the bell gives no warning and that the cursor does not advance to the next line. Instead, the cursor remains in column 80 and continually overwrites each character as you enter the next.

Your final display should appear as follows:

```
Starting out there was an abundance of room, but now I'm at the end of the line
with my terminal.

Starting out there was an abundance of room, but now I'm at the end of the line.
```

As the warning bell and end-of-line wraparound are "friendly features", you should undo the changes you made.

Step 9. Display the Global Configuration menu by pressing [SYSTEM], [f8], [f1].

Step 10. Move the cursor to the `Bell` field, press [f2] ([NEXT CHOICE]) to change "`Off`" to "`On`".

Step 11. Press [f1] to save this configuration.

Step 12. Display the Terminal Configuration menu by pressing [SYSTEM], [f8], [f5].

Step 13. Tab the cursor to the `InhEolWrp(C)` field and press [f2] to change "`Yes`" to "`No`".

Step 14. Pressing [f1] saves this configuration and the terminal returns to its original operating state.

Entering Data

While the terminal is set for Local Mode, you can enter data only from the keyboard (or bar code reader, if your terminal is equipped with one). After data is 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.)

Edit Keys

Your terminal has a built-in editing capability allowing you to modify text without using a special editor program.

The following exercise illustrates the [INS CHAR] key. The important point to remember is that the insert operation does not automatically wrap excess characters to the next line (as normally happens when you are entering text). To achieve "wraparound", you must explicitly request it.

This example assumes that the margins are set to the width of the screen (the default condition).

Step 1. Set your terminal for local operation.

Step 2. Enter the following 80-character line as a continuous line of text.

```
A boring sentence drags on forever or until it
exhausts all its allocated space.
```

Step 3. Using the cursor-positioning keys, move the cursor back to the beginning of the line. (Pressing the ▲ key suffices as the cursor should normally wrap to row 2, column 1 in preparation for the next character.)

Step 4. Press the INS CHAR key. (The terminal displays the message "Ins Char" in the Status Line.) Now observe what happens at the end of the line while you enter the following text:

```
Through use of the insert character feature,
```
trailing space

Your screen display should appears as follows:

```
Through the use of the insert character feature, A boring sentence drags on fore
```

Step 5. Press the INS CHAR key to disable the insert character operation. (The "Ins Char" message disappears from the Status Line.)

Step 6. In many cases, you want text forced from one line to be entered on the next line. To enable Insert Character With Wraparound, simultaneously press the SHIFT and INS CHAR keys. (In this operating state, the terminal displays the message "Ins Wrap" in the Status Line.)

Step 7. Use the cursor-positioning keys to move the cursor back to the "f" in "feature".

Step 8. Enter the following text:

```
with wraparound
               \__trailing space
```

The screen display should appear as:

```
Through use of the insert character with wraparound feature, A boring sentence d
rags on fore
```

Step 9. You may also delete characters while in Insert Character mode. Use the cursor-positioning keys to place the cursor under the capital "A" before "boring". Press the [DEL CHAR] key. The terminal deletes the "A". Since the terminal is still in insertion mode, enter a lower-case "a". This produces the final screen display:

```
Through use of the insert character with wraparound feature, a boring sentence d
rags on fore
```

Step 10. Press [INS CHAR] to end Insert Character With Wraparound. The "Ins Wrap" message disappears from the Status Line).

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.

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

Step 1. Press the [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

---

Note If your terminal is not equipped with a certain option, the screen labels associated with that option appear as blank labels on the screen.

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 [f2] 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 backtab 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.

```
First Column  Middle Column  Last Column
123           456           789
123           456           789
123           456           789_
                                \__cursor
```

Step 1. If the "Margins/Tabs/Col" labels are not displayed, press the 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 SHIFT and CLEAR DISPLAY together to clear the screen, since this sequence of keystrokes clears all the 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 ("AUTO LF" must be on).

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 backtabbing 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.

Setting 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 workspace you have defined and

saved in terminal memory. However, you may change the margin settings to suit your application.

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

Step 1. Press the [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.

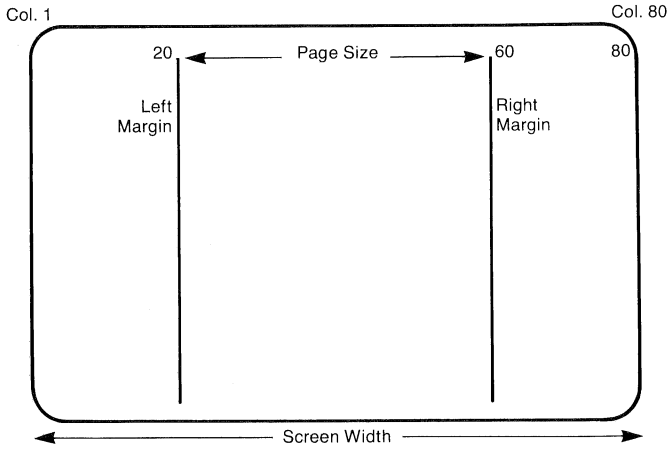
The terminal bell sounds a warning when the cursor reaches a position eight character spaces from the right margin. Upon reaching the right margin, if "end-of-line wraparound" is in effect, the cursor automatically moves to the left margin of the next line. ("End-of-line wraparound" is the normal (default) 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 edge of the display 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:

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 the right edge of the workspace.

Using Memory Lock

You select Memory Lock through the Modes function key labels. First press [SYSTEM], then [f4] (modes). 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 on the first row of the workspace. Therefore follow this procedure:

Step 1. Using the "home up" ▽ key, move the the cursor to the top of the display screen.

Step 2. Press SYSTEM, then f4 (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 (it will help if you display the modes labels and ensure that AUTO LF* has an asterisk in it).

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?

_(cursor's current position)
```

Step 1. Press [SYSTEM], then [f4] (modes) to display the Modes labels. Verify that Memory Lock is disabled (the label has no asterisk in it).

Step 2. Press the [▽] key and type the above paragraphs as shown. Press [RETURN] after the question mark in the 3rd paragraph.

Step 3. Move the cursor to the line above paragraph 2.

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

Step 5. Press [SHIFT] [▲] keys 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 [SHIFT] [▲] keys 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 [SHIFT] [▲] keys, instead of the [▽] key, to view the rearranged text.

Display Control

The Cursor. The cursor is the blinking mark that appears on the screen. (Through an entry in the Terminal Configuration menu, you may select the cursor to appear either as a rectangular box or as an underline.)

The cursor serves one of two functions. It either points to a specific location on the terminal screen or it marks the position where the terminal will enter the next character.

While entering data, the cursor must be positioned at a valid data entry point. Therefore, the terminal can take special action to ensure that this occurs. For example, the terminal keeps the cursor within the bounds set by existing margins. Or, at the end of one line, the terminal can wrap the cursor to the beginning of the next line (depending on the terminal's configuration settings).

When the cursor functions as a pointer, it obeys a different set of rules. In particular, the cursor must be able to access any point on the screen. Therefore, the cursor-positioning ("arrow") keys work on screen boundaries; they ignore margin settings. The [▶] key never rings the terminal bell as it approaches the screen's edge. The horizontal movement

keys always wrap around to the next row, regardless of the end-of-line wraparound setting in the Terminal Configuration menu.

To familiarize yourself with these differences, perform this simple exercise.

Step 1. Power the terminal on. Notice that the terminal positions the cursor in the upper left corner. Under normal circumstances, when no margins are set and Memory Lock is disabled, this location represents the cursor's "home base". "Homing the cursor", therefore, implies moving the cursor to the first accessible character position in workspace memory. Pressing the ▽ key homes the cursor. (Because this key works on workspace boundaries, it differs from the remaining "arrow" keys which operate on screen boundaries.)

Step 2. Use the ▷ and ◁ keys to move the cursor horizontally along a screen row. Observe the cursor's response at screen boundaries.

Step 3. Use the △ and ▽ keys to move the cursor vertically along a screen column. Do you see any difference when the cursor reaches a screen boundary?

Unlike the horizontal positioning keys, which always wrap to the next line, the vertical positioning keys never leave their respective column.

Step 4. Finally, position the cursor to the last column in the last row (screen row 24, column 80).

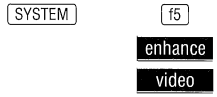
From this position, pressing the ▷ key wraps the cursor from the screen's last addressable point back to the screen's first addressable point (screen row 1, column 1).

Scrolling and Paging. You can use the display control keys to scroll through your workspace both horizontally and vertically (see the display control section of Chapter 2—The Keyboard).

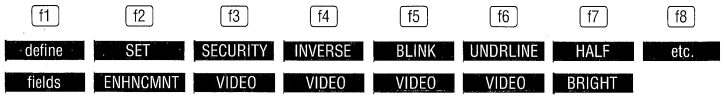
Using Display Enhancements. As a standard feature, your terminal includes the following display enhancements:

- Half Bright: The terminal displays characters at half intensity (gray), or maps to color pair 3 on 2397A.
- 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".) (No security video on the 2397A.)
- Background Inverse: This feature selects dark characters on a light background. (The screen normally displays light characters on a dark background.) (Reverses foreground/background colors on 2397A.)

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. 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 [SYSTEM] key to display the 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.

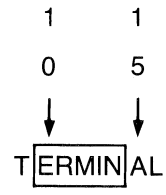
Step 3. Press [f4] ([INVERSE VIDEO]) and [f5] ([BLINK VIDEO]) to select these enhancements. (Once activated, an asterisk appears in the label.)

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.

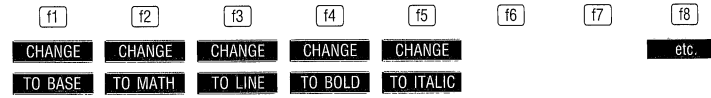
Step 7. Move the cursor back to column 9 of line 5. Type the word: TERMINAL. The display should appear as shown with the characters in the enhancement field blinking.



Using Alternate Character Sets

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 the math, line-drawing, bold or italics 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:

SYSTEM		: displays the 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 1-9).

Figure 1-9. Sample Data Entry Form

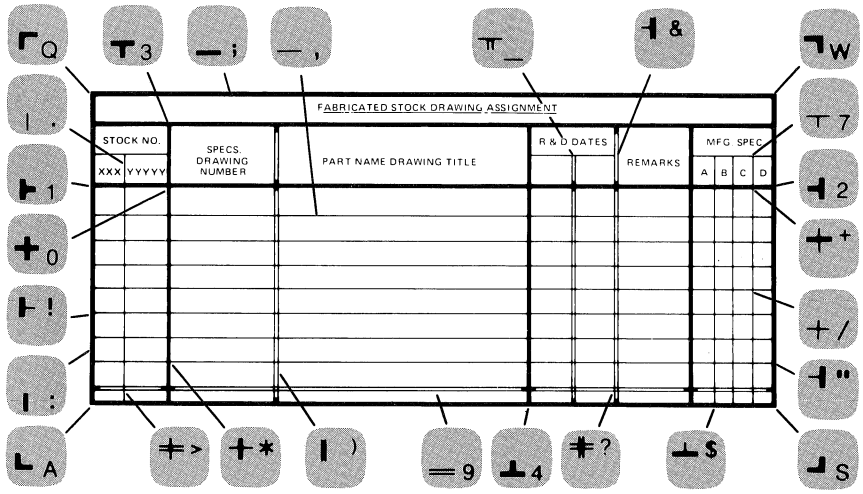
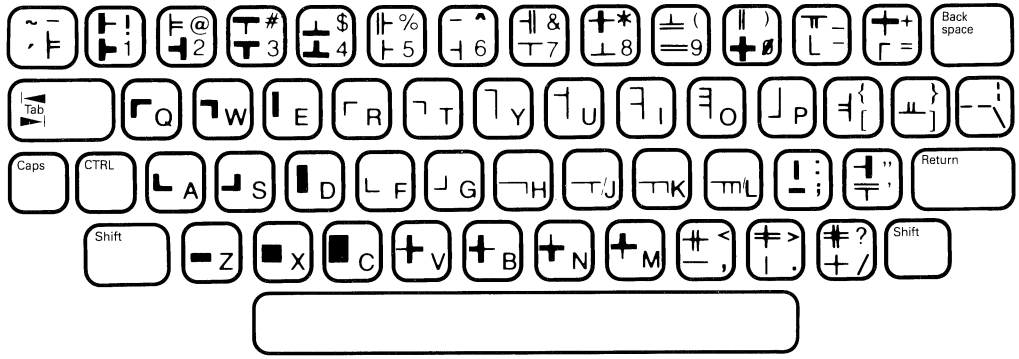


Figure 1-10 shows the keycap location for each line segment character. To access these characters, you must make the line-drawing set the active character set. To do so, sequentially press the following keys:

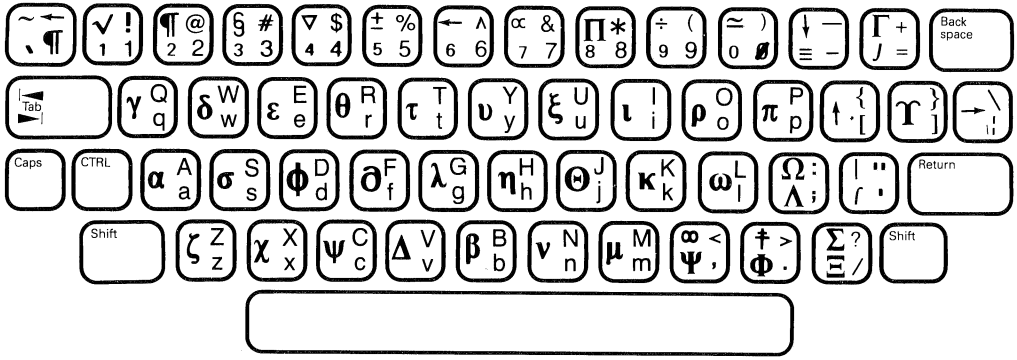
SYSTEM		: displays the System label set.
f5	(enhance video)	: displays the video enhancement label set.
f8	(etc.)	: displays the alternate character set labels.
f3	(CHANGE TO LINE)	: activates the line-drawing set so that subsequent keystrokes display the corresponding symbols from this set.

Figure 1-10. The Line-Drawing Set



Math Character Set. Figure 1-11 shows the location of mathematical symbols upon the keyboard.

Figure 1-11. The Math 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:

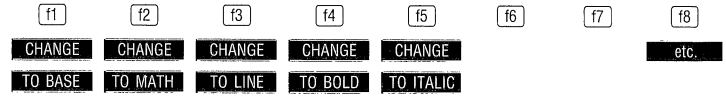
SYSTEM		: displays the System label set.
f5	(enhance video)	: displays the video enhancement label set.
f8	(etc.)	: displays the alternate character set labels.
f2	(CHANGE TO MATH)	: activates the math set so that subsequent keystrokes display the corresponding symbols from this set.

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:

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:

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

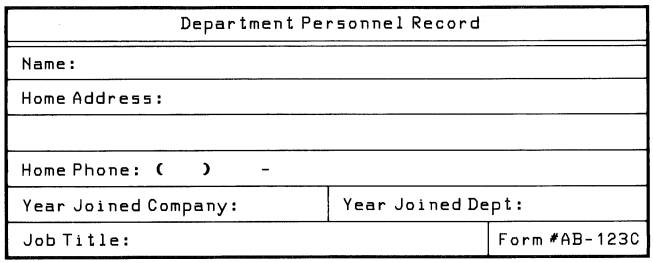
Step 5. Activate the Math character set by pressing f2. Then press:

2, R

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

SPACE, =, SPACE, 1

Using the Line-drawing Character Set. The task is to draw the following form by switching between the line-drawing set and the base character set.



Normally, after constructing the form's physical layout, you would next use the Define Fields function key labels to assign edit checks and field specifications to individual fields. You might also use display enhancements to highlight different fields. For space considerations, this example only draws the form. (As it is, the written explanation appears formidable. However, you will soon observe a pattern between successive steps, and you'll find constructing the form an easy task.)

To center the form on the screen, set the left margin to column 10:

- Press the [SYSTEM] key, then [f2] to display the Margins/Tabs/Col set of function key labels.
- Use the [▶] key to position the cursor at column 10.
- Press [f5] to set the left margin at this position.

When you begin each line, the terminal reverts to the base character set as the "active" character set. Thus your first action on each line is selecting the line-drawing set.

As you must continually change between the line-drawing set and the base character set, display the alternate character set function key labels by pressing:

Note Each of the following steps creates one line of the form. These conventions are used. (1) When you MUST press the SHIFT key to display the proper character, the text explicitly shows both keys. Otherwise, the case of the character is immaterial. (2) Quotation marks surround the text that you must enter. Enter only the text and not the quotation marks.

Step 1. Construct the first line of the form:

- If the cursor is not at column 10 (the left margin) press the RETURN key to move the cursor to this location.
- Press f3 to select the line-drawing set.
- Press Q to draw the upper left corner.
- For columns 11 through 69 continually press the semi-colon key (;) to generate the top line.
- In column 70, enter the upper right corner by pressing W.
- Go to line 2 by pressing the RETURN key.

Step 2. Construct the second line of the form:

- Press f3 to select the line-drawing set.
- Simultaneously press SHIFT : (a colon) to draw the left border.
- Change to the base set by pressing f1.
- Space over to column 25.
- From column 25, enter the text:
  "Department Personnel Record".

- Space over to column 70.
- Reactivate the line-drawing set by pressing [f3].
- In column 70, enter the right boundary by simultaneously pressing [SHIFT] [:].
- Go to line 3 by pressing the [RETURN] key.

Step 3. Construct the third line of the form:

- Press [f3] to select the line-drawing set.
- Press the One key ([1]) to create the left border.
- For columns 11 through 69, continually press the Nine key ([9]) to draw the double-width dividing line.
- In column 70, press the Two key ([2]) to draw the right border.
- Press the [RETURN] key to go to line 4.

Step 4. Construct the fourth line of the form:

- Press [f3] to select the line-drawing set.
- Simultaneously press [SHIFT] [:] to draw the left border.
- Change to the base set by pressing [f1].
- Space over to column 13.
- From column 13, enter the text: "Name:".
- Space over to column 70.
- Reactivate the line-drawing set by pressing [f3].
- In column 70, enter the right border by simultaneously pressing [SHIFT] [:].
- Go to line 5 by pressing the [RETURN] key.

Step 5. Construct the fifth line of the form:

- Press [f3] to select the line-drawing set.
- Simultaneously press [SHIFT] [!] (the exclamation point) to create the left border.
- For columns 11 through 69, continually press the comma key ([,]) to draw the single-width dividing line.

- In column 70, simultaneously press SHIFT " (a quotation mark) to draw the right border.
- Press the RETURN key to go to line 6.

Step 6. Construct the sixth line of the form:

- Press f3 to select the line-drawing set.
- Simultaneously press SHIFT : to draw the left border.
- Change to the base set by pressing f1.
- Space over to column 13.
- From column 13, enter the text: "Home Address:".
- Space over to column 70.
- Reactivate the line-drawing set by pressing f3.
- In column 70, enter the right border by simultaneously pressing SHIFT :.
- Go to line 7 by pressing the RETURN key.

Step 7. Construct the seventh line of the form:

- Press f3 to select the line-drawing set.
- Simultaneously press SHIFT ! to create the left border.
- For columns 11 through 69, continually press the comma key to draw the single-width dividing line.
- In column 70, simultaneously press SHIFT " to draw the right border.
- Press the RETURN key to go to line 8.

Step 8. Construct the eighth line of the form:

- Press f3 to select the line-drawing set.
- Simultaneously press SHIFT : to draw the left border.
- Change to the base set by pressing f1.
- Space over to column 70.
- Reactivate the line-drawing set by pressing f3.
- In column 70, enter the right border by simultaneously pressing SHIFT :.
- Go to line 9 by pressing the RETURN key.

Step 9. Construct the ninth line of the form:

- Press [f3] to select the line-drawing set.
- Simultaneously press [SHIFT] [!] to create the left border.
- For columns 11 through 69, continually press the comma key to draw the single-width dividing line.
- In column 70, simultaneously press [SHIFT] ["] to draw the right border.
- Press the [RETURN] key to go to line 10.

Step 10. Construct the tenth line of the form:

- Press [f3] to select the line-drawing set.
- Simultaneously press [SHIFT] [:] to draw the left border.
- Change to the base set by pressing [f1].
- Space over to column 13.
- From column 13, enter the text:
  "Home Phone: ( ) -".
- Space over to column 70.
- Reactivate the line-drawing set by pressing [f3].
- In column 70, enter the right border by simultaneously pressing [SHIFT] [:].
- Go to line 11 by pressing the [RETURN] key.

Step 11. Construct the form's eleventh line:

- Press [f3] to select the line-drawing set.
- Simultaneously press [SHIFT] [!] to create the left border.
- For columns 11 through 39, continually press the comma key to draw the single-width dividing line.
- In column 40, press the Seven key ([7]).
- For columns 41 through 69, press the comma key ([,]).
- In column 70, simultaneously press [SHIFT] ["] to draw the right border.
- Press the [RETURN] key to go to line 12.

Step 12. Construct the form's twelfth line:

- Press [f3] to select the line-drawing set.
- Simultaneously press [SHIFT] [:] to draw the left border.
- Change to the base set by pressing [f1].
- Space over to column 13.
- From column 13, enter the text: "Year Joined Company:".
- Space over to column 40.
- Change to the line-drawing set by pressing [f3].
- In column 40, press the period key ([.]).
- Press [f1] to revert to the base set.
- Space over two positions and enter the text: "Year Joined Dept:".
- Space over to column 70.
- Reactivate the line-drawing set by pressing [f3].
- In column 70, enter the right border by simultaneously pressing [SHIFT] [:].
- Go to line 13 by pressing the [RETURN] key.

Step 13. Construct the form's thirteenth line:

- Press [f3] to select the line-drawing set.
- Simultaneously press [SHIFT] [!] to create the left border.
- For columns 11 through 39, continually press the comma key to draw the single-width dividing line.
- In column 40, press the Eight key ([8]).
- For columns 41 through 54, press the comma key ([,]).
- In column 55, press the Seven key ([7]).
- For columns 56 through 69, press the comma key ([,]).
- In column 70, simultaneously press [SHIFT] ["] to draw the right border.
- Press the [RETURN] key to go to line 14.

Step 14. Construct the form's fourteenth line:

- Press [f3] to select the line-drawing set.
- Simultaneously press [SHIFT] [:] to draw the left border.
- Change to the base set by pressing [f1].
- Space over to column 13.
- From column 13, enter the text: "Job Title:".
- Space over to column 55.
- Change to the line-drawing set by pressing [f3].
- In column 55, press the period key ([.]).
- Press [f1] to revert to the base set.
- Enter the text: "Form #AB-123C".
- Space over to column 70.
- Change to the line-drawing set by pressing [f3].
- In column 70, enter the right border by simultaneously pressing [SHIFT] [:].
- Go to line 15 by pressing the [RETURN] key.

Step 15. Construct the form's last line:

- Press [f3] to select the line-drawing set.
- Press [A] to draw the lower left corner.
- For columns 11 through 54 continually press the semi-colon key ([;]) to generate the bottom line.
- In column 55, simultaneously press [SHIFT] [$] (the dollar sign symbol).
- For column 56 through 69, press the semi-colon key to draw the remaining portion of the bottom line.
- In column 70, enter the lower right corner by pressing [S].

Extended Characters Mode. The terminal normally restricts your choice of alphanumeric characters to those symbols contained within your base character set. By entering Extended Characters mode, however, you may generate all the characters from any of the national languages.

Note Because Extended Characters mode requires changes to configuration menus and use of control codes, the Reference Manual gives complete details. The following discussion only introduces you to this feature.

To use Extended Characters, you must configure the terminal for "8-bit" operation (see the Reference Manual). After you properly configure the terminal, you enter Extended Characters mode by pressing and holding down the [Extend Char] key. The message "Ext Char" appears in the status line while the [Extend Char] key is pressed and held down (the message goes away when you release the [Extend Char] key). If the message does not appear when you press the key, then you probably have not configured the terminal to operate in 8-bit mode.

Figure 1-12 shows the extended characters accessed by each key (USASCII must be configured as the base character set; otherwise you won't be able to display the characters shown in the figure).

To display a character from the Extended Character set, press and hold down the [Extend Char] key and at the same time press another key. For example, press [Extend Char] and [e] together and the "æ" character is displayed.

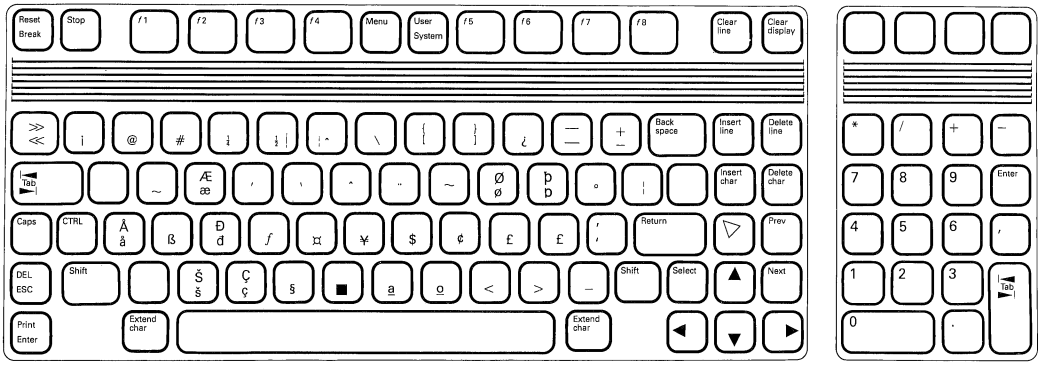
Some keys access a different extended character when pressed with the [Shift] key. For example, press [Shift], [Extend Char] and [e] at the same time to display the "Æ" character (which is the shifted extended character associated with the [e] key). A key associated with only one extended character displays that character whether you press the key with [Shift] [Extend Char], or just with [Extend Char].

The [r], [t], [y], [u] and [i] keys access special extended characters called "diacritical marks" or accent marks. When you want to display an accented character, press [Extend Char] together with the desired accent mark. The accent is displayed and the cursor remains under the mark (instead of advancing to type the alphabetic character you want accented. For example, press [Extend Char] and [r] together, then release [Extend Char] and type [a]. The result is an accented "á",. Note that if you type a character which cannot be accented, then that character replaces the accent mark you first typed.

The [q], [z], and [\] keys have no extended characters associated with them. If you type one of these keys while pressing the [Extend Char] key, nothing is displayed and the cursor remains in its current position.

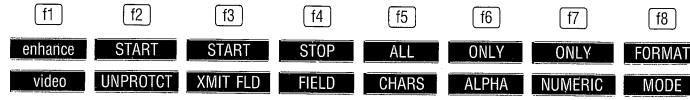
To leave Extended Characters mode, simply release the [Extend Char] key. This returns the keyboard to normal operation, and subsequent keystrokes produce normal characters.

Figure 1-12. Placement Of "Extended" Characters



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.

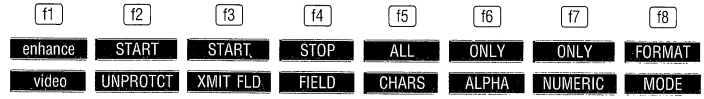
You display the Field Definition labels by pressing:

[SYSTEM] [f6]

define

fields

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.

Using Your Terminal with a Computer

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 [SYSTEM], then [f4] (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.

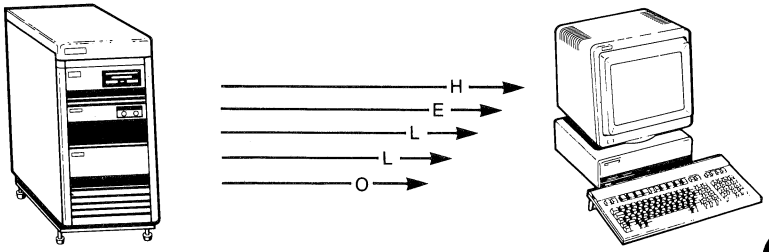
When operating in Character mode, this is probably extraneous information. Therefore, under these circumstances, you should disable automatic linefeed. To determine the state of Auto Linefeed mode, press [SYSTEM], then [f4] (modes) to display the Modes labels. If an asterisk indicates Auto Lf is active, 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.

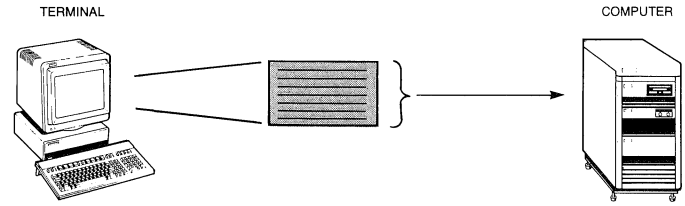


Block Mode. The state of the BLOCK MODE function key label determines whether the terminal sends data to the computer character-by-character or in blocks of characters.

To enter Block mode, press SYSTEM, then f4 (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 (see Reference Manual for details).



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:

SYSTEM	f4	f1
	modes	LINE MODIFY

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

To enter Modify All mode, press:

SYSTEM	f4	f2
	MODES	MODIFY ALL

Modify All mode resembles Line Modify except Modify All remains active after you press the ENTER or RETURN key. An asterisk 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:

```
:BUILD TF;REC=128,1,F,VINARY;DEV=DISC;CODE=D;DISC=1023,8,1
```

computer prompt

your response

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)
```

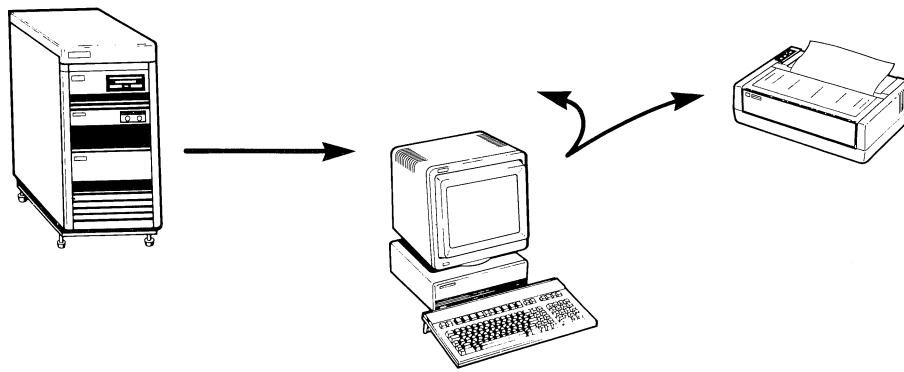
Realizing that you misspelled "BINARY", you enter Line Modify mode, position the cursor under the "V" in "VINARY", and enter a "B". When you press the RETURN key, the terminal transmits the line, beginning from the second character position. It does not transmit the prompt character to the computer.

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 further 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 (See "Using Your Terminal With An External Device" later in this chapter).



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

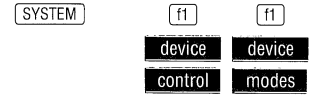
To demonstrate Record mode, this example prints a listing of your files to a selected destination device.

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 the selected destination device.

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

A Computer Session. To communicate with the computer requires your "logging-on" to the system. This varies between installations. Ask someone what procedure you need to follow.

Once you have successfully logged on, the computer requests information by "prompting" you with a special character (for example, a colon [:], a pound sign [#], or, perhaps, a dollar sign [$]).

To notify the computer that you have finished your request, you must end each line by pressing the RETURN key. Normally, your request will be a "command" and typing in the command then pressing the RETURN key is called "entering" a command.

A computer system can only recognize commands that it "expects" to see. The following examples use "MPE" commands for an HP 3000 computer.

Step 1. Enter the command:

```
listf
```

This command prints a listing of the files in your account.

Step 2. Enter the command:

```
showme
```

This command shows you who the computer thinks you are.

Step 3. Enter the command:

```
showtime
```

This command shows the day, the date, and the time in hours and minutes.

If your terminal is connected to another computer model, ask your neighbors for some commands that work for your system.

Using Your Terminal with an External Device

You can copy both alphanumeric and graphic data from the display to a selected destination device. In other words, you can obtain hardcopy of what's on the screen by sending the data to a printer. This section describes the keyboard procedures that set up hardcopy operations.

Note

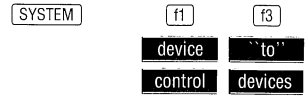
You must ensure that the "straps" on the external printer match the settings in the External Device Configuration menu. Consult the Reference Manual for the necessary details.

Copying Alphanumeric Data

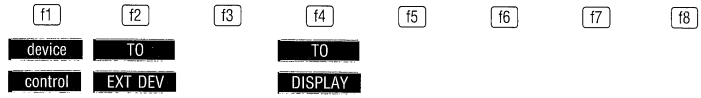
You may select between two methods for copying alphanumeric data. Data logging copies data while it is being entered. Screen copy operations copy data after data entry is complete. The procedure is similar for both methods.

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 (TO EXT DEV) selects a printer that matches the interface of the printer port (usually port 2).

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	PRESET PRINTER	to devices	ADVANCE PAGE	ADVANCE LINE	COPY ALL	COPY PAGE	COPY LINE

Alternately, you can press [SYSTEM], [f1] (device control) to access these same values, regardless of the initial label set.

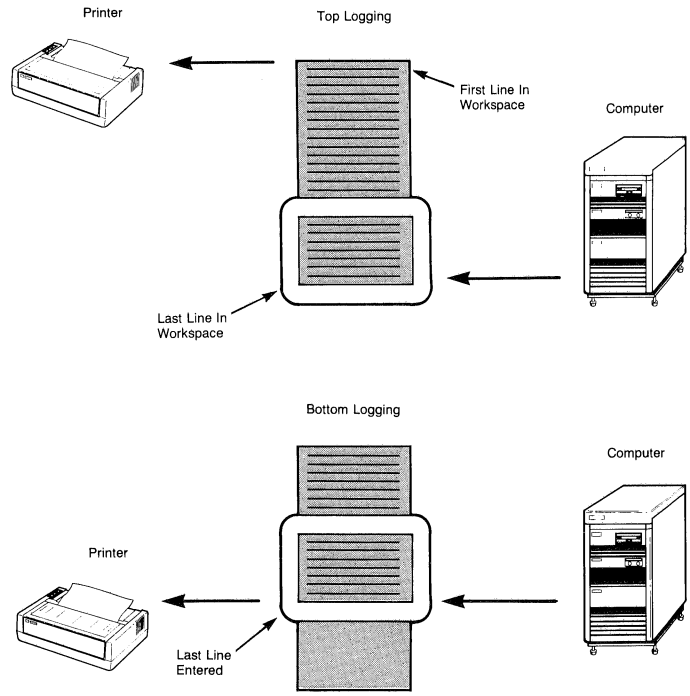
Step 3. Press [f1] to display the Device Modes label set:

[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 1-13. Data Logging



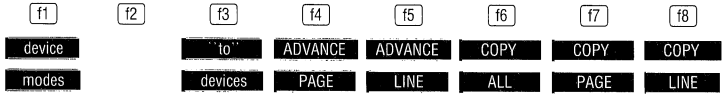
This completes the set-up procedure for data logging. You then enter data, as normal. The terminal automatically routes the information to the destination device(s).

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 SHIFT and ENTER keys.

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:



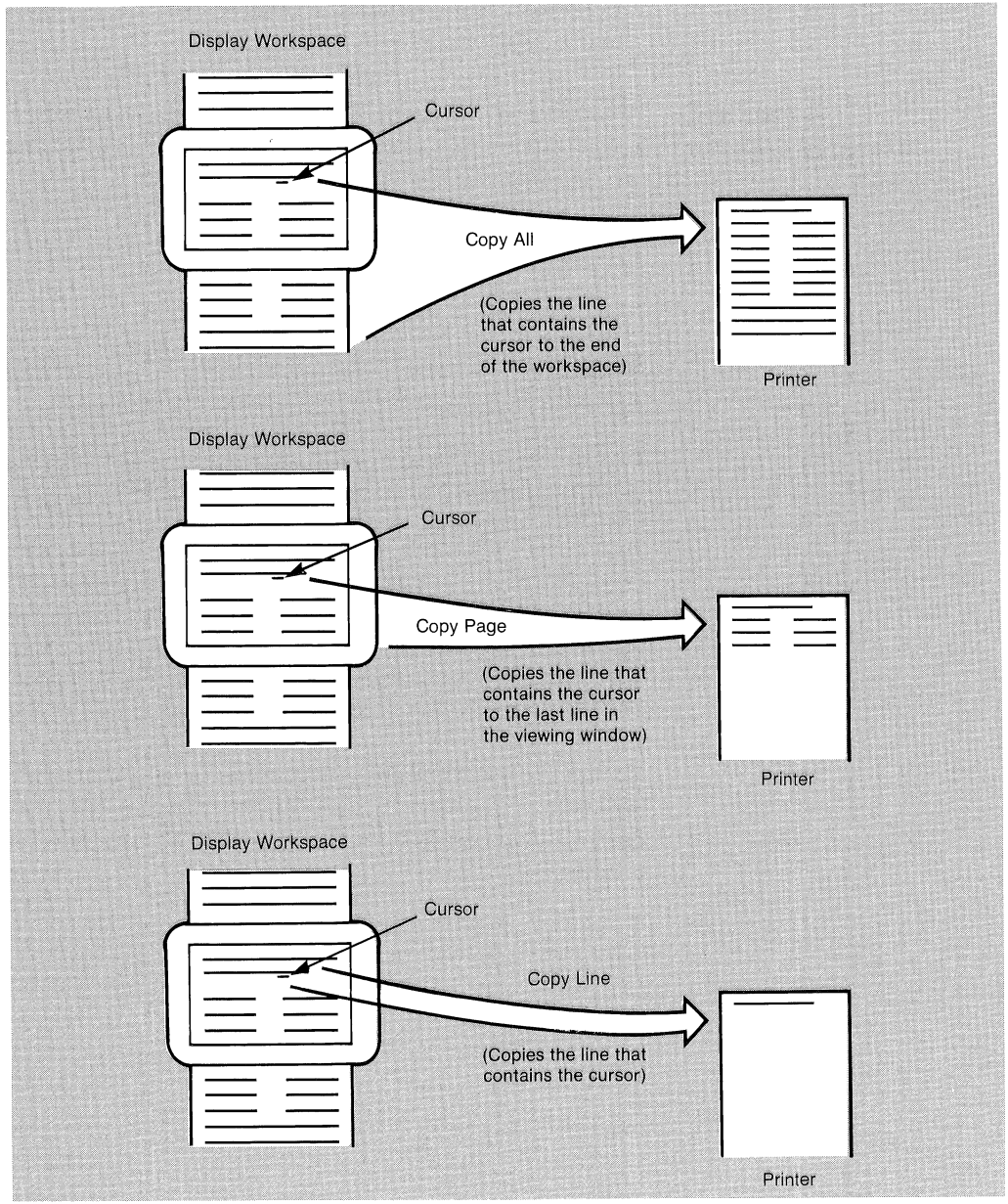
Alternatively, if another set of labels are displayed, you may access the Device Control labels by pressing SYSTEM, f1 (device control). If you wish the printer to skip a line before printing begins, you can press f5 (ADVANCE LINE). Likewise, if you want to skip the paper to the top of the next page (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.

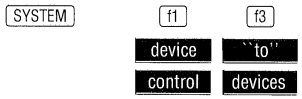
Figure 1-14. Copy All, Copy Page, Copy Line



Using the Print Key. If the terminal is set for Local mode, pressing [SHIFT] [ENTER] copies the contents of display memory to the selected destination device(s). [CTRL] [ENTER] also initiates a graphics hardcopy.

Copying Graphic 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" label set appears, you can enable an external device for the desired graphics hardcopy.

If "Num Pad" appears in the status line, press [SHIFT] [—] keys on the numeric pad to activate the graphics keys (and display "Grph Pad" in the Status Line).

Pressing the "G. Copy" key initiates the graphics data transfer. This key is the [ENTER] key on the numeric pad (see above paragraph). You can cancel the operation by pressing the [RETURN] key. Otherwise, the terminal copies the entire contents of graphics memory to the destination device.

Consult the Reference manual for a list of plotters and graphics printers supported for the terminal. The Reference Manual also contains details on using your terminal with a printer or plotter.

2 The Keyboard

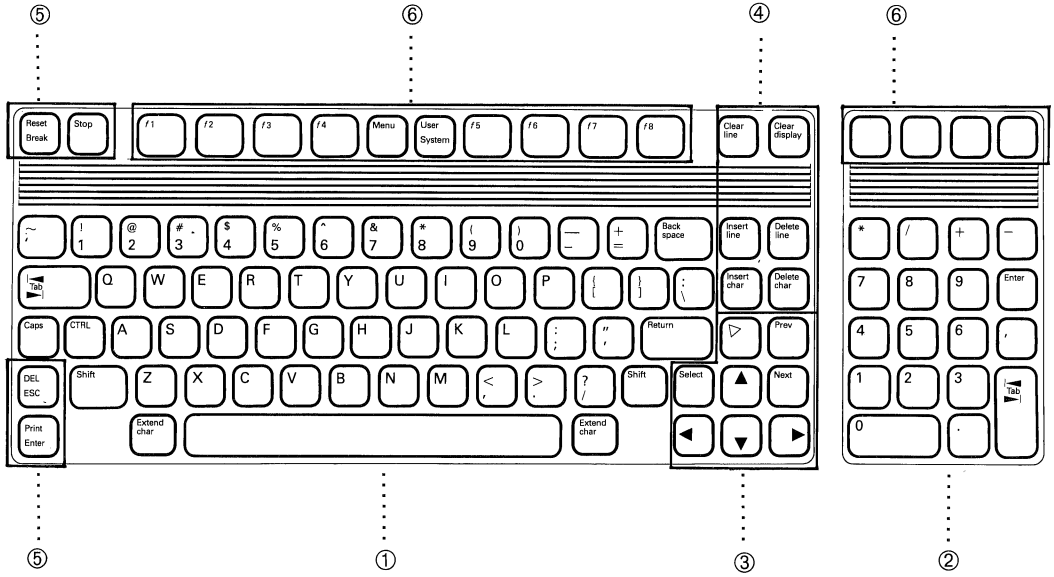
Introduction

The terminal's keyboard consists of several groups of keys:

- Typewriter keys. Type letters, numbers, and symbols just as you do on a standard typewriter.
- Numeric keypad. Use like a calculator for easy, rapid entry of numeric data.
- Display control keys. Control cursor movement and display separate "pages" of data on the screen.
- Edit keys. Edit text on the screen by inserting and deleting data as desired.
- Terminal control keys. Reset the terminal and control communications with a host computer.
- Function keys. Access many important terminal functions, and define your own tasks for these keys to perform.

This chapter describes the functions of the keys in each group.

Figure 2-1. Terminal Keyboard



1. Typewriter keys
2. Numeric keypad
3. Display control
4. Edit keys
5. Terminal control
6. Function keys

Typewriter Keys

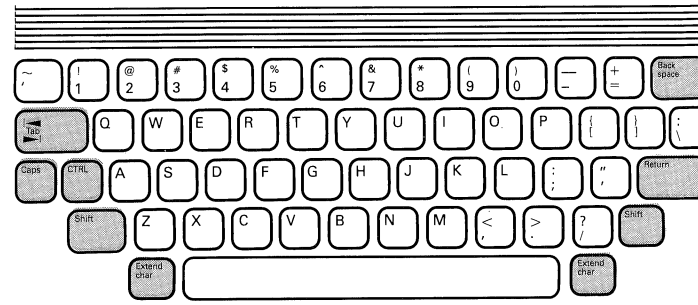
This part of the keyboard works like a standard typewriter. The keys include capital and small letters, numbers, punctuation marks and commercial symbols.

The typewriter keys also provide your access to:

- national language characters other than USASCII (see the [EXTEND CHAR] key description in this chapter).
- math and line drawing symbols, italics or bold characters (see Chapter 3).

The typewriter keys highlighted in Figure 2-2 perform special tasks described in the following paragraphs.

Figure 2-2. Special Typewriter Keys



[SHIFT] Use in combination with other typewriter keys to produce uppercase letters or the top symbol on keys with two symbols.

Use with double function keys to perform the function indicated on the top of the key (for example, [SHIFT] [BREAK] performs the reset function).

Shift key combinations require pressing and holding down all the keys in the combination at the same time.

[CAPS] Activates CAPS mode. Makes all letters you type on the screen capitals (number and symbol keys remain unaffected). "CAPS" appears at the bottom of the screen.

While in CAPS mode, use the [SHIFT] key to type individual lowercase letters.

Pressing [CAPS] again exits CAPS mode, returns the keyboard to normal lowercase operation and clears the "CAPS" indicator from the screen.

[TAB] Moves the cursor to the next set tab (see Chapter 3 for tab setting). In a menu or a form with protected fields, [TAB] moves the cursor from one unprotected field to another. The [TAB] key on the numeric keypad functions the same as the typewriter [TAB] key.

[SHIFT] [TAB] Moves the cursor to the preceding set tab.

[RETURN] Moves the cursor to the first column of the current line. When the terminal is set for automatic line feed, [RETURN] moves the cursor to the left margin of the next line (see Chapter 3 for terminal setting). In "online" use, the host computer usually performs automatic line feed, making terminal setting unnecessary for this feature.

Can be redefined to send other characters to a computer, or can be a signal to a computer that an entry is complete (see the Reference Manual).

[BACK SPACE] Moves the cursor back one space at a time. When you use the terminal by itself, [BACK SPACE] spaces over characters without deleting them. In some computer applications, however, [BACK SPACE] erases characters as it moves backward.

[SPACE] The unmarked space bar on the typewriter portion of the keyboard. Moves the cursor one position to the right, replacing any character with a blank space. (The cursor keys, described in the Display Control section of this chapter, move the cursor without erasing data.)

[CTRL] Use in combination with another typewriter key to control a specific terminal function. The codes these key combinations generate are

used to control the terminal from a computer. You can press a key combination on the keyboard to produce the same effect. For example, [CTRL] [G] rings the terminal's bell.

Use in combination with a terminal control key to access another function (for example, [CTRL] [SYSTEM] activates User Function keys). See the Terminal Control keys section in this chapter for definitions of the extended functions.

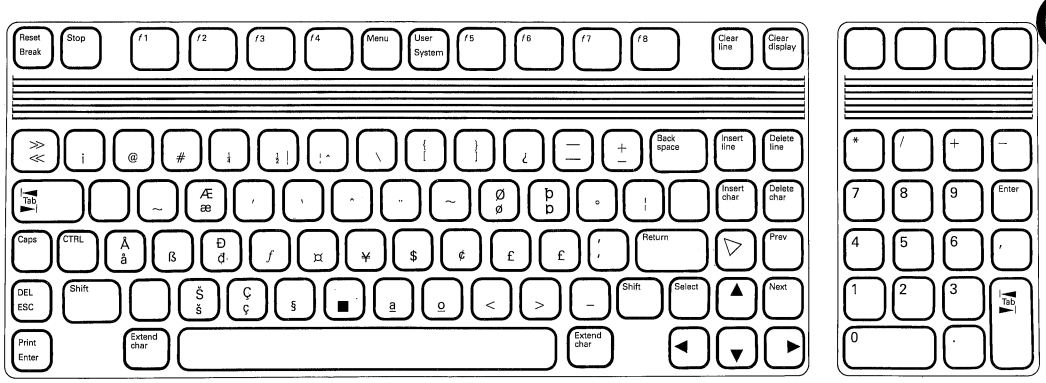
[CTRL] combinations require pressing and holding down all keys in the combination simultaneously.

(See the Reference Manual for detailed information on the use of control codes.)

[EXTEND CHAR] Press and hold down as you press a character key to display the corresponding character from the extended character set (figure 2-3). "Ext Char" appears at the bottom of the screen. Use to type characters and symbols from national languages other than English.

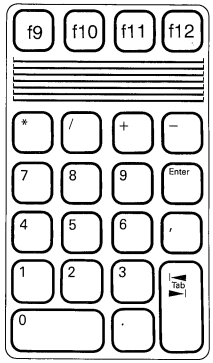
[SHIFT] [EXTEND CHAR] Activates the uppercase characters of the extended character set illustrated in Figure 2-3.

Figure 2-3. Extended Character Set



- To use extended characters, set ASCII 8 bits entry to "yes" in Terminal Configuration Menu. To print them, set parity to "none" and databits to "8" for printer port (see Chapter 3).

Numeric Keypad



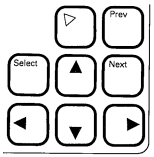
The numeric keypad on the right side of the keyboard contains number and symbol keys arranged like an adding machine or calculator, making rapid entry of numeric information an easy task.

The numeric keypad has alternate personalities, becoming:

- a graphics keypad in Graphics Mode (Chapter 4)
- an ANSI keypad in ANSI Mode (Chapter 5)

The new functions of the numeric keypad keys are described in the chapters indicated above.

Display Control Keys

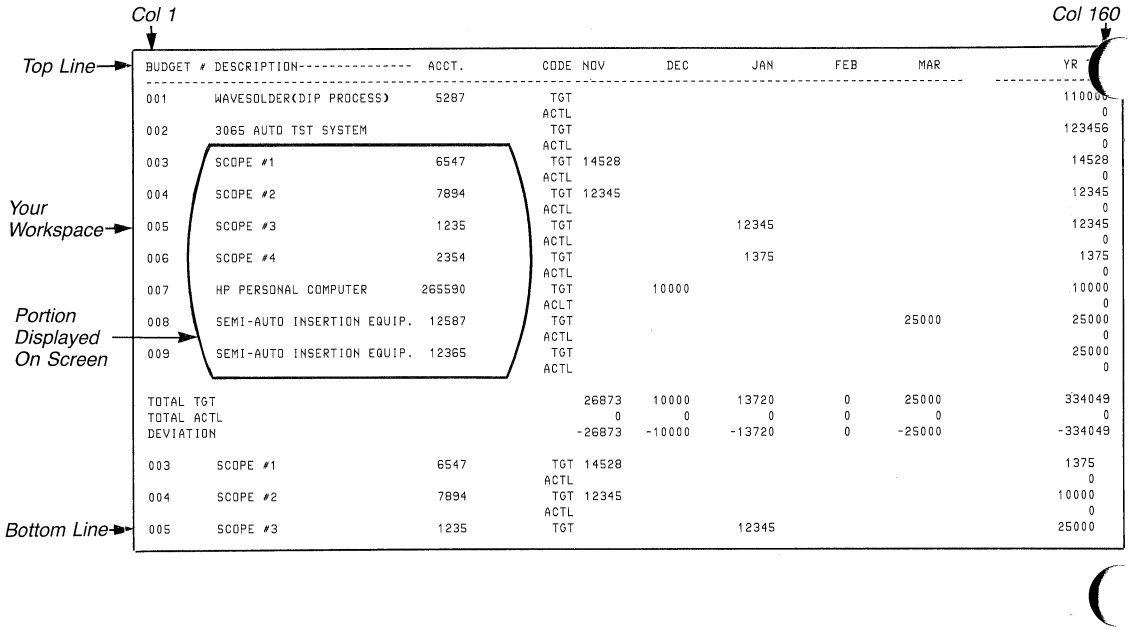


The terminal displays up to 24 lines of 80 characters at a time. Your actual data, however, can extend beyond the boundaries of the screen. The display control keys allow you to determine what portion appears on the screen.

Using the display control keys, you can bring different parts of your workspace into view. You can move the workspace horizontally or vertically (see Chapter 3 for instructions on setting line width).

Display control keys either move the cursor within the screen display, or select an entirely different portion of the workspace for viewing. The remainder of this section describes how each display control key functions by itself and in combination with the [SHIFT] key.

Figure 2-4. Relationship Between the Workspace and the Portion Displayed On The Screen



BUDGET #	DESCRIPTION	ACCT.	CODE	NOV	DEC	JAN	FEB	MAR	YR T
001	WAVESOLDER(DIP PROCESS)	5287	TGT						110000
			ACTL						0
002	3065 AUTO TST SYSTEM		TGT						123456
			ACTL						0
003	SCOPE #1	6547	TGT	14528					14528
			ACTL						0
004	SCOPE #2	7894	TGT	12345					12345
			ACTL						0
005	SCOPE #3	1235	TGT			12345			12345
			ACTL						0
006	SCOPE #4	2354	TGT			1375			1375
			ACTL						0
007	HP PERSONAL COMPUTER	265590	TGT		10000				10000
			ACLT						0
008	SEMI-AUTO INSERTION EQUIP.	12587	TGT					25000	25000
			ACTL						0
009	SEMI-AUTO INSERTION EQUIP.	12365	TGT						25000
			ACTL						0
TOTAL TGT				26873	10000	13720	0	25000	334049
TOTAL ACTL				0	0	0	0	0	0
DEVIATION				-26873	-10000	-13720	0	-25000	-334049
003	SCOPE #1	6547	TGT	14528					1375
			ACTL						0
004	SCOPE #2	7894	TGT	12345					10000
			ACTL						0
005	SCOPE #3	1235	TGT			12345			25000

- The number of lines your terminal is capable of storing depends on the display enhancements and colors you have on each line.

▽	Moves the cursor to "Home Position"—the left margin of line 1 of the screen (and display memory).
SHIFT ▽	Moves the cursor to the left margin of line following the last line of your data (the final segment of your data appears in the screen window).
▲	Moves the cursor up one line (after it hits the top line, the cursor reappears at the bottom of the screen).

SHIFT ▲	Moves lines of text up on the screen, displaying lines of your data that were below the screen window.
▼	Moves the cursor down one line (after it hits the bottom line, the cursor reappears at the top of the screen).
SHIFT ▼	Moves lines of text down on the screen, displaying lines that were above the screen window.
◄	Moves the cursor left one space. You can keep moving left from the first space of a line to the last space of the previous line.
SHIFT ◄	Moves the data to the left one column at a time. Displays columns of your data that were offscreen to the right (stops when the right edge of the workspace is on the right edge of the display.
►	Moves the cursor right one space. You can keep moving right from the last space of a line to the first space of the next line.
SHIFT ►	Moves the data to the right one column at a time. Displays columns of your data that were offscreen to the left. Stops when the left edge of the workspace is at the left edge of the. screen (see Chapter 3 for setting line width).
NEXT	Displays the next segment of your data that was below the screen window (up to 24 lines).
SHIFT NEXT	Displays the next segment of your data that was to the right of the screen window (the column you have designated as the right-hand edge of the workspace appears at the right edge of the screen window).

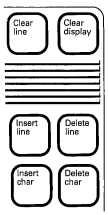
[PREV] Displays the previous segment of your data that was above the screen window (up to 24 lines).

[SHIFT] [PREV] Displays the previous segment of your data that was to the left of the screen window (the first column of your workspace is in the left-hand column of the screen window).

[SELECT] Use this key to "select" from an onscreen menu. This allows you to activate a menu selection just as you would by touching the menu field if your terminal were equipped with the HP Touch accessory.

[SHIFT] [SELECT] Use this key combination to select from an onscreen menu generated by a host graphics program. (This is the equivalent of putting the pen down on a graphics tablet or pressing the "select" button on a mouse.)

Edit Keys



The terminal has built-in editing capabilities that allow you to modify data on the screen. This section describes the word-processing operations available to you through the edit keys—independent of any host computer software.

[CLEAR LINE] Blanks out the line from the cursor's position to the end of the line.

[SHIFT] [CLEAR LINE] Blanks out the line containing the cursor, regardless of the cursor's position in the line.

[CLEAR DISPLAY] Deletes all characters from the cursor's position to the end of your data (including those not currently displayed).

[SHIFT] [CLEAR DISPLAY] — Blanks out the screen and erases all the data not currrently displayed (regardless of the cursor's position). Moves the cursor to "home position").

[INSERT LINE] — Inserts a new blank line above the current line. The cursor moves to the left margin of the new line, and moves the following lines down.

[DELETE LINE] — Deletes the line containing the cursor and moves the following lines up.

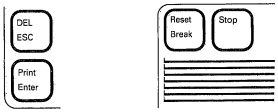
[INSERT CHAR] — Activates Insert Character mode ("Ins char" appears at the bottom of the screen). All subsequent characters you type are inserted at the cursor; if the line beomes full, the letters pushed to the right margin are lost. Press [INSERT CHAR] again to return to normal operation.

[SHIFT] [INSERT CHAR] — Same as [INSERT CHAR], except letters pushed to the right margin are wrapped to the next line. "Ins Wrap" appears in the status line (screen bottom). If the next line becomes full, a new line is inserted.

[DELETE CHAR] — Deletes the character at the current cursor position. Characters in front of the right margin move left to fill the gap.

[SHIFT] [DELETE CHAR] — Deletes the character at the current cursor position AND replaces the last character of the line with the character from the left margin of the next line.

Terminal Control Keys



Four terminal control keys are your controls for specific terminal functions, communications with a host computer, sending data to a printer or plotter, and other tasks described in this section.

[BREAK] Sends a "break" signal to the computer, which usually ends the application currently running. Has no meaning when you are using the terminal by itself (see the Reference Manual for additional information).

[SHIFT] [BREAK] Performs a "soft reset" of the terminal. A soft reset clears keyboard lock and error messages. It also stops any terminal operation currently in progress, turns off display functions and makes the terminal beep. See TROUBLESHOOTING (Appendix B) for further actions resulting from a soft reset.

[CTRL] [SHIFT] [BREAK] Performs a "hard reset" of the terminal. It does the same things as a soft reset and more. See Appendix B for complete details.

[STOP] Temporarily stops/starts data coming to the display from a computer. Has no meaning when using the terminal by itself.

[CTRL] [STOP] Initiates a long break in transmission to and from the host computer.

[ESC] Use in combination with other characters to control terminal operations. [ESC] key combinations—called escape sequences—are primarily used to control the terminal from a computer program. Entering an escape sequence from the keyboard, however, produces the same effect. (The Reference Manual provides full details on escape sequence programming.)

Can be set to operate in reverse—producing a DELETE symbol when pressed alone and operating as the [ESC] key when pressed with [SHIFT] (see Chapter 3).

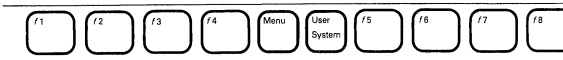
[SHIFT] [ESC] Sends a DELETE character to the host computer. Its meaning depends on the application program. [SHIFT] [ESC] displays a solid symbol on the screen when the terminal is used by itself.

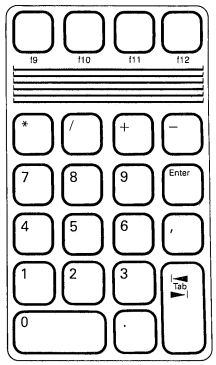
[ENTER] Sends a block of data to the host computer. This requires your setting the terminal to BLOCK MODE. The [RETURN] key can be set to perform the [ENTER] function (see Chapter 3).

[SHIFT] [ENTER] Prints all your data. This includes text on the screen and any not currently being displayed.

[CTRL] [ENTER] Sends graphics from the screen to a graphics printer selected as the "to device" (see Chapter 3—Function Keys—for details on setting the "to device").

Function Keys





The function keys are the most versatile keys on the keyboard. They provide your control over many important terminal operations. Chapter 3 describes how to access these operations; this section merely provides an overview to this key group.

The function keys [f1] through [f8] at the top of the keyboard perform the actions indicated in the eight corresponding labels displayed at the bottom of the screen. You don't have to press a key to start an operation, however. If your terminal is equipped with an HP Touch accessory, simply touch one of the screen labels to perform the function you

want. To select the set of labels that has the desired function, use the [MENU] and [SYSTEM] keys described below.

Four additional function keys—[f9] through [f12]—are accessed via the four unmarked keys above the numeric keypad. These keys have no screen labels associated with them. They do have an extended function—they can be set to automatically perform commands when you turn on the terminal. How to define and use these four keys is explained in detail in Chapter 3.

[MENU]	Turns the display of the function key labels along the bottom of the screen on and off (the user keys are active when the labels are not displayed).
[CTRL] [MENU]	Displays the user keys menu. You can define the twelve function keys as user keys that perform repetitive tasks or type frequently used key sequences. Chapter 3 describes how to define and operate the user keys.
[CTRL] [SHIFT] [MENU]	Turns the touchscreen feature on and off (if your terminal is equipped with HP Touch).
[SYSTEM]	Displays the last set of system labels you used. Press again to bring the primary system labels to the screen (see Chapter 3).
[SHIFT] [SYSTEM]	Displays and activates the user function keys (see [SHIFT] [MENU] description above).
[CTRL] [SYSTEM]	Same as [SHIFT] [SYSTEM].
[CTRL] [SHIFT] [SYSTEM]	Same as [SHIFT] [SYSTEM].

International Keyboards

The keyboard discussed in this chapter is the standard American (USASCII) keyboard.

The Reference Manual contains information on the other national language keyboards available for the terminal.

3 The Function Keys

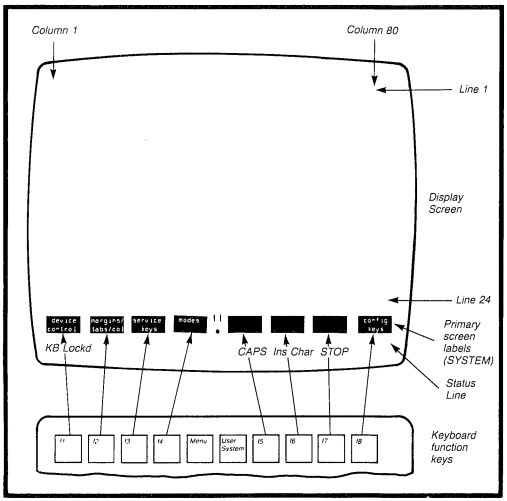
Introduction

The function keys provide a unique method of terminal control. They are your access to many of the terminal's operating features.

This chapter describes the tasks you can perform simply by pressing a few keys (or by touching a few labels on the screen if your terminal is equipped with the HP Touch accessory).

What Are Function Keys?

Figure 3-1. The Function Keys



The eight function keys at the top of the keyboard perform the functions indicated by the eight corresponding screen labels. With HP Touch installed, you can choose between touching a label or pressing the associated key to perform a function.

Uppercase labels perform the indicated function. An asterisk appears in a label that is touched to show the function is active. Several labels in a set can be active at the same time. However, when two labels activate mutually exclusive functions, pressing one label removes the asterisk in the other.

Lowercase labels lead to other label sets, allowing you to cycle through all the functions available.

Four additional function keys—f9 through f12—can be defined for your own use. f9 through f12 are the four unmarked keys above the numeric keypad; they have no screen labels.

This chapter describes all the features the terminal can have. If your terminal is not equipped with one of the optional features discussed in this chapter, the label related to the "missing" feature appears as a blank box on your screen.

What Can Function Keys Do For Me?

The function keys allow you to control and use the following terminal features:

- Terminal operating modes. The **modes** set of function keys allow you to define several important operating characteristics.
- Printing. The **device control**, **device modes** and **"to" devices** sets define how and where you print the contents of your workspace.
- Display characteristics. The **margins/tabs/col**, **enhance video**, **etc.** and **define fields** labels control the display—how it looks, what character set you use, etc.

- Terminal configuration. Each label in the config keys set displays a different configuration menu. In addition, the system defaults labels allow you to choose from among several standard HP computer configurations. Some frequently used menu selections are discussed here: the Reference Manual contains explanations of all available selections.
- Terminal tests. The service keys set provides several useful terminal tests to run. Included in this set is a label that aligns the touchscreen.
- User function keys. Pressing CTRL Menu displays the menu for defining keys f1 through f12 for your own applications. After defining the keys, you press Shift User System to activate the keys.

Figure 3-2. Available Sets of Function Keys

System

device control	margins/ tabs/col	service keys	modes	21 112	44 234	enhance video	define fields		config keys

modes

LINE MODIFY*	MODIFY ALL *	BLOCK MODE *	REMOTE MODE *	21 112	44 234	SMOOTH SCROLL*	MEMORY LOCK *	DISPLAY FUNCTNS*	AUTO LF *

device control

device modes	PRESET PRINTER	''to'' devices	ADVANCE PAGE	21 112	44 234	ADVANCE LINE	COPY ALL	COPY PAGE	COPY LINE

device modes

device control	RECORD MODE *	LOG BOTTOM*	LOG TOP *	21 112	44 234	EXPAND PRINT *	COMPRESS PRINT *	REPORT PRINT *	METRIC PRINT *

"to" devices

device control	TO EXT DEV*		TO DISPLAY*	21 112	44 234				

margins/tabs/col

START COLUMN	SET TAB	CLEAR TAB	CLR ALL TABS	21 112	44 234	LEFT MARGIN	RIGHT MARGIN	CLR ALL MARGINS	TAB = SPACES*

service keys

POWER ON TEST		DISPLAY ALIGNMNT		21 112	44 234	TERMINAL TEST	IDENTIFY HARDWARE	DATACOMM TEST	

enhance video

define fields	SET ENHNCMNT	SECURITY VIDEO *	INVERSE VIDEO *	21 112	44 234	BLINK VIDEO *	UNDRLINE VIDEO *	HALF BRIGHT*	etc.

etc.

CHANGE TO BASE	CHANGE TO MATH	CHANGE TO LINE	CHANGE TO BOLD	21 112	44 234	CHANGE TO ITALC			etc.

define fields

enhance video	START UNPROTCT	START XMIT FLD	STOP FIELD	21 112	44 234	ALL CHARS	ONLY ALPHA	ONLY NUMERIC	FORMAT MODE *

config keys

global config		datacomm config	ext dev config	21 112	44 234	terminal config	ansi config		

global config and ext device config

SAVE CONFIG	NEXT CHOICE	PREVIOUS CHOICE	DEFAULT VALUES	21 112	44 234	POWER ON VALUES	ACTIVE VALUES	DISPLAY FUNCTNS*	config keys

System Function Labels

The [User System] key displays the system function labels. Press it once to display the last set of labels you used. Press it again to display the system function labels:

Touch a system function label and you get another set of labels:

LABEL	NEW SET DISPLAYED
device control	Defines how you print information to a printer connected to the terminal.
margins/ tabs/col	Formats the display of information on the screen.
service keys	Performs several terminal tests and aligns the display or the touchscreen.
modes	Selects the operating modes you desire.
enhance video	Selects one or more video enhancement or chooses an alternate character set.
define fields	Creates forms for use in HP 3000/1000 applications.
config keys	Calls up menus to select precisely the operating characteristics you desire.

Printing with device control Set

You can select the amount of information you print and control the positioning of paper in a printer with the device control labels:

LABEL	FUNCTION
device modes	Displays the labels that govern how your information looks when it's printed.
PRESET PRINTER	Sets configured printer for normal operations (typical settings include character wraparound, margins, etc.)
"to" devices	Displays labels to select where you want information to be "printed".
ADVANCE PAGE	Advances the printer to a new page.
ADVANCE LINE	Advances paper in printer one line.
COPY ALL	Prints all your information, starting with the line containing the cursor.
COPY PAGE	Prints all the information on the screen, starting with the line containing the cursor.
COPY LINE	Prints the line containing the cursor.

Logging Data with the device modes Labels

You can automatically route information to a printer using the device modes set:

device	RECORD	LOG	LOG	EXPAND	COMPRESS	REPORT	METRIC
control	MODE*	BOTTOM*	TOP*	PRINT*	PRINT*	PRINT*	PRINT*

LABEL	FUNCTION
device control	Gets back the device control labels.
RECORD MODE*	When REMOTE MODE in modes set is turned off, RECORD MODE* sends all the information in your workspace to a printer. When REMOTE MODE* is on, the computer sends data directly to the printer, bypassing the terminal's display memory if so configured.
LOG BOTTOM*	As the cursor enters a new line, the previous line prints on a printer (continuous logging).
LOG TOP*	Prints each line as it scrolls off the top of the workspace (continuous logging).
EXPAND PRINT*	Prints five characters per inch (40 characters per line.) The vertical height remains the same.
COMPRESS PRINT*	Sets printer to print 16.4 characters per inch (132 characters per line).
REPORT PRINT*	Prints an 11-inch page with a 3-line top margin, 60 lines of text, and a 3-line bottom margin. A small tic mark shows the end of one page and the beginning of the next.
METRIC PRINT*	Prints a page with 70 lines (3-line top margin, 64 text lines, 3-line bottom margin). A tic mark shows the end of one page and the beginning of the next.

Select a Printer Via "to" device Labels

The "to" device set selects where your information prints:

LABEL	FUNCTION
device control	Gets back the device control labels.
TO EXT DEV*	Sets the terminal to print to a connected printer.
TO DISPLAY*	Sets the terminal to "print" to the screen display.

Format the Display with margins/tabs/col Labels

This set of labels formats the information on the screen:

START COLUMN	SET TAB	CLEAR TAB	CLR ALL TABS	LEFT MARGIN	RIGHT MARGIN	CLR ALL MARGINS	TAB = SPACES

LABEL	FUNCTION
START COLUMN	Sets the start column to the cursor's current column. You can then transmit information to a computer beginning with the start column you have specified. The terminal uses the specified start column only if: ■ no logical start-of-text pointer exists. ■ the terminal is connected to a computer and is sending information one character at a time. ■ you request a retransmission of information by turning on LINE MODIFY or MODIFY ALL in the modes set. If set, the logical start-of-text pointer overrides the start column you specify. However, the terminal uses a logical start-of-text pointer only if:

LABEL	FUNCTION
	■ the terminal is in Remote Mode when it receives the information. ■ the information was entered from the keyboard, not received from the computer. ■ the just-entered information is the last-used line in workspace memory.
SET TAB	Sets a tab at the cursor's current column position.
CLEAR TAB	Clears a tab at the cursor's current column position.
CLR ALL TABS	Clears all tabs.
LEFT MARGIN	Sets the left margin at the cursor's current column.
RIGHT MARGIN	Sets the right margin at the cursor's current column.
CLR ALL MARGINS	Sets the left margin at column 1 at the right margin at the right edge of the workspace (see column setting in Global Configuration Menu).
TAB= SPACES	Sets a "tab" to generate the appropriate number spaces to move the cursor forward to the next tab stop or backward to the previous one.

Tests Available Through service keys Labels

The service keys set provides several terminal tests (test procedures are explained in Appendix A—Installation):

POWER ON TEST | DISPLAY ALIGNMNT | TERMINAL TEST | IDENTIFY HARDWARE | DATACOMM TEST

LABEL	FUNCTION
POWER ON TEST	Performs a test of the terminal.
DISPLAY ALIGNMNT	Displays a test pattern used to align the display (also used to align the touchscreen if you have equipped the terminal with HP Touch).
TERMINAL TEST	Performs a test of the terminal.
IDENTIFY HARDWARE	Lists the ROMs installed in the terminal by part number and date for the version of code each ROM contains; also lists amount of RAM installed.
DATACOMM TEST	Performs a test of data communications.

The modes Labels

The modes labels control many of the terminal's operating conditions:

LINE MODIFY	MODIFY ALL	BLOCK MODE	REMOTE MODE	SMOOTH SCROLL	MEMORY LOCK	DISPLAY FUNCTNS	AUTO LF

LABEL	FUNCTION
LINE MODIFY	Allows editing of a line of text without having to retype the entire line. This mode operates only while Remote Mode is active and Block Mode is off. To edit a line, press LINE MODIFY, edit the text, then press the Return or Enter key to transmit the edited line to the computer (Line Modify is then automatically turned off).
MODIFY ALL	Similar to Line Modify, except that Modify All Mode remains on after you press the Return or Enter key. You have to press MODIFY ALL again to leave the mode.
BLOCK MODE	In Remote Mode operation, sends text to the computer all in one block. Characters appear on the screen as you type them, but are not transmitted to the computer until you press the Enter key. When Block Mode is off, the terminal transmits characters to the computer as you type them.
REMOTE MODE	Sets the terminal to operate "online" with a computer. Turning off Remote Mode puts the terminal offline for Local Mode operation.
SMOOTH SCROLL	Sets the display to scroll your information in an even flow, rather than "jumping" the lines.
MEMORY LOCK	Overflow Protection: To ensure that you don't lose data accidentally when workspace memory is full, you select Memory Lock while the cursor is in the first screen line. Upon reaching the end of your

LABEL	FUNCTION
	workspace. the keyboard locks, the terminal tone sounds and "MEMORY FULL" appears on the screen. To continue entering text, press Return to clear the message and unlock the keyboard, then delete some existing text or turn off Memory Lock. Display lock: You can "freeze" selected lines on the screen by turning on Memory Lock in a line of text. All lines above the cursor's current line become locked in place on the screen. Then enter data normally. When the viewing window fills up, any further data entered forces the first line of unfrozen text to scroll under the frozen data. Lines scrolled off the screen are inserted in memory immediately preceding the first frozen line.
DISPLAY FUNCTNS	Allows you to enter control characters on the screen without having the terminal perform the control operations indicated (carriage return and linefeed are displayed AND executed).
AUTO LF	Sets the terminal to advance the cursor to the next line when you press the Return key, which normally places the cursor at the beginning of the current line.

Video Enhancements and Alternate Character Sets

The enhance video labels allow you to alter the way your information displays on the screen:

LABEL	FUNCTION
define fields	Displays the define fields labels for creating forms.
Set ENHNCMNT	Activates the currently selected state (either on or off) for every enhancement. You use this key to enable or disable any enhancement.
SECURITY VIDEO	Prevents characters entered in this field from being displayed. This selection is used to define password fields. When you type a password, the characters display as blank spaces but the information is sent to the computer (you must be in Remote Mode). Security video is not available on the 2397A.
INVERSE VIDEO	Inverts the display intensity. If the display shows a dark background with bright characters, this label changes it to dark characters on a bright background. Inverts foreground/background colors on 2397A.
BLINK VIDEO	Causes the characters in the field to blink on and off.
UNDRLINE VIDEO	Underlines all characters (including blanks).
HALF BRIGHT	Displays all characters in the field at half intensity (gray). Maps to color pair 3 on 2397A.

LABEL	FUNCTION
etc.	Displays the remaining enhancement labels alternate character sets:

CHANGE TO BASE	The base character set is activated.
CHANGE TO MATH	The math set is activated.
CHANGE TO LINE	The line drawing set is activated.
CHANGE TO BOLD	The bold character set is activated.
CHANGE TO ITALC	The italic character set is activated.
etc.	Returns the enhance video labels to the display.

Creating Forms with define fields Labels

Use the define fields labels to create forms as follows:

enhance	START	START	STOP	9 ALL	ONLY	ONLY	FORMAT
video	UNPROTCT	XMIT FLD	FIELD	CHARS	ALPHA	NUMERIC	MODE

LABEL	FUNCTION
enhance video	Displays the enhance video labels.
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 Remote and Format Modes are on.
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 Remote and Format Modes are on.
STOP FIELD	Defines the end of an 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 characters" field. You can type any character into such a field.
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 uppercase and lowercase letters and the space character.

LABEL	FUNCTION
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 numeric digits, the space character, the plus and minus signs. the comma, and the period.
FORMAT MODE	Enables and disables Format Mode. In Format Mode, the terminal enforces field specifications to prevent accidental overwriting of protected areas. When you enable Format Mode, the terminal positions the cursor at the beginning of the first "unprotected" field (if none exists, the cursor homes to row 1, column 1).

Configuring The Terminal

As you have seen in this chapter, your terminal is no static piece of equipment. You can change many of its operating features to suit your specific needs. The configuration menus described here allow you to tailor these features.

Through the config keys labels you have access to seven configuration menus for:

- Global Configuration
- Terminal Configuration
- Remote Datacomm Configuration
- External Device Configuration (one of three menus depending on the type of external device connected to the terminal)
- ANSI Configuration

Once you have selected and displayed a menu, the folowing labels are displayed. Use them to select, change, and save settings in the menu:

LABEL	FUNCTION
SAVE CONFIG	Saves the selections currently displayed as the new "power on values", activates those selections and returns the terminal to normal operation (system function labels are displayed on the screen).
NEXT CHOICE	When the cursor is in a menu field with pre-set values to choose from, NEXT CHOICE cycles forward through that list.
PREVIOUS CHOICE	Cycles through a pre-set list of menu settings—just like NEXT CHOICE, only backwards.
system defaults	Displays the system default labels.
DISPLAY FUNCTNS	Allows the placement of control characters in a menu entry without performing the indicated functions of those characters. They appear on the screen in symbolic form (like CR for Return).
config keys	Any change made in the menu is ignored by the terminal. This is your route out of a menu when you don't want to change and save any entries.

To select a setting in any menu:

1. Position the cursor at the desired entry in the menu (use the Tab key or cursor movement keys marked with arrows).

2. Press NEXT CHOICE or PREVIOUS CHOICE to cycle through predefined selections, or enter a desired value from the keyboard.

3. Press SAVE CONFIG to store and activate your new selections and return to normal operation. (Press config keys if you decide you don't want the changes to take effect. This restores the menu to its original state and returns normal operation).

The system default labels allow you to choose from several standard HP computer configurations. These labels can save you time and effort in configuring your terminal, provided that your environment matches the standards listed:

config	POWER ON VALUES	ACTIVE VALUES	DEFAULT VALUES	HP 1000 PT. PT.	f6	HP 1000 PT. PT.	f8

LABEL	FUNCTIONS
config	Returns the config keys labels to the screen.
POWER ON VALUES	Displays the menu settings stored in memory that are active when you turn the terminal on.
ACTIVE VALUES	Displays the menu settings currently active (the active settings can differ from the stored settings).
DEFAULT VALUES	Displays the default ROM settings.
HP 1000 PT. PT.	Enters into the menu all the default settings for connecting to an HP 1000 computer.
HP 3000 PT. PT.	Enters the default settings for connecting to an HP 3000 computer.

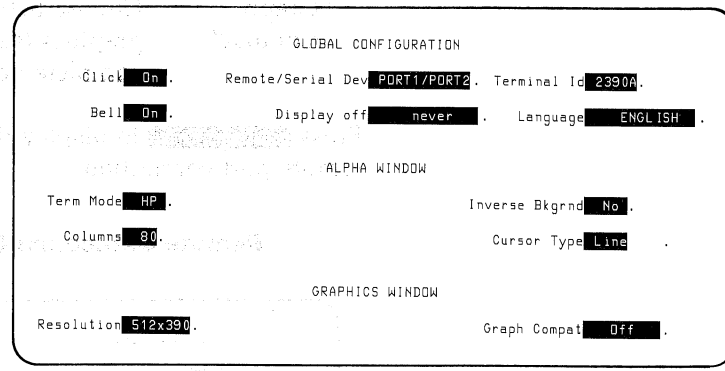
The Menus

The config keys labels call up the various menus. These menus are illustrated here with some frequently used settings discussed. See the Reference Manual for complete descriptions of all the available settings in each menu.

global config	f2	datacomm config	ext dev config	terminal config	ansi config

Press global config to display the Global Configuration menu:

Global Configuration Menu



Sample selections:

"Click" — You can turn off the audible keyboard click.

"Bell" — Normally the terminal beeps when you reach the right margin. A "No" in this field turns the beep off (CTRL G still causes a beep).

"Columns" — Select how wide you want your display. You can choose any value between 80 and 160 in increments of 2. Use horizontal scrolling to view lines longer than 80 characters.

Sample selections: (continued)

"Cursor Type"	Choose a blinking underline or box cursor.
"Resolution"	In graphics mode, choose between 512x390 and 640x400 points for your graphics resolution.
"Term Mode"	Choose between HP, ANSI, or EM52 operating modes
"Graph Compat"	Choose between HP and TEK mode graphics (see "Graphics," chapter 4, for complete details).

Press datacomm config to display the menu for configuring the remote port connection:

Remote Datacomm Configuration Menus

```
REMOTE DATACOMM Full Duplex Hardwired CONFIGURATION          Port 1

BaudRate 9600.  Parity/DataBits None/8.   Check Parity No.
Asterisk Off.       Stop Bits 1.          EnqAck Yes.
  TR(CD) Hi.          SR(CH) Lo.
RecvPace None.  Break Time 160.     RR(CF)Recv No.
XmitPace None.  Stop Function Xon/Xoff.   CS(CB)Xmit No.  DM(CC)Xmit No.
```

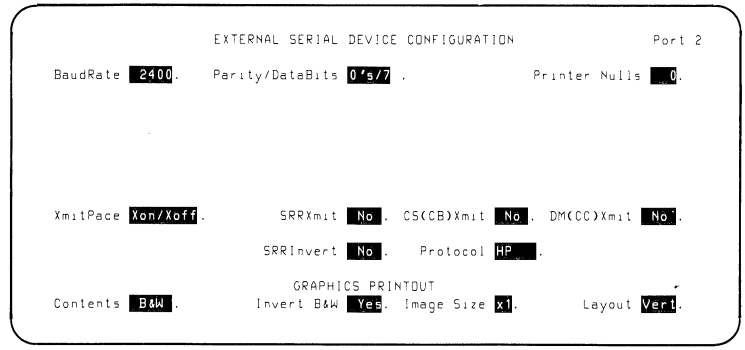
```
REMOTE DATACOMM Full Duplex Modem CONFIGURATION              Port 1

BaudRate 1200.  Parity/DataBits 0's/7 .   Check Parity No.
Asterisk RR.        Stop Bits 1.          EnqAck Yes.
  TR(CD) Hi.          SR(CH) Lo.
RecvPace None.  Break Time 160.     RR(CF)Recv No.
XmitPace None.  Stop Function Xon/Xoff.                  DM(CC)Xmit No.
```

Sample setting:

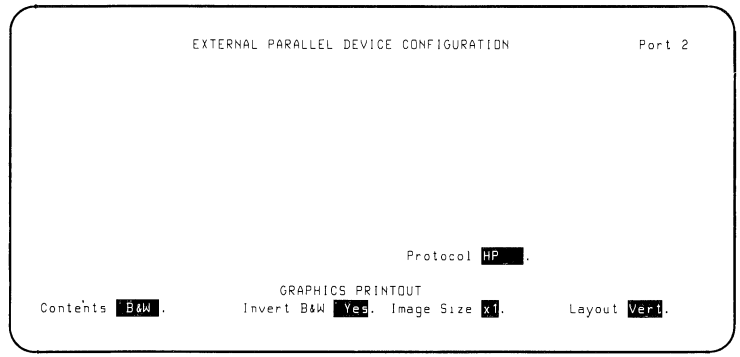
"BaudRate"	Choose the data transmission speed you need to match the system used (predefined list of settings).

Press ext dev config to display the menu for configuring a printer or plotter. Depending on your port option, one of the following three menus is displayed:

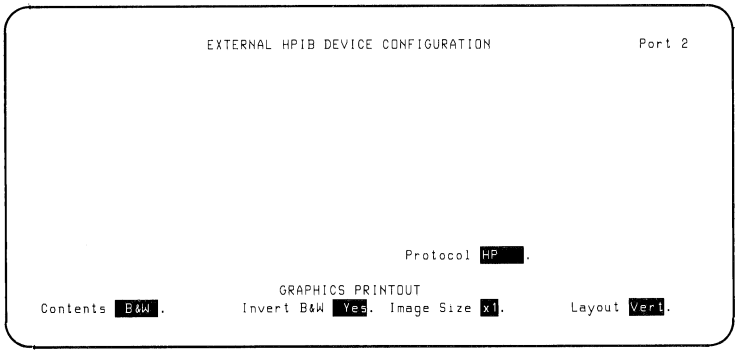
External Serial Device Configuration Menu



External Parallel Device Configuration Menu



External HPIB Device Configuration Menu

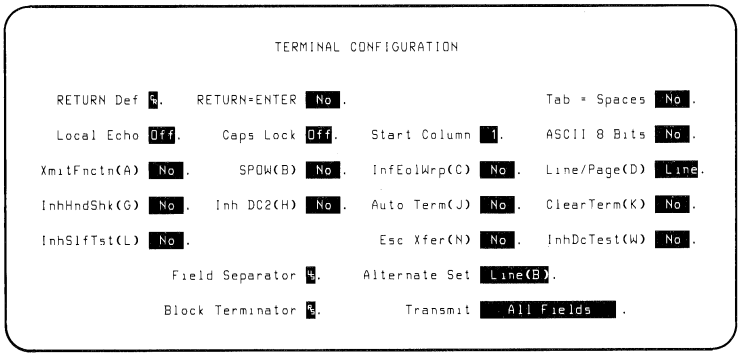


Sample Settings:

See the Reference Manual for descriptions of all available settings.

Press terminal config to display the Terminal Configuration Menu:

Terminal Configuration Menu

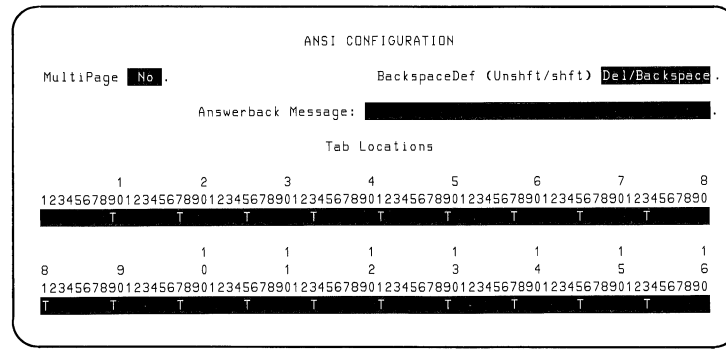


Sample selections:

"RETURN= ENTER"	You can define the Return key to function as the Enter key.
"Alternate Set"	You can have the math, bold, line drawing, etc. character set be the alternate set.

Press ansi config to display the ANSI Configuration Menu.

ANSI Configuration Menu



Sample selections: see Chapter 6 for descriptions of settings.

User-Definable Function Keys

So far, you have learned how to perform many basic tasks using your terminal's function keys.

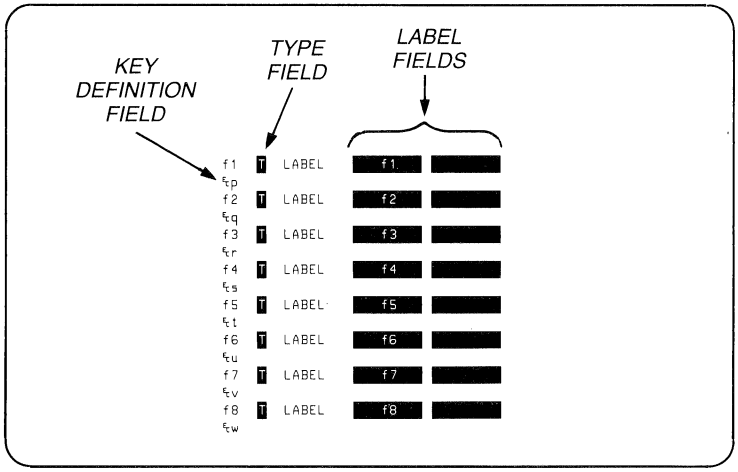
This section describes how you can define keys f1 through f12 to perform your own unique tasks. With the user-defined key feature, you can customize your terminal to suit any application.

Until you enter your own definitions, the user-definable function keys have default definitions that are in effect when you power the terminal on, perform a hard reset, or press the DEFAULT VALUES function key while the definition menu is displayed.

Defining Keys f1 Through f8

To define f1 through f8, press the CTRL and Menu keys together to display the definition menu (Figure 3-3). The default definitions for these keys are shown in the menu.

Figure 3-3. Menu For User-Defined Keys f1 Through f8



You define three fields for each user key: the transmission "type" character, the label, and the key definition itself.

- TYPE CHARACTER. This tells the terminal how to interpret your key definition. 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.

Position the cursor in the type field for key [f1]. Press the NEXT CHOICE and PREVIOUS CHOICE key until the type selection —L, T or N—is displayed in that field.

- LABEL FIELD. Assign a label to each function key to remind you which function that key performs. The maximum label size is 16 characters: 8 characters in the label's upper half, and 8 characters in the label's lower half.

  On the definition menu, the label field is 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".

  Position the cursor in the first block of the first key's label field and type the top half of your first label. Then type the bottom half of the label.

- DEFINITION FIELD. Position the cursor on the line below the label blocks. Now type the definition for the first user key. The definition can be up to 80 characters long.

  Use the DISPLAY FUNCTNS function key to enter keys that have special functions. When DISPLAY FUNCTNS* is activated, the function of a special key is inhibited so that you can include the special key in your definition. For example, you can include a carriage return in your definition. When DISPLAY FUNCTNS* is activated, pressing the [Return] key displays a "CR" character in your definition. When you turn off DISPLAY FUNCTNS, the normal operation for the [Return] key is reactivated (now pressing [Return] performs the normal function of the key—moving the cursor to the beginning of the line).

The default definition string for each of the eight function keys consists of two characters: the escape character (&t) 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 "&tt".

When you have finished defining keys f1 through f8, press the System key to exit the definition menu and display the last set of function labels you used.

Using Your Newly Defined Keys f1 Through f8

You activate the user-defined keys f1 through f8 by pressing Shift System or CTRL System to display the user-defined function key labels across the bottom of the screen. When no labels have been defined, the default values (f1–f8) appear.

Simply press a function key and your definition is executed, just as if you had typed it from the keyboard. If your terminal has HP Touch, you can touch a label OR press a key to perform the desired function.

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 logon 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.

When you are finished using your defined function keys, press the System key to display the last set of system labels you used and return to normal operation.

The following example summarizes many of the 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 [System], then [f4] ([modes]) to see if a asterisk occurs in the [AUTO LF] label. If so, press [f8] to disable Auto Linefeed.

Step 2. Simultaneously press the [CTRL] 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 [System], then [f4] (modes) 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.

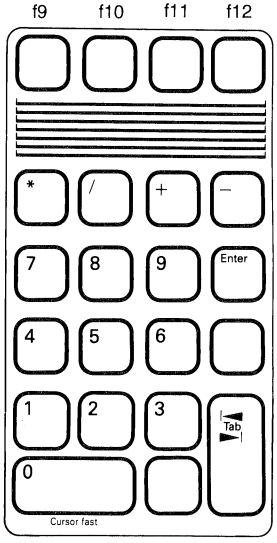
Step 10. Press [Shift] [System] or [CTRL] [System] to enter Use mode. (Notice that your title has replaced the "f1" label.)

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

Defining Keys [f9] Through [f12]

You have four additional user-definable keys—[f9] through [f12]—which you can define and use. These keys are the four unmarked keys above the numeric keypad (they are marked on the overlay).

Figure 3-4. User-Definable Keys [f9] Through [f12]

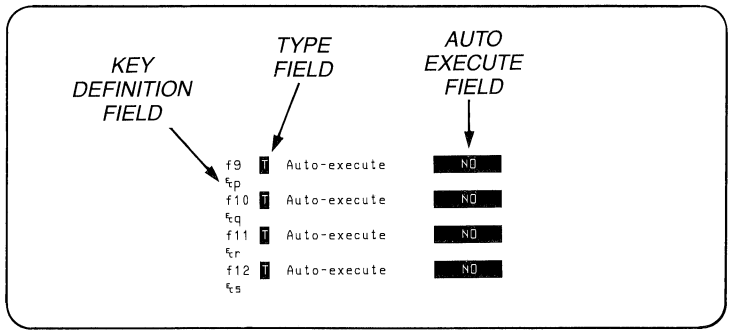


Keys [f9] through [f12] are similar to the keys discussed in the previous section — except for two vital differences:

- [f9] through [f12] do not have corresponding screen labels
- the definitions you assign to [f9] through [f12] can be saved in nonvolatile memory and set to automatically execute whenever you turn on the terminal

To define [f9] through [f12], press [CTRL] [Menu], then [f8] (define f9-f12) to display the appropriate definition menu.

Figure 3-5. Definition Menu For Keys [f9]–[f12]



You choose the "type" character and enter your definition for each key using the same methods described earlier for keys [f1] through [f8]. If you want your definitions to automatically execute whenever you turn on the terminal, position the cursor in the "Auto-execute" field and press NEXT CHOICE or PREVIOUS CHOICE until "YES" appears in that field.

Using the POWER ON VALUES function key, you can return a previously stored set of definitions to the menu.

The [Next] and [Prev] keys allow you to alternate the display of the two user key definition menus.

When you are satisfied with the settings and definitions for keys [f9] through [f12]—and you want to save them in non-volatile memory—press [f1] (SAVE CONFIG). If you want to use your definitions only temporarily, do not press SAVE CONFIG. Instead, exit the menu by pressing the [System] key, which displays the last set of system labels you used.

Using Keys [f9] Through [f12]

Keys [f9] through [f12] are active as soon as you leave the definition menu. (If the menu for [f1] through [f8] is displayed, exit that menu by pressing the [System] key.)

If you set [f9] through [f12] for "Auto-execute," they will automatically execute in sequence whenever you turn on the terminal (they must be "T" type). Thus if you defined [f9] as your logon and [f10] as "HPDESK," every time you turn on the terminal, you automatically log onto your system and enter HPDESK.

4 Graphics

Introduction

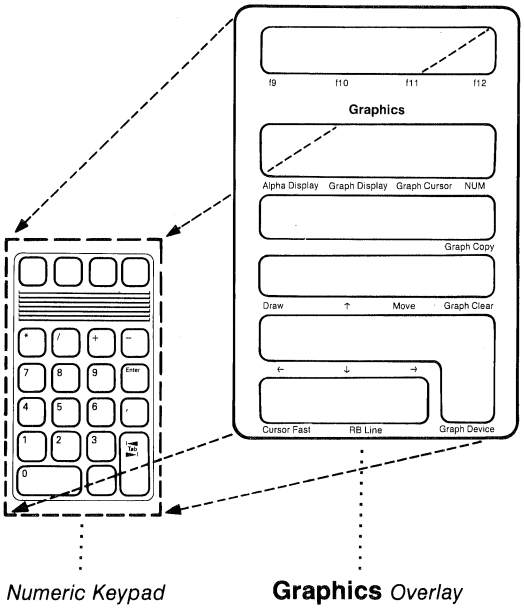
Your terminal maintains distinct memories for alphanumeric and graphics data. It provides separate control of each, allowing you to display the contents of either memory alone or both simultaneously. Through the "graphics" keypad, you have limited control over the terminal's graphics features. Escape sequences, used primarily by applications programs running on your host computer, 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

The numeric keypad assumes an extended role when it is graphics mode. A plastic template overlays the numeric keypad and shows the various keys' graphics operations. Where the template lacks a label, the corresponding key has no extended function.

Figure 4-1 shows the correspondence between the graphics keys and the numeric keypad.

Figure 4-1. 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 left the keypad.

The Status Line shows the keypad's current operating state. The message "`Grph Pad`" is displayed when the numeric keypad is in graphics mode; "`Num Pad`" is displayed when the pad is set for numeric data entry mode. You change the keypad to graphics operation by pressing the Shift key on the main keypad together with the − (Minus) key on the numeric pad. When set for graphics operation, you return the keypad to numeric operation by again pressing the Shift and "Minus" keys.

Table 4-1 lists the functions for the graphics keys when the keypad is in graphics mode.

Table 4-1. Graphics Keypad Functions

KEY	FUNCTION
Alpha display	Turns on and off the display of data from alphanumeric memory.
Graph display	Turns on and off the display of graphics data.
Graph cursor	Turns the graphics cursor on and off. To view the cursor, the graphics display must be on.
Shift or CTRL —	A toggle switch that alternates the numeric keypad between graphic and numeric operations. The status line shows the keypad's current operating mode.
Graph copy	Pressing this key copies the contents of graphics memory to the selected destination device(s).
Graph clear	Pressing this key clears the contents of graphics memory.
Draw	Allows you to draw lines and shapes locally.
Move	Moves the drawing "pen" to the point indicated by the graphics cursor position.
↑, ↓, ←, 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.
RB Line	Turns the rubber band line on or off.
Graph device	Turns graphics input devices (such as a mouse or tablet) on and offline, allowing you to disable an input device at any time for your convenience.

Drawing with Your Graphics Terminal

In most instances, drawing graphics on your terminal screen is done in conjunction with graphics applications programs on a host computer. These graphics programs prompt you to perform the appropriate actions so you can generate pictures and graphs on the screen. Thus you follow the computer's screen instructions (and the manual for the applications program you are running) to draw what you want.

There are, however, several ways you can draw locally on the screen, without the aid of a host computer program. The following paragraphs explain these local drawing features, including positioning the graphics cursor and drawing with:

- The graphics keys on the keyboard
- The mouse
- The touchscreen
- A graphics tablet

Using the Graphics Keypad

Your terminal powers on with the numeric keypad in graphics mode and the message "Grph Pad" displays in the status line. If the message "Num Pad" is displayed, you can enter graphics keypad mode by pressing the Shift (main keypad) and − (numeric pad) keys together, or CTRL (main keypad) and − (numeric pad) keys together.

The graphics overlay provided with your terminal should be mounted on the numeric keypad to facilitate your using the keypad for graphics operations.

How To Draw with the Graphics Keys

To display the graphics cursor, press the + key on the numeric pad ("Graph cursor"on the overlay). A small crosshair appears on the screen to indicate the current position of the graphics cursor.

You can move the graphics cursor up, down, right or left using the four arrow keys on the keypad. Diagonal movement of the graphics cursor is achieved by pressing two arrow keys at once. For example, to move the cursor diagonally to the upper righthand corner of the screen, press the up and right arrow keys together. Naturally, pressing the up and down arrow keys together—or the right and left arrow keys together—won't move the cursor at all. If you want the cursor to move faster, press and hold down the [0] key on the numeric pad ("Cursor fast").

To draw a line on the screen, position the cursor at a desired beginning point and press the [6] key on the numeric pad ("Move"). This moves an imaginary "pen" to the point indicated by the cursor. Now position the cursor at the other end-point of the line you want to draw and press the [4] key on the numeric pad ("Draw"). A line is drawn connecting the two points.

Using Rubber Band Line

You can use the rubber band line feature of your terminal to preview lines before you draw them. Turn on the rubber band line by pressing the [.] key on the numeric pad ("RB Line"). The rubber band line is displayed from the current "pen" position to the graphics cursor. As you move the cursor, the line stretches and contracts like a rubber band from the current "pen" position. The temporary line is "set" when the cursor position is entered as a new point by pressing [6] on the numeric pad ("Move"). The origin of the temporary rubberband line is then updated to the new point and the process can be repeated.

Note that if the graphics cursor is not already on, activating the rubberband line function turns on the graphics cursor.

Using the Mouse for Drawing

You can use the HP Mouse for drawing locally or drawing in conjunction with host-driven software.

For local drawing with the mouse, activate the graphics cursor (press the [+] key). Moving the mouse on a flat

surface, such as a desktop, moves the cursor on the screen display. To make finer movements, press the right-hand button on the mouse while moving it about the desk. This increases the mouse's accuracy for exact pin-pointing. When the cursor is at the desired point, press the [6] key on the numeric pad ("Move") to activate the point. You can have the rubber band line on during this activity if you want to see a line before it is drawn. Using the mouse, now move the cursor to the second end-point of the line you want draw, then press the [4] key on the numeric pad ("Draw") to draw the line connecting the two points.

You can also draw freestyle—write your name or make continuous shapes—by pressing and holding down the "Draw" key as you move the mouse around.

With a host software program, use the mouse in a similar fashion and follow the screen instructions you receive from the host program. You can "pick" from a menu by pressing left-hand button on the mouse (the button with the dot on it) after positioning the cursor at the desired menu field.

Using the Touchscreen "Mouse"

If your terminal is equipped with HP Touch, you can move the cursor and draw just like you do with a mouse—except that you touch the screen with your finger to perform these functions.

To activate the "touch-mouse," simply turn on the graphics cursor (by pressing the [+] key on the numeric pad). Once the crosshair cursor is displayed, you just touch a point on the screen and the cursor moves to that point. Note that when the touch-mouse is activated, all alphanumeric touch functions are disabled. If you want to activate a softkey with the touchscreen, you must first turn off the touch-mouse (by pressing the [+] "Graph cursor" key a second time).

For rapid cursor movement, move your finger quickly about the screen. For finer cursor movement, move your finger slowly to increase the pin-pointing accuracy of the touch-mouse.

If you hold the [4] "Draw" key on the numeric pad down while using the touch-mouse, you can draw continuous lines just as you do with the mouse accessory.

Using a Graphics Tablet

A graphics tablet provides functions similar to those provided by the mouse accessory and the touch-mouse.

You move the graphics "pen" about the tablet to move the cursor around the screen.

When using host-driven software, you can activate a point by pushing the pen down on the tablet until it clicks. This action has no effect when operating the tablet with the terminal in local mode.

Holding down the "Draw" key while the tablet pen is depressed allows you to draw free-hand, just like with the mouse and touch-mouse.

Graphics Control from a Program

The Reference Manual gives complete instructions on programming the terminal for graphics operations.

Making Menu Selections

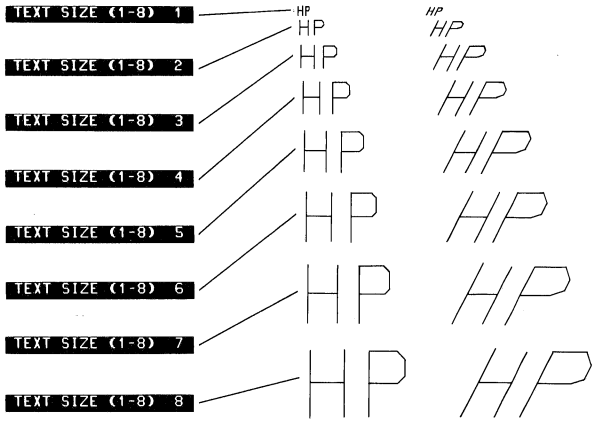
Use any of the following methods to make a menu selection when you are using graphics applications software:

- From the keyboard—Position the cursor in the desired menu field, then press and hold down together the [Shift] and [Select] keys. This "picks" the selection.
- Using the touchscreen—Touch the selection you desire.
- Mouse—Move the mouse until the cursor is positioned in the field you want, then press the left button on the mouse to "pick" the selection.
- Tablet—Move the pen on the tablet until the cursor is in the desired field, then press the pen tip down on the tablet to "pick" the desired selection.

Graphics Text Mode

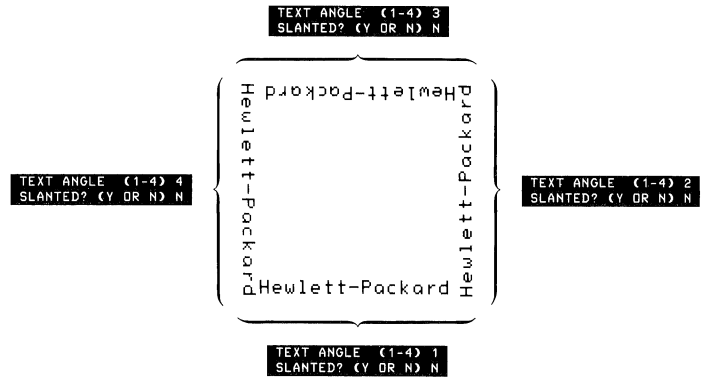
Graphics memory may contain vectors, graphics characters, or both. You may enter any displayable character from the terminal's base character set (USASCII and local languages) into graphics memory. (You may enter the special characters for each of the local languages.) You specify whether the characters should be upright ("normal" print) or slanted ("italicized") and choose between eight character sizes. The smallest size is the default selection. See Figure 4-2.

Figure 4-2. Graphics Text Sizes



Additionally, you can display lines of text at four different angles (in 90-degree increments.) See Figure 4-3. The Reference Manual provides further information on both text size and slant control and also information on graphics text origin/justification.

Figure 4-3. Graphics Text Orientation



Copying Graphics Data

You can copy the contents of graphics memory to a selected destination device. To select a destination device, press the System key twice to display the main system labels, then press f1 (device control), then press f3 ("to" devices).

After the "to" device set of labels appears, you can enable an external device.

Pressing the "Graph 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.

Choosing the Graphics Resolution

You can alternate the resolution of your graphics display by changing the "Resolution" field setting in the Global Configuration menu, then altering the switch setting on the back of your display monitor to match the menu selection.

To alternate between 512x390 and 640x400:

1. Press System twice, then f8 (config keys), then f1 (global config) to display the Global Configuration Menu.

2. Position the cursor in the "Resolution" field of the menu. Then use NEXT CHOICE or PREVIOUS CHOICE to choose the setting you desire.
3. Press f1 (SAVE CONFIG) to store your new setting in non-volatile memory.
4. Adjust the image selection switch on the back of your display monitor to match the setting you've made in the menu. See Appendix A for complete details on the image selection switch.

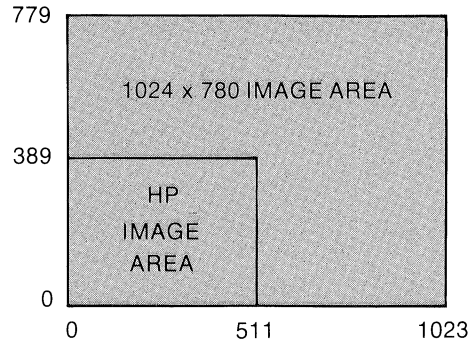
If your screen display appears flattened, you may not have the same selection for resolution in both the Global Configuration menu and the display monitor's image selection switch. In 512 x 390 mode, the monitor should be set for a full height display. In 640 x 400 mode, the monitor MAY be set for reduced height to preserve a 1-to-1 pixel ratio—so that circles don't appear as ellipses on the display screen.

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 resolution of your screen (twice the number of pixels in each direction). See Figure 4-4. Tek 4014 mode supports applications designed for screens with 8 times the linear resolution of your screen (8 times the number of pixels in each direction). 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, by previously positioning the relocatable origin, you can display the different portions of the image.

Figure 4-4. Display Area Comparison



Turning Compatibility Mode On and Off

You select Compatibility mode through the Global Configuration menu. Setting the Graph Compat field to either Scaled, Scl 4014, Unscaled, or Uns 4014 enables Compatibility mode.

Compatibility mode is disabled when you set the Graph Compat field to "Off". (This the default setting.) To change the entry, display the Global Configuration menu by pressing System, then f8 (config keys), then f1 (global config).

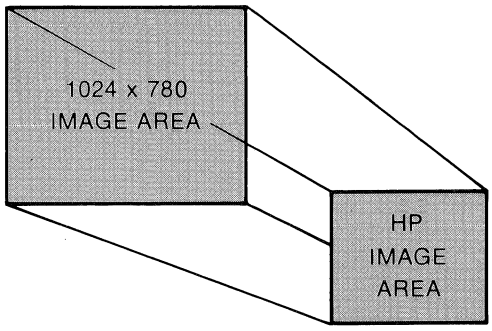
Once the menu appears, position the cursor in the Graph Compat field. Then use the NEXT CHOICE or PREVIOUS CHOICE keys to choose between "Scaled", "Scl 4014", "Unscaled", or "Uns 4014". Save your selection by pressing f1 (SAVE CONFIG).

Note that using compatibility mode automatically activates 512 x 390 graphics resolution. To restore 640 x 400 resolution,
enter the Global Configuration menu, turn off Compatiblity Mode,
enable 640 x 400 resolution, then press SAVE CONFIG.

Scaled Mode

Scaled mode halves a 1024 X 780 image so the image fits onto your terminal's screen. (Figure 4-5 depicts this scaling technique.) Characters are also scaled.

Figure 4-5. 1024 X 780 Image Area Scaled to Fit Your Terminal's Image Area



Setting the terminal for Scaled mode automatically activates 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

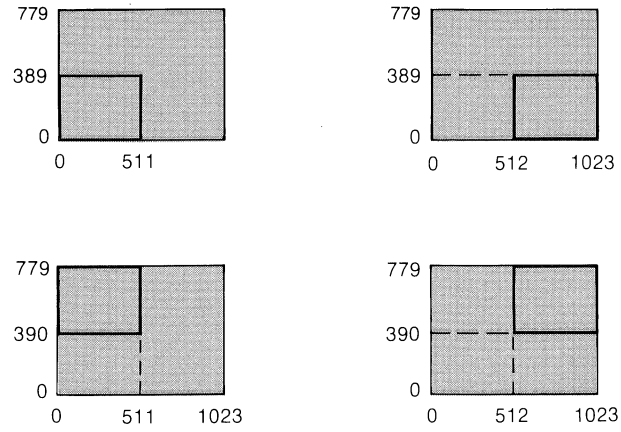
Unscaled mode displays a 512 X 390 subset of a 1024 X 780 display. The terminal "clips" any vectors going off the screen. This mode allows full use of the terminal's resolution but requires you to modify scaling statements in the software package if you want to display the complete image on the terminal 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 4-6). 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 4-6. 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.

5 ANSI X3.64 Operation

Introduction

This chapter tells how to use your terminal for ANSI X3.64 operations. The features provided in ANSI X3.64 mode are in addition to the HP mode features already described in this book.

Note The term "ANSI" appearing here in no way implies endorsement of this product by the American National Standards Institute. "ANSI" refers specifically to Institute's X3.64 1979 Standard, which defines a set of terminal control sequences known as the ANSI Standard.

ANSI X3.64 operation implements control sequences from the ANSI Standard used by DEC® terminals. Certain DEC private control codes are also implemented. This allows the terminal to run most applications written for the VT100® and VT52® terminals.

Two modes are available in ANSI X3.64 operation:

1. ANSI Mode—the terminal functions like a DEC® VT100® terminal when using software on a DEC computer system written specifically for the VT100
2. EM52 Mode—the terminal operates like a DEC VT52® terminal when using software on a DEC system written for the VT52

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How to Select Operating Modes

You can select the terminal's operating mode:

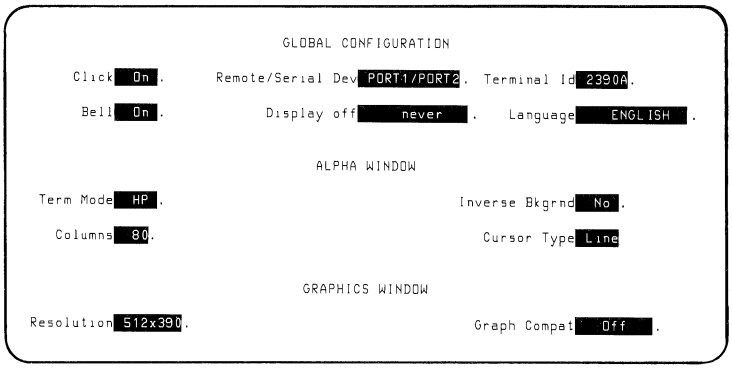
- via the TermMode setting in the Global Configuration Menu
- by a command issued from a computer program

Using the Global Configuration Menu

You select the terminal's operating mode by choosing either HP, ANSI or EM52 in the TermMode setting in the Global Configuration Menu.

To display the Global Configuration Menu, press the [SYSTEM] key, then [f8] (config keys), then [f1] (global config). The Global Configuration Menu appears on the screen as shown in Figure 5-1.

Figure 5-1. Global Configuration Menu shown with Default Settings



To select the desired operating mode—HP, ANSI or EM52:

- Use the [TAB] or cursor control keys to position the cursor at the TermMode field (the middle left-hand side of the menu).
- Press [f2] (NEXT CHOICE) or [f3] (PREVIOUS CHOICE) until the desired TermMode setting is displayed.
- Press [f1] (SAVE CONFIG) to enter the selected operating mode. This step also saves the selection in nonvolatile memory—so the terminal always powers on in the mode selected—and returns the System labels to the screen.

When the operating mode is changed from HP to ANSI, or from ANSI to HP, display memory is cleared. This leaves the screen blank except for function key labels and status indicators. The cursor moves to the upper left-hand corner of the screen.

Selecting Operating Mode Programmatically

You can also change operating mode via commands issued from a host computer program. Consult the Reference Manual for complete information on programming the terminal.

Configuring the Terminal for ANSI Operations

Before using the terminal in ANSI or EM52 Mode, you must make certain configuration settings.

Make sure your terminal is in Remote Mode and that the datacomm is configured correctly for your system (see Chapters 1 and 3).

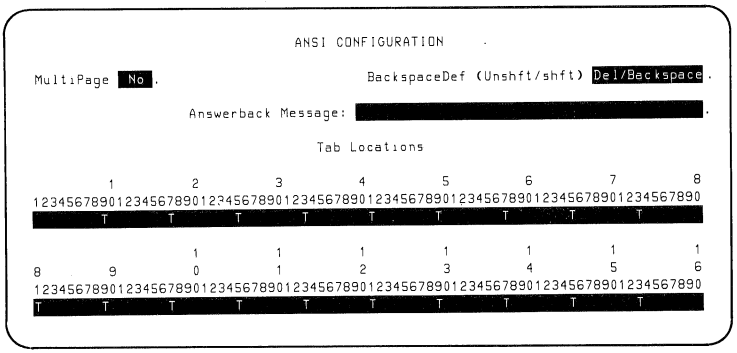
Using the ANSI Configuration Menu

The ANSI Configuration Menu allows you to tailor the terminal for specific application programs running on a standard DEC computer system.

To display the ANSI Configuration Menu:

- Ensure that the terminal is currently operating in ANSI or EM52 Mode ("ANSI" or "EM52" appears in the Status Line).
- Press the [SYSTEM] key, then [f8] (config keys), then [f6] (ansi config) to display the ANSI Configuration Menu as shown in Figure 5-2. Settings made in this menu apply to both ANSI and EM52 Mode operations. Note that the ansi config label appears only when the terminal is in ANSI or EM52 Mode.

Figure 5-2. ANSI Configuration Menu shown with Default Settings



As in other menus, use functions keys [f1] through [f8] when making menu selections. Table 2 describes the operation of the function keys while the ANSI Configuration Menu is displayed.

Table 5-1. Function Key Operations For ANSI Menu

Label	Function (ANSI Menu Function Keys)
SAVE CONFIG	Saves the displayed configuration settings in non-volatile memory and returns the terminal to normal operation with the SYSTEM label set.
NEXT CHOICE PREVIOUS CHOICE	When the cursor is in the "MultiPage" or "Backspace def" field or "Tab stop" line, these two keys scroll forward or backward through the available selections.
DEFAULT VALUES	Sets all displayed selections to their default settings (regardless of the cursor's position in the menu). Moves cursor to the 1st field. The Answerback Message is only reset (to no message) when the Answerback field is displayed.
ANSWER BACK	Turns the "Answerback Message" field on and off. You can enter a definition only when ON. A configured message can't be recalled from memory.
CLR ALL TABS	Clears all tab stops in the menu (except left margin).
DISPLAY FUNCTIONS	Allows control characters to be entered and displayed as symbols in the "Answerback Message"
config keys	Terminates configuration mode without saving the entered values. Returns to terminal to normal operation with main config labels displayed.

To make a selection in the ANSI Configuration Menu:

- Using the TAB or cursor control keys, position the cursor in the desired field of the menu
- Press f2 (NEXT CHOICE) or f3 (PREVIOUS CHOICE) to display the desired setting

- Use other function keys as needed to define each field appropriately
- When you are finished making selections in the ANSI Configuration Menu, press [f1] ([SAVE CONFIG]) to store the settings in nonvolatile memory and re-display the System labels

The ANSI Configuration Menu allows you to define the following four fields:

1. `MultiPage`—specifies the amount of display memory available in the terminal. Changing the MultiPage setting clears the contents of display memory. This blanks the screen and positions the cursor in the upper left-hand corner of the screen when you exit the menu.

   When MultiPage is set to "NO", subsequent applications use a single page of memory (24 lines) for all operations. This setting should be used when running host computer programs designed for ANSI terminals with a single page of memory. Ask your Data Processing Manager for assistance in determining whether your application is meant for a terminal with only one page of display memory). If single-page operation is selected, the [NEXT], [PREV], [SHIFT] [▲] (ROLL UP) and [SHIFT] [▼] (ROLL DOWN) keys are disabled.

   When MultiPage is set to "YES", all available memory is used in subsequent program operations.

2. `BackspaceDef` (Unshft/shft)—defines the function of the [BACK SPACE] key for use in DEC software applications. Normally the [BACK SPACE] key simply moves the cursor backward a character at a time. Some programs, however require this key to be a DELETE key that deletes a character as it backspaces.

   When set to DEL/BACKSPACE, the [BACK SPACE] key functions as a DELETE key when pressed by itself, and as a normal BACKSPACE key when pressed simultaneously with the [SHIFT] key.

When set to BACKSPACE/DEL, the [BACK SPACE] functions as a normal BACKSPACE key when pressed by itself, and as a DELETE key when pressed with the [SHIFT] key.

3. `Answback Message`—allows you to define an "answerback message". Some ANSI applications require such a message in response to a host computer enquiry (ENQ).

   The Answback field does not appear unless [f5] ([ANSWER BACK]) is pressed first. Once the field is displayed, you can enter the answerback message you need (up to 40 characters long). Pressing [f7] ([DISPLAY FUNCTIONS]) lets you enter control characters into the answerback message, where they are displayed as the appropriate symbols. Note that your definition is not redisplayed when you re-enter the menu. When you press [f5] ([ANSWER BACK]) upon re-entering the menu, a blank field is displayed, allowing you to define and save a new message.

4. `Tab`—allows you to set tab stops for subsequent use in ANSI and EM52 operations.

   To set a tab stop, use the cursor control keys to position the cursor in the desired column on the tab stop indicator line (bottom of menu). Press [f2] ([NEXT CHOICE]) or [f3] ([PREVIOUS CHOICE]) to toggle a tab stop on and off. A "T" on the tab stop indicator line shows an active tab stop. Press [f6] ([CLEAR ALL TABS]) to clear all tabs.

Status Line Indicators

ANSI and EM52 Mode operations add special indicators to the terminal's status line. The following section describes the functions of the new indicators. See Chapter 1 for information about all other displayable status line indicators.

ANSI Mode Indicators

In ANSI Mode, the terminal mode indicator "ANSI" appears in the status line. This shows that the terminal is currently operating in ANSI Mode.

The Status Line can also display up to four additional symbols in ANSI Mode—L1, L2, L3, or L4—which are activated by a program running on the host computer. These four symbols are provided to simulate the four LED indicators on a VT100 keyboard, allowing applications utilizing these LED indicators to run without modification on your terminal. The meaning of symbols L1 through L4 depends on the program used.

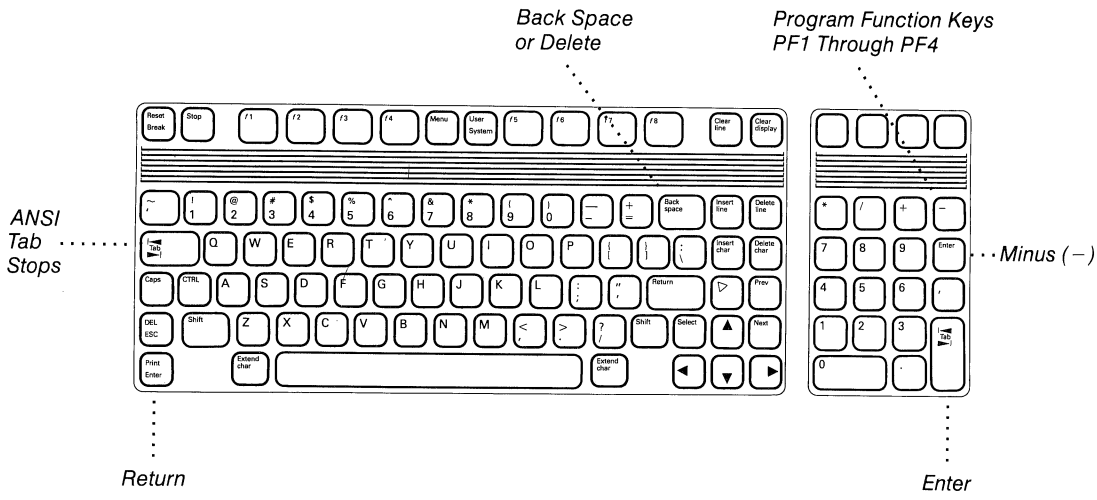
EM52 Mode Indicator

In EM52 Mode, the Status Line displays the indicator "EM52" to inform you that the terminal is operating in EM52 Mode.

Keyboard Operation in ANSI and EM52 Modes

The functions of several keys are changed when the terminal is operating in ANSI or EM52 Mode. Figure 5-3 shows the keys whose functions are changed.

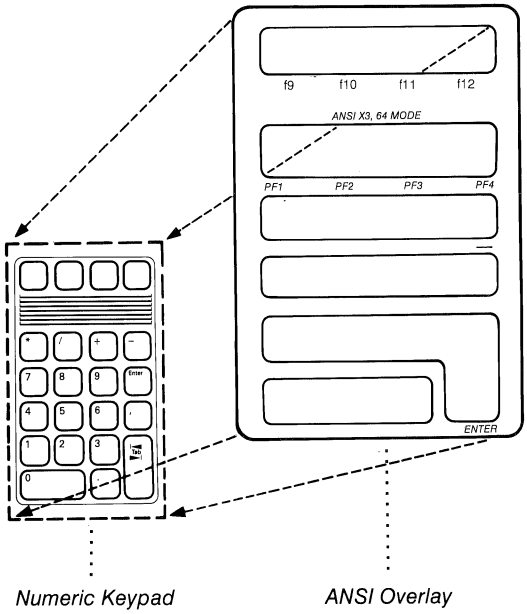
Figure 5-3. Keys Altered in ANSI and EM52 Modes



Numeric Keypad

A numeric keypad overlay is supplied for use in ANSI mode. The overlay, illustrated in Figure 5-4, indicates the new functions of the numeric pad keys in ANSI and EM52 Modes. For your convenience, mount the overlay on the numeric keypad for ANSI and EM52 operations.

Figure 5-4. ANSI Numeric Keypad Overlay



The keys on the numeric keypad with new functions include:

1. The keys [*], [/], [+] and [-]. These keys act as program function keys [PF1], [PF2], [PF3] and [PF4], whose functions vary with the application program being used.
2. The [ENTER] key. This key becomes the [-] key in ANSI and EM52 Modes.
3. The [TAB] key. This numeric pad key becomes the [ENTER] key, operating like the [RETURN] key does in normal HP Mode operation.

In addition, the numeric keys on the keypad can be set by a host computer program to perform special functions. These functions vary with the program being used; their meanings are defined and explained by the software controlling them.

Alphanumeric Keys

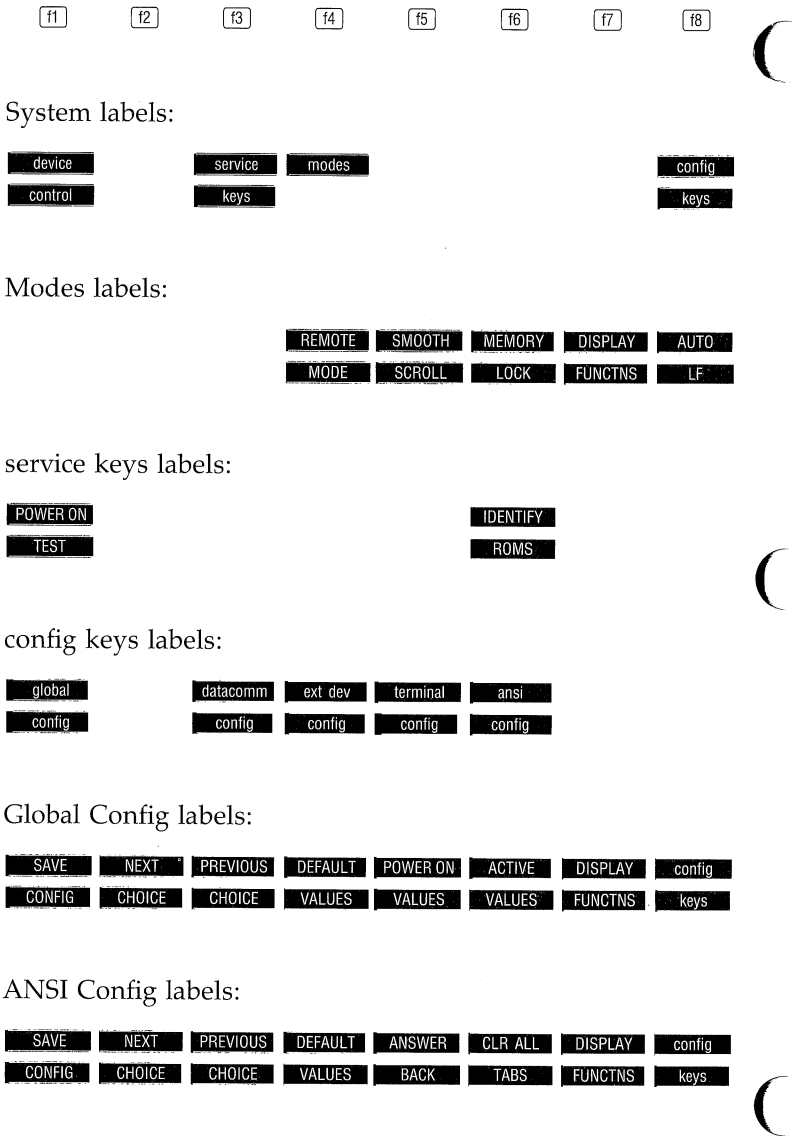
Certain keys on the alphanumeric or "typewriter" portion of the keyboard are affected by ANSI and EM52 operation. These keys, illustrated in Figure 5-3, include the following:

1. The [BACK SPACE] key. This key functions as a normal backspace or as a delete key (see the ANSI Configuration Menu section for a description of how to configure and use the [BACK SPACE] key.
2. The [INSERT LINE], [DELETE LINE], [INSERT CHAR] and [DELETE CHAR] keys. These keys are disabled during ANSI or EM52 Mode operation (they are available for use when making selections in the ANSI Configuration Menu).
3. The [ENTER] key, located on the lower left portion of the keyboard, duplicates the operation of the [RETURN] key. When in ANSI or EM52 Mode, you may press either [ENTER] or [RETURN] for a carriage return.
4. The [NEXT], [PREV], [SHIFT] [▲] (ROLL UP) and [SHIFT] [▼] (ROLL DOWN) keys are disabled when the terminal is set for single-page operations (see the "Configuring The Terminal For ANSI Operations" section).

In addition, the following two key sequences are added to the terminal's operating features:

- Press the [CTRL] and [BREAK] keys simultaneously to transmit the user-configured Answerback Message to the host computer system. See "Using the ANSI Configuration Menu" for further information.
- Press the [CTRL] and [STOP] keys simultaneously to transmit a 3.5 second BREAK to the host computer.

Figure 5-6. ANSI Operation Screen Labels Tree



6 Color

Introduction

The HP 2397A terminal offers all the operating features described in this book, but with the added dimension of a full color video display. You can also generate color hard-copy from the terminal to a peripheral device such as a color printer.

With the 2397A terminal, you can use all the advanced features of the color software available on your host computer system.

Through combinations of red, green and blue, the 2397A displays alphanumerics using up to eight basic colors—chosen from 64 possible color pairs—and graphics using eight pens which can be assigned any of 64 possible colors. Control of color features is achieved via escape sequences. These commands can be entered from the keyboard, but they are normally issued from a host computer program. The Reference Manual contains complete descriptions of the color commands and explains how to use them.

The Advantages of Color

Whether your application uses alphanumeric data, graphics data or a combination of the two, presenting data in color can enhance almost any display.

You can use color to:

- Highlight data
- Allow rapid comparisons
- Aid understanding
- Increase data density

Color Applications

Using color makes it easier for technicians to monitor expensive or dangerous processes, helps business managers interpret financial data, aids data entry and prevents errors in engineering design. The extent to which you can use color is limited only by your imagination.

The average person can distinguish between 13 levels of grey shading. Even if the display is limited to grey levels, there is a high probability of operator error in interpreting the data. Using color, you can eliminate these errors and at the same time provide more information and reduce operator fatigue.

If headings on figure columns are color coded they can be read more quickly with increased comprehension. Similarly, identifying a symbolic shape on a process diagram is much easier if you know that pumps are blue and liquid sodium is red.

In chemistry, atoms used in molecular bonds are color coded to simplify their study. Oxygen can be white, carbon black, nitrogen blue, hydrogen red, etc. Color coding eliminates the need for labeling each element and contributes to the scientist's ability to visualize his subject.

Color is frequently used in computer-aided circuitry design to indicate the various layers of material. This provides a handy guide for determining the area being displayed and helps prevent costly errors.

For business presentations, you can preview your charts in color before creating expensive 35mm slides.

Differences Between 2393A and 2397A

Most of the differences between the monochrome 2393A terminal and the color 2397A terminal are in the escape sequences that control the terminal. See the Reference Manual for information on escape sequence programming.

There are a few noticeable differences between a monochrome and color terminal you will encounter in normal use:

- When you use the half-bright enhancement, the resulting display for the enhanced data is yellow (unless you have used an escape sequence to change the color map). This includes the function key labels and menu fields that have fill-in—as opposed to preset—settings.
- The inverse video enhancement inverts the background and foreground display colors. For example, you can change the alphanumeric display color map (using an escape sequence) to red for characters, blue for background. When you use the inverse video enhancement, the colors are reversed, so that all the characters are blue on a red background.
- The security video enhancement is available only on the 2393A.

Color Hardcopy

The 2397A offers a broad range of output options, allowing considerable flexibility in connecting to HP peripherals.

You can generate engineering drawings for documentation or plots for reports and overhead transparencies on HP plotters, hardcopy text and graphics on the Diablo Color Inkjet printer and other HP printers, and create 35mm slides on an HP film recorder.

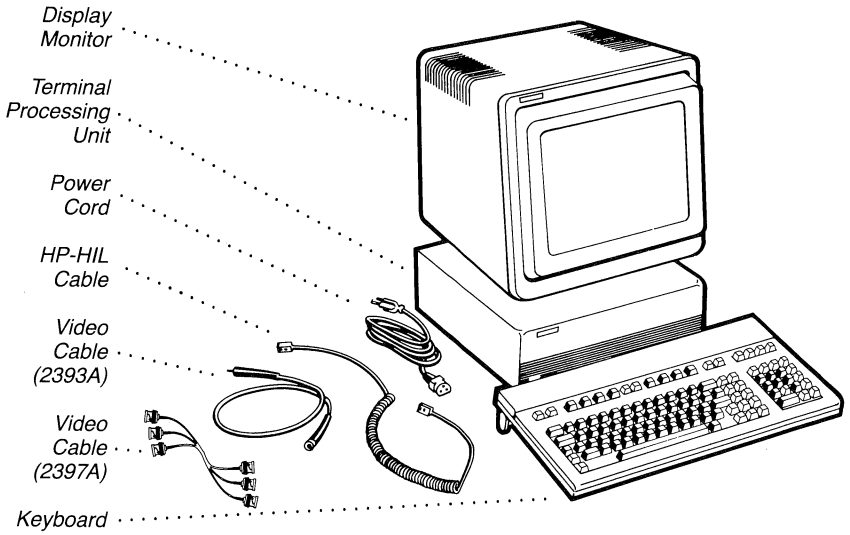
In addition, the modular design of the 2397A allows the video interface to be connected to commercial large screen projectors, film recorders or large monitors instead of the monitor provided.

A Installation

This appendix guides you through the steps required to install all the components of your terminal. The first section covers procedures for installing the display monitor, terminal processing unit (TPU) and keyboard. The following sections explain how to install all options and accessories. After you have set up your terminal, read Chapter 1 "Getting Started" for information on how to operate your terminal.

The standard terminal includes a display monitor, the terminal processing unit (TPU), a keyboard, and the cables needed to connect the terminal components.

Figure A-1. Terminal Components And Cables



How to Identify Options and Accessories

Find the identification label on the rear panel of the TPU. The label contains three lines of information.

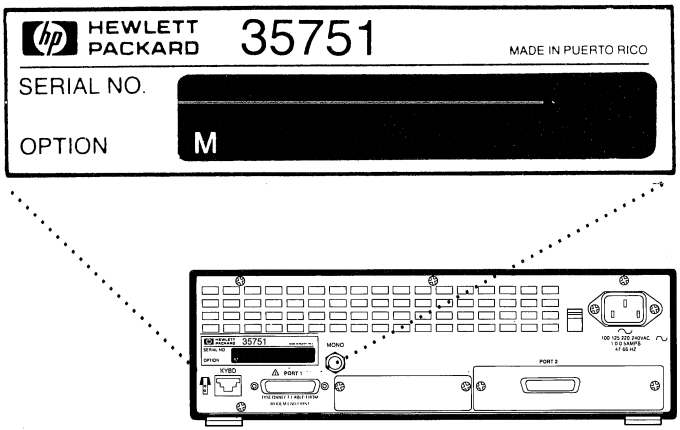
The first line specifies the model number of the TPU. This number is 35751.

The second line gives the terminal's serial number.

The third line reads:

OPTION M	for Monochrome TPU
OPTION C	for Color TPU

Figure A-2. Identification Label



Check your equipment with the packing invoices to make sure you have received precisely what you ordered.

In communications with Hewlett-Packard concerning your terminal, please specify the model number, serial number and option numbers, if any. This ensures proper identification. You can find a list of the major Hewlett-Packard Sales and Service Centers at the back of this book.

Terminal Options

Your terminal can come with any of several options. If requests for accessories were placed with your original order, the accessories arrive in separate packages.

Table A-1. Terminal Options

Product Number	Description
2393A	Graphics Terminal
2397A	Color Graphics Terminal
Options:	
-049	ANSI X3.64 Operation
-060	Delete Monitor
User Installable Options:	
-046	Port 2: HP-IB Interface
-092	Port 2: 25 pin RS232C Interface
-093	Port 2: 8 bit parallel Centronics® Interface
Localization Options:	
-015	Delete US Monitor, add International Monitor
-101	Swedish
-102	Norwegian
-103	French
-104	German
-105	UK
-106	Spanish
-107	Canadian-French
-108	Canadian-English
-109	Italian
-110	Dutch
-111	Finnish
-112	Danish
-113	Swiss-German
-114	Swiss-French
-115	Spanish-Latin American
-116	Flemish

(continued)

Table A-1. Terminal Options (continued)

Product Number	Description
Cable Options:	
-301	US modem cable, same as cable accessory 40242M
-302	European modem cable,same as cable accessory 40242M
-303	RS232C cable, same as cable accessory 40242C
-304	HP direct connect RS232C cable, same as cable accessory 40242X
-305	EMP protect cable, same as cable accessory 40242Y
-306	HP direct connect RS422 cable, same as cable accessory 40242P

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Table A-2. Terminal Accessories

Product Number	Description
Datacomm cables:	
40242A	RS232C/HP422 cable. Male (25-pin)/female (50-pin), 1m (3 ft)
40242C	RS232C cable. Female (25-pin)/male (25-pin), 5m (16 ft)
40242M	U.S./European modem cable. Male (25-pin)/male 25 pin), 5m (16 ft)
40242P	HP direct connect type 422 cable. Male (25-pin)/ male (5-pin), 5m (16 ft)
40242X	HP direct connect type 232 cable. Male (25-pin)/ male (3-pin), 5m (16 ft)
40242Y	EMP protect cable. Male (25-pin)/male (25-pin), 5m (16 ft)
40242Z	RS232C modem bypass cable. Male (25-pin)/ female (25-pin), 5m (16 ft)

(continued)

Table A-2. Terminal Accessories (continued)

Product Number	Description
Peripheral cables:	
40242D	Parallel printer cable. Amphenol male (36-pin)/ male (36-pin), 2m (6.6 ft)
40242G	Serial (RS232C) printer cable. Male (25-pin)/male (25-pin), 5m (16 ft)
45529A	HP-IB cable, 1m (3.3 ft)
40242R	RGB Video Cable, 0.4m (1.5 ft)
40242V	Composite video cable, 0.4m (1.5 ft)
92241A	HP-HIL cable

Input Device Accessories

The terminal can support one or more simultaneous input devices. These devices, listed in the following table, are ordered individually as accessories.

Table A-3. Input Device Accessories

Peripheral Device	Model Number
HP Touch Accessory	35723A
HP Mouse Accessory	46060A
HP Graphics Tablet	46087A
HP Bar Code Reader	92916A

Choosing a Site For Your Terminal

Place your terminal on a hard, level surface such as a desk, table or stand designed for this purpose. Choose a site that does not restrict the flow of air through the front and rear vents of the terminal processing unit.

Also refrain from placing objects on top of the display monitor, as this would block the monitor's air vents.

Installing and Connecting the Display Monitor and TPU

Follow the procedures in this section to install and connect your display monitor and TPU. For normal use, place the display monitor on top of the TPU as illustrated in Figure A-3.

Figure A-3A. Display Monitor and TPU (Front View)

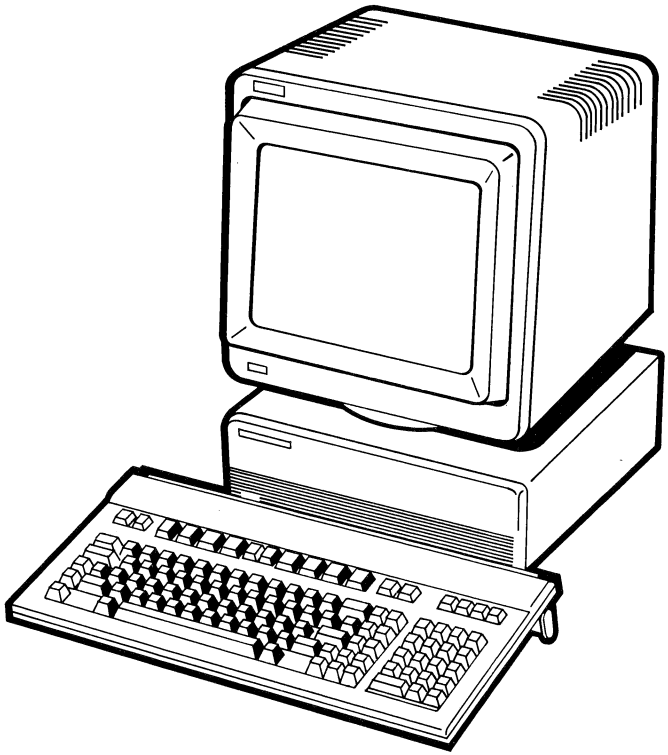


Figure A-3B. Display Monitor and TPU (Rear View)

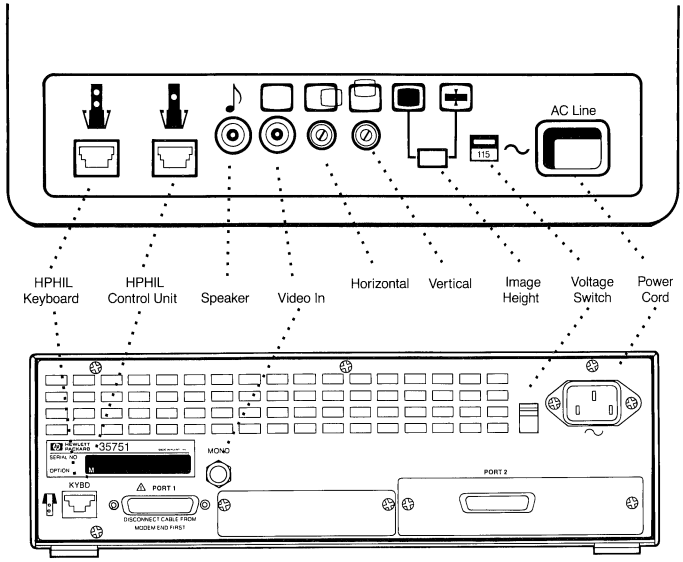
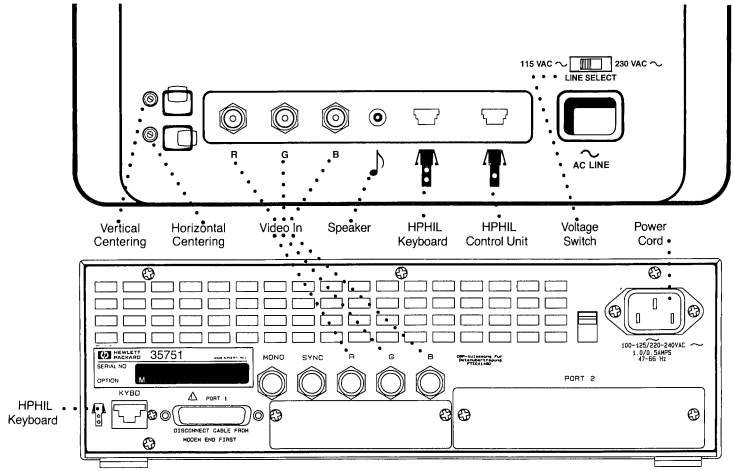


Figure A-3C. Color Monitor and TPU (Rear View)



Setting Monitor and TPU Voltage Switches

Set the voltage switches on the monitor and the TPU according to the voltage available in your area. Check with your local electric company to determine the correct voltage. For installations in the U.S., the switches should be set to 115 volts.

Caution

Make sure the voltage switches are set properly BEFORE applying power to the terminal. You can damage the equipment by running it at the wrong voltage level.

(If your monitor is not equipped with a voltage switch, skip the procedures for setting the monitor voltage. Instead, perform the procedures that follow for setting the TPU voltage.)

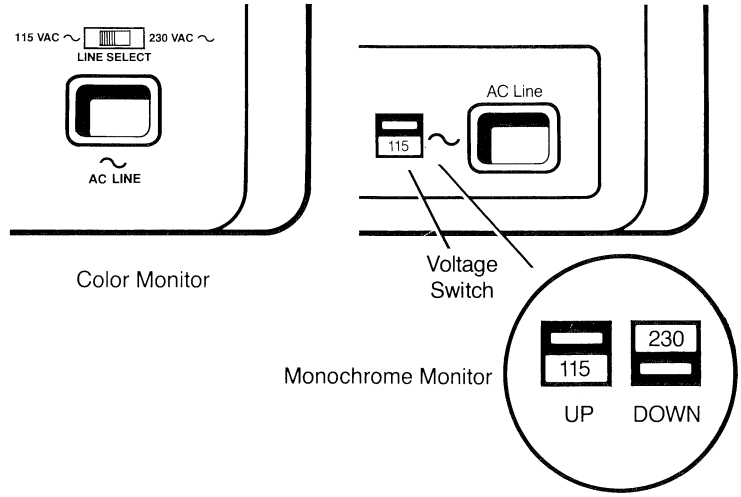
To set the voltage switch on the monitor, insert a small, flathead screwdriver or similar tool into the recessed voltage switch on the back of the unit:

- For 100–120 volt operation, push the switch UP (the switch reads "115V" in this position).
- For 200–240 volt operation, push the switch DOWN (it reads "230V" in this position).

Color monitor voltage:

- For 115 Volts, push switch LEFT
- For 230 Volts, push switch RIGHT

Figure A-4. Voltage Switch (Rear of Display Monitor)

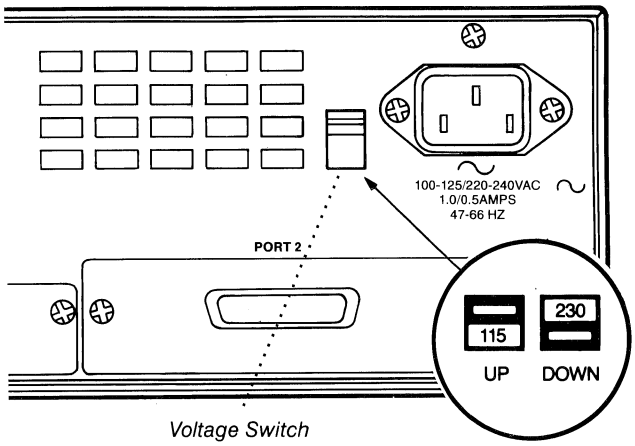


To set the voltage switch on the TPU:

- For 100–120 volt operation, push the switch UP (it reads "115V" in this position).
- For 200–240 volt operation, push the switch DOWN (it reads "230V" in this position).

Make sure that the monitor and TPU are set for the same voltage.

Figure A-5. Voltage Switch (Rear of TPU)



Connecting the Power Cords

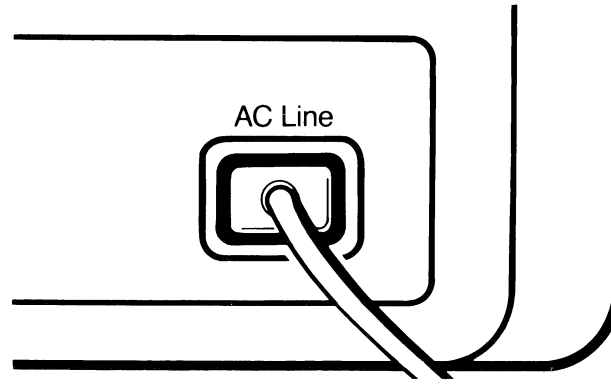
You must connect two separate AC power cords—one to the monitor and one to the TPU.

Warning

Turn your monitor and TPU off before applying power (power buttons, shown in Figure A-3, are located at the front of the units). For your safety, use only power cords with a 3-prong connector.

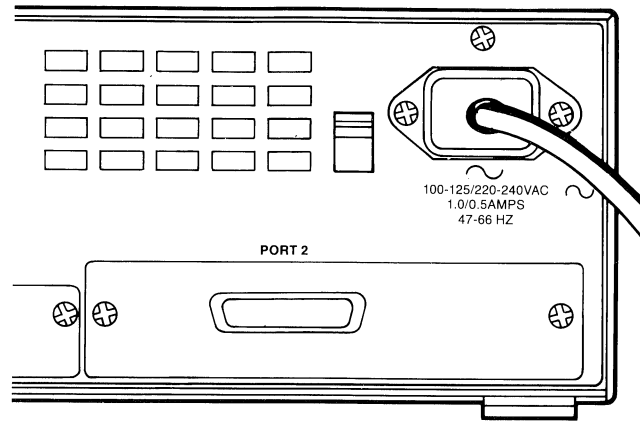
1. Insert one power cord into the AC socket on the back of the monitor, then plug the 3-prong connector on the other end of the cable into the electrical outlet. (If your monitor's power cable is already attached, skip this step and continue with the installation.)

Figure A-6. Monitor AC Power Cord Socket



2. Insert the second power cord into the AC socket on the back of the TPU. Then plug the 3-prong connector on the other end of the cable into the electrical outlet.

Figure A-7. TPU AC Power Cord Socket

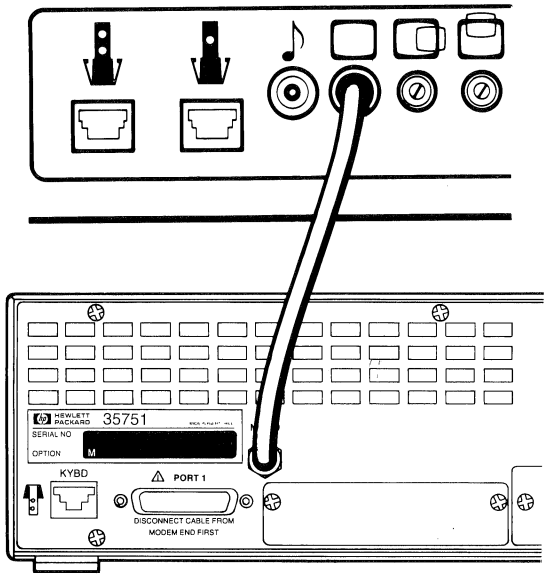


Connecting the Monochrome Video Cable

The video cable has a standard phono-type connector at one end of the cable, and a BNC connector at the other end.

1. Insert the phono-type connector into the socket marked ▢ on the back of the monitor.
2. Insert the other end of the cable into the monochrome BNC connector socket (labeled "MONO") on the TPU back panel.

Figure A-8A. Monochrome Video Cable (Installed)

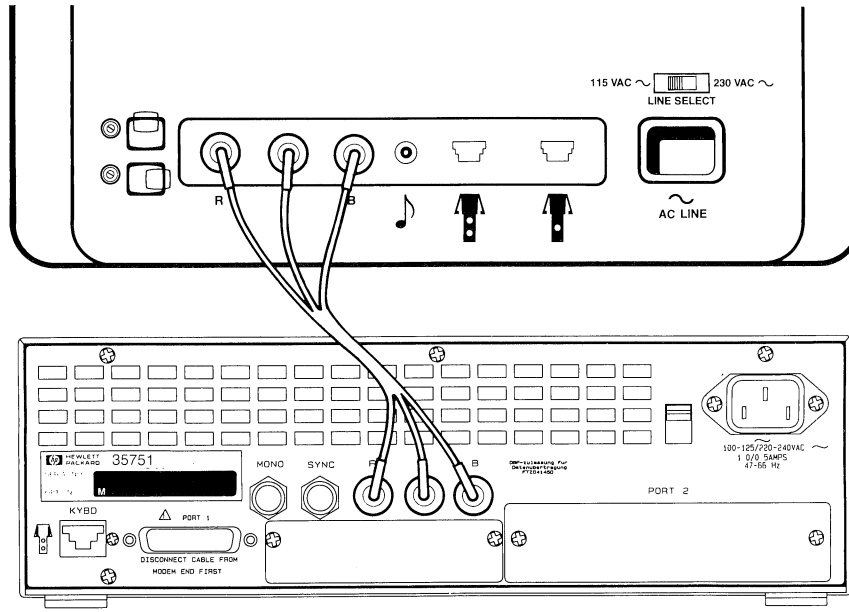


Connecting the Color Video Cable

The color video cable has 3 BNC connectors on each end.

1. Locate the three video sockets on the back of the monitor. Each socket is marked with a dot of color.
2. Connect the left, middle and right connectors on one end of the cable to the sockets on the monitor marked with a red, green and blue dot (in that order).
3. Locate the three video sockets on the TPU back panel. These sockets are labeled "R" for red, "G" for green and "B" for blue. (Note: some monitors require a fourth connection for "SYNC". If you have such a monitor, connect the cable between the "SYNC" sockets on the monitor and TPU.)
4. Connect the left, middle and right connectors on the other end of the cable to the Red, Green and Blue sockets on the TPU. Make sure that the cable is connected to the same socket on both monitor and TPU (don't connect red to blue, etc.).

Figure A-8B. Color Video Cable (Installed)



Connecting the Keyboard

The keyboard cable has a connector at each end that resembles a telephone connector. A single dot is marked on the cable near one connector; two dots appear on the cable near the other connector.

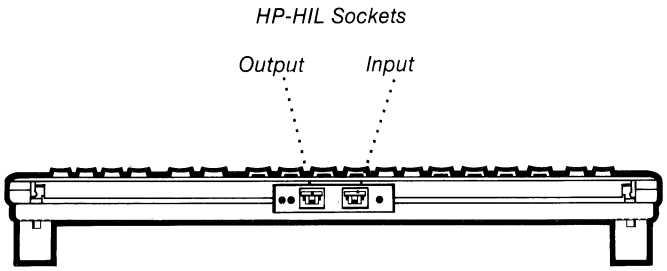
Caution

Connecting a one-dot connector to a two-dot socket—or vice versa—will result in damage to the equipment (the connectors are keyed for safety, but they could still be forced into the incorrect socket).

Connect the cable from the keyboard to the TPU as follows:

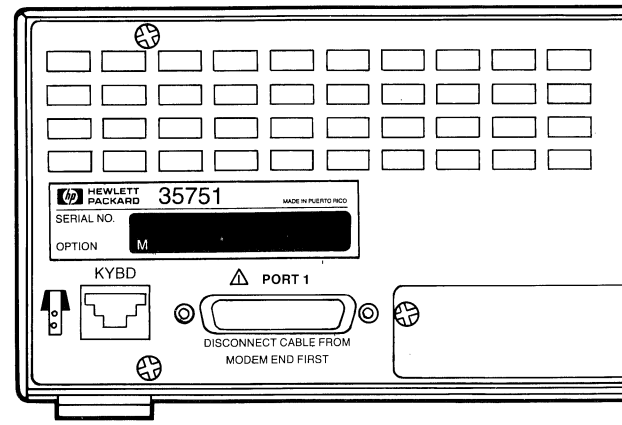
1. Locate the two connector sockets at the center back of the keyboard.

Figure A-9. Keyboard Sockets



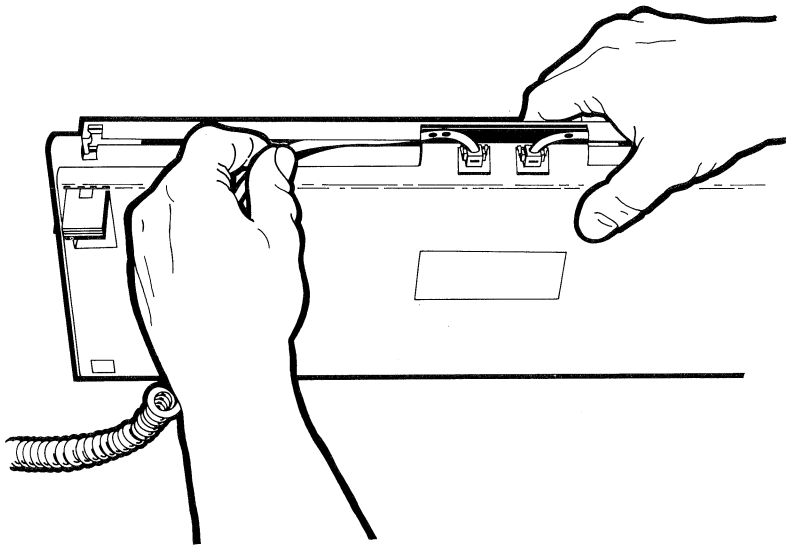
2. Insert the connector at end of the cable marked with a single dot into the socket on the keyboard marked with a single dot. Then insert the connector at the two-dot end of the cable into the keyboard socket on the back of the TPU.

Figure A-10. TPU Socket for Keyboard Cable



3. If you are going to connect another input device to the keyboard—such as a mouse, tablet, or bar code reader, refer to the instructions for connecting alternate input devices later in this appendix).
4. You can, if you desire, route the keyboard cable so that it comes out the left or right side of the keyboard. Simply push the cable under the strip on the back of the keyboard that guards the cable channel. Then route the cable to the left or the right, as desired.

Figure A-11. Routing the Keyboard Cable

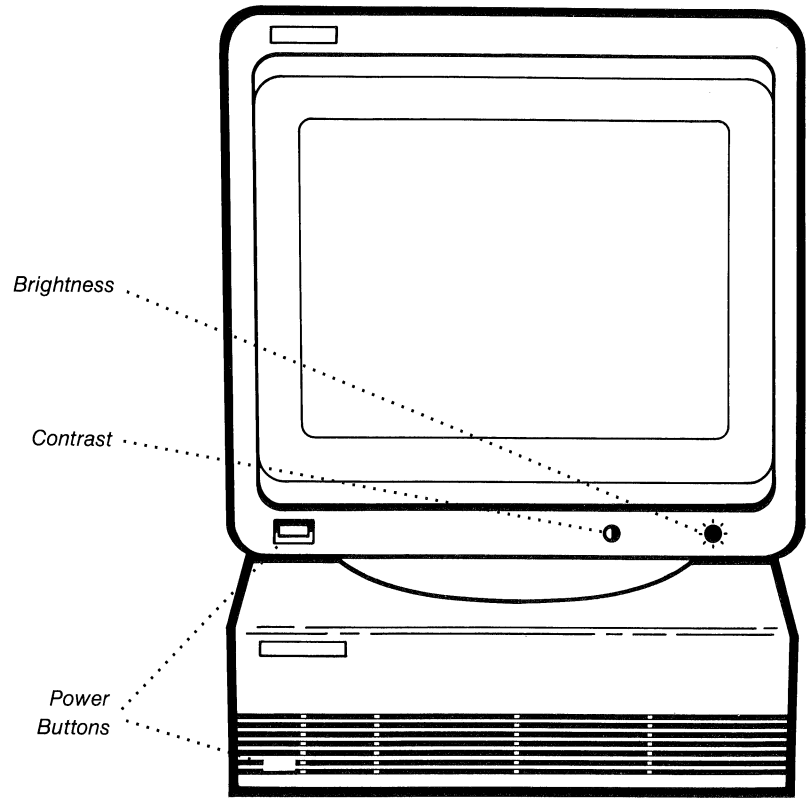


The base of the keyboard is equipped with a hinged stand that allows you to use the keyboard either flat on a table or mounted at a slight angle.

Turning On Terminal Power

Now that you have installed and connected the terminal's three basic components, you are ready to turn on the terminal power.

Figure A-12. TPU and Monitor Front User Controls



The TPU Power Button

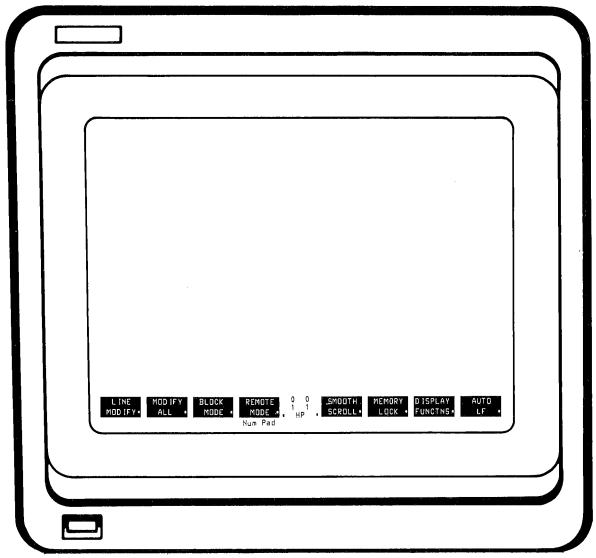
Press the power button at the front of the terminal processing unit. The button remains depressed in the ON position. The TPU beeps when you turn it on, providing you with audible verification that the unit is functioning properly.

The Monitor Power Button

Press the power button at the front of the monitor. The button remains depressed in the ON position.

After a few seconds, the following display appears:

Figure A-13. Initial Screen at Power On



Adjust the brightness and contrast wheels (Figure A-12) until the screen display is at a level of brightness comfortable for viewing.

If nothing appears on the screen, check the following:

- Both the TPU and monitor power buttons are pressed ON.
- Both AC power lines are properly connected to the equipment and to a power source.
- The video cable is connected properly.
- The screen brightness is turned up so you can see the display.

- The circuit for your power outlet is ON (you can check it by plugging in a lamp or other electrical device into the same outlet).

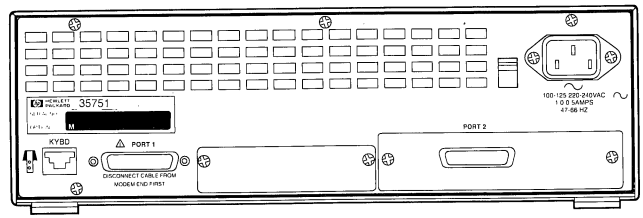
If you verify all the above and your terminal fails to power on, or if an error message appears at the bottom of the screen, consult Appendix B—Troubleshooting—for directions on how to proceed.

Connecting the Datacomm Cable

The Datacomm cable is the link from your terminal to a host computer.

In its standard configuration, your terminal communicates with a Hewlett-Packard computer through Port 1 over an RS232C datacomm cable.

Figure A-14. TPU Rear Panel



To connect the datacomm cable to your terminal (it is already connected to the host computer), perform the following steps:

1. Insert the RS232C connector into the socket provided in Port 1 on the TPU (see Figure A-14). The connector shell is shaped so that it fits onto the socket only if it is correctly positioned.

2. After fully inserting the connector into the socket on the TPU, tighten the two screws that secure the connection.
3. If you are installing an RS232C datacomm module on Port 2, you can connect the host computer to Port 2. First install the module according to the instructions in the following section, then connect the datacomm cable to Port 2 as directed in the preceding steps.

Installing an Auxiliary Port 2 Module

You can install one of the following auxiliary port 2 modules in the Port 2 slot on the back of the TPU: HP-IB Interface, RS232C Interface, or Centronics Interface.

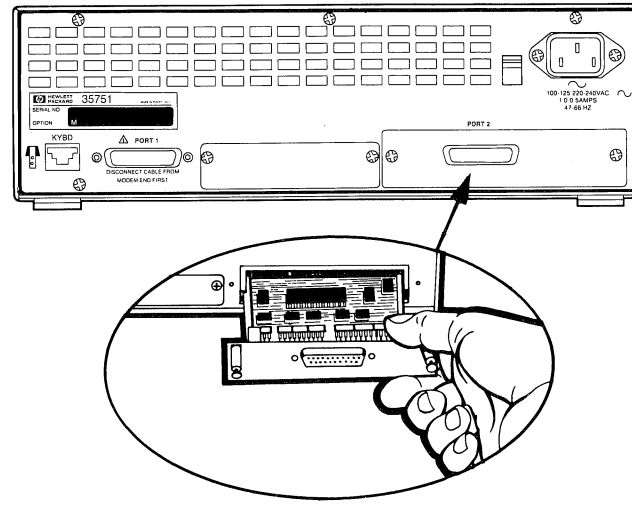
Caution

Static electricity can damage the components on the module. When installing a module, avoid any site with carpeting or other static-generating material. Ground yourself (discharge static buildup) immediately before installing a module.

Follow these steps to install one of the modules:

1. Make sure the power button on the TPU is off and the power cable is disconnected from the power source.
2. Unscrew the two screws securing the panel that covers Port 2 (see Figure A-15).
3. Hold the datacomm module by the metal panel, component side up. Carefully slide the module into Port 2 along the slot runners inside the Port 2 opening.
4. Gently press the metal panel to make sure that the module fully engages inside the Port 2 opening.
5. Secure the module in position by tightening the two locking screws on either side of the module's faceplate.

Figure A-15. Installing an Auxiliary Port 2 Module



After you have installed the module, you can connect the cable that corresponds to the kind of module you installed.

If you have an RS232C module in Port 2, you can connect a datacomm cable from your computer (see the instructions for connecting datacomm cables in the preceding section), or you can use the additional port for connecting a peripheral device such as a printer or plotter.

If you have installed an HPIB module or a Centronics module, you can connect the appropriate peripheral device cable from the device to the auxiliary port.

Installing HP Touch Accessory to the Display Monitor

Refer to the Installation Manual that came with your HP Touch Accessory for complete installation instructions.

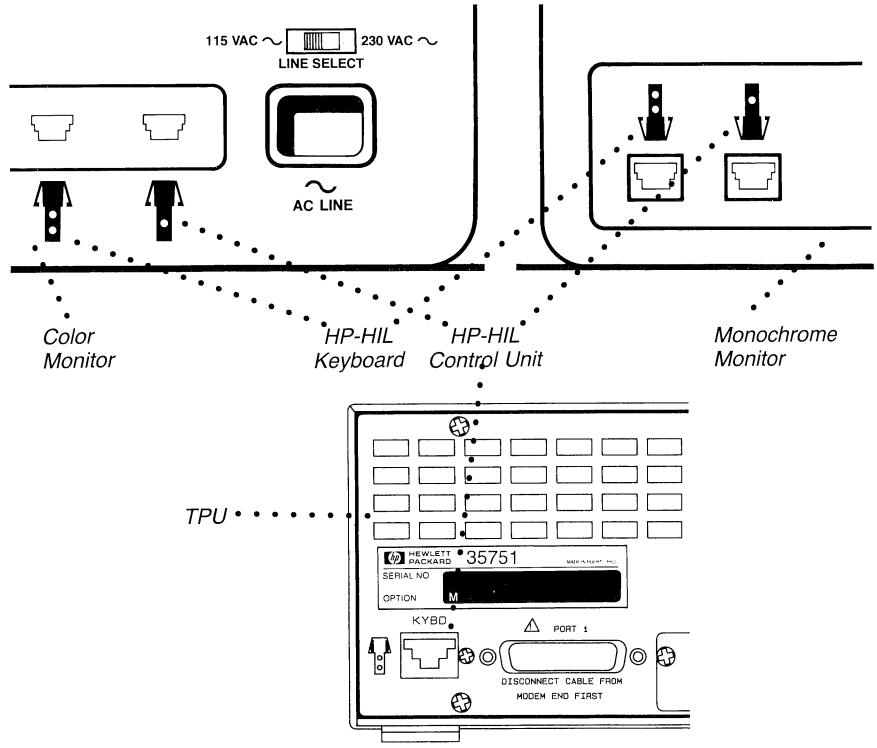
After you have installed HP Touch onto your display monitor, you must make the following additional cable connections:

Caution

Make sure that the TPU is off and disconnected from a power source before performing the following steps; otherwise, you risk damaging the equipment.

1. Remove the keyboard cable from the TPU keyboard socket, pinching the sides of the connector with thumb and forefinger.
2. Using an HP-HIL cable—with connectors like those of the keyboard—connect the two-dot end of the cable into the TPU socket from which you just removed the keyboard cable.
3. Connect the one-dot end of the HP-HIL cable to the socket marked with one dot on the display monitor's rear panel.

Figure A-16. Connecting HP-HIL Cable to Monitor



4. Now connect the keyboard cable to the socket marked with two dots on the monitor's rear panel. This completes the additional connections necessary for a terminal equipped with HP Touch.

Note If you are not installing the HP Touch Accessory, do not use the monitor's HP-HIL sockets to connect your keyboard, TPU or any other device. Your terminal may malfunction if operated under these circumstances.

Connecting Alternate Input Devices

You can attach 4 input devices to your terminal, choosing any combination of the following: HP Touch, HP Mouse, Graphics Tablet, Bar Code Reader, and keyboard.

The HP-HIL cable you use to connect an input device is the same kind of cable that is used for the keyboard. The HP-HIL cable has a connector at each end that looks like a telephone connector. One end of the cable is marked with a single dot near the connector. The other end of the cable has two dots marked near the connector.

Connect alternate input devices as follows:

1. Connect the two-dot end of the first input device cable to HP-HIL socket at the back of the TPU (see Figure A-14). Connect the one-dot end of the cable to the socket marked with one dot on the back of the input device.

Note If you are connecting HP Mouse, it must be the last input device in the chain, as it has a cable already attached to the back of the unit. The other end of the HP Mouse cable has a standard HP-HIL connector marked with two dots on the cord. The mouse is the only HP accessory with this restriction.

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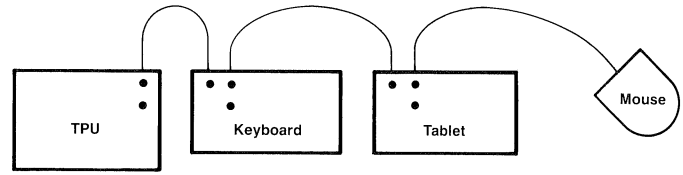
2. Connect the two-dot end of the second input device cable to the socket marked with two dots on the back of the first input device. Then connect the one-dot end of the cable to the socket marked with one dot on the back of the second device.

3. Continue in a similar fashion until you have connected all your input devices. If you are connecting the HP Mouse, it must be the last device in the chain.

Figure A-17. Typical Input Device Configuration



Additional Display Adjustments

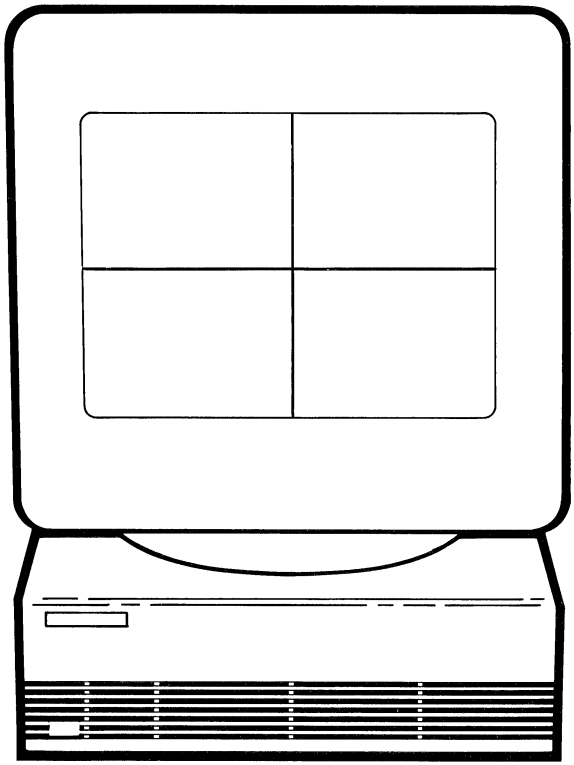
In addition to the brightness and contrast controls on the front panel of your display monitor, you have access to controls for centering the screen image. There may be an image height control you can use to adjust the graphics display in certain applications.

Centering the Screen Image

If your screen display needs centering, perform the following steps:

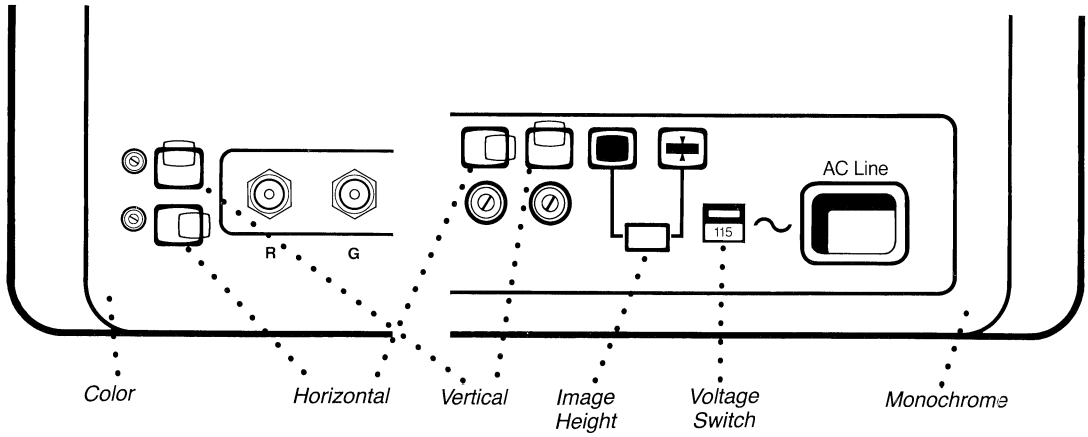
1. Press the System key on your keyboard. Then press f3 (service keys).
2. Press f3 (DISPLAY ALIGNMNT) to display the following alignment pattern:

Figure A-18. Alignment Pattern



3. Locate the horizontal and vertical centering controls on the rear panel of your monitor (Figure A-19).

Figure A-19. Monitor Rear Panel Controls



4. Insert a screwdriver into the recessed horizontal control marked ◫ on the back of the monitor. Turn the control until the crosshair pattern is centered horizontally.
5. Now use the screwdriver in a similar fashion to adjust the vertical control (marked ⊟). Turn until the crosshair pattern is centered vertically.

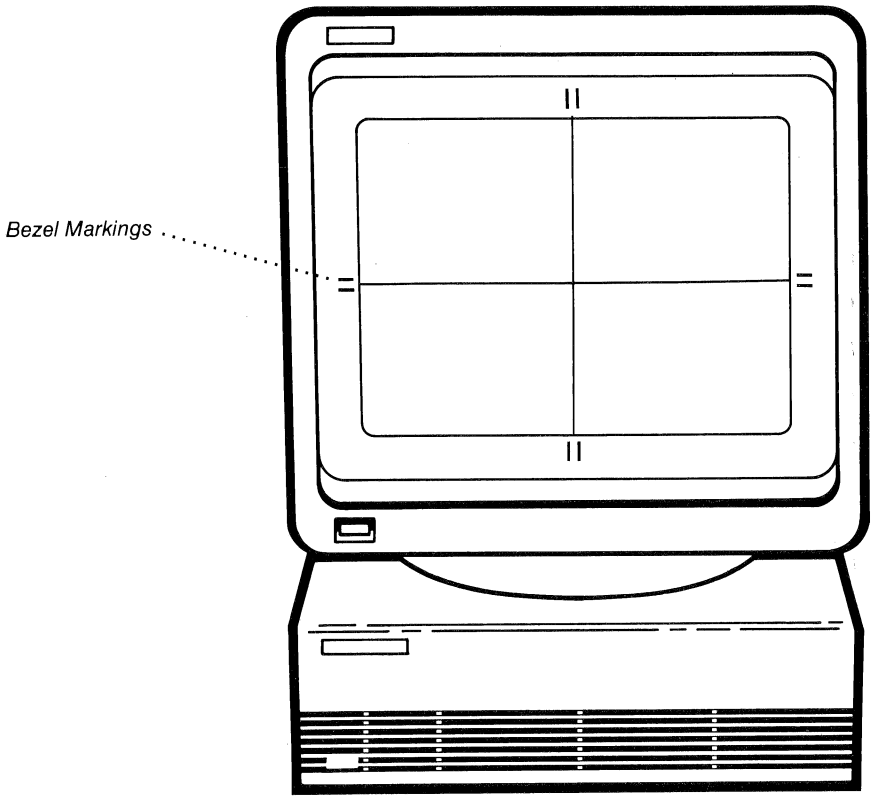
Aligning HP Touch

If your terminal is equipped with HP Touch, you may need to align the touchscreen.

To align your HP Touch accessory properly:

1. Follow the steps in the preceding paragraphs to display the crosshair alignment pattern.
2. Locate the raised markings inside the HP Touch bezel. These markings are at the midpoint of the bezel on all four sides surrounding the display.

Figure A-20. HP Touch Inner Bezel Markings (for alignment)



3. Adjust the vertical and horizontal centering controls at the back of the monitor until the crosshairs of the alignment pattern line up with the markings on the HP Touch bezel. (See the instructions in the preceding section that describe centering the screen image.)

Changing the Screen Image Height

In some computer graphics applications, the image height must be adjusted to display graphics images properly. For example, if you draw a circle and it looks like an ellipse, simply change the image height switch setting on the back of the monitor (see Figure A-19). Changing the image height may, however, cause the HP Touch accessory to function incorrectly.

You can configure your terminal to display graphics in either 640 x 400 or 512 x 390 resolution (see Chapter 4 "Graphics" for selecting the resolution you desire). Use of the monitor image height switch should only be necessary to accommodate the resolution mode in use.

Move the image height switch to the right or left to select the desired setting.

Note There is no image height switch on the color monitor for the HP 2397A.

B Troubleshooting and Maintenance

Introduction

At certain times, the terminal displays error messages across the bottom of the screen. Some errors diagnose incorrect keyboard input. Other errors indicate improper configuration settings. A few errors show a terminal malfunction.

The first part of this section tells how you may isolate the problem and determine what form of error you have. The latter part of this section gives some simple preventive maintenance procedures.

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 terminal to expose its internal circuitry.

Error Messages

The terminal generates several kinds of status checks and diagnostic error messages. You should concern yourself with two: user-error messages and system-error messages.

Most user-error messages occur when you enter data that the terminal was not expecting or request a service that the terminal cannot perform. However, some errors result from incompatible settings in the configuration menus.

System-error messages indicate if a malfunction has occurred in the terminal system.

The error messages appear on lines 25 and 26; they replace the function key labels. Pressing the Return key clears the error message, restores the labels, and unlocks the keyboard.

Table B-1 lists the most common error messages and their meanings.

Table B-1. User Error Messages

MESSAGE	MEANING
`Default Configurations Used`	This message occurs whenever non-volatile memory does not contain valid data. In this case, the terminal uses a default set of configuration parameters.
`Device Busy`	A device selected for a data transfer is currently being used by another process.
`Function Locked`	An attempt to perform a function that has been programmatically "locked".
`Illegal For Edit Type: ALPHABETIC`	While in Format mode, an attempt to enter invalid data into a field defined as alphabetic only".
`Illegal For Edit Type: NUMERIC`	While in Format mode, an attempt to enter invalid data into a field defined as numeric only".
`Illegal or No Source Device`	Either no source device was selected or the selection is invalid.
`Illegal or No Destination Device`	Either no destination device was specified or the selection is invalid.

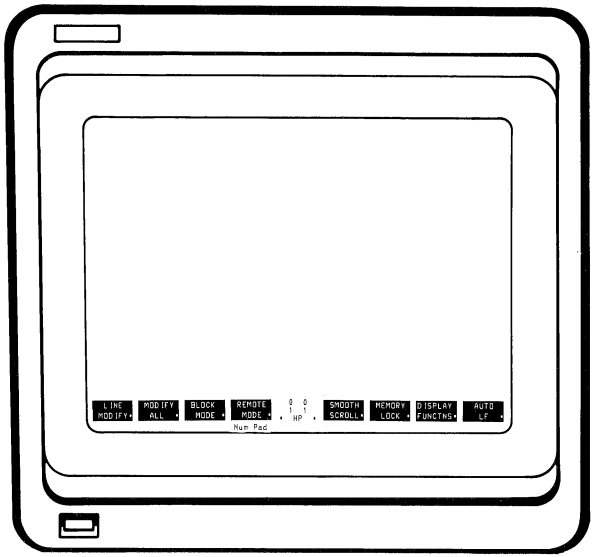
Table B-1. User Error Messages (continued)

MESSAGE	MEANING
Illegal Unit Device	The specified unit is an invalid selection.
Invalid Configuration	A conflict exists between two interrelated fields in the displayed configuration menu.
MEMORY FULL	Display memory is full and Overflow Protect is preventing accidental loss of data. Either disable Memory Lock (and, perhaps, enable data logging) or delete some lines from the workspace.
No Device Driver	No support for device exists for sending or receiving data.
Source = Destination	An attempt to perform a data transfer between devices except one of the "to" devices is the same as the "from" device.
Use NEXT or PREVIOUS Key	An attempt was made to enter data through the keyboard to change a configuration field that is underlined. Such fields can only be changed by using the "NEXT CHOICE" or "PREVIOUS CHOICE" function keys.
Value Out Of Range	The configuration menu field marked by the cursor contains a value that falls outside the acceptable range.

Malfunction At Power On

To perform a test of the terminal, press and hold down the space key before you turn on the Terminal Processing Unit. This procedure performs an extended test. Upon successful completion of the test, the TPU "beeps" once and displays the initial screen image (Figure B-1).

Figure B-1. Initial HP Screen Display



(Pressing and holding the "D" key down before turning on the TPU performs the same test described above, but also resets the terminal to its default settings.)

If the terminal fails to power on correctly, turn the power off and call your nearest Hewlett-Packard sales and service office for help.

Troubleshooting Procedures

Some terminal 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 terminal malfunction may rather be an incorrect terminal-computer configuration. When the terminal appears to malfunction, before resetting the terminal 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 Reference Manual for help.

Resetting the Terminal

Occasionally, you may find it necessary to reset the terminal to clear an error condition. There are two types of reset: a soft reset and a hard reset. Both types temporarily halt printer 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 the terminal to its power-on condition.)

For these reasons, you should use discretion when considering a reset operation.

Soft Reset. You perform a soft reset by pressing the Shift and Break keys. A soft reset has these effects:

- The terminal bell rings.
- The active configuration values remain in effect.
- The terminal preserves all data stored in workspace memory.
- The window maintains the current screen display.
- The terminal unlocks the keyboard.
- If Display Functions is enabled, the terminal disables it.
- If Record Mode is active, the terminal cancels its selection.

- The terminal stops all operations by devices (such as printers) which it controls.
- The terminal stops transferring data to the datacomm line.
- The HP-HIL is re-initialized.

Hard Reset. You perform a hard reset by simultaneously pressing the [CTRL], [Shift], and [Break] keys. A hard reset has these effects:

- The terminal bell rings.
- The HP-HIL is re-initialized.
- The terminal resets all configuration parameters to the values stored in non-volatile memory.
- The terminal destroys any data stored in workspace memory.
- The terminal resets user-defined function keys [f1] through [f8] to default values and [f9] through [f12] to the values stored in non-volatile memory.
- The terminal unlocks the keyboard.
- The terminal displays the Modes set of function key labels.
- The terminal sets the left margin to column 1 and the right margin to the workspace width.
- The terminal clears all tabs.

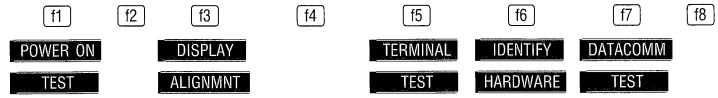
- If enabled, resets all the following:
  1. Display Functions
  2. Line Modify
  3. Insert Character
  4. Memory Lock
  5. CAPS Mode
  6. Record Mode
  7. Monitor Mode
  8. Any special datacomm modes
  9. Extended Characters Mode
  10. Top or Bottom Logging
  11. Report print
  12. Metric print

Self-Tests

Your terminal can test itself. You may select from five tests by displaying the service keys labels.

To display these labels, press System, then f3 (service keys).

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.

This section describes the Terminal Test. See the Reference Manual for information on the remaining tests.

Terminal Test. The Terminal Test verifies whether the terminal is operating correctly. Once the Service Keys labels are visible, pressing f5 (TERMINAL TEST) initiates this test.

When the test completes successfully, the terminal displays a test pattern on the screen. If the test pattern does not appear or if an error message replaces the function key labels, you could conduct additional tests to isolate the problem, or you could contact your nearest Hewlett-Packard sales and service office for help.

Preventive Maintenance

One simple procedure which you may do to help ensure the proper operation of your terminal is to keep the screen and keyboard clean.

Cleaning the Screen and Keyboard

You should regularly clean your terminal to remove dust and grease. First, dust lightly using a damp, lint-free cloth. (Paper towels are fine.) The cloth should be just damp enough to pick up dust. Avoid wiping dust or lint into the keyboard area.

If smudges or fingerprints persist, you can use a mild solution of soap and water. Remember to wring the cloth thoroughly; otherwise, rubbing the dirty areas will drip water over the terminal. Avoid getting any liquid between the keys.

Caution

Never use petroleum-based cleaners, such as lighter fluid, or cleaners containing benzene, trichloroethylene, dilute ammonia, ammonia, or acetone. These cleaners may harm the plastic surfaces.

Display Adjustments

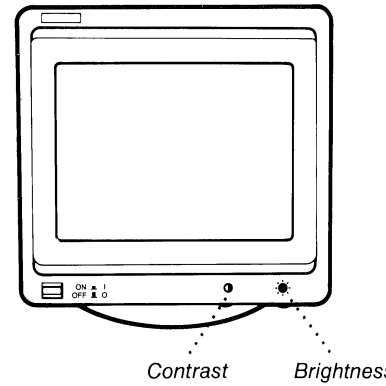
The terminal has two display adjustments that you may use if the screen's image appears fuzzy or dim.

Brightness

The Brightness Control is located on the terminal's front panel (Figure B-2).

Position the cursor near the middle of the screen and enter a few characters. Then adjust the brightness so the image is comfortable to your eyes.

Figure B-2. Screen Brightness and Contrast Controls



Contrast

The Contrast Control is located beside the Brightness Control. Using the characters that you just centered on the screen, turn the Contrast Control to the right or left until the characters are displayed properly.

Glossary

The following 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 MEMORY	A storage area that holds alphanumeric information (also called display memory because the terminal displays this data on the screen). See GRAPHICS MEMORY.
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.
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 to another.
DESTINATION DEVICE	The device that receives data during a data transfer. Also called the "to" device.
DEVICE CONTROL OPERATION	The process of skipping lines, moving printer paper to the top of the next page, or copying data from display memory to printer.

DISPLAY MEMORY	Another term for alphanumeric memory. Display memory is distinct from graphics memory.
ESCAPE SEQUENCE	A sequence of characters beginning with ESC (the ASCII escape character), followed by one, or more, additional characters. The terminal recognizes these sequences as special commands rather than data. The Reference Manual covers escape sequence programming.
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 terminal prevents the user 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 twelve keys at the top of the keyboard. [f1] through [f8] have screen labels that indicate the current active functions.
FUNCTION CONTROL KEYS	The [System] and [Menu] keys. These keys assign initial values to the function key labels.

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 (also called raster memory) that holds graphics display data. The terminal stores graphics data and alphanumeric data 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 "offline".
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 "online".
STATUS LINE	The screen's last line. It displays information on the terminal's 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.

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