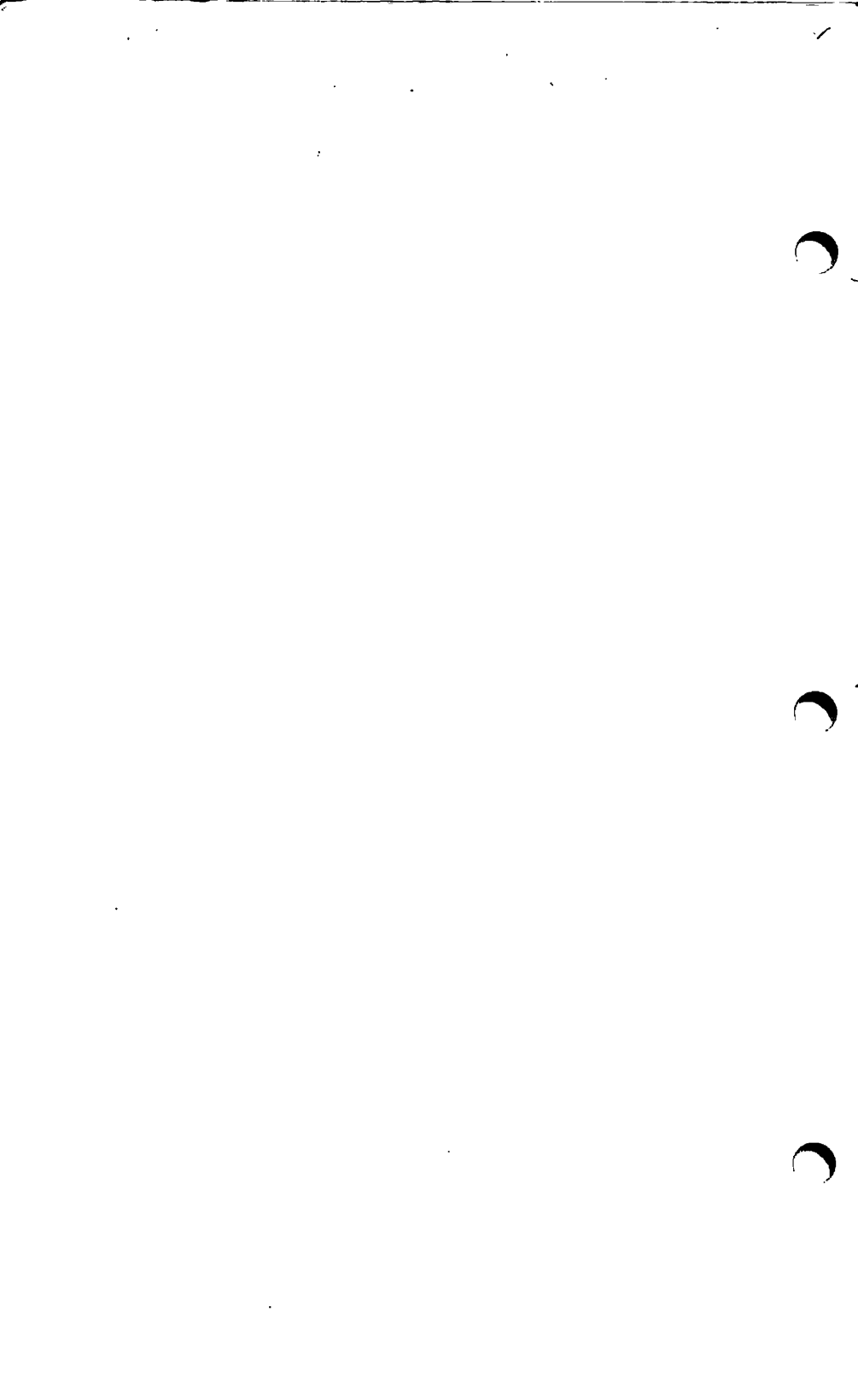


The logo for Prime, featuring a stylized horizontal bar with a textured, striped appearance to the left of the word "Prime" in a bold, italicized sans-serif font.

PT250TM
Programmer's Guide

DOC11069-2XA



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PT250™ PROGRAMMER'S GUIDE

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*This guide documents the use and operation of the
PT250 terminal as implemented at Firmware Revision B.*

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ABOUT THIS BOOK

This book is a reference guide for programmers developing applications for the PT250™ terminal. It describes the special features of the PT250 and shows how a program communicates when the terminal is in Block mode.

If you are reading this book, it is assumed that you know:

- The basic operation of the PT250 terminal as described in the *PT250 User's Guide*.
- The PRIMOS[®] operating system and one of Prime's text editors (EMACS or ED).
- A high-level language such as COBOL, FORTRAN, or C and the language's subroutine statements.
- How to install applications into PRIMOS.

Organization of This Book

This book contains six chapters and four appendices.

- Chapter 1, Introduction, presents programmable features and introduces PT250 command syntax.
- Chapter 2, Block Mode Programming, introduces basic PT250 commands. The chapter describes how to set the terminal to half duplex so that it can interact in Block mode. The discussion also shows how to set terminal characteristics and how to reset the terminal to its original state when a program finishes executing.
- Chapter 3, Block Mode Transmission, describes the way in which the PT250 sends information to the host, and it also describes the modes that affect what is sent.
- Chapter 4, Graphics: Line and Block Drawing, describes how to access the line and block drawing character sets.
- Chapter 5, PT250 Commands, contains complete information on all PT250 commands. The mode commands, which define PT250 operating states, are listed alphabetically under MODES -- SET/RESET.
- Chapter 6, DSC Commands describes the syntax and operation of all Data Stream Compatibility (DSC) commands.
- Appendix A, PT250 Function Key Code Sequences, lists the function key, single shift two, and single shift three code sequences.
- Appendix B, Command Listings, contains quick reference listings of all PT250 commands. Three tables list the commands alphabetically by command name, alphabetically by escape sequence, and by function.

- Appendix C, Character Sets, describes the standard and alternate character sets and how they are accessed in both 7-bit and 8-bit mode.
- Appendix D, DCS Bytes, describes how to interpret and construct DCS bytes.

Conventions Used in This Book

The following list summarizes the conventions used in this book.

<i>Item</i>	<i>Convention</i>
Escape Character	Unless noted otherwise, the escape character appears as Esc when it is part of an escape sequence.
Spaces in Escape Sequences	<p>Often, the components of an escape sequence are separated by spaces as shown in the following example:</p> <pre>Esc [>4;7 m</pre> <p>The escape character, left bracket, arguments, and final character are separated for clarity. Do not enter the spaces as part of the sequence or you will receive an error message.</p>
Greater-than Symbol	Some escape sequences use the greater-than symbol (>) as part of their arguments. The

greater-than symbol is used as an ASCII character only -- it does not have its usual mathematical meaning.

Additional PT250 Publications

The *PT250 Installation Instructions* (IDR11071-1XA) describes how to unpack, connect, and verify operation of a new PT250 terminal. It also provides guidelines and instructions for correcting problems with the terminal.

The *PT250 User's Guide* (DOC11070-1XA) contains basic operating and maintenance instructions for the PT250 terminal and includes descriptions of the Status Line and Set Up Menu. This book is an introductory guide for all PT250 terminal users.

Additional Prime Publications

The *Subroutines Reference Guide* (DOC10080-1LA through DOC10083-1LA and their updates) provides detailed descriptions of Prime subroutines.

The *Guide to Prime User Documents* (DOC6138-5PA) is a catalog of books available on Prime's hardware and software products. Refer to this guide for sources of further information on PRIMOS commands, PRIMOS subroutines, EMACS, ED, and programming languages.

1

INTRODUCTION

The PI250 terminal is a versatile, high performance alphanumeric display terminal suited for a variety of applications requiring Character and Block mode operation. In addition to the ANSI-standard features, the features that tailor the PI250 to PRIMOS, the 50 Series™ operating system, includes:

- Character and Block operating modes
- Data Stream Compatibility (DSC) operating mode
- Programmable visual and logical attributes
- Modes that change terminal characteristics dynamically
- Configurable display memory and programmable cursor movement
- Standard and alternate character sets
- Line-drawing and block graphics

PT250 Models and Operating Modes

There are two PT250 models. One operates in either Character or Block mode. The other offers Data Stream Compatibility (DSC) mode in addition to Character and Block mode. Otherwise, the two models are identical.

Character Mode

When the PT250 is in Character mode, each key pressed on the keyboard causes a character or command sequence to be sent to the CPU. Characters appear on the display screen only if the program receiving the characters sends them back to the terminal. That is, the PT250 displays characters or performs operations only when it receives them from the CPU.

Block Mode

When the PT250 is in Block mode, data entered is stored in the terminal and appears on the display screen. The stored data is transmitted as a block when the user presses the Enter key. The CPU intervenes only when the user presses the Enter key. This not only saves CPU cycles but reduces traffic on the communication line between the terminal and the CPU. When a user is interacting with a formatted screen that asserts logical attributes, the terminal must be in Block mode.

Data Stream Compatibility (DSC) Mode

Data Stream Compatibility (DSC) mode is a Block mode operation in which the PT250 emulates certain features of an IBM 3270 terminal for interaction with an IBM host. DSC mode dictates how certain of the other controllable modes are set and how they operate.

The Keyboard

In addition to the standard alphanumeric keys and predefined function keys, the PT250 keyboard has 26 function keys. These keys are: F1-F10, PA1-PA4, and PF1-PF12. The keys in these three groups generate unique codes for each augmentation and can be used by applications for any purpose. (Refer to Appendix A for a list of the predefined and function key code sequences.)

Rearranging the Keyboard

The Load keyboard Table (LKT) command allows any key on the keyboard to be logically moved to another position. The format of the command is:

```
Esc < data cksum Esc \
```

where **data** is a table of logical key functions and **cksum** is a calculated checksum.

The LKT command also allows key functions, not available on the default keyboard, to be added to the physical keyboard. (Refer to Chapter 5 for more information and examples for using the LKT command.)

Menu and Help Keys

The Menu and Help keys can be implemented by an application program (or operating system) with the Application Program Command (APC). The format of the command is:

```
Esc _ arg Esc \
```

arg is one of eight arguments which specifies a key or key sequence. When the application receives one of these sequences, it can respond by displaying a different menu, or by displaying different levels of help information. (Refer to Chapter 5 for a definition of valid arguments and more information on this command.)

PT250 Command Syntax

A PT250 command begins with an escape character and is followed by one or more characters. The following examples illustrate most of the possible escape command formats. Note that spaces are used in these commands for clarity and are not part of the sequence.

Esc ?	Clear screen.
Esc \$ E	Blank screen.
Esc [4 C	Cursor forward. The 4 is an argument that tells how many character positions to move.
Esc [4,10 f	Horizontal and vertical position. Move to line 4, column 10.
Esc [>2,>10,>12 h	Set three modes. This example sets the terminal to Character mode, activates the functions printed on the numeric keypad, and locks visual attributes.

If a command can take more than one argument, the arguments are separated with a semicolon (;).

Commands are often sent to the terminal as a group. Each escape character marks the beginning of a new command. The following example shows four commands as they would appear in a line of code.

```
Esc[5CEsc4,>10Esc[3CEsc[>0o
```

Note that some escape sequences use the greater-than symbol (>) as part of their arguments. For example, you may see the following sequence.

```
Esc [ >4 m
```


Control characters may also be commands. For example, Enter (Ctrl-M) and Backspace (Ctrl-H) tell the terminal to perform actions.

Entering Escape Characters

The way you enter escape characters into source programs depends on the program editor you are using.

If you use ED to enter source code, enter a caret (^) and the octal value for Escape, which is 233. For example, the program statement

```
MOVE '^233[10g' TO TEMP
```

contains an escape.

In EMACS, you must precede the escape character with Ctrl-X Q (q_quote_command). This command "quotes" the character following it instead of interpreting that character as an EMACS command. The escape character displays on the screen as the DELETE character (␣).

After you enter the escape, a program statement might look like the following example.

```
MOVE '␣[10g' TO TEMP.
```

Note

Throughout this book, both ^233 and ␣ are represented as Lsc unless noted otherwise.

Sending Commands to the Terminal

PT250 commands and sequences can be sent to the terminal from:

- Application program
- PRIMOS command level
- CPL program

You can also use the PRIMOS TYPE command interactively or from within a CPL program to send PT250 commands.

Application Program

An application can send a command to the terminal by using:

- Host language's I/O facilities
- PRIMOS subroutines

An example of the first method is this C library function that sends a Device Control String (DCS) command to the terminal:

```
printf("EscPEsc\"),
```

Another example is this COBOL I/O statement which sends a DCS command to the terminal:

```
DISPLAY 'EscPEsc'
```

For this command, and for many others, host language I/O displays the text. However, COBOL and other programming languages append a carriage return/new-line character to the end of the displayed text and the cursor moves to the beginning of the next line.

If you want to leave the cursor on the same line as the displayed characters, you may be able to use a host I/O command to suppress the carriage return/new-line character. For example, in Prime's version of COBOL, you could use the following statement:

DISPLAY 'EscPEsc\' WITH NO ADVANCING

This statement leaves the cursor to the right of the displayed text.

An alternative method is to use the PRIMOS TNOUA subroutine. TNOUA does not append a new-line character to text. For example,

```
MOVE 'EscPEsc\' TO TEXT
MOVE 4 TO LENGTH
CALL 'TNOUA' USING TEXT, LENGTH
```

PRIMOS Command Level

As you type a PT250 command string at command level, PRIMOS echoes each keystroke back to your terminal, causing the command string to be interpreted. However, when you press the Return key, PRIMOS then attempts to execute the command string as a PRIMOS command. Because PT250 command strings are invalid PRIMOS commands, PRIMOS produces an error message. Consequently, the error message causes the command string to be sent to the terminal a second time.

To prevent this from happening, type your PRIMOS KILL character just before pressing the Return key. (To determine your PRIMOS KILL character, use the TERM-DISPLAY command.) The KILL character tells PRIMOS to ignore the command string just typed, thus preventing the command string from being interpreted a second time as a PRIMOS command.

CPL Program

To send PT250 command strings to the PT250 terminal from within a CPL program, use the PRIMOS TYPE command. To prevent embedded characters in the command (such as [and ;) from being erroneously interpreted by CPL, enclose the command string in single quotes. For example,

```
TYPE 'Esc [ >13,>10,>11 h'
```

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If single quotes are not included, executing the preceding command produces the following error message:

```
Function call contains too many left brackets  
(EVAL_AF)  
Error in variable or command function reference  
(std$cp)
```

Because the PRIMOS TYPE command appends a carriage return/new line character to the command line, do not use this command if you want to leave the cursor at a specific location on the screen.

Receiving Data From the Terminal

When the terminal sends information to the host, the information is transmitted in a stream that does not terminate with a carriage return. Therefore, your program should use the PRIMOS T1IN subroutine. This subroutine reads characters from the terminal. For example, the C statement:

```
t1in(&c),
```

returns one character at a time to your program. Each character is returned in the low-order byte of a 16-bit halfword (datatype COMP, INTEGER*2, or FIXED BIN(15)). The contents of the high-order byte of the 16-bit halfword are undefined. Therefore, your application program should ignore the high-order byte and use only the low-order byte of the returned halfword.

Changing Terminal Defaults

When you turn on the terminal, the PT250 is in its default state. Some modes are set; others are reset. There is no reliable way of knowing what these default states are when you log in. If you want to be sure the terminal will be in a known state when you log in, add a DCS command to your LOGIN.CPL file. The following FD example shows how the PRIMOS TYPIN command may be used to send a DCS command from a CPL program.

```
TYPE ^233PGs1~Gs2~Gs3~Gs4~Gs5~Gs6^233\
```

The Gs1, Gs2, etc. represent the group of bytes that you can send to define the terminal's characteristics. For more information on the DCS command see Chapters 2 and 5.

I have been thinking of you
 and wondering how you are
 getting on. I hope you are
 well and happy. I have been
 very busy lately but I
 will try to write to you
 more often. I love you
 very much and miss you
 very much. I hope to see
 you soon. I am your
 affectionate friend,
 John Doe



2

BLOCK MODE PROGRAMMING

This chapter introduces some basic PT250 commands by stepping through an actual Block mode program created for the P1250. The functions described in this chapter are:

- Setting the communications controller
- Requesting and setting terminal characteristics
- Beginning the form
- Defining visual and logical attributes
- Writing text to the terminal
- Moving the cursor
- Completing the form and transmitting the data

The examples used in this chapter are taken from a program written in Prime C. The complete program appears as Figure 2-1 later in this chapter. For further information on the commands introduced in this chapter, refer to Chapter 5, PT250 Commands.

Setting the Communications Controller

In Block mode, all activity takes place in half duplex. In half duplex mode, either terminal-to-CPU or CPU-to-terminal communications can take place, but not simultaneously. This ensures that when the terminal transmits information to the CPU, the CPU does not immediately transmit the same information back to the terminal. To set the communications controller into half duplex, use the PRIMOS DUPLX\$ subroutine.

Before a program sets the communications controller to half duplex, it should first record the communications state so that it can return the controller to that state when the program finishes executing.

To retrieve the current communications controller setting, call the DUPLX\$ subroutine with an argument of -1. PRIMOS returns a number that describes the current state as the value of DUPLX\$.

The following example defines the variable `neg1` as the value of the DUPLX\$ subroutine and saves the current setting:

```
short neg1 = -1,  
  
duplex = duplx$(&neg1),
```

Set the communications controller to half duplex as shown in the following example:

```
short half_duplex = 49152,  
  
duplx$(&half_duplex),
```

The 49152 value will be interpreted as a binary bit pattern when it is received. This value, along with others that you might want to transmit, specifies the new communications controller state.

BLOCK MODE PROGRAMMING

Before the program terminates, you can restore the initial state by calling the `DUPLX$` subroutine as follows:

```
duplx$(&duplex),
```

Terminal Characteristics

The PT250 Device Control String (DCS) command is used to tell a program what the current terminal settings are and to change those settings. A program usually sends the DCS command to the terminal in three situations:

- Before a program changes the terminal state. The terminal responds by telling the program its current state.
- Before the user interacts with the terminal. Here the program sets the terminal into a known state.
- Before terminating. The program puts the terminal back to its previous state.

The format of the DCS command is:

**Esc P string Esc **

where **string** is an optional group of arguments that indicate the state of the PT250. A DCS argument consists of 1, 2, or 3 characters (or bytes).

Requesting Terminal Characteristics

To request the current terminal settings, use the DCS command with no arguments. For example,

```
Esc P Esc \
```

The PT250 responds by transmitting a character stream which represents the current terminal state. For example,

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Esc P, ~B&~ 0~B~*#~F Esc \

The tilde character delimits each group of bytes in the string. Each group may consist of one, two, or three bytes between tildes. After the program receives the DCS, it must translate bytes into binary bit strings in order to interpret the received DCS. In this form, each bit (or set of bits) represents a terminal state or characteristic. Refer to Appendix D for DCS bit definitions and how to interpret DCS bytes

Alternatively, a program can simply store the entire DCS string in memory so that it can restore the terminal state by sending the entire string back to the terminal. This is useful when the program does not actually use the information in the DCS, except to restore it later.

Setting Terminal Characteristics

Terminal characteristics are set by adding arguments to the DCS command or by the Set/Reset Mode commands.

DCS Command: If the DCS command contains arguments, the PT250 uses these arguments to set the terminal to the states indicated. A DCS argument consists of one, two, or three characters (or bytes). The procedure for constructing a DCS character to be used in a DCS argument is the reverse procedure for interpreting the character. Refer to Appendix D for steps on how to construct a DCS byte and how to send it to the terminal.

Set and Reset Mode Commands: The second method of setting terminal characteristics exists in which a program specifies the mode(s) to be changed. You can change one or more modes using the Set Mode command:

Esc [args h

where **args** is one or more characters that tell the PT250 which modes to set. The Reset Mode command turns a mode off. The format is:

BLOCK MODE PROGRAMMING

Esc [args 1

where **args** is one or more characters that tell the PT250 which modes to reset. (Note that a lowercase L, not the number 1, is the final character in this sequence.)

The following modes are significant for Block mode programming:

<i>Name</i>	<i>Argument</i>
Character/Block mode	>2
Logical Attributes mode	>3
Page/Line mode	>4
One/Two Page mode	>11
Visual Attribute Lock mode	>12
Unprotected/Modified mode	>6
Selected Area Transfer mode	17
Send Tabs mode	>17
DSC mode	>20

The first five modes set up the terminal environment. The remaining three modes tell the PT250 how to send characters to your program.

More than one mode can be set by a single command by separating the arguments with semicolons as shown in the following example:

```
Esc [ >2,>11,>12 h
```

This command places the terminal into Block mode, allows access to two pages of display memory, and sets the Visual Attribute Lock state. Refer to the Modes -- Set/Reset section in Chapter 5 for detailed information on PT250 mode commands.

Beginning the Form

Before a form is displayed, the application should disable the keyboard, specify the size of the screen, and clear the screen.

Disabling the Keyboard

The Disable Manual Input (DMI) command locks the keyboard. The sequence is

```
Esc ' 
```

where ' is a single open quotation mark. This causes all keyboard input to be ignored and the message

```
KEYBD LOCK
```

appears in the status line.

Setting the Form Length

The Set Display Size (SDS) command sets the screen size for the form. The SDS command takes one of four arguments.

<i>Argument</i>	<i>Meaning</i>
1	80 columns by 24 rows
2	80 columns by 48 rows
3	132 columns by 27 rows
4	80 columns by 25 rows

For example, the following SDS command

```
Esc [ 2 N
```

sets the screen size to 80 columns by 48 lines (or two pages).

Clearing the Screen

The Clear Screen (CS) command

Esc ?

erases all characters from the screen, sets all logical and visual attributes to their default settings, and places the cursor at the absolute home position (1,1).

Visual and Logical Attributes

The PI250 has several types of attributes that affect the way characters are displayed on the screen. You can highlight portions of text by using visual attributes and change the way text is entered by using logical attributes.

Defining Visual Attributes

Visual attributes are defined by the Select Graphic Rendition (SGR) command. The format of this command is:

Esc [args m

The SGR command specifies how data will appear when it is entered. How the characters look is specified by an argument (or arguments) to this command. Valid arguments for the SGR command are listed below.

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<i>Argument</i>	<i>Attribute</i>
0	Normal video
2	Low intensity
4	Underscore
5	Blink
7	Reverse video
>1	Strike-through
>2	Invisible image
>3	Line drawing graphics
>4	Block graphics

When the PT250 receives an SGR command, it stores the command meaning for use when information is displayed.

Visual Attribute Lock Mode: Visual Attribute Lock mode tells the terminal if visual attributes, such as reverse video, are attached to newly entered characters or to positions on the screen. When reset, the visual attributes defined by the current Set Graphics Rendition (SGR) value are applied to each character as it is entered. Visual Attribute lock mode is reset by the sequence

Esc [>12 I

When this mode is set, visual attributes are locked to a position on the screen.

Visual attributes can also be applied to a field of characters by using the Change Visual Attribute commands. Also see the Compressed Visual Attributes and Compressed Visual Area commands, which are described in Chapter 5.

Defining Logical Attributes

Logical attributes define the type of information that can be entered at a particular screen position. Every position on the screen has a logical attribute associated with it. When Logical Attributes mode is set, characters are checked against the defined position. If the character

BLOCK MODE PROGRAMMING

fails the PT250 validity check, the PT250 ignores the character. It also rings the bell, displays an error message that tells the user what is wrong, and locks the keyboard.

Normally, logical attributes are not asserted. That is, a user is free to enter any character in any position. After a formatted screen is displayed, the program uses a Set Logical Attributes command to tell the terminal to assert logical attributes.

Define Area Qualification Command: The Define Area Qualification (DAQ) command defines the type of data that can be entered in a particular area on the screen while in Block mode. The format of the DAQ command is

Esc [args o

where **args** is one or more of the following logical attributes

<i>Argument</i>	<i>Meaning</i>
2	All printing characters
3	Numeric characters
4	Alphabetic characters
5	Right justify in area
>0	Protected accept no input (default)
>1	Must enter data in the field
>2	Must fill in every position in field
>3	Set Modified Data lag

The DAQ command defines the current cursor position as the beginning of a qualified area. The end of a qualified area is indicated by the beginning of the next qualified area.

When a new DAQ is given, the current values are replaced with the new values. For example, assume that the current area is a numeric-only field. To create a new right justified, numeric-only field, you must give both the right justified and numeric only parameters.

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The following is an example of a DAQ command:

```
Esc[18;16HEsc[4oEsc[21CEsc[o
```

This sequence translates to:

1. Position the cursor (Esc [18; 16 H)
2. Define an alphabetic-only field (Esc [4 o)
3. Move the cursor forward 21 characters (Esc [21 C)
4. Accept no input (Esc [o)

Compressed Commands: Another, more efficient, method of defining fields is by using compressed commands. A program can send logical attributes, visual attributes, and cursor positioning commands to the PT250 in a compressed format. By sending fewer characters, a program can increase system performance.

The PT250 uses the following five compressed commands:

<i>Compression</i>	<i>Command Sequence</i>
Cursor Position	Esc 0 row col
Logical Attributes	Esc 1 row col la len
Visual Attributes	Esc 2 row col va len
Logical Area	Esc 3 la
Visual Area	Esc 4 va

where **row** is the row number and **col** is the column number of the screen in a compressed format.

la and **va** are single characters that define a logical or visual attribute. **len** is a specified number of character positions.

See the compressed commands in Chapter 5 for further information on how to construct and interpret compressed attribute values.

Other Area and Logical Attribute Commands: For less complex applications, you can also use the Start Protected Area (SPA) and End Protected Area (EPA) commands. This gives the user an easier mechanism for defining the boundaries of protected areas. The Define Logical Attributes (DLA) command can also be used to redefine the logical attributes of portions of the display. This is often useful for changing attributes of a formatted screen after it has displayed.

A program defines areas using the Start Logical Attributes (SLA) and End Logical Attributes (FLA) commands. After the PT250 receives the IIA command it defines logical attributes (using the current DLA value) for the area delimited by the SLA and FLA commands inclusive. A program can specify logical attributes at any time. However, attributes are not used (asserted) until the PT250 receives a FLA mode command.

Writing Text to the Terminal

To write text (literals) to the screen, send the text to the PT250 using PRIMOS or programming language I/O.

The text sent to the terminal might be a heading that identifies the form, a label for a field, or a prompt defining what user entry is appropriate. A literal may be written to any position on the screen, but it must be within the defined screen size (80 x 24, 80 x 48, 132 x 27, or 80 x 25).

For example the sequence

```
Esc [ 1, 35 H Esc [ 7 m PRIME COMPUTER INC
```

positions the cursor to the appropriate coordinates (Esc [1, 35 H) and writes the heading in reverse video (Esc [7 m)

Moving the Cursor

The PT250 contains a number of commands that move the cursor. There are three types of cursor movement:

- *Absolute* moves the cursor to a specific location.
- *Relative* moves the cursor relative to its current location. For example, the cursor moves forward three positions from its current location or moves up three lines from its current location.
- *Tabulation* moves the cursor to a predefined tab stop.

Under certain conditions, these commands may cause the screen to scroll.

Some movement commands do not work if locked lines exist on the terminal. Refer to the Locked Lines command in Chapter 5 for more information. Several of the commonly used cursor movement commands are listed below.

<i>Command Name</i>	<i>Command Sequence</i>
Cursor Backward	Esc [arg D
Cursor Down	Esc [arg B
Cursor Forward	Esc [arg C
Cursor Horizontal Absolute	Esc [arg G
Cursor Next Line	Esc [arg E
Cursor Position	Esc [arg-1;arg-2 H
Cursor Preceding Line	Esc [arg F
Cursor Up	Esc [arg A
Next Line	Esc E

For all the preceding cursor command sequences, **arg** is the number of character or line positions that the cursor is to be moved, or a column number. **arg-1** is a line number, and **arg-2** is a column number.

Completing the Form and Transmitting the Data

Once a complete formatted screen has been displayed, the application should execute a Cursor Absolute Home command

`Esc $ B`

and enable the keyboard using the Enable Manual Input command

`Esc b`

to allow data to be entered.

After the user fills in the formatted screen, the data is transmitted to the host using the Send Block Data command

`Esc 5`

This causes the PF250 to send the data filled fields to the host. An explanation of data transmission is given in Chapter 3, Block Mode Transmission Formats

The complete Block mode program is shown in Figure 2-1. Note that in this example, the character represents the Escape character.

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/* PT250 BLOCK MODE EXAMPLE

Create a PT250 form using Block Mode and read back the data filled in */

```
#include <stdio.h>
```

```
main()
```

```
{
    short int i,c,
    short neg1 = -1, /* parameters to pass to */
    short half_duplex = 49152, /* the duplx$ command */
    int exit_flag = 1,
    char DCS[21], /* saved DCS settings */
    short duplex, /* saved comm line settings */
}
```

/* Note how external PRIMOS subroutines are defined for use in the following two lines */

```
fortran tlin(), /* PRIMOS 1 char input */
fortran duplx$( ); /* PRIMOS comm line command */
```

/* SAVE CURRENT SETTINGS FOR TERMINAL AND COMM LINE

Use the PRIMOS duplx\$ command first to read the current line setting and save it for when we exit, then set the line to half duplex. Note that the arguments passed to the duplx\$ command must be of type "short" and must be passed by reference */

```
duplex = duplx$(#neg1), /* save comm line setting, */
duplx$(#half_duplex), /* then set to half duplex */
```

/* Request the current settings of the terminal through the use of a DCS string with no parameters. The reply from the terminal is a DCS string with the current parameters filled in. Store this in a character array to be sent back to the terminal when we exit this program, thus restoring the terminal to its settings upon entry */

```
printf("iPr\\n"), /* request current DCS string */
for (i = 0, i < 20, i++) { /* save the response */
    tlin(&c),
    DCS[i] = c,
}
DCS[i] = '\\0',
```

/* BEGIN PUTTING UP THE FORM */

```
printf("''"), /* disable keyboard */
printf("s[2Nf?"), /* set to 80x48, clear the screen */
printf("s[>12I"); /* reset visual attr lock */
printf("s[1,35H[7mPRIME COMPUTER INC "); /* write a heading, inverse video */
printf("s[3,32H[7mPersonnel Records Form NJA' ),
printf("s[5,10H[7mPersonal "); /* put titles on entry fields */
printf("s[7,5H [mName i[4m i[25b' ), /* use cursor positioning, */
printf("s[8,5H[7mAddress i[4m i[40b' ), /* v isual attributes and */
printf(" [9,14H i[40b' ), /* the repeat function to */
printf("s[10,5H[7mCity i[4m i[25b' ), /* define the fields visually */
printf("s[11,5H[7mState i[4m ");
printf("s[11,25H[7mZip Code i[4m ");
printf("s[12,5H[7mTelephone i[4m - - ");

printf("s[14,10H [7mEmployment History ");
```

FIGURE 2-1. PT250 Block Mode Example

BLOCK MODE PROGRAMMING

```

printf("I[16,5H][mStart Date I[4m / / '),
printf("I[17,5H][mCurrent Salary $I[4m , " ),
printf("I[18,5H][mJob Title I[4m I[20b' ),

printf("I[>4,7mI[20,1HnI[50bI[21,51HPI[22,51HPI[23,51HPI[24,51HP").
printf("I[mI[21,1HAI Fields I[4mMustI[m Be Completely Filled In ").
printf("I[22,2HUse the PF1 key to submit ").
printf("I[23,2HUse the PF2 key to start over ' ),
printf("I[24,2HUse the PF3 key to erase current field " ),

/* The 2nd page will contain a set of instructions to the operator
This page would not normally be visible, but there will be a key
set up allowing the operator to switch to this page when needed */

printf("I$XI[26,10HI[>4mDI[59bG\n"),
printf("I[10GPI[m I[>4mRRRRRP[m I[45bI[>4,7mRRRRRI[m I[>4,7mp\n'),
printf("I[10GI[>4mpI[m I[>4mXXXXXXXXXX I(m"),
printf("I[14bPRIME COMPUTER I[16bI[>4,7mXXXXXXXXXXI[m I[>4,7mp\n"),
printf("I[10GI[>4mpI[m I[>4mXXXXXXXXX I[m I[45bI[>4,7mssssssI[m I[>4,7mp\n"),
printf("I[10GI[>4mDI[29btDI[28bG\n"),
printf("I[10GPI[m I[29bI[>4mpI[m I[28bI[>4,7mp\n"),
printf("I[10GI[>4mpI[m Help Information for "),
printf("I[>4mpI[m I[4mFunction Key Usage I[m I[>4,7mp\n"),
printf("I[10GI[>4mpI[m I[29bI[>4mpI[m I[28bI[>4,7mp\n"),
printf("I[10GI[>4mpI[m I[4mPersonnel Information Form"),
printf("I[m I[>4mpI[m I[7mPF1I[m—Submit form Use this I[>4,7mp\n"),
printf("I[10GI[>4mpI[m I[29bI[>4mpI[m key when the form is I[>4,7mp\n"),
printf("I[10GI[>4mpI[m I[29bI[>4mpI[m correctly filled in I[>4,7mp\n"),
printf("I[10GI[>4mpI[m This form is for recording I[>4mpI[m I[28bI[>4,7mp\n"),
printf("I[10GI[>4mpI[m basic data on new hires &"),
printf("I[>4mpI[m I[7mPF2I[m—Erase whatever is now I[>4,7mp\n")
printf("I[10GI[>4mpI[m for any such updates that"),
printf("I[>4mpI[m entered and restart I[>4,7mp\n"),
printf("I[10GI[>4mpI[m may be necessary I[>4mpI[m I[28bI[>4,7mp\n"),
printf("I[10GI[>4mpI[m I[29bI[>4mpI[m I[7mPF3I[m—Erase only current I[>4,7mp\n"),
printf("I[10GI[>4mpI[m There are no opt onal"),
printf("I[>4mpI[m field and re-enter it I[>4,7mp\n"),
printf("I[10GI[>4mpI[m areas on this form I[>4mpI[m I[28bI[>4,7mp\n"),
printf("I[10GI[>4mpI[m I[29bI[>4mpI[m I[7mPF4I[m—Exit I[16bI[>4,7mp\n'),
printf("I[10GI[>4mpI[m I[29bI[>4mpI[m I[28bI[>4,7mp\n"),
printf("I[10GI[>4mqI[>4,7mI[29bI[>4mqI[>4,7mI[28bI[mN");

/* With the visual part of the form now displayed, set up the
validation attributes to go with the fields For most of the
fields we use the Cursor Position (CUP) command and the Def ne
Area Qualification (DAQ) command These are probably the most
easy to read ways of doing it, but not the most efficient */

printf("I[>2h"), /* first enter block mode */
printf("I[18,16HI[4oI[2CI[o' ), /* Title alpha only */
printf("I[17,22HI[3oI[2CI[o' ), /* Salary numeric only */
printf("I[Ci[3oI[3CI[o' ),
printf("I[16,17HI[3oI[2CI[o' ), /* Start Date numeric only */
printf("I[Ci[3oI[2CI[of[Ci[3oI[2CI[o' ),

printf("I[12,16HI[2oI[3CI[o' ), /* Phone all graphics */
printf("I[Ci[2oI[3CI[of[Ci[2oI[4CI[o' ),
printf("I[11,35HI[3oI[5CI[o' ), /* Zip numeric only */
printf("I[11,12H[4oI[2CI[o' ), /* State alpha only */

/* The following lines are examples of other, usually more efficient,
ways of defining fields */

```

FIGURE 2-1. PT250 Block Mode Example
(continued)

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```
/* The next line is an example of compressed logical area */
printf("%s[10,11H;3#;[26C;3 ",          /* C ty alpha only */

/* The next line is an example of compressed logical attributes */
printf("%s) #1",                        /* Line 2 of address */

/* The next line is an example of compressed cursor position */
printf("%0( %2of[41Cl[o",              /* Address all graphics */
printf("%s[7,11H[2of[26C;[o",         /* Name all graphics */

/* The form is now complete. Turn on logical attribute mode,
position the cursor to the start of the form and let the
operator fill it in */

printf("%sP, ~B~ .0~B~*#~F;\'',      /* send DCS string */
printf("%s$B$'",                      /* cursor position */
printf("%sb",                          /* enable keyboard */

/* Now wait for the operator to do something. All requests
should be in the form of escape sequences. Ignore anything
that doesn't start with an ESC character */

while (exit_flag) {
    tlin(&c),                            /* get character from terminal */
    while (c != '\233') {
        tlin(&c)                          /* keep reading until ESC found */
    }
    tlin(&c),                            /* get 2nd char in ESC sequence */
    if (c == 'O') {
        tlin(&c),                          /* check for valid char */
        switch(c) {
            case 'A':
                break,                    /* form all filled in */
        }
    }
}

/* Here you would want to send the terminal "ESC 5", the Send Block Data
command. This will cause the terminal to send the data filled into the
fields of the form to the host. This data can then be stored and
processed in whatever manner is appropriate */

case 'B':
    printf("%s[6I'[2J;$A\11",           /* erase fields, home cursor */
    break,
case 'C':
    printf("%s[6I'[20\215'",           /* erase just this area, */
    break,
case 'D':
    printf("%s ?", DCS),                /* reset terminal modes */
    duplx$(&duplex),                    /* reset duplex */
    exit_flag = 0,                       /* set flag to allow exit */
    break,
default:
    printf("\207",                       /* unknown command, beep */
    break,
}
}
}
```

FIGURE 2-1. PT250 Block Mode Example
(continued)

3

BLOCK MODE TRANSMISSION

This chapter describes how the PT250 sends information to the host while in Block mode. It also describes the modes that affect what is sent.

The Transmission Process

In Block mode, a user indicates that a formatted screen (or operation) is completed by pressing the Enter key. At this point, the PT250 and the program exchange a series of signals. These signals let the PT250 confirm that the program is ready to receive data. The sequence is as follows:

1. The user presses the Enter key to indicate that information should be transmitted.
2. The PT250 transmits an Esc S (Set Transmit State) to the program.
3. The program sends an Esc 5 (Send Block Data) to the PT250 to tell it to transmit the data.

4. The terminal responds by sending data to the program.

Note

You must ensure that each PT250 terminal used in Block mode has been allocated sufficient input buffer space in PRIMOS during system configuration, as described in the *System Administrator's Guide*. Contact your System Administrator for further information.

Data Formats

All Block mode information that the PT250 sends begins with an STX (Control-B) and ends with an ETX (Control-C). (These are the ASCII Start and End Transmission characters.) Between these characters, the data can be formatted in a variety of ways. The format the PT250 uses is determined by the settings of the following modes:

- Logical Attribute mode
- Selected Area Transfer mode
- Send Tabs mode
- Unprotected/Modified mode

The amount of data transmitted is determined by the setting of:

- Page/Line Mode command
- Set Display Size command

Logical Attribute Mode

By defining areas, the program can establish logical attributes that indicate the kinds of information that can be typed. However, logical attributes are not used (asserted) until Logical Attribute mode is set. Consequently, the Logical Attribute mode command switches the terminal between states where logical attributes are asserted and unasserted.

This mode has a strong effect on transmitted information. If logical attributes are asserted, the PT250 knows how a program defined areas. However, when logical attributes are not asserted, the PT250 treats the entire display area as one field.

Selected Area Transfer Mode

When establishing the logical attributes of areas, a program can use the Start of Selected Area (Esc F) and End of Selected Area (Esc G) commands to delimit regions. These commands tell the PT250 that future transmissions of data could be restricted to just those selected areas.

When Selected Area Transfer mode is not set, the PT250 sends only the selected areas. However if Selected Area Transfer is in its set state, the P1250 does not send selected areas. Instead, the information sent is governed by the setting of Unprotected/Modified mode.

Send Tabs Mode

If Send Tabs mode is asserted, the terminal uses vertical and horizontal tabs to distinguish unmodified and modified fields, respectively.

The settings of other modes can alter the terminal's choice of which tab separator it should use.

- If Unprotected/Modified is reset, horizontal tabs indicate the end of each unprotected field.
- If Unprotected/Modified is set, horizontal tabs indicate fields that were modified. Vertical tabs indicate unprotected fields that were not modified.

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- If logical attributes are not asserted, one horizontal tab indicates the end of the protected field

If the Send Tabs mode is not in force, the PT250 does not use tabs as area separators. However, character set and cursor positioning information will be sent.

Unprotected/Modified Mode

When a program establishes a formatted screen, it should leave some areas unprotected so that the user can type information. The user does not necessarily have to enter information into these areas.

For example, a programmer could establish a personnel form on which all fields would probably be filled in when a person is hired. However, to retrieve information about an employee, a user would only have to enter the employee number. The program then would find the data and fill in the formatted screen.

If the Unprotected/Modified mode is set, the terminal transmits only those areas that the user has actually altered. Otherwise, the PT250 transmits all fields in which information could have been entered.

If Selected Area Transfer mode is not in force, this mode is ignored. That is, if you tell the PT250 to send only selected fields, it will send all selected information, regardless of how Unprotected/Modified mode is set.

Transmission Formats

This section describes the transmission formats according to the following conditions:

- Logical Attribute Mode Reset
- Logical Attribute Mode Set
- No Information to Send

Logical Attribute Mode Reset

When Logical Attribute mode is reset, the transmission format is determined by the setting of Send Tabs mode. If Send Tabs mode is set, the entire screen (or line) followed by a horizontal tab (HT) separator is sent. If Send Tabs mode is reset, the entire screen (or line) with the full descriptor is sent. The formats are shown in Figure 3-1

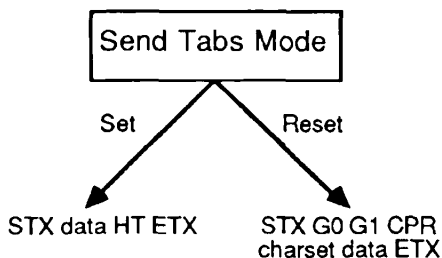


FIGURE 3-1. Logical Attribute Mode Reset

where:

STX Indicates the start of a transmission.

data Represents the block of data.

HT Is a horizontal tab separator.

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G0 Indicates the current G0 character set by one of the following sequences:

Esc \$ 0 -- Standard PT250 character set

Esc \$ 2 -- Alternate character set

G1 Indicates the current G1 character set by one of the following sequences:

Esc \$ 1 -- Standard PT250 character set

Esc \$ 3 -- Alternate character set

CPR Is the Cursor Position Report command (Esc [arg;arg R). Its arguments indicate the line number and column of the data field.

charset Indicates the type of character that appears in the field. This entry appears before the first field. However, it appears before other fields only if the character type changes. There are six possible formats for this field:

Ctrl-N Esc [0 m

The subsequent characters are from the G1 character set.

Ctrl-O Esc [0 m

The subsequent characters are from the G0 character set.

Esc \$ 1 Ctrl-N Esc [0 m

The subsequent characters are from the ASCII character set.

Esc \$ 3 Ctrl-N Esc [0 m

The subsequent characters are from the alternate character set and G0 and G1 are both seven-bit ASCII.

BLOCK MODE TRANSMISSION

Esc [>3 m

The subsequent characters are from the line drawing set.

Esc [>4 m

The subsequent characters are from the block graphics set.

ETX Indicates the end of a transmission.

Logical Attribute Mode Set

When Logical Attribute mode is set, the transmission format is determined by the setting of Set Tabs mode and Unprotected/Modified mode. Figure 3-2 shows what is sent depending on the setting of these modes.

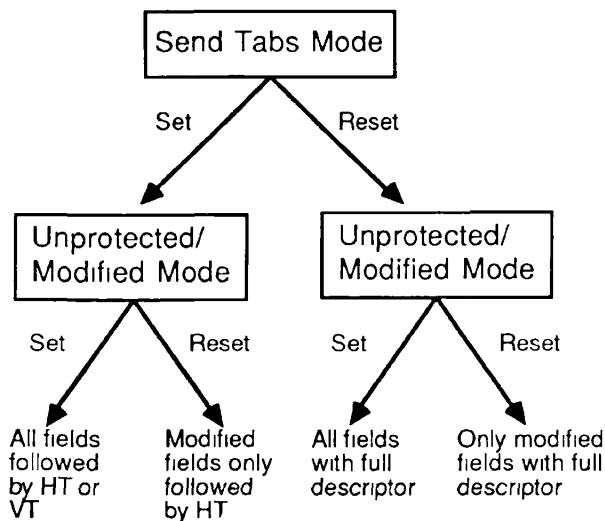


FIGURE 3.2. Logical Attribute Mode Set

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Send Tabs Set, Unprotected/Modified Set: If Send Tabs and Unprotected/Modified modes are set, all fields followed by an HT or VT are sent. The format is:

**STX data-1 HT data-2 VT ...
data-n HT ETX**

where:

STX Indicates the start of a transmission.

data-n Represents the nth block of information.

HT Is a horizontal tab separator. Horizontal tabs signal the end of a modified field.

VT Is a vertical tab separator. Vertical tabs signal the end of an unprotected and unmodified field.

ETX Indicates the end of a transmission.

Send Tabs Set, Unprotected/Modified Reset: If Send Tabs mode is set and Unprotected/Modified mode is reset, only modified fields followed by HT are sent. The format is:

**STX data-1 HT data-2 HT ...
data-n HT ETX**

The definitions of the symbols are the same as those described previously.

Send Tabs Reset, Unprotected/Modified Set or Reset: If the Send Tabs mode is reset, the terminal sends a great deal of information. This information tells where fields are located and which character set is in force. Schematically, this format is as follows:

BLOCK MODE TRANSMISSION

STX

G0 G1

CPR charset data-1

CPR [charset] data-2

...

CPR [charset] data-n

ETX

The definitions of the symbols are the same as those listed under Logical Attribute Mode Reset.

No Information to Send

When no information meets the sending criteria, the format is as follows:

STX HT ETX

where:

STX Indicates the start of a transmission.

HT Is a horizontal tab separator. Horizontal tabs signal the end of a modified field.

ETX Indicates the end of a transmission.

Send Tabs Reset, No Information: If there is no information to transmit and Send Tabs mode has not been set, the terminal transmits:

STX G0 G1 ETX

where:

STX Indicates the start of a transmission.

G0 Indicates the current G0 character set.

G1 Indicates the current G1 character set

ETX Indicates the end of a transmission.

Page Dump Format

In some circumstances, the programmer may want to send all information that exists on a page, rather than a specified portion. For example, page dump format could be used after a formatted screen is built. When the PT250 performs the page dump, it transmits all the commands and characters necessary to describe the formatted screen. Then these characters are saved for later use to rebuild the formatted screen.

To perform this action, the application program sends a Dump Block Data command (Esc 6) rather than the Send Block Data command (Esc 5) that it normally sends to the PT250. This tells the terminal to perform the page dump.

A user can indicate that a page dump is desired by typing Shift Enter. This keystroke transmits a Set Page Dump command (Esc =). Instructions in the application program determine if a page dump should occur.

When the PT250 performs a dump, it starts at the beginning of the page and sends all escape sequences and data required to duplicate the displayed formatted screen. This includes logical and visual attribute descriptions.

An initial Cursor Position Report command contains the absolute home position coordinates. A Define Area Qualification command indicates the logical attributes that are in effect at the absolute home position. In the same manner, a Select Graphic Rendition command specifies the initial visual attributes. At this time, data is transmitted.

BLOCK MODE TRANSMISSION

Changes in logical attributes are indicated by additional DAQ escape sequences. Changes in visual attributes are indicated by additional Select Graphic Rendition commands. Graphics sets used to display characters are indicated if changes occur.

In dump format, pad characters (whether spaces or nulls) are transmitted. Consequently, only the initial Cursor Position Report indicates position.

The PT250 transmits one character for each character position on the screen until there is a change in logical or visual attributes. At that time, a command is sent that defines the change.

Because the format of a page dump is determined by the contents of the page, a typical page dump might look like:

```
STX G0 G1
      CPR DAQ SGR      data
          DAQ      SSA data ESA
              SGR      data
                  SGR      data
ETX
```

where:

STX Indicates the start of a transmission.

G0 Indicates the current G0 character set.

G1 Indicates the current G1 character set.

CPR Is the Cursor Position Report command (Esc [arg;arg R). Its arguments indicate the line number and column of the data field.

DAQ Define Area Qualification (Esc [args o)

SGR Select Graphic Rendition (Esc [args m)

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- data** Represents the block of data.
- SSA** Start of Selected Area (Esc F)
- ESA** End of Selected Area (Esc G)
- ETX** Indicates the end of a transmission.

4

GRAPHICS: LINE AND BLOCK DRAWING

The PT250 contains two graphics character sets: Line Drawing and Block Drawing graphics. The Line Drawing character set is used primarily to draw rectangular grids, whereas the Block Drawing character set can be used to draw solid block borders or other block patterns.

Both character sets are invoked using the Select Graphic Rendition (SGR) command as follows:

Esc [>3 m (Line Drawing Graphics)

Esc [>4 m (Block Drawing Graphics)

When the terminal is using one of these character sets, each ASCII character displays in an alternate form when it is written to the terminal.

To return to the normal video character set, use the default SGR command as follows:

Esc [0 m (Normal Video)

Because this is the default setting, the zero can be omitted as follows:

Esc [m

Line Drawing Graphics

Line drawing characters may be used after the PT250 receives an SGR command that contains an argument of >3. The three low-order character bits of an ASCII character define the line or lines that the PT250 displays. The Line Drawing graphic character set is illustrated in Figure 4-1.

In this figure, the box represents the area in which a line can be displayed. (This area is the size of the block cursor.) The shaded lines within the box are the lines that can be drawn. The arrow leading from the character byte below the box to the line indicates which line or lines will be drawn.

GRAPHICS: LINE AND BLOCK DRAWING

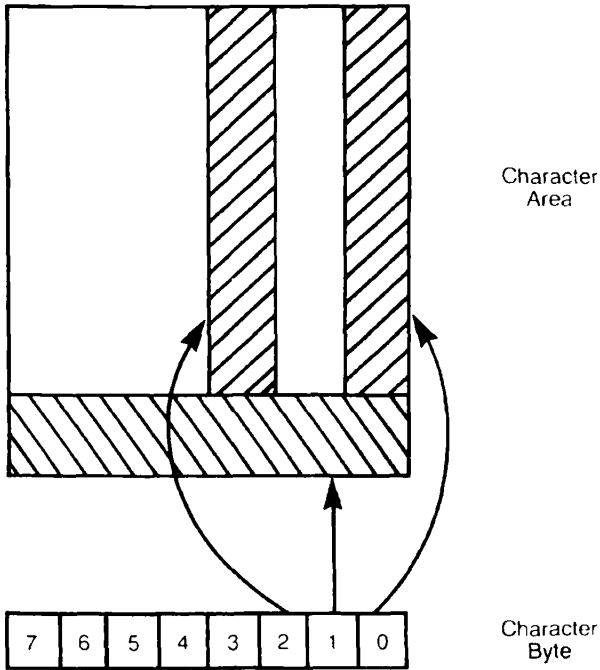


FIGURE 4-1. Line Drawing Graphic Characters

Because several different ASCII characters have identical low-order bit patterns, these characters will produce the same result. For example, the following characters produce a vertical line at the edge of the box:








! 1 A Q a q

You can produce more than one line at a time. For example, the low-order bits for the letter W are 111. This character displays all three lines.

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Table 4-1 shows all possible combinations of lines that can be drawn as well as the PT250 characters used to draw them. Tables C-2 and C-3 in Appendix C show bit patterns for all PT250 characters.

TABLE 4-1. Line Drawing Character Set

Line Character	Low-Order Bit-Pattern	ASCII Characters
 (right line)	001	' 1 A Q a q) 9 I Y i y
 (bottom line)	010	" 2 B R b r * · J Z j z
 (bottom and right lines)	011	# 3 C S c s + ; K [k {
 (middle line)	100	\$ 4 D T d t , < L \ l |
 (middle and right lines)	101	% 5 E U e u - = M] m }
 (bottom and middle lines)	110	& 6 F V f v . > N t n ~
 (bottom, right and middle)	111	' 7 G W g w / ? 0 _ o

For example, to draw a horizontal line, send a series of any one of the ASCII characters that draws the bottom line (such as the double quote or the number 2). Do not append a carriage return/new-line to the characters.

To draw a lower right-angle corner, send any ASCII character, such as 3, that draws both the bottom and right lines.

Block Drawing Graphics

To use Block Drawing characters, send an SGR command with an argument of >4. When this character set is invoked, the PT250 examines bits 0-2 and 4-6 when it displays data. The block drawing graphics characters are illustrated in Figure 4-2.

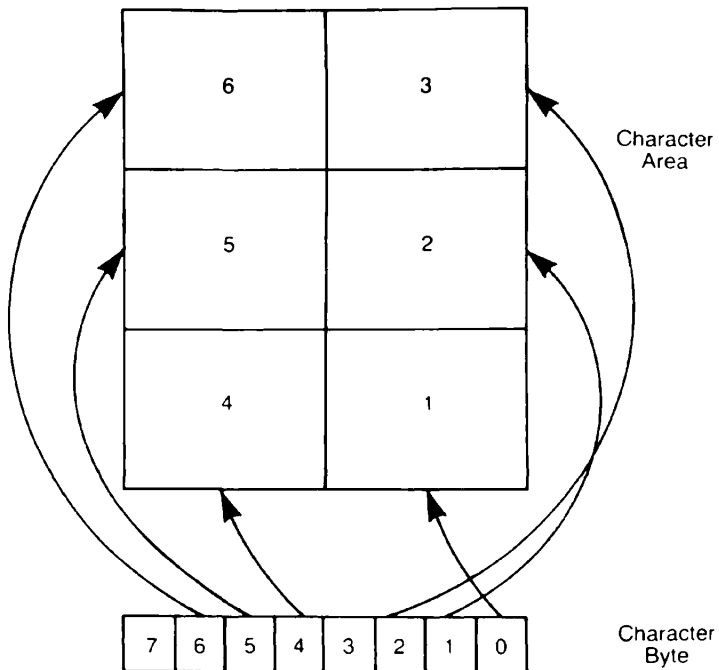


FIGURE 4.2. Block Drawing Graphics Characters

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The top portion of this figure contains a box. The box represents the area in which a character can be displayed (The box is the size of the block cursor.) The box is subdivided into six blocks. These blocks represent the portion of the box that displays when a character is received by the terminal. When in reverse video, these blocks represent the portion of the box that is not displayed. For example, the Space character, whose bit pattern is 0010 0000, displays block number 5 in normal video. In reverse video, the Space character blanks out block number 5, and displays each of the other five blocks.

The bit pattern sent to the terminal can tell the PT250 to draw in combinations of these blocks. For example, the letter "U" displays blocks 1, 3, 4, and 6 in normal video, and blocks 2 and 5 in reverse video.

Note that control characters do not display line or block graphics characters. Consequently, not all block combinations are possible in normal video. However, normal video and reverse video can be used in conjunction to display all block combinations. For example, if you want to display block number 1, you must set the SGR value to block graphics and reverse video. To do this, use the command

```
Esc [ >4,7 m
```

Then send either a lowercase *v* or the tilde (~) character.

Table 4-2 shows all block combinations for normal and reverse video as well as the ASCII characters that generate them. Tables C-2 and C-3 in Appendix C shows bit patterns for all PT250 characters.

GRAPHICS: LINE AND BLOCK DRAWING

TABLE 4-2. *Block Drawing Characters*

ASCII Character	Normal Video Block Numbers	Reverse Video Block Numbers
SPACE ()	5	1, 2, 3, 4, 6
! " # \$ % & ' /	1, 5 2, 5 1, 2, 5 3, 5 1, 3, 5 2, 3, 5 1, 2, 3, 5	2, 3, 4, 6 1, 3, 4, 6 3, 4, 6 1, 2, 4, 6 2, 4, 6 1, 4, 6 4, 6
0 8	4, 5	1, 2, 3, 6
1 9	1, 4, 5	2, 3, 6
2 :	2, 4, 5	1, 3, 6
3 ;	1, 2, 4, 5	3, 6
4 <	3, 4, 5	1, 2, 6
5 =	1, 3, 4, 5	2, 6
6 >	2, 3, 4, 5	1, 6
7 ?	1, 2, 3, 4, 5	6
• H	6	1, 2, 3, 4, 5
A I	1, 6	2, 3, 4, 5
B J	2, 6	1, 3, 4, 5
C K	1, 2, 6	3, 4, 5
D L	3, 6	1, 2, 4, 5
E M	1, 3, 6	2, 4, 5
F N	2, 3, 6	1, 4, 5
G O	1, 2, 3, 6	4, 5
P X	4, 6	1, 2, 3, 5
Q Y	1, 4, 6	2, 3, 5
R Z	2, 4, 6	1, 3, 5
S [	1, 2, 4, 6	3, 5
T \	3, 4, 6	1, 2, 5
U]	1, 3, 4, 6	2, 5
V ^	2, 3, 4, 6	1, 5
W _	1, 2, 3, 4, 6	5

TABLE 4-2. Block Drawing Characters (continued)

ASCII Character	Normal Video Block Numbers	Reverse Video Block Numbers
' h	5, 6	1, 2, 3, 4
a i	1, 5, 6	2, 3, 4
b j	2, 5, 6	1, 3, 4
c k	1, 2, 5, 6	3, 4
d l	3, 5, 6	1, 2, 4
e m	1, 3, 5, 6	2, 4
f n	2, 3, 5, 6	1, 4
g o	1, 2, 3, 5, 6	4
p x	4, 5, 6	1, 2, 3
q y	1, 4, 5, 6	2, 3
r z	2, 4, 5, 6	1, 3
s {	1, 2, 4, 5, 6	3
t |	3, 4, 5, 6	1, 2
u }	1, 3, 4, 5, 6	2
v ~	2, 3, 4, 5, 6	1
w DEL	1, 2, 3, 4, 5, 6	—

For example, if you send a lowercase w or the DELETE character to the terminal when the block drawing character set is active, all six blocks will be drawn.



If you send the space or left parentheses character, only block 5 is drawn.



If you send a space or left parentheses when the SGR is set to block drawing and reverse video, all blocks except block 5 are drawn.



5

PT250 COMMANDS (NON-DSC)

This chapter describes each non-DSC PT250 command (see Chapter 6 for DSC commands). For ease of reference, the commands are in alphabetical order by command name. The Mode commands, which define PT250 operating states, are listed alphabetically under MODES -- SET/RESET and contain a description for both the reset and set states.

When reading command explanations, keep in mind the following considerations:

- An error often occurs if a command is executed when the cursor is in the system line.
- Movement commands move over locked lines as if they did not exist. Some cursor positioning commands produce an error message if there are locked lines.

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- If a command would move the cursor off the screen, the PT250 scrolls the screen so the cursor remains visible. Scrolling does not occur, however, if the PT250 has received a Scroll Inhibit Set command.
- For many commands, an argument of zero is the same as an argument of 1. If a command takes an argument and the argument is omitted, a zero value is assumed.
- If a command is entered with extra arguments, an error occurs.
- A command usually works from the current cursor position. For example, an insertion command begins inserting from the current position.
- The word *up* means toward the top of the screen or toward the beginning of the terminal's display memory.
- The word *down* means toward the bottom of the screen or toward the end of the terminal's display memory.
- The word *cursor* also means the position to which the cursor points. Consequently, a cursor position still exists when the cursor is not being displayed.
- The word *arg* represents a number that becomes part of the command.

► APPLICATION PROGRAM Esc _ arg Esc \

The Application Program Command (APC) is sent to the host when a user presses the Help or Menu key. The sequence transmitted begins with the command delimiter (Esc _) and ends with the string terminator (Esc \). The argument in the sequence indicates which key and augmentation were used to send the sequence. The following sequences can be transmitted.

PT250 COMMANDS (NON-DSC)

<i>Code Sequence</i>	<i>Keystroke</i>
Esc _ 0 Esc	Menu or Caps Lock/Menu
Esc _ 1 Esc	Help or Caps Lock/Help
Esc _ 2 Esc	Shift/Help
Esc _ 3 Esc	Ctrl/Help
Esc _ 4 Esc	Shift/Ctrl/Help
Esc _ 5 Esc	Shift/Menu
Esc _ 6 Esc	Ctrl/Menu
Esc _ 7 Esc	Shift/Ctrl/Menu

Both the Menu and Help keys may be used by an application program or operating system to implement the key as desired. Upon receipt of one of these sequences, the application program can respond by displaying a different menu or help screen for each augmentation of the key.

▶ BLANK SCREEN Esc \$ E

The Blank Screen (BSCN) command removes all data from the terminal screen. This command does not alter the terminal's memory. The screen can be restored with an Unblank Screen command (Esc \$ P). The terminal functions normally, except that no data is displayed.

▶ CHANGE VISUAL ATTRIBUTE COMMANDS

Change Visual Attributes is a group of four commands that change the way information looks on the screen. The commands are:

- Change Visual Attributes of Area (CVA)
- Change Visual Attributes of Character (CVC)
- Change Visual Attributes of Display (CVD)
- Change Visual Attributes of Line (CVL)

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▷ Change Visual Attributes of Area Esc [arg p

The Change Visual Attributes of Area (CVA) command changes the visual attributes of a qualified area. The visual attributes are changed to the value of the Select Graphics Rendition (SGR) command. The area to be changed is determined by one of the following arguments.

<i>Argument</i>	<i>Meaning</i>
0	Change attributes from the current cursor position to the end of the area.
1	Change attributes from the start of the area to the current position. The current cursor position is also changed.
2	Change the entire area.

Examples: Assume a field is defined from (1,10) to (1,20) and the cursor is at (1,15). Also, the field is displayed in normal video and the value of SGR indicates reverse video. The command

Esc [0 p

changes the area (1,15) through (1,20) to reverse video.
The command

Esc [1 p

changes the area (1,10) through (1,15) to reverse video.
The command

Esc [2 p

changes the area (1,10) through (1,20) to reverse video.

If DSC mode is set, an error occurs.

▷ **Change Visual Attributes of Character**

Esc [arg q

The Change Visual Attributes of Character (CVC) command changes the visual attributes of a specified number of characters. The visual attributes are changed to the value of the Select Graphics Rendition (SGR) command.

arg represents the number of characters, beginning at the current position, whose appearance will be changed.

If DSC mode is set, wrapping may occur. If both DSC mode and Logical Attribute mode are set, an error occurs.

▷ **Change Visual Attributes of Display**

Esc [arg r

The Change Visual Attributes of Display (CVD) command changes the visual attributes of the current display. The visual attributes are changed to the value of the Select Graphics Rendition (SGR) command. The portion of the display to be changed is determined by one of the following arguments.

<i>Argument</i>	<i>Meaning</i>
0	Change attributes from the current cursor position to the end of the display.
1	Change attributes from the start of the display up to, and including, the current cursor position.
2	Change the entire display.

If both DSC mode and Logical Attribute mode are set, an error occurs.

▷ **Change Visual Attributes of Line** Esc [arg t

The Change Visual Attributes of Line (CVL) command changes the visual attributes of a line. The visual attributes are changed to the value of the Select Graphics Rendition (SGR) command.

A portion or the entire line can be changed with one of the following arguments.

<i>Argument</i>	<i>Meaning</i>
0	Change attributes from the current cursor position to the end of the line.
1	Change attributes from the start of the line up to, and including, the current cursor position
2	Change the entire line.

If DSC mode is set, an error occurs.

▶ **CLEAR SCREEN** Esc ?

The Clear Screen (CS) command performs the following:

- Clears (erases) display memory as defined by the current screen size. Locked lines are not cleared.
- Sets logical and visual attributes to their default values, that is, all positions are protected and no visual attributes are asserted. However, the current value of the Select Graphic Rendition command does not change.
- Performs a Cursor Absolute Home operation.
- Transmits an Operating System Command (OSC) with an argument of 2 to the host, if the terminal is online and Host Notification mode is set.

PT250 COMMANDS (NON-DSC)

A program normally executes this command before it displays a screen or after it performs an operation that significantly alters the display.

Default settings may not be what you expect them to be. For example, if logical attributes were asserted, you may not be able to write information to the terminal. To avoid difficulties, first be sure the terminal is in the state you want. Normally, the default setting for logical attributes is "protected" and the default for visual attributes is "no attributes asserted" (normal video). Another Block mode program could change these defaults, or the terminal could have been left in a state other than the one you require. Ensure that logical attributes are not asserted by sending a Reset Logical Attribute mode (Esc [>3 1) command.

If DSC mode is set, the CS command clears the display region to nulls and resets Logical Attribute mode and Visual Attribute Lock mode. The default DSC logical attributes of unprotected, all graphics, and the default visual attributes of half intensity are applied. Beginning bits are not set. The cursor moves to the home (1,1) position. The memory pointer is not moved. Do not enter this command at the keyboard when DSC software is being used or an interpretive data error may occur.

► CLEAR SELECTED AREAS

Esc \$ K

After the Clear Selected Areas (CSA) command executes, no selected areas exist. When an area is selected using the Start of Selected Area command (Esc F) and the End of Selected Area command (Esc G), the PT250 sets a bit in the terminal's memory for each selected position. The Clear Selected Areas command resets these bits. See Selected Area Transfer mode (in the section MODES -- SET/RESFT later in this chapter) and the Start and End of Selected Area commands for more information.

An error occurs if the terminal is not set to Block mode.

► COMPRESSED COMMANDS

Logical attributes, visual attributes, and cursor positioning commands can be sent between the host and the terminal in a compressed form to optimize system performance. The five compressed commands are:

- Compressed Cursor Position (CCP)
- Compressed Logical Area (CLAR)
- Compressed Logical Attributes (CLAT)
- Compressed Visual Area (CVAR)
- Compressed Visual Attributes (CVAT)

All arguments require conversion from the hexadecimal value into a single ASCII character. Numeric arguments (**row**, **col**, and **len**) can range from 20 hex (Space) through 7E hex (~). Logical and visual attribute arguments (**la** and **va**) require conversion of the bit pattern to an ASCII character.

Numeric Arguments (row, col, and len): To construct a numeric argument, add 20 Hex to the hexadecimal value of the argument. (See Table C-1 for the hexadecimal value of the full 256-character set.)

For example, assume you want to use a Compressed Cursor Position command that moves the cursor to (21,68). The Hex value for the numeric argument 21 is 15. Adding 20 Hex yields 35 Hex, which is the ASCII character 5. Similarly, the numeric argument 68 converts to the ASCII character d. Thus, the compressed command is

```
Esc 0 5 d
```

To convert the Hex value of the numeric argument to an ASCII character, subtract 20 from the Hex value.

PT250 COMMANDS (NON-DSC)

After the conversion process occurs, the Space character (20 Hex) is interpreted as a numeric argument of 0, and subsequent characters are interpreted similarly as numeric arguments up to the tilde character (~), 7E Hex, which represents a numeric argument of 94.

Logical Attribute Arguments: The logical attribute bit patterns are shown in Figure 5 1. The three high-order bits (bits 3 through 5) specify Modified, Must Fill, and Must Enter and the three low-order bits (bits 0 through 2) indicate the kind of character a user can enter.

ASCII CHARACTER BIT

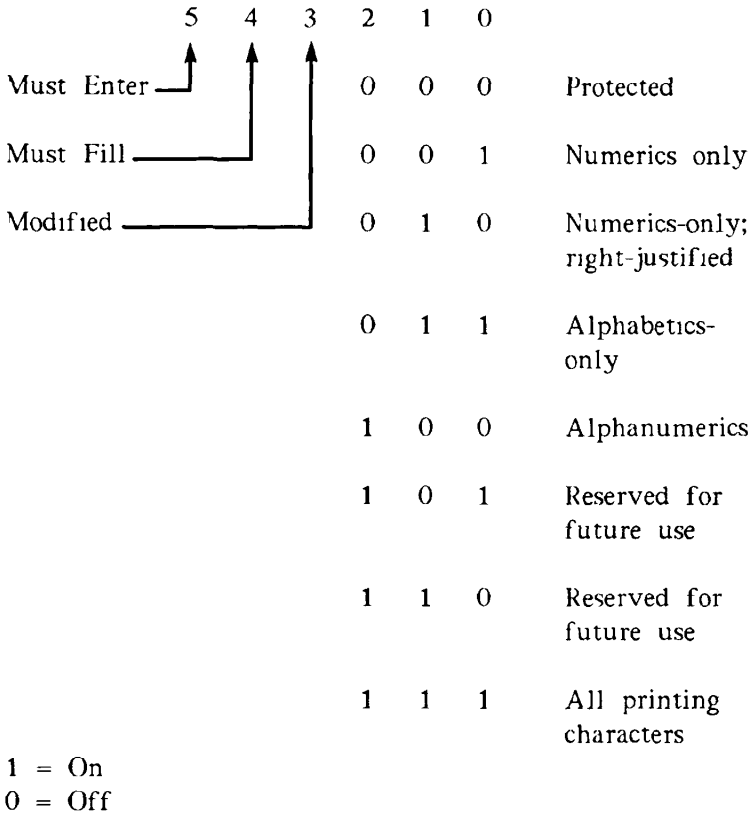


FIGURE 5-1. Logical Attribute Bit Coding

The bit pattern obtained from Figure 5-1 is converted to an ASCII character whose value ranges between Space (20 Hex) and Underscore (5F Hex). To construct a value, add 20 to the Hex value. To interpret a byte value, subtract 20 Hex from the value of the ASCII character. Note that this means that an ASCII Space character (20 Hex) is interpreted as a byte containing all zeros.

PT250 COMMANDS (NON-DSC)

For example, assume you want to specify a must fill in, alphabetic only field. Figure 5-1 provides the bit string 0001 0011, or 13 Hex. Add 20 Hex. The result is the character 3 (33 Hex).

Visual Attribute Arguments: The visual attribute bit patterns are shown in Figure 5-2. The resulting 6-bit code is converted into an ASCII character whose value is in the range 20 Hex (Space) to 5F Hex (Underscore).

For example, assume you want to create an underlined, blinking, half-intensity area. As Figure 5-2 illustrates, you would use a bit pattern of 0010 1001 (29 Hex). After adding 20 Hex, the result corresponds to the letter I (49 Hex).

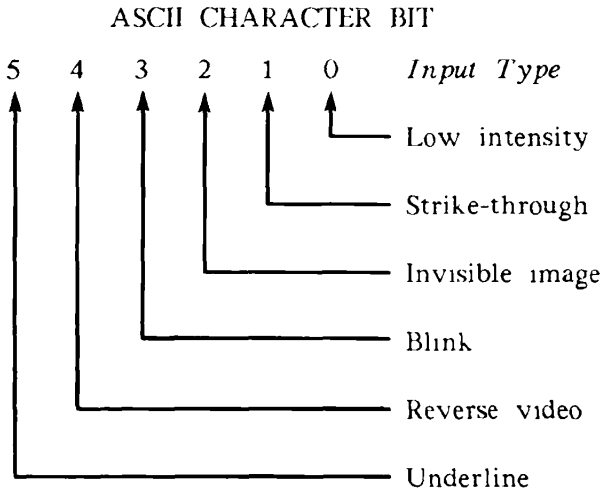


FIGURE 5-2. Visual Attribute Bit Coding

▷ Compressed Cursor Position Esc 0 row col

The Compressed Cursor Position (CCP) command moves the cursor to the specified row and column position.

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The **row** value specified must be between 1 and 48, and the **col** value must be between 1 and 94. (Note that a 0 parameter is treated the same as a 1. Also note that if the screen size is set to 132 columns, not all columns are accessible.) If locked lines exist, or if the cursor is in the system line, an error occurs.

Example: This compressed command positions the cursor at (21,68):

```
Esc 0 5 d
```

▷ Compressed Logical Area Esc 3 la

The Compressed Logical Area (CLAR) command defines the logical attributes of an area, where **la** is the compressed logical attribute character for the area.

The logical area begins at the current cursor position and concludes at the beginning of the next area or, if no areas follow, at the end of the display. The character data and visual attributes associated with an area are not changed by the operation, nor is the cursor position.

This command may be substituted for the Define Area Qualification command. Define Logical Attributes is another similar command.

An error occurs if Character/Block mode or Logical Attribute mode is reset, or if the cursor is in the system line. You cannot specify selected areas using this command.

Example: The following command defines a must-fill, alphabetic-only logical area that starts at the current cursor position within the current area and includes the rest of the area:

```
Esc 3 3
```

If DSC mode is set, an error occurs.

▷ **Compressed Logical Attributes****Esc 1 row col la len**

The Compressed Logical Attributes (CIAT) command defines logical attributes for an area.

The area this command defines starts at the position indicated by **row** and **col** and continues for the number of characters specified by **len**, which can range from 0 to 94 characters. The **la** argument defines the logical attributes for the area. At the end of this operation, the cursor is located at the starting position.

An error occurs if Character/Block mode is reset or if the cursor is in the system line.

Example: The following compressed command defines a must-fill, alphabetic-only logical area that starts at (21,68) and is 50 characters long

```
Esc 1 5 d 3 R
```

The cursor is left at (21,68).

If DSC mode is set, an error occurs.

▷ **Compressed Visual Area****Esc 4 va**

The Compressed Visual Area (CVAR) command defines a set of visual attributes for an area, where **va** is the compressed visual attribute character defining the visual attributes

The area defined by this command begins at the current cursor position and concludes at the beginning of the next current area. The position of the cursor is unchanged.

Line drawing and block character sets cannot be specified using compressed visual format.

An error occurs if either Character/Block mode or Visual Attribute Lock mode is reset, or if the cursor is in the system line.

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Example: This compressed command defines a reverse video field that starts at the current cursor position in the current area and includes the rest of the area:

Esc 4 0

If DSC mode is set, an error occurs.

▷ Compressed Visual Attributes

Esc 2 row col va len

The Compressed Visual Attributes (CVAT) command defines visual attributes for an area.

The area which this command defines starts at the position specified by **row** and **col** (column) and continues for the number of characters specified by **len**. This value can range from 0 to 94 characters. The **va** argument defines the visual attributes for the area. At the end of the operation, the cursor is located at the specified row and column.

An error occurs if locked lines exist, or if the cursor is in the system line.

Note that graphics characters cannot be specified using the Compressed Visual Attributes format. Also, this operation is not affected by the existence of other areas.

Example: This command defines a reverse video field that starts at (21,68) and is 50 characters long:

Esc 2 5 d 0 R

This command operates differently when DSC mode is set. Refer to the DSC mode command in Chapter 6 for further information.

► **CURSOR ABSOLUTE HOME** **Esc \$ B**

The Cursor Absolute Home (CAH) command moves the cursor to the first column of the first unlocked line in the terminal's memory. If the cursor is in the second page of memory, the P1250 displays the first page of memory.

If the entire screen is protected, the cursor moves to the home position (1,1).

If DSC mode is set, this command moves the cursor to the first column of the first line in the terminal memory. If the entire screen is protected, the cursor moves to the home position (1,1). The only condition in which the cursor is not set to the home position is when both DSC mode and Logical Attribute mode are set. In this case, the cursor moves to the first position of the first unprotected area on the screen.

► **CURSOR BACKWARD** **Esc [arg D**

The Cursor Backward (CUB) command moves the cursor backward the number of characters indicated by **arg**. When the beginning of the line is reached, the cursor wraps to the last character position on the previous line. In this case, moving to the end of the previous line counts as moving back one character position.

Example: Assume the cursor is at (4,3) in an 80-column format. The command

Esc [5 D

moves the cursor to (3,78)

If the cursor reaches the absolute home position, it stops moving. If the cursor moves through the cursor relative home position, Scroll Down is induced.

An error occurs if **arg** is greater than 255.

► **CURSOR BACKWARD TABULATION**

Esc [arg Z

The Cursor Backward Tabulation (CBT) command moves the cursor backward the number of tab stops indicated by **arg**. If the argument requires that the cursor move back more tab stops than exist on the current line, the cursor moves to a tab stop on a previous line.

This command causes the screen to scroll if it moves the cursor past the cursor relative home position.

If logical attributes are asserted, this command moves the cursor to the beginning of the first preceding unprotected area rather than to the preceding tab stop.

If the cursor is currently positioned in an unprotected area (other than the first position), the cursor moves to the first data position of the first preceding unprotected area, and the argument is ignored.

Example: Assume tabs are set at positions 5, 15, and 25 and the cursor is at (4,13), the command

Esc [3 Z

moves the cursor to (3,15).

If DSC mode is set and Logical Attribute mode reset, the cursor moves to the home position, and the value of the argument is ignored. If DSC and Logical Attributes are both set, the cursor moves to the first data position of the first previous unprotected area, and the argument is ignored.

► **CURSOR DOWN** Esc [arg B

The Cursor Down (CUD) command moves the cursor down the number of lines indicated by **arg**. Unlike the Cursor Next Line command, the CUD command does not alter the cursor's horizontal position.

Example: Suppose the cursor is at (5,47). The command

Esc [10 B

moves the cursor to (15,47).

If locked lines exist, they are skipped. Thus, if the cursor is at (5,47), and lines 10 and 11 are locked, the command

Esc [10 B

moves the cursor to (17,47).

This command can induce scrolling.

► **CURSOR FORWARD** Esc [arg C

The Cursor Forward (CUF) command moves the cursor forward the number of character positions indicated by **arg**. Movement continues onto the next line if the argument requires it.

An error occurs if **arg** is greater than 255.

Example: If the cursor is at (3,79) in an 80-column format, an Esc [2 C command moves the cursor to (4,1).

This command induces a Scroll Up if the cursor moves beyond the page boundary.

Movement stops when the cursor reaches the end of the last unlocked line.

► **CURSOR HORIZONTAL ABSOLUTE** Esc [arg G

The Cursor Horizontal Absolute (CHA) command moves the current position to the column specified by **arg**. If **arg** is greater than the maximum available column, the PT250 ignores the command.

Example: If the cursor is at (4,20), the command

Esc [3 G

moves the cursor to (4,3)

► **CURSOR HORIZONTAL TAB** Esc [arg I

The Cursor Horizontal Tabulation (CHT) command moves the cursor forward the number of tab stops indicated by **arg**. If the argument requires that the cursor move forward more tab stops than exist on the current line, the cursor moves to a tab stop on a following line.

Example: If tabs are set at positions 5, 15, and 25 and the cursor is at (4,13), the command

Esc [3 I

moves the cursor to (5,5).

If logical attributes are asserted, this command moves the cursor to the beginning of the next unprotected area rather than to the next tab stop.

If the cursor is currently positioned on the attribute character position of an unprotected area, the cursor advances one position. If the entire display is protected, the cursor moves to the home position (1,1).

If DSC mode is set and Logical Attribute mode reset, the cursor moves to the home position, and the value of the argument is ignored. If DSC and Logical Attributes are both set, the cursor moves to the first data position of the next unprotected area, and the argument is ignored.

► **CURSOR NEXT LINE** Esc [arg E

The Cursor Next Line (CN) command moves the cursor down the number of lines specified by **arg**. If locked lines exist, they are skipped over as if they did not exist. Unlike the Cursor Down command, this command does *not* retain column position. Instead, the cursor is moved to column 1.

Example: Assume the cursor is at (17,31). The command

Esc [4 E

moves the cursor to (21,1).

► **CURSOR POSITION** Esc [arg-1;arg-2 H

The Cursor Position (CUP) command moves the cursor to a specified line (**arg-1**) and column (**arg-2**). If the line number is greater than the page size or if the column position is greater than the column width of the screen size, the PT250 ignores the command.

This command is invalid if locked lines exist on the screen. Both arguments must be specified with this command.

Example: The command

Esc [2,47 H

moves the cursor to (2,47).

► **CURSOR POSITION REPORT** Esc [arg-1;arg-2 R

The PT250 sends a Cursor Position Report (CPR) command to a program in response to a Device Status Report command. To obtain the current cursor position, a program sends a Device Status Report with an argument

of 6 (Esc [6 n) to the terminal. The CPR command has two arguments. The first is the line position; the second is the column position.

► **CURSOR PRECEDING LINE** Esc [arg F

The Cursor Preceding Line (CPL) command moves the cursor up the number of lines specified by *arg*. If locked lines exist, they are skipped and do not count as lines. Unlike the Cursor Up command, this command does *not* retain column position. Instead, the cursor is moved to column 1.

Example: Assume the cursor is at (12,31). The command

Esc [4 F

moves the cursor to (8,1)

► **CURSOR RELATIVE HOME** Esc \$ A

The Cursor Relative Home (CRH) command moves the cursor to the first column of the first unlocked line on the current screen. In One Page mode, the Cursor Absolute Home and Cursor Relative Home commands perform identically.

If DSC mode is set, this command works the same as the Cursor Absolute Home command.

► **CURSOR TABULATION CONTROL** Esc [arg W

The Cursor Tabulation Control (CTC) command can either set or clear a single tab stop or it can clear all tab stops. The value of **arg** indicates the action that will occur, as follows:

<i>Argument</i>	<i>Meaning</i>
0	Sets a tab stop at the current position (default).
2	Clears the tab stop at the current position.
5	Clears all tab stops.

This command with an argument of 0 (Esc [0 W) performs the same action as the Horizontal Tabulation Set command.

► **CURSOR UP** Esc [arg A

The Cursor Up (CU) command moves the cursor up the number of lines indicated by **arg**. Unlike the Cursor Preceding Line command, this command does *not* alter the cursor's horizontal position. If locked lines exist, they do not count as lines and they are skipped.

This command can induce scrolling.

Example: Suppose the cursor is at (15,47). The command
Esc [10 A

moves the cursor to (5,47).

If the cursor is at (17,47), and lines 10 and 11 are locked, the command

Esc [10 A

moves the cursor to (5,47).

► **DEFINE AREA QUALIFICATION** Esc [args o

The Define Area Qualification (DAQ) command defines the current cursor position as the beginning of a qualified area. The argument(s) define the logical attributes for that area. The qualified area ends at the beginning of the next defined qualified area. If there is no next defined qualified area, the end of the page boundary becomes the end of the qualified area. Block mode must be asserted when this command is received.

You may enter more than one argument when defining an area's logical attributes. If you do, separate the arguments with semicolons.

Valid DAQ arguments and their meanings are listed in Table 5-1.

TABLE 5-1. Logical Attributes

<i>Argument</i>	<i>Meaning</i>
2	Accept all printing characters
3	Accept numeric characters
4	Accept alphabetic characters
5	Right-justify in area
>0	Protected -- accept no input (default)
>1	Must enter data in the field
>2	Must fill in every position in field
>3	Set Modified Data Tag

The DAQ command tells the PT250 that it should replace the old argument values with the new values. For example, assume that the current area is a numeric-only field. In order to create a new right-justified, numeric-only field, you must give both the right-justified and numeric-only parameters.

PT250 COMMANDS (NON-DSC)

Examples: To define the beginning of a numeric field, send the following command:

```
Esc [ 3 o
```

To define an area where every space must be filled, send the following command:

```
Esc [ >2 o
```

To define a must-enter area that accepts letters and numbers, send the following command:

```
Esc [ 4,3,>1 o
```

The DAQ command indicates that the current position is the beginning of a new area. This area ends at the position where the next area begins or at the end of the terminal's display memory. Consequently, the order in which you define areas can greatly affect performance. That is, if you define areas in the order in which they will appear on the formatted screen, each area, when it is defined, terminates at the end of the terminal's display memory. When the next area is defined, the terminal must adjust the end of the previous area. To obtain the best performance, define areas in an order opposite to their appearance on the screen. That is, define the final field first.

The DAQ command is one way to define logical attributes; the Define Logical Attributes command, described below, is another way. The Compressed Logical Area (CLAR) command may also be substituted for the DAQ command.

An error occurs if Block mode is not asserted or if the cursor is in the system line.

If DSC mode is set, an error occurs.

► DEFINE LOGICAL ATTRIBUTES Esc [args v

The Define Logical Attributes (DLA) command defines the type of information that can be entered at a particular screen position. Although similar in some respects to the Define Area Qualification command, described above, DLA functions differently. The DLA command establishes the logical attributes which will be in force when an area is defined using Start Logical Attributes (SLA) and End Logical Attributes (ELA) commands. Use these steps to define logical attributes for an area:

1. Define logical attributes using DLA.
2. Move the cursor to the beginning of the area by using cursor positioning commands.
3. Mark the beginning of the area with the SLA command.
4. Move the cursor to the end of the area.
5. Mark the end of the area with the ELA command.

After the PT250 receives the ELA command, it defines logical attributes (using the current DLA value) for the area delimited by the SLA and ELA commands, inclusive.

Using the DLA command lets you redefine the logical attributes of portions of the display. This is often useful for changing attributes of a formatted screen after it has been displayed.

A program can specify logical attributes at any time. However, attributes are not used (asserted) until the PT250 receives a ELA mode command.

After logical attributes are asserted with Block mode and Logical Attribute mode both set, auto-tabbing is automatically invoked. This means that when the last character position of an unprotected field has been entered, the cursor automatically moves to the first character position of the next unprotected area. Auto-tabbing does not occur if a field is right-justified. Also, if the cursor is currently positioned in a protected field and the user types a character, the terminal tabs to the next field before attempting to enter the character.

PT250 COMMANDS (NON-DSC)

Logical attributes can be asserted only if the terminal is in Block mode. Failure to put the terminal into Block mode when creating programs that use logical attributes causes the PT250 to produce an error message.

Once a complete formatted screen has been displayed, the program should execute a Cursor Absolute Home command. If the first unprotected area starts at the absolute home position (1,1), the cursor is where it should be. If, however, the first unprotected area is at any other location, your program should send a Horizontal Tab (Ctrl-I) to the terminal. This positions the cursor in the first unprotected field on the formatted screen.

After the user fills in the formatted screen, the PT250 must transmit the data to the program. An explanation of data transmission appears in Chapter 3.

Valid arguments are the same as those for the DAQ command shown in Table 5-1. If more than one argument is specified, separate them with semicolons.

No action occurs when the terminal receives this command. This is because the DLA command only sets up a condition that will be established when areas are defined.

See Chapter 3 for more information. Refer also to the Compressed Logical Attributes command.

The DLA command is invalid in DSC mode.

► DELETE CHARACTER

Esc [arg P

The Delete Character (DCH) command removes the number of characters indicated by *arg*. This deletion begins at the cursor and extends to the right. Characters to the right of the active position are shifted left as the deletion progresses. The characters at the end of the shifted string are replaced with pad characters.

The extent to which a DCH can remove information can be specified by the Select Editing Extent Mode (SEM)

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command. This command can define the extent of the deletion to be an area, line, or display memory.

An error occurs if the cursor is in a protected area or if there are not enough pad characters to perform the deletion.

If DSC mode and Logical Attribute mode are set, wrapping will not occur. Modified bits are set. The active position is the cursor position rather than the memory pointer.

► DELETE LINE Esc [arg M

The Delete Line (DL) command removes one or more lines from the screen. The number of lines is specified with **arg**. The contents of all following lines are shifted in a block toward the current line. The lines at the end of the shifted block are erased.

If logical attributes are not asserted, both data and attributes are shifted. If logical attributes are asserted and if there are protected areas, shifting may not occur.

Visual attributes remain with the screen position if Visual Attributes Lock mode is set. Otherwise, visual attributes move with the data.

If DSC mode is set, an error occurs.

► DEVICE ATTRIBUTES Esc [arg c

The Device Attributes (DA) command is used by applications programs to query the terminal as to its type. When a program sends a DA sequence without arguments or with an argument of 0 to the terminal, the terminal responds by returning a DA with arguments to the program. For this to be functional, the PT250 must be online.

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In response to a DA without arguments, the terminal returns a DA sequence with an argument of 10.

► DEVICE CONTROL STRING Esc P string Esc \

The Device Control String (DCS) command is a series of twenty characters delimited by an Esc P and Esc \. These characters indicate the state of many terminal parameters. The structure of the DCS is:

```
EscPbyte1byte2~byte1byte2  byte1byte2Esc\
```

The tilde character delimits each group of bytes in the string. Although this example shows byte pairs, each group may consist of one, two or three bytes between tildes.

After the program receives the DCS it must translate bytes into binary bit strings in order to interpret the received DCS. In this form, each bit (or set of bits) represents a terminal state or characteristic. (Refer to Appendix D for the bit definitions.) For example, if bits 4 and 5 in GS4 are 0 and 1 respectively, then the cursor is a blinking underline. If a bit is set, it means that a state is set. If a series of bits can represent more than one state, these states are shown in numerical order.

If an application sends this command to the PT250 without arguments, the PT250 responds by sending back a DCS that indicates the terminal's state. If the DCS contains arguments, the PT250 interprets these arguments as the new terminal characteristic settings.

The terminal must be online to receive or send a DCS.

When sending a DCS to the terminal, you must include all characters that could occur in an argument *or* you can omit all characters between two tildes. You omit a grouping (but not the tilde separator) if the states indicated by those bytes will not change. Consequently, the way to omit an argument is to send adjacent tildes. Only changed groups need be sent. However, be sure to

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send tildes for placement purposes whether or not you send character arguments.

For information on how to interpret and construct the DCS, see Appendix D

► DEVICE STATUS REPORT Esc [arg n

The Device Status Report (DSR) command can either report the status of the device sending the DSR or it can be a request for information, as follows:

<i>Argument</i>	<i>Meaning</i>
0	Ready; no malfunctions detected.
5	Report status using a DSR command.
6	Report cursor position using a Cursor Position Report command.

Example: When the PT250 receives an inquiry of

Esc [5 n

it should respond with

Esc [0 n

If it does not return that message, the terminal is not in a ready state.

An error occurs if the terminal receives an

Esc [6 n

and the cursor is in the system line. This is because the cursor position is undefined in that line.

► **DISABLE MANUAL INPUT** Esc `

The Disable Manual Input (DMI) command prevents the keyboard from accepting input. The message KEYBD LOCK also appears in the status line.

The DMI command hard locks the keyboard. The Clear key will not unlock it. This condition can only be altered when the terminal:

- Receives an Enable Manual Input command
- Is reset using a Ctrl-Shift Stop or another sequence that sends a Reset to Initial State (RIS) command.

This command cannot be entered from the keyboard when the terminal is in Local or Block mode

► **DISPLAY ERROR MESSAGE** Esc : string Esc \

The Display Error Message (DFM) command writes a string of up to twelve characters to the Error Message field of the status line. (This is the rightmost field.)

Example: The PT250 writes WHO ARE YOU when it receives the string

Esc WHO ARE YOUEsc\

If the system line is being displayed, the PT250 replaces it with the status line

The previous message is removed before the new string is written. To clear this field, send:

Esc Esc\

► **DISPLAY REVISION** Esc \$ Z

The Display Revision (DIS) command clears the screen and replaces it with the following.

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- Terminal name
- Firmware revision date

If Host Notification mode is set, this command will also cause an Operating System Command with an argument of 2 to indicate that the screen has been cleared.

An error occurs if the cursor is in the system line or if locked lines exist.

▶ DUMP BLOCK DATA Esc 6

When the terminal receives the Dump Block Data (DBD) command from a program, it transmits a page dump of its memory. The format of this transmission is discussed in Chapter 3.

An error occurs if the terminal is not in Block mode.

▶ ENABLE MANUAL INPUT Esc b

The Enable Manual Input (EMI) command lets the user enter information from the keyboard after the keyboard has been hard locked using the DMI command.

If DSC mode is set, this command releases the keyboard from a soft lock condition.

▶ END LOGICAL ATTRIBUTES Esc \$ M

The End Logical Attributes (ELA) command instructs the terminal that the current cursor position is the end of a logical area. See the Start Logical Attributes command for more information.

An error occurs if:

- Block mode is not asserted.
- The area spans locked lines.
- The ending position precedes the starting position.
- There is no corresponding SLA command.

If DSC mode is set, an error occurs.

▶ **END OF PROTECTED AREA**

Esc W

The End of Protected Area (EPA) command sets the current cursor position as the end of the region started by a Start of Protected Area (SPA) command.

An error occurs if:

- Block mode is not asserted.
- The area spans locked lines.
- The ending position is before the starting position.
- This command is not preceded by an SPA command.
- The cursor is in the system line.

If DSC mode is set, an error occurs.

▶ **END OF SELECTED AREA**

Esc G

The End of Selected Area (ESA) command defines the end of a selected area that will be transmitted to the host or to another device. When this command is received, all character positions from the beginning of the selected area marked with the SSA command to the end of the area marked with the ESA command have their logical attributes set to indicate that they have been selected. Any other asserted logical attributes for the area remain unchanged.

An error occurs if:

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- Block mode is not asserted.
- The ending position precedes the starting position.
- This command is not preceded by an SSA command.

If DSC mode is set, an error occurs.

► ERASE

The four erase commands remove characters and replace them with the pad character (which is either a space or a null). The commands and escape sequences are listed below.

- | | |
|-------------------------|-------------|
| ● Erase Character (ECH) | Esc [arg X |
| ● Erase in Area (EA) | Esc [arg O |
| ● Erase in Display (ED) | Esc [arg J |
| ● Erase in Line (EL) | Esc [arg K |

For all but the Erase Character (ECH) command, the value of *arg* can be only 0, 1, or 2. The meanings of the arguments, which specify how much information will be erased, are as follows.

Value *Meaning*

- | | |
|---|----------------------------------------------------------------------------------------------------|
| 0 | Erase from the current cursor position to the end of the area, line, or display. |
| 1 | Erase from the start of the area, line, or display to the current position, which is also changed. |
| 2 | Erase the entire area, line, or display. |

For the Erase Character (ECH) command, the argument specifies the actual number of characters to be erased. Also, the ECH command treats an argument of 0 (zero) the same as an argument of 1.

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An erase command can remove protected information if Erasure mode is set. An error occurs if an attempt is made to erase a protected area when Erasure mode is reset. If logical attributes are asserted, an erase sets a modified bit to indicate that data has been changed.

The Erase in Area command requires that logical attributes be asserted.

If an ED sequence with an argument of 2 is received, a check is made to see where the ED sequence originated. If the ED sequence is from the keyboard, modified bits are set. If the ED sequence is from the host, modified bits are reset. If Erasure mode is reset and an attempt is made to erase an entirely protected extent, an error occurs.

For all erase commands, except Erase in Display (ED), when DSC mode is set, characters are replaced with nulls, and wrapping may occur. The active position is the cursor position rather than the memory pointer position. If DSC mode and Logical Attribute mode are both set, modified bits are set. An error occurs if Erasure mode is reset and an attempt is made to erase an entirely protected extent.

For the Erase in Display (ED) command, when DSC mode is set, characters in the display are replaced with nulls. The active position is the cursor position. If DSC mode and Logical Attribute mode are set, and an ED sequence with an argument of 0 or 1 is received, modified bits are set.

If Erasure mode is reset and an attempt is made to erase an entirely protected extent, an error occurs, except when an ED sequence with an argument of 2 is sent from the host in DSC mode.

▶ ESCAPE KEY DISABLE

Esc \$ H

The Escape Key Display (EKD) command tells the terminal that it should no longer send an Esc character when the Escape key is pressed.

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An error occurs if Escape is pressed after the PT250 receives this command. The EKD command is not honored if the terminal is in Local or Block mode.

▶ ESCAPE KEY ENABLE Esc \$ I

The Escape Key Enable (EKE) command allows escape characters to be transmitted when the Esc key is pressed.

▶ FIELD ENTRY CHECK Esc \$ C

The Field Entry Check (FEC) command is used to determine if all Must Enter and Must Fill fields are ready for transmission. If all Must Enter fields contain an entry and all Must Fill fields are filled, the PT250 sends a Set Transmit State (STS) command (Esc S) back to the CPU. If these conditions are not met, no response is transmitted and, to alert the user, the cursor moves to the improper field and the bell rings.

The FEC command is invalid in DSC mode.

▶ HORIZONTAL/VERTICAL Esc [arg-1;arg-2 f

The Horizontal and Vertical Position (HVP) command moves the cursor to a specified line (**arg-1**) and column (**arg-2**). Unlike the Cursor Position command, this command works relative to the current screen position. Consequently, **arg-1** can never exceed the screen row length (24, 25, 27, or 48), and **arg-2** cannot exceed the screen column width (80 or 132).

If **arg-2** is omitted, the cursor moves to the line specified by **arg-1**, without changing the horizontal position of the cursor. If no argument is used, this command moves the cursor to the relative home position.

PT250 COMMANDS (NON-DSC)

A second difference between this command and the Cursor Position command is that this command moves the cursor even if locked lines exist. However, if you attempt to move the cursor to a locked line, the current cursor position does not change, the keyboard becomes soft locked, and `INVALID CMD` appears in the system line.

▶ **HORIZONTAL TABULATION SET** **Esc H**

The Horizontal Tabulation Set (HTS) command sets a tab stop at the current cursor position. This command performs the same action as a Cursor Tabulation Control command with an argument of 0.

▶ **INDEX** **Esc D**

The Index (IND) command moves the cursor down one line. The column position does not change. This command is equivalent to a Cursor Down command with an argument of 1.

▶ **INSERT CHARACTER** **Esc [arg @**

The Insert Character (ICH) command inserts spaces or null characters at the current cursor position. The number of spaces or nulls that are inserted is determined by `arg`. When a character is inserted, other characters move to the right.

The extent to which data is moved is determined by the setting of the Select Editing Extent Mode (SEM) command. This command indicates whether shifting can occur by area, line, or terminal display. If logical attributes are asserted, data is moved to the end of the current extent or until a new area is encountered. If logical attributes are not asserted, then as characters are

moved, their logical attributes are also moved. The logical attributes associated with the cursor position at the time of the insertion are applied to the newly inserted character.

If Visual Attribute Lock mode is set, visual attributes may be affected by the insertion and each character will assume the visual attribute associated with the screen position. If this mode is not set, visual attributes move with the character.

An insertion can occur only if a pad character exists at the end of the current editing extent. If there is no pad character, an error occurs. This ensures that no data is lost.

If DSC and Logical Attribute modes are set, wrapping may occur. The active position is the cursor position. An error occurs if the cursor is in a protected area or if there are not enough pad characters to perform the insertion.

► **INSERT LINE**

Esc [arg L

The Insert Line (IL) command inserts the number of empty lines indicated by **arg**. The current lines are shifted downward. The contents of the lines at the bottom of the terminal or prior to the first line containing a new area must contain all pad characters. If not, the insertion does not occur. An error occurs if the current line contains a protected area or if logical attributes are asserted

If logical attributes are asserted, only data is moved. Depending on the setting of the Visual Attribute Lock mode, visual attributes may move with the line

If DSC mode is set, an error occurs

► **LOAD KEYBOARD TABLE**

**Esc < data cksum Esc **

■ The Load Keyboard Table (LKT) command allows the keyboard to be rearranged:

- Any key on the keyboard can be logically moved to any other position.
- Several "keys" that do not exist on the physical keyboard can be put at physical key positions.
- The same logical key can be duplicated in as many physical positions as desired

Figure 5.3 shows how the physical keyboard is numbered. The numbers correspond to the order of the 115 data bytes in the LKT command and to the values of the logical key functions.

■

■

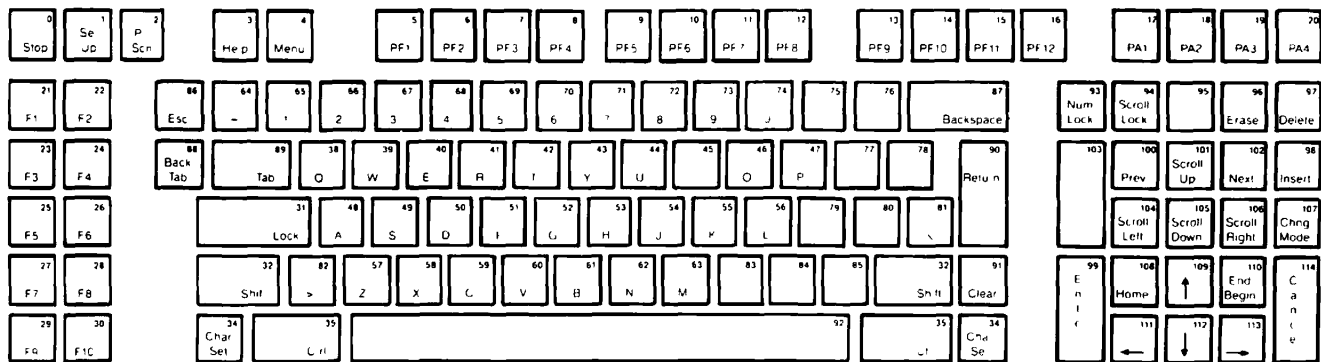


FIGURE 5-3. PT250 Keyboard for the Load Keyboard Table Command

PT250 COMMANDS (NON DSC)

To change the logical location of a key function, the key number must be in the physical key position of the data in the command. For example, suppose you want to move the Home key to where the Scroll Lock key is normally located (check these positions in Figure 5-3). To do this, put the number 108 in the 94th position of the data. Note that the 115 positions in the data stream and on the physical keyboard are numbered 0 through 114.

The following 14 logical key functions are not on the default keyboard, but they can be mapped onto physical keys.

<i>Logical Key Number</i>	<i>Generates</i>
37	00
115	0
116	1
117	2
118	3
119	4
120	5
121	6
122	7
123	8
124	9
125	+
126	-
127	no action

The data stream must contain exactly 115 characters with decimal values from 0 through 127. The checksum is calculated in the following manner:

1. Add the decimal values of all 115 characters.
2. Divide this sum by 128 and determine the remainder (modulo 128).
3. Subtract the remainder from 128 to obtain the checksum.

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For example, if the sum of the 115 data characters is 8214, dividing this sum by 128 yields 64, remainder 22. Thus, the checksum is 106 (128 minus 22 equals 106).

The Load Keyboard Table command reports the success or failure of the table load by using the OSC command. One of the following messages is sent after the table is received:

```
OSC string for error   Esc ] 3 Esc \  
OSC string when O K   Esc ] 4 Esc \  

```

When an error is determined, the default keyboard table is reloaded. Therefore, a quick way of returning to the default table is to send the string

```
Esc < Esc \  

```

The terminal responds with the error OSC sequence and reloads the default table.

Although a key can be moved, its actions under different augmentations cannot be changed. For example, if the Lnd/Begin key is moved to the normal position of the Chng Mode key, all augmentations of Lnd/Begin in the new position work exactly as they worked in the old position.

When an augmentation key has been moved, the LFD on the original position of the key lights when the key is activated.

► LOCK LINES

```
Esc [ arg-1;arg-2 u
```

The Lock Lines (LL) command locks one or more lines. Locking means to freeze the lines indicated by the arguments in their positions on the screen. Data and their attributes cannot be altered.

The **arg-1** represents the line at which locking will begin relative to the top of the screen. The **arg-2** specifies the number of lines to be locked. This second argument may be omitted. If it is omitted, the terminal will lock one line.

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As many as 23 (24 in 80 x 25 format, 26 in 132-column format) lines can be locked in one command. After lines have been locked, another command can lock additional lines. However, in no case can more than 23, 24, or 26 lines be locked.

Locked lines can be unlocked separately or as a group with an Unlock Lines command.

If the terminal is in Soft Scroll mode, it changes to Hard Scroll mode when lines are locked.

Some PT250 commands work differently if at all, when locked lines exist. For example, most relative cursor commands skip over a locked line as if it does not exist. In addition you will not be able to put the cursor on a locked line. Scrolling occurs around these lines

Example: The command

```
Esc [ 10,3 u
```

locks three lines beginning at line 10.

The LL command is invalid in DSC mode.

► MEDIA COPY

Esc [arg i

The Media Copy (MC) command determines auxiliary (AUX) port functionality features. This command transfers data from the PT250 to an auxiliary device. Some print operations are also available using the P1250 keyboard Prt Scn key. Refer to the *PT250 User's Guide* for Prt Scn key information.

The MC command sent from the host to the terminal requests a print operation. The value of **arg** determines how the auxiliary device implements the print request. The possible values are described as follows.

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Value Meaning

- 0 Initiates a screen print. This is the default. (Press the Prt Scn key alone as an alternative to the MC command from the PT250 keyboard.) The extent of the screen print is determined by the screen size setting. A carriage return/line feed is inserted after every line.

- 4 Turns off data stream to auxiliary device, stopping a transparent or nontransparent print operation.

- 5 Turns on data stream to auxiliary device, starting a transparent print operation. (Data does not display on the screen.)

- >0 Starts a screen print of qualified areas that are determined by Selected Area Transfer mode, Unprotected/Modified mode, Block mode, and Logical Attribute mode. When Logical Attribute mode is Reset, all qualified areas are printed. The extent is determined by the current display size setting.

- >1 Starts a screen transfer. The extent of the transfer is determined by the current display size setting. (Press the Shift and Prt Scn keys simultaneously as an alternative to the MC command.)

- >2 Initiates a page dump. This value is equivalent to Dump Block Data, except that the data goes to the AUX port instead of the Host port. (Press the Ctrl and Prt Scn keys simultaneously as an alternative to the MC command.)

Value Meaning

- >3 Starts a nontransparent copy. (Data appears on the screen as well as being sent to the AUX port.) Data is transferred to the AUX port exactly as it is received from the host, with escape sequences included.

If characters exist in the display memory that do not appear on the screen, these characters are transferred and appear on the auxiliary device.

► MODES -- SET/RESET**Set: Esc [args h****Reset: Esc [args l**

PI250 Mode commands define the terminal operating states. Terminal modes are set or reset using the following commands

- Set Mode: Esc [args h
- Reset Mode Esc [args l

The argument in these commands identifies the mode that is to be set or reset. Several modes can be specified within one Set or Reset Mode command by separating the arguments with a semicolon (;) For example, the following example illustrates more than one mode being set by a single command

```
Esc [ >2,>11,>12 h
```

This command places the terminal into Block mode allows access to two pages of display memory, and sets the Visual Attribute Lock state.

The PI250 contains two kinds of modes: ANSI Standard and Prime. Together, the modes define a single set of terminal states.

Mode commands and the default conditions are listed in alphabetical order in Table 5.2. A complete description of each mode in the Set and Reset states follows the table

TABLE 5-2. Mode Command Summary

<i>Mode Name</i>	<i>Default Mode</i>	<i>Argument</i>
Auto Line Feed	Reset: CR only	>1
Character/Block	Reset: Character	>2
DOS Merge	Reset: Local control of Numeric/Function keypad	>25
L2	Reset: Enter key is normal	>21
Erase	Reset: Unprotected erase	6
Function Termination	Reset: Do not append	>18
Hard/Soft Scroll	Reset: Hard scroll	>5
Host Notification	Reset: Host not notified	>16
Insertion/Replacement	Reset: Replacement	4
Line Feed/New Line	Reset: New line	20
Line Truncate	Reset: Do not truncate	>9
Local Cursor Action	Reset: Local action	>13
Local Print	Reset: Host print	>24
Logical Attribute	Reset: Not asserted	>3
Non erasable Fields in Character	Reset: Erasable	>23
Null/Space	Set: Space	>7
Numeric/Function Keypad	Set: Functions	>10
One/Two Page Boundary	Reset: One page	>11
Page/Line	Reset: Page mode	>4
Screen Wrap	Reset: No wrap	>8
Selected Area Transfer	Set: Not send selected	17
Selective Data Trap	Reset: Normal	>14
Send/Receive	Set: No local echo	12
Send Tabs	Set: On	>17

PT250 COMMANDS (NON-DSC)

TABLE 5-2 Mode Command Summary (continued)

<i>Mode Name</i>	<i>Default Mode</i>	<i>Argument</i>
Soft Lock Option	Reset: Do not lock	>19
Transparent Data	Reset: Flow control	>15
Unprotected/Modified	Set: Modified	>6
Visual Attribute Lock	Reset: Not locked	>12
DSC/Normal	Reset: Non-DSC mode	>20

▷ **Auto Line Feed Mode** Set: Esc [>1 h
Reset: Esc [>1 l

When Auto Line Feed mode is set, the Return key transmits carriage return/line feed characters. Locally, the PT250 also performs a carriage return and a line feed. When reset, Return transmits a carriage return only.

The default is Reset (carriage return only).

The user can set or reset this mode from the Set Up Menu.

▷ **Character/Block Mode** Set: Esc [>2 h
Reset: Esc [>2 l

When set to Block mode, characters entered at the keyboard are stored in display memory and transmitted as a block to the host when the user presses the Enter key. Most commands are performed independently from the CPU. The PT250 also handles character echoing. In Block mode, the PT250 can send a line, a page, or two pages when the Enter key is pressed. The size of the transmitted block is governed by the settings of the Page/Line and One/Two Page modes.

When you enter Block mode, previously defined logical attributes may still be asserted. Consequently, you should clear these attributes using a Clear Screen command or Start Logical Attributes/Fnd Logical Attributes commands.

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In Block mode, a user indicates that a formatted screen (or operation) is completed by pressing the Enter key. At this point, the PT250 and the program exchange a series of signals. These signals let the PT250 confirm that the program is ready to receive data. The sequence is as follows:

1. The user states that information should be transmitted by pressing the Enter key.
2. The PT250 transmits an Esc S (Set Transmit State).
3. After the program receives the Esc S, it can tell the PT250 that it should transmit data. It does this by sending an Esc 5 (Send Block Data) to the terminal.
4. The terminal responds by sending data to the program.

Note

You must ensure that each PT250 terminal used in Block mode has been allocated sufficient input buffer space in PRIMOS during system configuration, as described in the *System Administrator's Guide*. Contact your System Administrator for further information.

When reset to Character mode, the PT250 sends each character to the host as it is entered. If the user presses a function key while the terminal is in Character mode, the PT250 sends an escape sequence to the CPU.

The default is Reset (Character mode).

The user can set or reset this mode from the Set Up Menu.

▷ DOS Merge Mode

Set: Esc [>25 h
Reset: Esc [>25 l

■ If DOS Merge mode is set:

1. Depressing the Num Lock key alternately sends set and reset Numeric/Function Keypad mode escape sequences to the host (see Numeric/Function Keypad mode).
2. The existing display size is saved.
3. The IBM PC Group 1 character set is loaded and the display size changes to 80 by 25 (no status line). See *IBM Technical Reference Manual (Personal Computer XT and Portable Personal Computer)*, Publication 6361459, for Group 1 character set table.

If DOS Merge Mode is reset (the default):

-
1. You can set and reset Numeric/Function Keypad locally, without host intervention.
 2. The original display size and character set are restored.

▷ E2 Mode

Set: Esc [>21 h
Reset: Esc [>21 l

■ This mode affects the action of the Enter key and the F1 key. If E2 mode is set, the Enter key generates four different escape sequences for four possible augmentations. Different Single Shift Two sequences are generated for each of these augmentations (see the Single Shift Two code sequences in Table A-2). Striking the F1 key with any augmentation when E2 mode is set and online causes the LED beneath the F1 key to toggle on and off.

If E2 mode is reset, the Enter key functions like a Return key when in Character mode. In Block mode, the Enter key transmits either the Set Transmit State or the Set Page Dump command depending on its augmentation.

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The default is Reset (do not use the Enter key to generate Single Shift Two sequences).

▷ **Erasure Mode (ANSI)** Set: Esc [6 h
Reset: Esc [6 l

When set, protected and unprotected characters can be erased. When reset, only unprotected characters can be erased. (Erased means the character disappears and a pad character is inserted in its place. The cursor does not move.) An error occurs if Erasure mode is reset and an attempt is made to erase an entirely protected area.

The default is Reset (erase unprotected characters only).

▷ **Function Termination Mode** Set: Esc [>18 h
Reset: Esc [>18 l

When set, the PI250 appends a carriage return character to the escape sequence transmitted when a function key is hit. (These are keys F1 through F10, PF1 through PF12, and PA1 through PA4.)

If this mode is not set, a carriage return is not appended.

The code sequences that the PI250 transmits are shown in Appendix Tables A-2 and A-3. However, carriage returns are not indicated in those tables.

The default is Reset (do not append carriage returns).

▷ **Hard/Soft Scroll Mode** Set: Esc [>5 h
Reset: Esc [>5 l

When set, lines soft scroll, that is, they move up smoothly rather than jumping from line position to line position. This is the same as the Hard/Soft Scroll in the Set Up Menu option. In addition, the speed at which soft scrolling occurs can be regulated using the Set Up Menu's Soft Scroll Speed selection.

PT250 COMMANDS (NON DSC)

If lines are locked, soft scrolling cannot occur.
The default is Reset (hard scroll).

▷ **Host Notification Mode** Set: Esc [>16 h
Reset: Esc [>16 l

When set, the terminal sends an Operating System Command (OSC) to notify the operating system or program that a user has performed an action that could change the state of the PT250.

The commands that send notification are Clear Screen (Esc ?), Display Revision (Esc \$ Z), and Reset to Initial State (Esc \$ R). The parameter to the OSC indicates which key was pressed. See the OSC command for an explanation of its parameters.

When reset, no notification occurs.

The default is Reset (no host notification).

▷ **Insertion/Replacement Mode (ANSI)** Set: Esc [4 h
Reset: Esc [4 l

When set, existing characters move to the right as new characters are typed. In addition, the Insert key light comes on. In the reset state, a newly typed character replaces the character in the current position. In both the set and reset states, the cursor advances one character position.

When set to Insert mode, the extent of possible shifting is influenced by the setting of the Select Editing Extent and One/Two Page Boundary modes. Depending on what state the terminal is in, the extent of the shifting could be by an area, field, line, or the terminal's display memory. If logical attributes are asserted, data moves to the end of the extent or until protected data is encountered, whichever occurs first.

When data is shifted, the terminating character must be a pad character. That is, it must be a space and/or a null, depending on the setting of Null/Space mode. This insures that no information is lost by the insertion. If the last character before the shift is not a pad character, insertion does not occur, and the keyboard becomes soft locked.

If logical attributes are asserted when in Insert mode, they are not changed by the insertion (that is, they remain associated with the screen position). If logical attributes are not asserted, they move with the characters they are associated with. The logical attributes associated with the cursor position at the time of the insertion are applied to the newly inserted character.

If Visual Attribute Lock mode is set during an insertion, each character assumes the visual attributes associated with the screen position. If Visual Attribute Lock mode is reset, visual attributes move with the characters they are associated with. The visual attributes associated with the cursor position at the time of the insertion are applied to the newly inserted character.

The default is reset (Replacement mode)

▷ **Line Feed/New Line Mode (ANSI)**

Set: Esc [20 h

Reset: Esc [20 l

When set, a line feed moves the cursor to the first position on the next line. Otherwise, a line feed moves the cursor vertically to the same column position on the next line.

The default is Reset (line feed only).

PT250 COMMANDS (NON-DSC)

▷ Line Truncate Mode

Set: Esc [>9 h
Reset: Esc [>9 l

When set, the cursor remains at the last character position on the line as characters are typed past the last position. The characters that are being typed are not shown. Note that the forward arrow key always moves to column 1 of the next line when it is at the last position on the line.

When reset, the cursor moves to column 1 of the next line when characters are typed beyond the last character position.

If the PT250 is in Block mode with logical attributes asserted, the PT250 does not truncate lines regardless of this mode's setting.

The default is Reset (move to the next line).

If the cursor is in the system line, the Reset state does not reset Line Truncate mode.

▷ Local Cursor Action Mode

Set: Esc [>13 h
Reset: Esc [>13 l

When set, the PT250 sends control codes or sequences to the host whenever the user presses the Tab, Home, or Backtab keys; any one of the four scroll keys or any one of the four arrow keys. Cursor action will not occur on the terminal unless the code or sequence is transmitted back to the terminal. Therefore, any activity in half duplex that uses these keys requires a Local Cursor Action enable.

When reset, the terminal performs the cursor function locally without sending control codes or sequences to the host.

The default is Reset (local action only).

Note that this mode has meaning only when the PT250 is in Character mode. In Block mode cursor action is always local and is directed by the logical attributes of the formatted screen.

▷ **Local Print Mode**

Set: Esc [>24 h
Reset: Esc [>24 l

When Local Print mode is set, the unaugmented Prt Scn key performs local printing without sending the command sequence to the host.

When this mode is reset (the default), the Prt Scn key returns to normal print operation.

▷ **Logical Attribute Mode**

Set: Esc [>3 h
Reset: Esc [>3 l

When set, previously defined logical attributes are asserted. These logical attributes define areas and state the restrictions on the characters that will go in those areas. They are the last attributes assigned to the terminal. Until this command is received, logical attributes have no effect on information typed. That is, before Logical Attribute mode is set, the user is free to describe how the screen is defined.

The default is Reset (logical attributes are not asserted).

The Set state of this command is ignored if the cursor is in the system line.

▷ **Non-erasable Fields in Character Mode**

Set: Esc [>23 h
Reset: Esc [>23 l

When this mode is set, the command sequence that normally performs a Read Cursor Character (Esc ;) performs a variation of the Erase in Display command which erases all non-low-intensity characters to spaces.

When this mode is reset (the default), Esc ; returns to normal operation.

▷ **Null/Space Mode**

Set: Esc [>7 h

Reset: Esc [>7 l

When set, the terminal uses a space as the pad character. When reset, the terminal uses a null as the pad character.

During Block mode transmissions, both nulls and spaces are used as pad characters when this mode is set.

The default is Set (pad with the space character).

▷ **Numeric/Function Keypad**

Set: Esc [>10 h

Reset: Esc [>10 l

When set, the numeric keypad performs the function printed on the top of the numeric keypad keys. (The escape sequences for these functions are presented in Appendix A.) When reset, the numeric keypad sends the number or symbol shown on the face of the key, and the light on the Num Lock key comes on. Local or host control of numeric/function keypad escape sequences is affected by the setting of DOS Merge mode.

The default is Set (perform functions).

▷ **One/Two Page Boundary**

Set: Esc [>11 h

Reset: Esc [>11 l

When set, the terminal's display memory contains 48 lines (two pages) Otherwise it contains 24 lines (one page).

Page/Line and Select Editing Extent modes may further restrict the amount of data that can be accessed.

If a user switches from Two Page mode to One Page mode, the PT250 positions the cursor at the absolute home position before switching the mode setting. This ensures that only the first page of the terminal's display memory is shown.

The One/Two Page Boundary mode exists mainly for PSI 100 compatibility. This mode can access only two of the three possible PT250 screen formats. The preferred

method for changing the screen size is with the Device Control String command or the Set Display Size command.

The default is Reset (one page).

▷ **Page/Line Mode** **Set: Esc [>4 h**
Reset: Esc [>4 l

When set, the terminal transmits the current line to a program when it receives a Send Block Data command. Otherwise, it transmits either one or two pages, depending on the setting of One/Two Page Boundary mode.

When the PT250 sends a line, it sends the entire line except for trailing pad characters. Then it performs a carriage return, which moves the cursor either to the beginning of the current or to the next line, depending on the setting of Auto Line Feed mode.

The default is Reset (send page).

▷ **Screen Wrap Mode** **Set: Esc [>8 h**
Reset: Esc [>8 l

When set, display memory is considered circular. If two pages of memory are available and the cursor goes above line 1, the terminal displays information from the second page of memory. When the cursor goes beyond line 48, the terminal displays information from the first page of memory. If one page of display memory is available and the cursor goes above line 1, it moves to line 24. If the cursor moves past line 24, it returns to line 1.

In all cases, new information appears to overwrite old information. At PRIMOS level, the display can be very confusing.

When reset, no screen wrapping occurs, and the cursor cannot move past the end of the page boundary.

The default is Reset (no screen wrapping).

▷ **Selected Area Transfer Mode (ANSI)**

Set: Esc [17 h
Reset: Esc [17 l

When reset, selected areas, defined by the Start Selected Area and End Selected Area commands, are transmitted during Block mode data transmission.

If this mode is set, the setting of the Unprotected/Modified mode determines which areas are sent during a block data transmission.

The default is Set (do not send selected areas).

▷ **Selective Data Trap Mode**

Set: Esc [>14 h
Reset: Esc [>14 l

When set, all control characters except carriage return and horizontal tab are acted upon when they are received. When reset, all control characters including carriage return and horizontal tab are acted upon when they are received.

The default is Reset (act upon all control characters, including carriage return and tab).

▷ **Send/Receive Mode (ANSI)**

Set: Esc [12 h
Reset: Esc [12 l

When set, only data sent by the host to the terminal is shown on the screen. There is no local echo (full duplex). When reset, each character is displayed when it is typed (half duplex).

The default is determined by the Non-volatile RAM (\VR) setting upon power up. This mode is usually Set (no local echo).

▷ **Send Tabs Mode**

Set: Esc [>17 h
Reset: Esc [>17 l

When set, vertical and horizontal tab characters separate fields sent by the terminal to a program. A vertical tab

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indicates an unmodified field and a horizontal tab indicates a modified field. A number of interactions occur that affect this basic definition.

- If Unprotected/Modified mode is reset, horizontal tabs indicate the end of each unprotected field.
- If Unprotected/Modified mode is set, horizontal tabs indicate fields that were modified and vertical tabs indicate unprotected fields that were not.
- If Logical Attribute mode is reset, one horizontal tab is sent to signal the end of the protected field.

If this mode is reset, the terminal sends character set and cursor positioning information that signals the beginning of each unprotected field.

The default is Set (send both horizontal and vertical tabs).

▷ **Soft Lock Option Mode** **Set: Esc [>19 h**
Reset: Esc [>19 l

When set, an illegal command causes the keyboard to go into the soft-locked state. This state requires that the user press the Clear key before continuing. In addition, the bell sounds and an error message appears in the status line in normal intensity.

When reset, illegal commands do not cause a soft lock to occur. However, the bell still sounds and an appropriate message appears. In this case, the user does not have to press the Clear key.

The default is Reset (the keyboard will not become soft locked).

▷ **Transparent Data Mode** **Set: Esc [>15 h**
Reset: Esc [>15 l

When set, XON (Ctrl-Q), XOFF (Ctrl-S), and Ctrl-P codes from the keyboard are treated as normal characters. They

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are not sent immediately, but are put into the transmit buffers in the order in which they are received. XON and XOFF codes are not generated from the terminal because of buffer threshold conditions (that is, buffer full or buffer ready to receive more data). If an XOFF is received from the host and the transmitter is active, data transmission from the terminal to the host is suspended. If an XOFF is received from the host and the transmitter is not active, the XOFF is ignored. Data transmission will not resume until an XON code is received from the host.

When this mode is reset, the characters have their usual PRIMOS meaning. The codes are considered preemptive, which means they are sent immediately. If a typeahead has occurred, they are sent before the typeahead characters.

The PT250 always responds to host-generated XON, XOFF, and Ctrl-P codes as flow control, regardless of how this mode is set.

The default is Reset (these characters have their usual PRIMOS meaning).

▷ Unprotected/Modified Mode

Set: Esc [>6 h
Reset: Esc [>6 l

When set, only modified unprotected areas are sent by the terminal during a Block mode transmission. Otherwise, when reset, all unprotected areas, modified and unmodified, are sent.

If Selected Area Transfer mode is reset, the setting of this mode is ignored and only selected areas are transmitted.

The default is Set (send modified unprotected areas only).

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For example, suppose there are 10 locked lines. Therefore, a screen consists of 14 lines (24 minus 10). The Next Page command with an argument of 1 causes lines 15 through 28 to be displayed. An argument of 2 causes lines 29 through 42 to be displayed.

If the terminal is in One Page mode, the cursor is moved to the absolute home position.

► OPERATING SYSTEM Esc] arg Esc \

The PT250 sends the Operating System Command (OSC) to notify an application that a potentially destructive action has occurred. The arguments to this command's arguments are described below:

<i>Argument</i>	<i>Meaning</i>
0	Reset to Initial State (RIS) notification. This is sent whenever the user presses Ctrl-Shift-Stop. It is also sent when the RIS command is received.
2	Screen Clear notification. This is sent whenever the Clear Screen or Display Revision command is sent or the user enters Ctrl-Clear.
3	Load Keyboard Table command failed, default table is reloaded.
4	Load Keyboard Table command successful.

The PT250 ignores this command if it is received from an application. The OSC command is generated only when Host Notification mode is set.

► **PAGE DOWN**

Esc \$ b

The Page Down (PD) command scrolls the screen to display the next screen page. Locked lines do not scroll.

No scrolling occurs if the terminal is in One Page mode (either 24, 25, or 27 lines) or if the cursor is in the system line.

► **PAGE UP**

Esc \$ a

The Page Up (PU) command scrolls the screen up to display the previous screen page. Locked lines do not scroll.

No scrolling occurs if the terminal is in One Page mode (either 24, 25, or 27 lines) or if the cursor is in the system line.

► **PRECEDING PAGE**

Esc [arg V

The Preceding Page (PP) command displays the previous screen of information. If there are no locked lines, a screen consists of 24 lines. If there are locked lines, a screen will have fewer than 24 lines.

For example, suppose there are 10 locked lines. Consequently, the screen consists of 14 lines (which is 10 subtracted from 24). Also, assume that lines 25 through 38 are being displayed. This command, with an argument of 1, causes lines 11 through 24 to be displayed.

If the terminal is in One Page mode, the cursor is moved to the absolute home position.

► **READ CURSOR CHARACTER** Esc ;

The Read Cursor Character (RCC) command sends the character located at the current cursor position to the host. This command works in both Character and Block modes.

► **REPEAT** Esc [arg b

The Repeat (RLP) command inserts the character preceding this command in the data stream. The argument indicates how many times this character is repeated. **arg** cannot be greater than 255.

Example: The following RLP command repeats the letter A nine times. Note that ten uppercase As will display.

A Esc [9 b

► **RESET INHIBIT CURSOR** Esc \$ R

The Reset Inhibit Cursor (RIC) command makes an invisible cursor visible. It reverses the Set Inhibit Cursor command's action.

► **RESET MODIFIED TAGS** Esc \$ J

The Reset Modified Tags (RMT) command resets the modified bit of each logical attribute byte. Note that the modified bits are not changed automatically when data is transmitted.

An error occurs if Block mode is not set, or if the cursor is in the system line.

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If DSC mode is set, not only is the modified bit of each logical attribute byte reset, but the modified bit of each DSC attribute character byte is also reset. This sequence should not be entered at the keyboard when DSC mode is set.

► RESET TO INITIAL STATE

Esc c

The Reset to Initial State (RIS) command resets the terminal, as follows

1. The terminal transmits a Ctrl-P. This terminates the current program or operation
2. If Host Notification mode is set, the terminal transmits an Operating System Command to notify the host that the terminal is reinitializing to its default state.
3. The terminal performs a self-check operation.
4. The screen clears and the cursor returns to the home (1,1) position.

The terminal then resets to the state defined in Non-volatile RAM (NVR). Note that changes made to the terminal state using the Set Up Menu are written to NVR only if the user presses the Ctrl/Shift/Set Up keys after making changes. Any other changes made to the terminal state using the Set Up Menu are lost when the RIS command is received.

► RESTORE CURSOR AND ATTRIBUTES

Esc \$ Q

The Restore Cursor and Attributes (RCA) command reestablishes the terminal's windows, cursor position, and the Select Graphic Rendition value to what they were when the Save Cursor and Attributes command was sent.

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This command is invalid if there are locked lines.

The RCA is ignored if the PT250 has not received a Save Cursor and Attributes command.

▶ REVERSE INDEX Esc M

The Reverse Index (RI) command moves the cursor to the same horizontal position on the preceding unlocked line.

▶ SAVE CURSOR AND ATTRIBUTES Esc \$ O

The Save Cursor and Attributes (SCA) command saves:

- The current cursor position
- The relative screen position
- The visual attribute associated with this position
- The value of the Select Graphic Rendition command

If, at a later time, the terminal receives a Restore Cursor and Attributes command, the terminal returns these saved positions and attributes.

The PT250 ignores this command if locked lines are on the screen.

▶ SCROLL DOWN Esc [arg T

The Scroll Down (SD) command moves all nonlocked lines down. The last line is removed from view and a new line is displayed at the top of the screen. **arg** indicates by how many lines the screen is scrolled.

The SD command is meaningful only when the screen size is set to 80 x 48.

The SD command is invalid in DSC mode.

► **SCROLL INHIBIT RESET**

Esc \$ W

The Scroll Inhibit Reset (SIR) command tells the terminal to scroll information so that the cursor remains visible. For example, moving the cursor down when it is on the 24th line moves the information on the screen up a line. That is, line 2 becomes the first line on the screen, and so on. The cursor will be pointing at the 25th line in the terminal's memory. This line will be the 24th on the screen.

When the PT250 receives this command, it also performs a Cursor Relative Home command.

The SIR command is invalid in DSC mode.

► **SCROLL INHIBIT SET**

Esc \$ X

The Scroll Inhibit Set (SIS) command tells the PT250 that it should not automatically scroll the information on the screen if the cursor moves out of the displayed window. For example, when two pages of information exist, it is desirable to display the first page of data even while the second page is being recorded into the terminal's memory.

Although cursor movement will not induce scrolling, the terminal can be scrolled using Scroll Up and Scroll Down commands.

The SIS command is invalid in DSC mode.

► **SCROLL UP**

Esc [arg S

The Scroll Up (SU) command moves all nonlocked lines up. The first line is removed from view and a new line is displayed at the bottom of the screen. **arg** indicates by how many lines the screen is scrolled.

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The SU command is meaningful only when the screen size is set to 80 x 48.

The SU command is invalid in DSC mode.

▶ SELECT EDITING EXTENT MODE Esc [arg Q

The Select Editing Extent Mode (SEM) command specifies how much of the information on the screen is affected by Insert Character and Delete Character commands. These commands can alter the entire display, a line, or a field. The arguments to this command indicate the extent of the change, as follows:

<i>Argument</i>	<i>Meaning</i>
0	Edit in Display (default)
1	Edit in Line
3	Edit in Area

If logical attributes are not asserted, an Edit in Area is treated as an Edit in Line.

▶ SELECT GRAPHIC RENDITION Esc [args m

The Select Graphic Rendition (SGR) command specifies how data will appear when it is entered. How the characters look is specified by an argument (or arguments) to this command.

Valid arguments for the SGR command are as follows:

<i>Argument</i>	<i>Attribute</i>
0	Normal video
2	Low intensity
4	Underscore

<i>Argument</i>	<i>Attribute</i>
5	Blink
7	Reverse video
>1	Strike-through
>2	Invisible image
>3	Line drawing graphics
>4	Block drawing graphics

Example: To set the terminal to low intensity, blinking, and reverse video, send the following command:

Esc [2,5,7 m

The default setting of SGR is white characters on a black background. If reverse video is selected, the result will be black characters on a white background.

► SEND BLOCK DATA

Esc 5

The Send Block Data (SBD) command, when received by the terminal, tells the PT250 to send data to the computer. Data contained within a locked line is not sent. For more details, see Chapter 3.

This command is valid only in Block mode.

► SET DISPLAY SIZE

Esc [arg N

The Set Display Size (SDS) command sets the display size of the screen to one of four formats. The argument indicates the screen size, as follows.

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<i>Argument</i>	<i>Attribute</i>
1	80 columns by 24 rows
2	80 columns by 48 rows
3	132 columns by 27 rows
4	80 columns by 25 rows

Arguments 2 and 4 are invalid in DSC mode.

▶ SET GO ALTERNATE Esc \$ 2

The Set GO Alternate (SGOE) command causes characters from the Alternate character set to display when the GO character set is active. The GO set is active when the message GO appears in the sixth field of the status line. The SGOE command does not cause the GO set to become the active character set. Consequently, if another set is active when this command is received, characters being displayed continue to come from the same character set as before until the terminal is switched to the GO set. Previously displayed characters remain unchanged.

In 7-bit operating mode, the Alternate character set contains characters 80 through FF Hex from the 8-bit character set (see Table C-1 in Appendix C). In 8-bit operating mode, the Standard and Alternate character sets are identical.

▶ SET GO ASCII Esc \$ 0

The Set GO ASCII (SGOA) command causes normal ASCII characters to display when the GO character set is active. The GO set is active when the message GO appears in the sixth field of the status line. The SGOA command does not cause the GO set to become the active character set.

Consequently, if another set is active when this command is received, new characters being displayed will continue to come from the same character set as before until the terminal is switched to the G0 set. Previously displayed characters are unchanged.

► **SET G1 ALTERNATE**

Esc \$ 3

The Set G1 Alternate (SG1I) command selects characters from the Alternate character set when the G1 character set is active. The G1 set is active when the message G1 appears in the sixth field of the status line. The SG1E command does not cause the G1 set to become the active character set. Consequently, if another set is active when this command is received, characters being entered continue to come from the same character set as before until the terminal is switched to the G1 set. Previously displayed characters are unchanged.

In 7-bit operating mode, the Alternate character set contains characters 80 through FF Hex from the 8-bit character set (see Table C 1 in Appendix C). In 8 bit operating mode, the Standard and Alternate character sets are identical.

► **SET G1 ASCII**

Esc \$ 1

The Set G1 ASCII (SG1A) command causes normal ASCII characters to display when the G1 character set is active. The G1 set is active when the message G1 appears in the sixth field of the status line. The SG1A command does not cause the G1 set to become the active character set. Consequently, if another set is active when this command is received, characters being entered continue to come from the same character set as before until the terminal is switched to the G1 set. Previously displayed characters are unchanged.

► **SET INHIBIT CURSOR** **Esc \$ S**

The Set Inhibit Cursor (SIC) command tells the terminal to stop displaying the cursor. A program ordinarily executes this command so that a user does not see the cursor move as operations occur

► **SET PAGE DUMP** **Esc =**

When the user hits Shift Enter, the terminal sends this code sequence to an application program. This sequence means that the user wants to dump the terminal's contents. However, the actual operation that will occur is determined by the application. If the page is to be dumped, the application program will send a Dump Block Data (DBD) command. See Chapter 3, Page Dump Format, for more information.

► **SET TRANSMIT STATE** **Esc S**

The Set Transmit State (STS) command is sent to a program by the terminal when a user hits the Enter key while the terminal is in Block mode. The SIS command does not actually cause data to be transmitted. Instead, data is transferred when the terminal receives a Send Block Data (SBD) command. See Chapter 3, Transmission Formats, for more information.

► **SINGLE SHIFT THREE** **Esc O ch**

The Single Shift Three (SS3) sequence provides a set of application functions that are generated by the F and PF function keys, and augmented with the Shift and Control keys. The keys and sequences are listed in Table A-3 in Appendix A.

Each Single Shift Three key sends the sequence

Esc O ch

where **ch** is the final character of the sequence that identifies the key used to generate the sequence.

► **SINGLE SHIFT TWO** **Esc N ch**

The Single Shift Two (SS2) sequence provides a set of application functions that are generated by various function keys and the PA1 through PA4 keys, and may be augmented with the Shift and Control keys. The keys and sequences are listed in Table A-2 in Appendix A.

Each Single Shift Two key sends the sequence

Esc N ch

where **ch** is the final character of the sequence that identifies the key used to generate the sequence.

► **SOFT KEYBOARD LOCK** **Esc \$ F**

The Soft Keyboard Lock (SKL) command causes all keys except Clear and Stop to be ignored. The SOFT LOCK message appears in the status line.

► **SOFT KEYBOARD UNLOCK** **Esc \$ G**

The Soft Keyboard Unlock (SKU) command releases a Soft Lock condition. If a previously defined system line was

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cleared due to the soft lock condition, it will be redisplayed.

The Clear or Shift Clear key can be used to unlock a soft-locked keyboard.

If DSC mode is set, characters 8 through 59, inclusive, in the system line will be cleared to spaces.

▶ START LOGICAL ATTRIBUTES **Esc \$ L**

The Start Logical Attributes (SLA) marks the current cursor position as the beginning of an area to which the PT250 will apply logical attributes. The end of an area is marked with an End Logical Attributes (ELA) command.

The logical attributes used by an area are those of the current value of the Define Logical Attributes (DLA) setting. When the FLA is received, the PT250 applies these logical attributes to all positions in the field. This includes the position the cursor is in when the terminal receives the ELA.

The SLA command is invalid in DSC mode.

▶ START OF PROTECTED AREA **Esc V**

The Start of Protected Area (SPA) command marks the current cursor position as the beginning of a group of consecutive character positions that is protected against alterations by a user. The end of this region is marked with an End of Protected Area (EPA) command.

When the PT250 receives the EPA command, all positions from the SPA, up to and including the current cursor position, are protected from user input. Existing logical attribute settings are overwritten.

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An error occurs if Block mode is not asserted or if the cursor is in the system line.

If DSC mode is set, an error occurs

▶ START OF SELECTED AREA **Esc F**

The Start of Selected Area (SSA) command marks the qualified area containing the current cursor position as the first of one or more qualified areas whose contents will be transmitted in a data stream or to another device. The PT250 makes this selection only if Selected Area Transfer mode is reset.

The last selected area is marked with an End of Selected Area (ESA) command. When the PT250 receives the ESA, all qualified areas from the start of the area marked by the SSA, up to and including the end of the area containing the current cursor position, are marked as selected. There is no limit to the number of areas that can be selected.

For additional information on selected area transmission, see Chapter 3, Selected Area Transfer Mode.

▶ SYSTEM LINE DISPLAY **Esc \$ U**

The System Line Display (SLD) command displays the system line as the bottom line on the screen. If the line had data written to it, this data will reappear.

If the cursor is not in the system line, the system line replaces the status line as the bottom line. If the cursor is already in the system line, the cursor returns to the position it was in before it entered this line. The settings of Logical Attribute mode, Insertion/Replacement mode, and Character/Block mode are also restored.

► **SYSTEM LINE RESET** **Esc \$ T**

The System Line Reset (SIR) command writes the status line to the bottom line of the terminal. If the cursor is already in the system line (because of a System Line Set command), the cursor returns to its previous position on the screen. The settings of Logical Attribute mode, Insertion/Replacement mode, and Character/Block mode are also restored.

If the cursor is not in the system line, the status line replaces the system line.

► **SYSTEM LINE SET** **Esc \$ V**

The System Line Set (SLS) command writes a blank system line to the bottom line of the terminal. The current value for the cursor position is saved so that it can be restored with the System Line Display or System Line Reset commands. The PT250 places this line into Character mode and Replace mode. In addition, logical attributes cannot be asserted in this line.

Although the system line is initially displayed in low-intensity, reverse video, its visual attributes may be changed. While the cursor is in this line, you can type data, backspaces, and carriage returns. A carriage return always positions the cursor at the beginning of the line.

The system line acts as a one line, Character mode window to the computer. Consequently, you can conduct interactive dialogs with the user while the terminal is Block mode without destroying a screen's contents.

► **UNBLANK SCREEN** **Esc \$ P**

The Unblank Screen (UBS) command causes an invisible screen to become visible. (A screen would be made invisible by a Blank Screen command.) After this

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command executes, screen data, the cursor, and the status line reappear.

► UNLOCK LINES Esc [arg-1;arg-2 y

The Unlock Lines (UL) command unlocks locked lines. The **arg-1** represents the line at which unlocking will begin. The **arg-2** specifies the number of lines to be unlocked. **arg-2** may be omitted. If it is, the terminal will unlock one line.

Example: The following command unlocks 3 lines beginning at line 10:

```
Esc [ 10,3 y
```

Up to 24 lines (25 in 80 x 25 format, 27 in 132-column format) can be unlocked at one time. (Recall, however, that no more than 23 locked lines can exist on the screen.) Unlocking 24, 25, or 27 lines ensures that all lines are unlocked.

After the lines are unlocked, they can be scrolled, moved to, or altered like any other line.

► VERTICAL POSITION ABSOLUTE Esc [arg d

The Vertical Position Absolute (VPA) command moves the cursor to the line number specified by **arg**. The horizontal position does not change.

If the line indicated by **arg** is not on the screen, the PT250 scrolls information until the indicated line is displayed.

This command is invalid if locked lines are on the screen or if **arg** is greater than the screen size line length.

6

DSC COMMANDS

This chapter describes Data Stream Compatibility (DSC) commands. DSC mode enables the PT250 to emulate selected characteristics of the IBM 3270 terminal. The PT250 in DSC mode can interact with an IBM host, thereby providing SNA capability.

For ease of reference, the commands are in alphabetical order by command name. The Mode commands, which define operating states, are listed alphabetically under MODES -- SET/RESET and contain a description for both the reset and set states.

When reading command explanations, keep in mind the following considerations:

- An error often occurs if a command is executed when the cursor is in the system line.
- Movement commands move over locked lines as if they did not exist. Some cursor positioning commands produce an error message if there are locked lines.
- If a command would move the cursor off the screen, the PT250 scrolls the screen so the cursor

remains visible. Scrolling does not occur, however, if the PT250 has received a Scroll Inhibit Set command.

- For many commands, an argument of zero is the same as an argument of 1. If a command takes an argument and the argument is omitted, a zero value is assumed.
- If a command is entered with extra arguments, an error occurs.
- A command usually works from the current cursor position. For example, an insertion command begins inserting from the current position.
- The word *up* means toward the top of the screen or toward the beginning of the terminal's display memory.
- The word *down* means toward the bottom of the screen or toward the end of the terminal's display memory.
- The word *cursor* also means the position to which the cursor points. Consequently, a cursor position still exists when the cursor is not being displayed.
- The word *arg* represents a number that becomes part of the command.

► **CURSOR SELECT**

Esc \$ f

The PT250 generates the Cursor Select (CUS) sequence in response to a Cursor Select Functionality command. The sequence indicates that the first data character in the cursor-selectable qualified area is a space or null. The cursor-selectable area is an area for which the attribute has been defined by a Set Attribute command with bits 2 and 3 of the attribute set to either 01 or 10.

▶ **CURSOR SELECT FUNCTIONALITY** Esc \$ e

The user generates the Cursor Select Functionality (CSF) command by pressing the Set Up key, unaugmented, while in DSC mode. The PT250 performs an action based on the current cursor position and the first data character in a cursor-selectable qualified area.

If the cursor is in a cursor-selectable qualified area, one of the following actions occurs, depending on the first data character in the qualified area.

First Data

<i>Character</i>	<i>Action</i>
?	Sets the modified bits for the qualified area and changes the ? to >.
>	Resets the modified bits for the qualified area and changes the > to ?.
space or null	Sends a Cursor Select sequence to the host and soft locks the keyboard.
&	Sets the modified bits for the qualified area, sends a Set Transmit State (Esc S) sequence, and soft locks the keyboard.

In addition to performing one of the above actions, the CSF command causes Insertion/Replacement mode to be set to Replacement mode.

If the current cursor position is not within a cursor-selectable qualified area, or if the first data character in a qualified area is not one of the ones listed above, the keyboard is soft locked, and the message NT SELECTBLE displays in field H of the status line.

► DSC DUP FUNCTION

Esc \$ d

The DSC DUP Function (DUP) command puts a special DUP character (an asterisk with a bar over it) at the active position and performs a Cursor Horizontal Tab. The modified data bit for the field is also set. If the active position is in a protected qualified area or at an attribute character, the command is ignored and the keyboard is soft locked.

► END DSC DATA

Esc \$ 5

The End DSC Data (EDD) command marks the end of a stream of PT250 DSC mode commands.

If qualified areas are to be defined and display data is to be written to the memory pointer, the display data remains invisible on the terminal screen until all qualified areas specified in the SDD/EDD stream are defined.

An error occurs if:

- DSC mode is reset.
- A Start DSC Data (SDD) command has not been received.
- The EDD command is issued from the keyboard rather than from the host.
- The cursor is in the system line.

► ERASE UNPROTECTED TO ADDRESS

Esc [arg-1;arg-2 x

The Erase Unprotected to Address (EUA) command inserts nulls into all unprotected memory locations, starting at the current memory pointer up to, but not including, the specified memory address. The **arg-1** is the row parameter and **arg-2** is the column parameter.

DSC COMMANDS

If the stop address equals the current memory pointer, nulls are inserted into all unprotected memory locations. Attribute character positions (modified bits) are not affected. Wrapping may occur. The memory pointer is set to the memory address specified by the arguments. The cursor is not moved.

An error occurs if:

- DSC mode is reset.
- Two arguments were not specified.
- A Start DSC Data (SDD) command has not been received.
- The user issues the EUA command from the keyboard.
- The cursor is in the system line.

▶ HOST NOTIFICATION OF MODIFICATION

Esc \$ c

The PI250 sends the Host Notification of Format Modification (HINFM) command to notify the host that a user has either changed data on the screen or has entered data on a blank screen. When DSC mode is initially entered, Host Notification of Format Modification is turned on.

The first modification to the screen causes this escape sequence to be sent to the host. Whenever this sequence is sent to the host, Host Notification of Format Modification is turned off, and subsequent modifications to the screen do not cause this sequence to be sent to the host. When a Start DSC Data (SDI) command is received by the terminal, Host Notification of Format Modification is turned on, and the next modification to the screen causes this sequence to be sent to the host.

► INDEX

Esc D

The Index (IND) command moves the cursor down one line. The column position does not change. This command is equivalent to a Cursor Down command with an argument of 1.

► INSERT CHARACTER

Esc [arg @

The Insert Character (ICH) command inserts spaces or null characters at the current cursor position. The number of spaces or nulls that are inserted is determined by arg. When a character is inserted, other characters move to the right.

The extent to which data is moved is determined by the setting of the Select Editing Extent Mode (SEM) command. This command indicates whether shifting can occur by area, line, or terminal display. If logical attributes are asserted, data is moved to the end of the current extent or until a new area is encountered. If logical attributes are not asserted, then as characters are moved, their logical attributes are also moved. The logical attributes associated with the cursor position at the time of the insertion are applied to the newly inserted character.

If Visual Attribute Lock mode is set, visual attributes may be affected by the insertion and each character will assume the visual attribute associated with the screen position. If this mode is not set, visual attributes move with the character.

An insertion can occur only if a pad character exists at the end of the current editing extent. If there is no pad character, an error occurs. This ensures that no data is lost.

DSC COMMANDS

If DSC and Logical Attribute modes are set, wrapping may occur. The active position is the cursor position. An error occurs if the cursor is in a protected area or if there are not enough pad characters to perform the insertion.

▶ INSERT CURSOR Esc \$ N

The Insert Cursor (INC) command moves the cursor to the current memory pointer but does not move the memory pointer. An error occurs if:

- DSC mode is reset.
- A Start DSC Data (SDD) command has not been received.
- The INC command is issued from the keyboard rather than from the host.
- The cursor is in the system line.

▶ MODES -- SET/RESET Set: Esc [args h Reset: Esc [args l

PT250 Mode commands define the terminal operating states. See Chapter 5 for instructions on how to set and reset modes, as well as a complete description of other mode commands and default conditions.

▷ DSC Mode Set: Esc [>20 h Reset: Esc [>20 l

When Data Stream Compatibility (DSC) mode is set, a number of PT250 mode command settings are established. These settings are listed in Table 6-1.

TABLE 6-1. DSC Mode Controllable Mode Settings

<i>Mode</i>	<i>Set</i>	<i>Reset</i>
Auto Line Feed	---	Initially
Character/Block	Always (Note 1)	---
Erase	---	Always
Function Termination	---	Initially
Hard/Soft Scroll	--	Initially
Host Notification	--	Initially
Insertion/Replacement	---	Initially
Line Feed/New Line	---	Initially
Line Truncate	---	Initially
Local Cursor Action	---	Initially
Logical Attribute	---	Initially (Note 2)
Null/Space	---	Always (Note 3)
Numeric/Function Keypad	---	Initially
One/Two Page Boundary	---	Initially
Page/Line	---	Always
Screen Wrap	Always	---
Selected Area Transfer	Initially	---
Selective Data Trap	-	Initially
Send/Receive	Initially	---
Send Tabs	---	Always
Soft Lock Option	Initially	---
Transparent Data	---	Initially
Unprotected/Modified	Initially	--
Visual Attribute Lock	---	Initially (Note 4)

Notes

1. Character/Block mode is always set, except when the cursor is in the system line. When the cursor is in the system line, interactive dialogue between the host and user can take place.

2. Logical Attribute mode is initially reset but cannot be manipulated by host or keyboard action. Logical attributes are set when defined/asserted by a Set Attribute escape sequence, and Logical Attribute mode is set when a qualified area (field) is defined/asserted.
- 3 Pad character is always a null.
4. Visual Attribute Lock mode is initially reset but cannot be manipulated by host or keyboard action except when no qualified areas (fields) exist (that is, except when Logical Attribute mode is reset). Visual attributes of a qualified area are set when defined/asserted by a Set Attribute escape sequence That is, Visual Attributes Lock mode is set when a qualified area is defined/asserted.

If DSC is set when the Reset DSC mode sequence is received, DSC mode is reset, both pages of display memory are cleared, and non-DSC terminal parameters are restored to the state they were in prior to DSC mode operation.

An error occurs if DSC mode is already set when the Set DSC mode sequence is received, or if DSC mode is already reset when the Reset DSC mode sequence is received

The default is Reset (normal, non-DSC mode).

The following PT250 commands work differently when DSC mode is set Refer to individual commands in Chapter 5 for the effect of DSC mode on their operation.

Change Visual Attribute of	Erase in Display
Character	Erase in Line
Display	Insert Character
Line	Logical Attribute Mode
Character/Block Mode	Reset Mode
Clear Screen	Reset Modified Tags

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Cursor Absolute Home	Screen Wrap Mode
Cursor Backward Tabulation	Select Graphic Rendition
Cursor Horizontal Tabulation	Single Shift Three
Cursor Relative Home	Single Shift Two
Delete Character	Soft Keyboard Unlock
Device Attributes	System Line Display
Dump Block Data	System Line Reset
Erase Character	System Line Set
Erase in Area	Visual Attribute Lock Mode

In DSC mode, the following operations are not allowed:

- Scrolling
- Line lock
- Insert line
- Delete line
- Using the DEL character
- Entering data in a protected area

Attempting to perform one of these operations results in an error message. When qualified areas are defined, auto-tabbing occurs. That is, when a character is entered into the last position of an unprotected area, the cursor is automatically tabbed to the first data character position of the next unprotected area. When data is entered into an unprotected area, the modified bits in that area are set to indicate that the area has been altered.

Note

A qualified area may cause the screen to wrap.

DSC Mode Display Characteristics

Default Visual Attributes: The default visual attribute intensity for DSC mode is half-intensity. The default intensity for non-DSC mode is high-intensity.

Default Logical Attributes: When DSC mode is set, the screen is initially unprotected. All characters are considered to be alphanumeric.

Cursor Position on Cleared Screen: The screen is initially cleared to nulls; the cursor is initially positioned at (1,1). References to the *active position* mean the cursor position; references to the *memory pointer* mean the current memory address being accessed by DSC mode escape sequences.

Data Display: When display data moves from the host to the terminal, the display data overwrites the character displayed at the current memory pointer, and the memory pointer increments by one. If logical areas are defined/asserted, attribute characters may be overwritten (See the description of the Repeat to Address (RPA) command.) If no logical areas exist, the display data that is sent from the host to the terminal is subject to the same visual attribute considerations (Visual Attribute Lock mode and SGR setting) as display data entered from the keyboard. Display data sent from the host and written to the current memory pointer must be part of a Start DSC Data/Lnd DSC Data command stream.

The cursor does not move with display data, except when data is entered from the keyboard or data is entered into the system line (Separate pointers are required for memory management and cursor movement.) The editing extent is initially set to that of the qualified area. DSC MODE appears in the third box from the right in the status line.

► **MOVE MEMORY POINTER** Esc [arg-1;arg-2 s

The Move Memory Pointer (MMP) command moves the memory pointer to the memory address specified by the arguments.

The **arg-1** is the row parameter and **arg-2** is the column parameter. Both arguments must be between 1 and the maximum row or column width defined by the current screen size setting. The cursor is not moved. An error occurs if any of the following conditions exist:

- DSC mode is reset.
- Two arguments have not been specified.
- The MMP command is issued from the keyboard rather than from the host.
- The cursor is in the system line.

The MMP command may be used with or without the SDD/EDD command stream.

► **PROGRAM TAB** Esc [arg z

The Program Tab (PT) command moves the memory pointer to the first data character position of the next unprotected area. If forward-wrapping occurs, the memory pointer is set to (1,1), regardless of whether the current area is protected or unprotected. The cursor is not moved.

If **arg** is 0, perform a regular program tab (PT). If **arg** is 1, insert nulls starting from the current memory pointer up to the end of the current qualified area, regardless of whether the current area is protected or unprotected. If the current area forward-wraps, the null insertion stops at the last position of the screen. Modified bits are not affected. If the current memory pointer is located on an attribute character, a regular program tab is performed with no null insertion. If forward wrapping occurs and the current PT with an argument of 1 causes

null insertion, the PT immediately following (regardless of which argument is specified) will continue the null insertion, except when the memory pointer is located on an attribute character.

If the current memory pointer contains an attribute character (that is, if the beginning bit of the current memory pointer is set), the attributes of the area defined by the current attribute character are checked. If the area defined by the current attribute character is unprotected, the memory pointer is incremented by one, and no null insertion is performed. If the area is protected, the memory pointer is tabbed to the first data character position of the next unprotected area, and no null insertion is performed.

If the screen is totally protected, the memory pointer will be positioned to home. No null insertion is performed if the memory pointer is located on an attribute character. If Logical Attribute mode is Reset (no attribute characters exist), the memory pointer will be positioned to home, and a null insertion may be performed. If no argument is specified, the default value is 0.

An error occurs if any of the following conditions exist:

- DSC mode is reset.
- More than one argument is specified.
- A Start DSC Data (SDD) command has not been received.
- The PT command is issued from the keyboard rather than from the host.
- The cursor is in the system line.

► **REPEAT TO ADDRESS** Esc [**arg-1;arg-2 w**

The Repeat to Address (RPA) command displays the next graphic character or null starting from the current memory pointer up to, but not including, the memory address specified by the arguments.

arg-1 is the row parameter and **arg-2** is the column parameter. Both row and column arguments must be between 1 and the maximum row or column number defined by the current screen size setting. If the stop address equals the current memory pointer, the character displays in all screen positions. Wrapping may occur. The memory pointer is set to the memory address specified by the arguments. The cursor is not moved.

Modified bits are not affected unless an attribute character position (that is, a memory position with its beginning bit set) is overwritten. If an attribute character position is written over, that position assumes the new data character, and the logical and visual attributes of the previous qualified area are applied until the specified address is reached. If all memory positions up to the specified address are written over, RPA resets Logical Attribute mode and Visual Attribute Lock mode, and the default DSC logical and visual attributes are applied to the display.

An error occurs if any of the following conditions exist:

- DSC mode is reset.
- Two arguments have not been specified.
- A Start DSC Data (SDD) command has not been received.
- The RPA command is issued from the keyboard rather than from the host.
- The cursor is in the system line.

▶ SET ATTRIBUTE

Esc 8 ch

The Set Attribute (SA) command, when immediately followed by an attribute character (**ch**), defines a qualified area of attributes (both logical and visual) starting at the location after the current memory pointer up to, but not including, the next attribute character position.

The current memory pointer has a space character written into it, which represents the position of the currently defined attribute character. Also, the current memory pointer has a Logical Attribute of Protected and a Visual Attribute of Half (Low) Intensity which is Normal Intensity when DSC mode is set (see Compressed Commands in Chapter 5 for a description of Logical and Visual Attributes). Wrapping may occur.

The current memory pointer is incremented by one. The cursor is not moved. If an attribute character position is written over by an SA, that position assumes the new logical and visual attributes defined by the current SA sequence SA sets Logical Attribute mode and Visual Attribute Lock mode, and also sets the editing extent to that of the qualified area.

An error occurs if any of the following conditions exist:

- DSC mode is reset.
- A Start DSC Data command has not been received.
- The user issues this command from the keyboard.
- The cursor is in the system line.

The attribute character **ch** following the SA sequence can be any ASCII character in the range 20 Hex (space) to 5F Hex (underscore) To interpret a byte value, subtract 20 Hex from the Hex value of the ASCII character. To construct a value, add 20 Hex to the Hex value. This means that an ASCII space character (20 Hex) is interpreted as a byte containing all zeros.

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Example: The following SA command defines a blinking, numeric, visible, selected, normal intensity, unmodified, unprotected qualified area:

Esc 8 T

The ASCII T translates into:

Bit	1	Blinking
	1	Numeric
	0	Visible, Selected, Normal Intensity
	1	
	0	Qualified area not modified
	0	Unprotected

See Table 6-2 for definitions of the six attribute-character bits.

Note

When bit 0 is set to 1 (Protected), bit 4 (Alphanumeric/Numeric) is ignored.

TABLE 6-2. Attribute-character Bits

Bit	Function
5	Blinking 0 No Blinking 1 Blinking
4	Alphanumeric/Numeric 0 Alphanumeric (All Graphics in PT250 memory) 1 Numeric
3,2	Intensity/Selected/Invisible 0 0 Visible, Not Selected, Normal Intensity (Half Intensity in non-DSC mode) 0 1 Visible, Selected, Normal Intensity 1 0 Visible, Selected, High Intensity (Normal Intensity in non-DSC mode) 1 1 Invisible, Not Selected, Normal Intensity
1	Modified 0 Qualified Area Not Modified 1 Qualified Area Modified
0	Unprotected/Protected 0 Unprotected 1 Protected

► **SET ROW NUMBER** Esc [arg Y

The Set Row Number (SRN) command sets the last usable row for the PT250 to the number specified in the argument. The row number must be greater than 0 and less than or equal to the current screen size length.

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After this command executes, both the memory pointer and the cursor are reset to (1,1), and the screen is cleared. This command is valid only in DSC mode.

► START DSC DATA

Esc \$ 4

The Start DSC Data (SDD) command marks the start of a stream of PT250 DSC commands. Several DSC commands, and any display data written to the memory pointer, must be bracketed between a Start DSC Data (SDD) command and an End DSC Data (EDD) command. The following DSC commands must be bracketed between SDD and EDD:

- Erase Unprotected to Address (EUA)
- Insert Cursor (INC)
- Program Tab (PT)
- Repeat to Address (RPA)
- Set Attribute (SA)

Note that the MMP command may be included between the SDD and EDD commands or may be sent without the SDD/EDD commands.

Caution

Do not bracket any other PT250 escape sequence commands with the SDD/EDD escape sequence stream, or an interpretive data error may occur.

DSC COMMANDS

The DSC command sequence is terminated by an End DSC Data (EDD) command. If qualified areas are to be defined and display data is to be written to the memory pointer, the display data remains invisible on the terminal screen until all qualified areas specified in the SDD/EDD stream are defined.

An error occurs if either of the following conditions exist:

- The SDD command is issued from the keyboard rather than from the host.
- The cursor is in the system line.

If an error is detected *within* an SDD/EDD stream, the bell sounds, the keyboard is soft-locked, and an error message appears in the status line.





APPENDICES





A

PT250 PREDEFINED AND FUNCTION KEY CODE SEQUENCES

This appendix consists of the following tables:

- A-1 PT250 Predefined Function Key Code Sequences
- A-2 Single Shift Two (SS2) Code Sequences
- A-3 Single Shift Three (SS3) Code Sequences

The tables present the sequences and characters transmitted by PT250 keys.

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TABLE A-1. PT250 Predefined Function Key Code Sequences

Key	Unaugmented	Shift	Control	Control-Shift
	Esc [A	(note 1)	(note 1)	(note 1)
	Esc [B	(note 1)	(note 1)	(note 1)
	Esc [C	(note 1)	(note 1)	(note 1)
	Esc [D	(note 1)	(note 1)	(note 1)
Backspace	Ctrl-H	Ctrl H	DEL/ETI	DELETE
BackTab	Esc [Z	Esc [Z	(note 2)	(note 2)
Clear (note 3)	Esc \$ G	Esc \$ G (locally)	Esc ?	Esc ? (locally)
Delete	Esc [P	Esc [M	(note 1)	(note 1)
Enter -Char. -Block (note 6)	Ctrl-M (CR) Esc S	Ctrl-M (CR) Esc =		
Erase	Esc [X	Esc [K	Esc [O	Esc [J
Help	Esc _ 1 Esc \	Esc _ 2 Esc \	Esc _ 3 Esc \	Esc _ 4 Esc \
Home	Esc \$ A	Esc \$ B	Esc \$ B	Esc \$ B
Insert (note 4)	Esc [4 h Esc [4 l	Esc [4 h Esc [4 l	Esc [4 h Esc [4 l	Esc [4 h Esc [4 l
Menu	Esc _ 0 Esc \	Esc _ 5 Esc \	Esc _ 6 Esc \	Esc _ 7 Esc \
Num Lock (note 4)	Esc [>10 h Esc [>10 l	Esc [>10 h Esc [>10 l	Esc [>10 h Esc [>10 l	Esc [>10 h Esc [>10 l
Pg Dn (Next)	Esc \$ b	(note 1)	(note 1)	(note 1)
Pg Up (Prev)	Esc \$ a	(note 1)	(note 1)	(note 1)
Prt Scn	Esc [0 1	Esc [>1 1	Esc [>2 1	(note 5)

PT250 FUNCTION KEY CODE SEQUENCES

TABLE A 1. PT250 Predefined Function Key Code Sequences (continued)

<i>Key</i>	<i>Unaugmented</i>	<i>Shift</i>	<i>Control</i>	<i>Control-Shift</i>
Scroll Down	Esc [T	(note 1)	(note 1)	(note 1)
Scroll Left	Esc [k	(note 1)	(note 1)	(note 1)
Scroll Lock	(note 1)	(note 1)	(note 1)	(note 1)
Scroll Right	Esc [j	(note 1)	(note 1)	(note 1)
Scroll Up	Esc [S	(note 1)	(note 1)	(note 1)
Stop (note 3)	Ctrl-S Ctrl-Q (note 4)	(note 2)	(note 2)	Esc c
Tab	Ctrl I	Ctrl I	(note 2)	(note 2)





Notes

1. Generates a Single Shift Two (SS2) sequence. See Table A-2.
2. Generates a Single Shift Three (SS3) sequence. See Table A-3.
3. Char Set/Stop sends Ctrl-P (Break). Char Set/ Ctrl/Clear resets the hardware.
4. The unaugmented Stop key alternately sends a Ctrl-S and Ctrl-Q sequence. Num Lock and Insert alternately set and reset Numeric/Function Keypad mode and Insertion/Replacement mode respectively.
5. Ctrl/Shift/Prt Scn alternately displays status and system lines.

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6. If DSC mode is set, the keyboard is soft locked and Insertion/Replacement is reset after an Esc S (Set Transmit State) or Esc = (Set Page Dump) sequence is generated.

TABLE A-2. Single Shift Two Code Sequences

Key	Unaugmented	Shift	Control	Control-Shift
PA1	!	%)	-
PA2	"	&	*	.
PA3	#	'	+	/
PA4	\$	(	,	0
Scroll Lock	1 (note 1)	2	3	4
Unlabeled	5 (note 1)	6	7	8
Large Unlabeled	9	:	;	<
Scroll Up	---	=	>	?
Scroll Down	---	@	A	B
Scroll Left	---	C	D	L
Scroll Right	---	F	G	H
	---	I	J	K
	---	L	M	N
	---	O	P	Q
	---	R	S	T
Cancel	U	V	W	X
Delete	---	---	Y	Z
Pg Dn (Next)	---	^	_	'
Pg Up (Prev)	---	[\]
End/Begin	---	---	a	b
Enter	c	d	e	f
(note 2)				

Notes

1. Works only when DSC mode is set. If DSC mode is set, the unaugmented Scroll Lock key generates an Esc \$ d (DSC DUP) sequence.
2. Works only when E2 mode is set.

PT250 FUNCTION KEY CODE SEQUENCES

A horizontal line (----) indicates that the keystroke does not generate a Single Shift Two sequence.

The code sequence each Single Shift Two key transmits begins with Esc N. If Function Termination mode is set and the terminal is in Character mode, this code sequence concludes with a carriage return. For example, if Function Termination mode is reset, function key PA1 transmits:

Esc N !

If Function Termination mode is set, it transmits:

Esc N ! CR

Note that each function key may be struck unaugmented or in combination with the Shift, Ctrl, and Shift-Ctrl keys.

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TABLE A-3. Single Shift Three Code Sequences

Key	Unaugmented	Shift	Control	Control-Shift
F1	!	)	1	9
F2	"	*	2	:
F3	#	+	3	;
F4	\$	,	4	<
F5	%	-	5	=
F6	&	.	6	>
F7	'	/	7	?
F8	(	0	8	@
F9	M	[	i	w
F10	N	\	j	x
PF1	A	O	]	k
PF2	B	P	^	l
PF3	C	Q	_	m
PF4	D	R	'	n
PF5	E	S	a	o
PF6	F	T	b	p
PF7	G	U	c	q
PF8	H	V	d	r
PF9	I	W	e	s
PF10	J	X	f	t
PF11	K	Y	g	u
PF12	L	Z	h	v
Stop	---	y	z	---
Set Up	----	}	~	----
		(note 1)	(note 1)	
BackTab	---	---	{	{
Tab	----	----	|	|

PT250 FUNCTION KEY CODE SEQUENCES

Note

1. Works only when DSC mode is set.

A horizontal line (- -) indicates that the keystroke does not generate a Single Shift Three sequence.

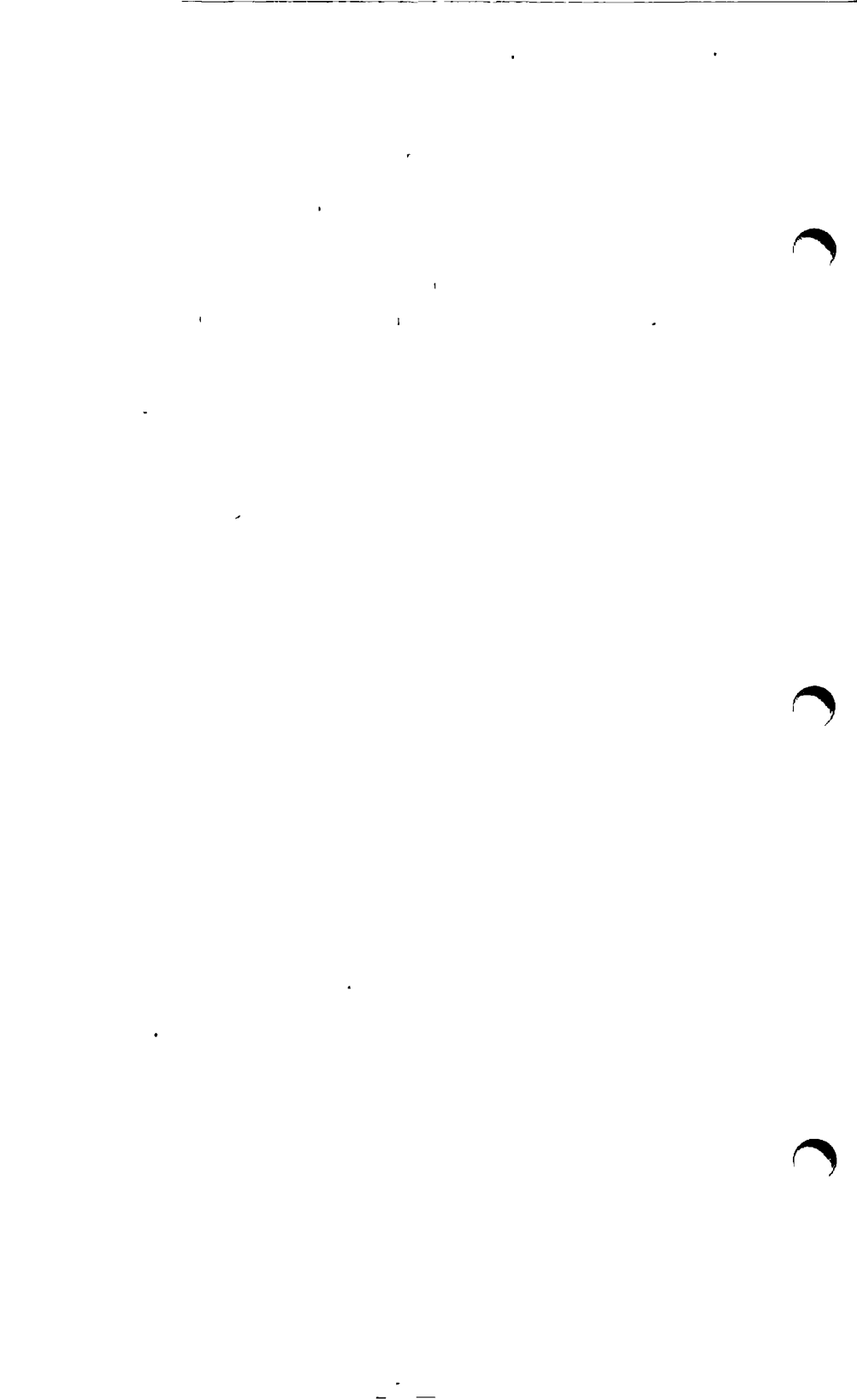
The code each Single Shift Three key transmits begins with Esc O. If Function Termination mode is set and the terminal is in Character mode, this code sequence concludes with a carriage return. For example, if Function Termination mode is reset, function key F1 transmits:

Esc O ' |

If Function Termination mode is set, it transmits:

Esc O ' | CR

Note that each function key may be struck unaugmented or in combination with the Shift, Ctrl, and Shift-Ctrl keys.



B

COMMAND LISTINGS

Tables B-1, B-2, and B-3 use the following command argument conventions:

- arg** Represents a number that will become part of the command. If an argument has a special meaning, the argument's meaning is also presented.
- ch** Represents a character that will become part of the command.

Table B-1 lists all PT250 commands by their command name. Table B-2 lists them in order of their escape sequences. Table B-3 lists the commands by function.

An asterisk (*) indicates that the listing is a DSC command.

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TABLE B-1. Alphabetical Table of PT250 Commands

Command

Escape Sequence

Application Program Command (APC)	Lsc _ arg Lsc \
arg = 0 Menu	
1 Help	
2 Shift/Help	
3 Ctrl/Help	
4 Ctrl/Shift/Help	
5 Shift/Menu	
6 Ctrl/Menu	
7 Ctrl/Shift/Menu	
Auto Line Feed Mode Reset	Esc [>1 l
Auto Line Feed Mode Set	Lsc [>1 h
Blank Screen (BSCN)	Esc \$ E
Block Mode Set	Esc [~2 h
Change Visual Attributes of Area (CVA)	Esc [arg p
arg = 0 Active position to end of area	
1 Start of area to active position	
2 All of area	
Change Visual Attributes of Character (CVC)	Esc [arg q
Change Visual Attributes of Display (CVD)	Esc [arg r
arg = 0 Active position to end of display	
1 Start of display to active position	
2 All of display	
Change Visual Attributes of Line (CVL)	Esc [arg t
arg = 0 Active position to end of line	
1 Start of line to active position	
2 All of line	
Character/Block Mode Reset	Esc [~2 l
Character/Block Mode Set	Esc [~2 h
Clear Screen (CS)	Esc ?
Clear (Reset) Selected Areas (CSA)	Esc \$ k
Compressed Cursor Position (CCP)	Lsc 0 ch ch
Compressed Logical Area (CLAR)	Esc 3 ch
Compressed Logical Attributes (CLAT)	Esc 1 ch ch ch ch
Compressed Visual Area (CVAR)	Esc 4 ch
Compressed Visual Attributes (CVAT)	Lsc 2 ch ch ch ch
Control Sequence Introducer (CSI)	Esc [
Cursor Absolute Home (CAH)	Lsc \$ B
Cursor Backward (CUB)	Esc [arg D
Cursor Backward Tabulation (CBT)	Esc [arg Z
Cursor Down (CUD)	Lsc [arg B
Cursor Forward (CUF)	Fsc [arg C
Cursor Horizontal Absolute (CHA)	Esc [arg G
Cursor Horizontal Tabulation (CHT)	Fsc [arg I
Cursor Next Line (CN)	Lsc [arg I
Cursor Position (CUP)	Esc [arg1,arg2 H
Cursor Position Report (CPR)	Fsc [arg1,arg2 R
Cursor Preceding Line (CPL)	Esc [arg F
Cursor Relative Home (CRH)	Esc \$ A
* Cursor Select (CUS)	Lsc \$ f
* Cursor Select Functionality (CSF)	Esc \$ e
Cursor Tabulation Control (CTC)	Fsc [arg W

COMMAND LISTINGS

*TABLE B-1. Alphabetical Table of PT250 Commands
(continued)*

<i>Command</i>	<i>Escape Sequence</i>
arg = 0 Set tab at current position	
2 Clear tab at current position	
5 Clear all tab stops	
Cursor Up (CUU)	Esc [arg A
Define Area Qualification (DAQ)	Esc [args o
arg = 2 All printing characters	
3 Numeric characters	
4 Alphabetic characters	
5 Right-justify in area	
>0 Protected accept no input (default)	
>1 Must enter the area	
>2 Must fill the whole area	
>3 Set modified data tag	
Define Logical Attributes (DLA)	Esc [args v
arg = 2 All printing characters	
3 Numeric characters	
4 Alphabetic characters	
5 Right-justify an area	
>0 Protected accept no input (default)	
>1 Must enter the area	
>2 Must fill the whole area	
>3 Set modified data tag	
Delete Character (DCH)	Lsc [arg P
Delete Line (DL)	Esc [arg M
Device Attributes (DA)	Esc [arg c
Device Control String (DCS)	Esc P string Esc \
Device Status Report (DSR)	Lsc [arg n
arg = 0 Ready	
5 Report Status	
6 Report Cursor Position	
Disable Manual Input (DMI)	Esc ^
Display Error Message (DEM)	Esc string Esc \
Display Revision (DJS)	Esc \$ Z
DOS Merge Mode Reset	Esc [25 I
DOS Merge Mode Set	Esc [25 H
* DSC DUP Function (DUP)	Esc \$ d
* DSC Mode Reset	Esc [>20 I
* DSC Mode Set	Esc [>20 H
Dump Block Data (DBD)	Lsc 6
E2 Mode Reset	Esc [21 I
F2 Mode Set	Esc [>21 H
Enable Manual Input (IMI)	Esc b
* Fnd DSC Data (FDD)	Lsc \$ 5
Fnd Logical Attributes (ELA)	Esc \$ M
Fnd of Protected Area (EPA)	Esc W
Fnd of Selected Area (FSA)	Esc G
Frasc Character (ECH)	Esc [arg X
Frasc in Area (EA)	Esc [arg O
arg = 0 Active position to end of area	
1 Start of area to active position	
2 All of area	

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TABLE B-1 Alphabetical Table of PT250 Commands
(continued)

Command	Escape Sequence
Fraser in Display (I1)	Esc [arg J
arg = 0 Active position to end of display	
1 Start of display to active position	
2 All of display	
Erase in Line (I1)	Esc [arg k
arg = 0 Active position to end of line	
1 Start of line to active position	
2 All of line	
* Frase Unprotected to Address (FUA)	Esc [arg1,arg2 x
Frasure Mode Set	Esc [6 h
Erasure Mode Reset	Esc [6 l
Escape Key Disable (EKD)	Esc \$ H
Escape Key Enable (EKE)	Esc \$ I
Field Entry Check (FEC)	Esc \$ C
Function Termination Mode Reset	Esc [18 l
Function Termination Mode Set	Esc [~18 h
Hard/Soft Scroll Mode Reset	Esc [5 l
Hard/Soft Scroll Mode Set	Esc [5 h
Horizontal and Vertical Position (HVP)	Esc [arg1,arg2 f
Horizontal Tabulation Set (HTS)	Esc H
* Host Notification of Format Change	Esc \$ c
Host Notification Mode Reset	Esc [16 l
Host Notification Mode Set	Esc [16 h
Index (IND)	Esc D
Insert Character (ICH)	Esc [arg @
* Insert Cursor (INC)	Esc \$ N
Insert Line (IL)	Esc [arg I
Insertion/Replacement Mode Reset	Esc [4 l
Insertion/Replacement Mode Set	Esc [4 h
Line Feed/New Line Mode Reset	Esc [20 l
Line Feed/New Line Mode Set	Esc [20 h
Line Mode	Esc [>4 h
Line Truncate Mode Reset	Esc [9 l
Line Truncate Mode Set	Esc [>9 h
Load Keyboard Table (LKT)	Esc data cksum Esc \
Local Cursor Action Mode Reset	Esc [>13 l
Local Cursor Action Mode Set	Esc [13 h
Local Print Mode Reset	Esc [24 l
Local Print Mode Set	Esc [24 h
Lock Lines (L1)	Esc [arg1,arg2 u
Logical Attribute Mode Reset	Esc [3 l
Logical Attribute Mode Set	Esc [3 h
Media Copy (MC)	Esc [arg i
arg = 0 Screen print	
4 Turn off copying to auxiliary	
5 Turn on copying to auxiliary	
>0 Transfer area	
>1 Screen transfer	
2 Page dump	
>3 Nontransparent copy	
Modified Mode	Esc [6 h

COMMAND LISTINGS

*TABLE B-1. Alphabetical Table of PT250 Commands
(continued)*

<i>Command</i>	<i>Escape Sequence</i>
* Move Memory Pointer (MMP)	Esc [arg1;arg2 s
Next Line (NEL)	Esc L
Next Page (NP)	Esc [arg U
Non-Erasable Fields in Character Mode Reset	Esc [>23 l
Non-Erasable Fields in Character Mode Set	Esc [>23 h
Null/Space Mode Reset	Esc [>7 l
Null/Space Mode Set	Esc [>7 h
Numeric/Function Keypad Mode Reset	Esc [>10 l
Numeric/Function Keypad Mode Set	Esc [>10 h
One/Two Page Boundary Mode Reset	Esc [>11 l
One/Two Page Boundary Mode Set	Esc [>11 h
Operating System Command (OSC)	Esc] arg Esc \
arg = 0 RIS Notification	
2 Screen Clear Notification	
3 LKT command failed; default table loaded	
4 LKT command successful	
Page Down (PD)	Lsc \$ b
Page Up (PU)	Lsc \$ a
Page/Line Mode Reset	Esc [>4 l
Page/Line Mode Set	Esc [>4 h
PF Keypad Mode	Esc [>10 h
Preceding Page (PP)	Esc [arg V
* Program Tab (PT)	Esc [args 7
Read Cursor Character (RCC)	Esc ;
Repeat (REP)	Esc [arg b
* Repeat to Address (RPA)	Esc [arg1;arg2 w
Replacement Mode	Esc [4 l
Reset Inhibit Cursor (RIC)	Esc \$ R
Reset Mode (RM)	Esc [args l
Reset Modified Tags (RM1)	Lsc \$ J
Reset to Initial State (RIS)	Esc c
Restore Cursor and Attributes (RCA)	Esc \$ Q
Reverse Index (RI)	Esc M
Save Cursor and Attributes (SCA)	Esc \$ O
Screen Wrap Mode Reset	Esc [>8 l
Screen Wrap Mode Set	Esc [>8 h
Scroll Down (SD)	Esc [arg T
Scroll Inhibit Reset (SIR)	Esc \$ W
Scroll Inhibit Set (SIS)	Esc \$ X
Scroll Up (SU)	Esc [arg S
Select Editing Extent Mode (SEM)	Esc [arg Q
arg = 0 Fdit in display	
1 Edit in line	
3 Edit in area	
Select Graphic Rendition (SGR)	Esc [args m
arg = 0 Normal video	
2 Low intensity	
4 Underscore	
5 Blink	
7 Reverse image	
>1 Strike-through	

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TABLE B-1. Alphabetical Table of PT250 Commands
(continued)

<i>Command</i>	<i>Escape Sequence</i>
2 Invisible	
3 Line drawing graphics	
4 Block drawing graphics	
Selected Area Transfer Mode Reset	Esc [17 l
Selected Area Transfer Mode Set	Lsc [17 h
Selective Data Trap Mode Reset	Lsc [14 l
Selective Data Trap Mode Set	Lsc [14 h
Send Block Data (SBD)	Esc 5
Send/Receive Mode Reset	Esc [12 l
Send/Receive Mode Set	Esc [12 h
Send Tabs Mode Reset	Esc [>17 l
Send Tabs Mode Set	Esc [>17 h
* Set Attribute (SA)	Esc 8 ch
Set Display Size (SDS)	Esc [arg N
arg = 1 80 x 24	
2 80 x 48	
3 132 x 27	
4 80 x 25	
Set G0 Alternate (SGOF)	Esc \$ 2
Set G0 ASCII (SGOA)	Esc \$ 0
Set G1 Alternate (SG11)	Lsc \$ 3
Set G1 ASCII (SG1A)	Esc \$ 1
Set Inhibit Cursor (SIC)	Lsc \$ 5
Set Mode (SM)	Esc [args h
Set Page Dump (SPD)	Esc =
* Set Row Number (SRN)	Esc [arg Y
Set Transmit State (SIS)	Esc S
Single Shift Three (SS3)	Esc O ch
Single Shift Two (SS2)	Esc N ch
Soft Keyboard Lock (SKL)	Esc \$ F
Soft Keyboard Unlock (SKU)	Esc \$ G
Soft Lock Option Mode Reset	Lsc [>19 l
Soft Lock Option Mode Set	Esc [>19 h
* Start DSC Data (SDD)	Esc \$ 4
Start Logical Attributes (SLA)	Lsc \$ L
Start of Protected Area (SPA)	Esc V
Start of Selected Area (SSA)	Esc F
String Terminator (ST)	Esc \
System Line Display (SLD)	Esc \$ U
System Line Reset (SLR)	Lsc \$ T
System Line Set (SLS)	Esc \$ V
Transparent Data Mode Reset	Esc [15 l
Transparent Data Mode Set	Esc [15 h
Unblank Screen (UBS)	Lsc \$ P
Unlock Lines (UL)	Esc [arg1,arg2 y
Unprotected/Modified Mode Reset	Esc [>6 l
Unprotected/Modified Mode Set	Esc [>6 h
Vertical Position Absolute (VPA)	Esc [arg d
Visual Attribute Lock Mode Reset	Esc [>12 l
Visual Attribute Lock Mode Set	Esc [>12 h

COMMAND LISTINGS

TABLE B 2 *PT250 Commands by Escape Sequence*

<i>Escape Sequence</i>	<i>Command</i>
Esc S 0	Set G0 ASCII
Esc S 1	Set G1 ASCII
Esc S 2	Set G0 Alternate Set
Esc S 3	Set G1 Alternate Set
* Esc S 4	Start DSC Data
* Esc S 5	End DSC Data
Esc S A	Cursor Relative Home
Esc S B	Cursor Absolute Home
Esc S C	Field Entry Check
Esc S I	Blank Screen
Esc S F	Soft Keyboard Lock
Esc S G	Soft Keyboard Unlock
Esc S H	Escape Key Disable
Esc S I	Escape Key Enable
Esc S J	Reset Modified Tags
Esc S K	Clear Selected Areas
Esc S L	Start Logical Attributes
Esc S M	End Logical Attributes
* Esc S N	Insert Cursor
Esc S O	Save Cursor and Attributes
Esc S P	Unblank Screen
Esc S Q	Restore Cursor and Attributes
Esc S R	Reset Inhibit Cursor
Esc S S	Set Inhibit Cursor
Esc S T	System Line Reset
Esc S U	System Line Display
Esc S V	System Line Set
Esc S W	Scroll Inhibit Reset
Esc S X	Scroll Inhibit Set
Esc S Z	Display Revision
Esc S a	Page Up
Esc S b	Page Down
* Esc S c	Host Notification of Format Change
* Esc S d	DSC DUP Function
* Esc S e	Cursor Select Functionality
* Esc S f	Cursor Select
Esc 0 ch ch	Compressed Cursor Position
Esc 1 ch ch ch ch	Compressed Logical Attributes
Esc 2 ch ch ch ch	Compressed Visual Attributes
Esc 3 ch	Compressed Logical Area
Esc 4 ch	Compressed Visual Area
Esc 5	Send Block Data
Esc 6	Dump Block Data
* Esc 8 ch	Set Attribute
Esc string Esc \	Display Error Message
Esc ,	Read Cursor Character
Esc =	Set Page Dump
Esc ?	Clear Screen
Esc b	Enable Manual Input
Esc c	Reset to Initial State
Esc D	Index

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TABLE B-2. PT250 Commands by Escape Sequence
(continued)

Escape Sequence Command

Esc E	Next Line
Esc F	Start of Selected Area
Esc G	End of Selected Area
Esc H	Horizontal Tabulation Set
Esc M	Reverse Index
Esc N ch	Single Shift Two
Esc O ch	Single Shift Three
Esc P string Esc \	Device Control String
Esc S	Set Transmit State
Esc V	Start of Protected Area
Esc W	End of Protected Area
Esc [	Control Sequence Introducer
Esc [arg	@ Insert Character
Esc [arg	A Cursor Up
Esc [arg	B Cursor Down
Esc [arg	C Cursor Forward
Esc [arg	D Cursor Backward
Esc [arg	E Cursor Next Line
Esc [arg	F Cursor Preceding Line
Esc [arg	G Cursor Horizontal Absolute
Esc [arg1;arg2	H Cursor Position
Esc [arg	I Cursor Horizontal Tabulation
Esc [arg	J Erase in Display
0	Active position to end of display
1	Start of display to active position
2	All of display
Esc [arg	K Erase in Line
0	Active position to end of line
1	Start of line to active position
2	All of line
Esc [arg	L Insert Line
Esc [arg	M Delete Line
Esc [arg	N Set Display Size
1	80 x 24
2	80 x 48
3	132 x 27
4	80 x 25
Esc [arg	O Erase in Area
0	Active position to end of area
1	Start of area to active position
2	All of area
Esc [arg	P Delete Character
Esc [arg	Q Select Editing Extent Mode
0	Edit in display
1	Edit in line
3	Edit in area
Esc [arg1;arg2	R Cursor Position Control
Esc [arg	S Scroll Up
Esc [arg	T Scroll Down
Esc [arg	U Next Page
Esc [arg	V Preceding Page

COMMAND LISTINGS

TABLE B-2 PT250 Commands by Escape Sequence
(continued)

Escape Sequence	Command
Esc [arg	W Cursor Tabulation Control
0	Set tab at current position
2	Clear tab at current position
5	Clear all tab stops
Esc [arg	X Frase Character
* Esc [arg	Y Set Row Number
Esc [arg	Z Cursor Backward Tabulation
Esc [arg	b Repeat
Esc [arg	c Device Attributes
Esc [arg	d Vertical Position Absolute
Esc [arg1,arg2	f Horizontal and Vertical Position
Esc [arg	h Set Mode
4	Insertion/Replacement Mode Set
6	Frasure Mode Set
12	Send/Receive Mode Set
17	Selected Area Transfer Mode Set
20	Line Feed/New Line Mode Set
>1	Auto Line Feed Mode Set
2	Character/Block Mode Set
>3	Logical Attribute Mode Set
4	Page/Line Mode Set
5	Hard/Soft Scroll Mode Set
>6	Unprotected/Modified Mode Set
>7	Null/Space Mode Set
8	Screen Wrap Mode Set
>9	Line Truncate Mode Set
>10	Numeric/Function Keypad Mode Set
>11	One/Two Page Boundary Mode Set
>12	Visual Attribute Lock Mode Set
>13	Local Cursor Action Mode Set
14	Selective Data Trap Mode Set
>15	Transparent Data Mode Set
>16	Host Notification Mode Set
>17	Send Tabs Mode Set
>18	Function Termination Mode Set
>19	Soft Lock Option Mode Set
* >20	DSC Mode Set
>21	E2 Mode Set
>23	Non-Erasable Fields in Character Mode Set
>24	Local Print Mode Set
>25	DOS Merge Mode Set
Esc [arg	i Media Copy
0	Screen print
4	Turn off copying to auxiliary
5	Turn on copying to auxiliary
>0	Transfer area
>1	Screen transfer
>2	Page dump
>3	Nontransparent copy
Esc [arg	l Reset Mode
4	Insertion/Replacement Mode Reset

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TABLE B-2. PT250 Commands by Escape Sequence
(continued)

Escape Sequence	Command
6	Erase Mode Reset
12	Send/Receive Mode Reset
17	Selected Area Transfer Mode Reset
20	Line Feed/New Line Mode Reset
>1	Auto Line Feed Mode Reset
>2	Character/Block Mode Reset
>3	Logical Attribute Mode Reset
>4	Page/Line Mode Reset
>5	Hard/Soft Scroll Mode Reset
>6	Unprotected/Modified Mode Reset
>7	Null/Space Mode Reset
>8	Screen Wrap Mode Reset
>9	Line Truncate Mode Reset
>10	Numeric/Function Keypad Mode Reset
>11	One/Two Page Boundary Mode Reset
>12	Visual Attribute Lock Mode Reset
>13	Local Cursor Action Mode Reset
>14	Selective Data Trap Mode Reset
>15	Transparent Data Mode Reset
>16	Host Notification Mode Reset
>17	Send Tabs Mode Reset
>18	Function Termination Mode Reset
>19	Soft Lock Option Mode Reset
* >20	DSC Mode Reset
>21	E2 Mode Reset
>23	Non Frangible Fields in Character Mode Reset
>24	Local Print Mode Reset
>25	DOS Merge Mode Reset
Esc [args	m Select Graphic Rendition
0	Normal video
2	Low intensity
4	Underline
5	Blink
7	Reverse video
>1	Strike-through
>2	Invisible
3	Line drawing graphics
4	Block drawing graphics
Lsc [arg	n Device Status Report
0	Ready
5	Report status
6	Report cursor position
Lsc [arg	o Define Area Qualification
2	All printing characters
3	Numeric characters
4	Alphabetic characters
5	Right-justify in area
>0	Protected, accept no input
1	Must enter the area
>2	Must fill the whole area
>3	Set modified data tag

TABLE B-2. PT250 Commands by Escape Sequence
(continued)

<i>Escape Sequence</i>	<i>Command</i>
<code>Esc [arg</code>	<code>p</code> Change Visual Attribute of Area
0	Active position to end of area
1	Start of area to active position
2	All of area
<code>Esc [arg</code>	<code>q</code> Change Visual Attribute of Character
<code>Esc [arg</code>	<code>r</code> Change Visual Attribute of Display
0	Active position to end of display
1	Start of display to active position
2	All of display
* <code>Esc [arg1,arg2</code>	<code>s</code> Move Memory Pointer
<code>Esc [arg</code>	<code>t</code> Change Visual Attribute of Line
0	Active position to end of line
1	Start of line to active position
2	All of line
<code>Esc [arg1,arg2</code>	<code>u</code> Lock Lines
<code>Esc [arg</code>	<code>v</code> Define Logical Attributes
2	All printing characters
3	Numeric characters
4	Alphabetic characters
5	Right-justify in area
>0	Do not accept input (default)
>1	Must enter the area
>2	Must fill the whole area
>3	Set modified data tag
* <code>Esc [arg1;arg2</code>	<code>w</code> Repeat to Address
* <code>Esc [arg1,arg2</code>	<code>x</code> Erase Unprotected to Address
<code>Esc [arg1,arg2</code>	<code>y</code> Unlock Lines
* <code>Esc [arg</code>	<code>z</code> Program Tab
<code>Esc \</code>	String Terminator
<code>Esc] arg Esc \</code>	Operating System Command
0	RIS Notification
2	Screen Clear Notification
3	LKT failed, default table loaded
4	LKT command successful
<code>Esc _ arg Esc \</code>	Application Program Command
0	Menu
1	Help
2	Shift/Help
3	Ctrl Help
4	Ctrl Shift/Help
5	Shift/Menu
6	Ctrl Menu
7	Ctrl Shift/Menu
<code>Esc < data cksum Esc</code>	Load Keyboard Table
<code>Esc *</code>	Disable Manual Input

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TABLE B-3. PT250 Commands by Function

<i>Command</i>	<i>F-escape Sequence</i>
Area and Logical Attribute Commands	
Define Area Qualification (DAQ)	Esc [args o
arg = 2 All printing characters	
3 Numeric characters	
4 Alphabetic characters	
5 Right justify in area	
>0 Protected, accept no input (default)	
1 Must enter the area	
2 Must fill the whole area	
3 Set modified data tag	
Start of Protected Area (SPA)	Esc V
End of Protected Area (FPA)	Esc W
Start of Selected Area (SSA)	Esc F
End of Selected Area (FSA)	Esc G
Clear (Reset) Selected Areas (CSA)	Esc \$ K
Define Logical Attributes (DLA)	Esc [args v
arg = 2 All printing characters	
3 Numeric characters	
4 Alphabetic characters	
5 Right justify an area	
>0 Protected, accept no input (default)	
>1 Must enter the area	
>2 Must fill the whole area	
3 Set modified data tag	
Start Logical Attributes (SLA)	Esc \$ I
End Logical Attributes (ELA)	Esc \$ M
Field Entry Check (IEC)	Esc \$ C
Reset Modified Tags (RMT)	Esc \$ J
Character Set Commands	
Set G0 Alternate (SGOF)	Esc \$ 2
Set G0 ASCII (SGOA)	Esc \$ 0
Set G1 Alternate (SGIE)	Esc \$ 3
Set G1 ASCII (SGIA)	Esc \$ 1
Set Inhibit Cursor (SIC)	Esc \$ 5
Compressed Commands	
Compressed Cursor Position (CCP)	Esc 0 ch ch
Compressed Logical Area (CLAR)	Esc 3 ch
Compressed Logical Attributes (CLAI)	Esc 1 ch ch ch ch
Compressed Visual Area (CVAR)	Esc 4 ch
Compressed Visual Attributes (CVAT)	Esc 2 ch ch ch ch
Cursor Control Commands	
Cursor Absolute Home (CAH)	Esc \$ B
Cursor Backward (CUB)	Esc [arg D
Cursor Backward Tabulation (CBT)	Esc [arg Z
Cursor Down (CUD)	Esc [arg B
Cursor Forward (CUF)	Esc [arg C

COMMAND LISTINGS

*TABLE B-3. PT250 Commands by Function
(continued)*

<i>Command</i>	<i>Escape Sequence</i>
Cursor Horizontal Absolute (CHA)	Esc [arg G
Cursor Horizontal Tabulation (CH1)	Esc [arg I
Cursor Next Line (CN)	Esc [arg F
Cursor Position (CUP)	Esc [arg1,arg2 H
Cursor Position Report (CPR)	Esc [arg1,arg2 R
Cursor Preceding Line (CPL)	Esc [arg F
Cursor Relative Home (CRH)	Esc \$ A
Cursor Tabulation Control (CIC)	Esc [arg W
arg = 0 Set tab at current position	
2 Clear tab at current position	
5 Clear all tab stops	
Cursor Up (CUU)	Lsc [arg A
Index (IND)	Lsc D
Next Line (NLL)	Lsc L
Reverse Index (RI)	Esc M
Vertical Position Absolute (VPA)	Esc [arg d
Horizontal and Vertical Position (HVP)	Esc [arg1,arg2 f
Read Cursor Character (RCC)	Esc ,
Save Cursor and Attributes (SCA)	Esc \$ O
Restore Cursor and Attributes (RCA)	Esc \$ Q
Reset Inhibit Cursor (RIC)	Esc \$ R
Set Inhibit Cursor (SIC)	Esc \$ S
Horizontal Tabulation Set (HIS)	Esc H
 Data Stream Compatibility (DSC) Commands	
*Start DSC Data (SDD)	Esc \$ 4
*End DSC Data (LDD)	Esc \$ 5
*Set Attribute (SA)	Esc 8 ch
*Repeat to Address (RPA)	Lsc [arg1,arg2 w
*Program Tab (PT)	Esc [args z
*Insert Cursor (INC)	Esc \$ N
*Cursor Select (CUS)	Esc \$ f
*Cursor Select Functionality (CSF)	Lsc \$ e
*Move Memory Pointer (MMP)	Esc [arg1,arg2 s
*Frse Unprotected to Address (LUA)	Fsc [arg1,arg2 x
*Set Row Number (SRN)	Esc [arg Y
*DSC DLP Function (DLP)	Esc \$ d
*Host Notification of Format Change	Esc \$ c
 Device State Commands	
Device Attributes (DA)	Esc [arg c
Device Control String (DCS)	Esc P string Esc \
Device Status Report (DSR)	Esc [arg n
arg = 0 Ready	
5 Report Status	
6 Report Cursor Position	
Operating System Command (OSC)	Esc] arg Esc \
arg = 0 RIS Notification	
2 Screen Clear Notification	

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TABLE B-3. PT250 Commands by Function
(continued)

Command	Escape Sequence
3 IKT command failed; default table loaded	
4 IKT command successful	
Reset to Initial State (RIS)	Esc c
Display Revision (DIS)	Esc \$ Z
Display Control Commands	
Blank Screen (BSCN)	Esc \$ I
Unblank Screen (UBS)	Esc \$ P
Clear Screen (CS)	Esc ?
Lock Lines (LL)	Esc [arg1,arg2 u
Unlock Lines (UL)	Esc [arg1,arg2 v
Set Display Size (SDS)	Esc [arg N
arg = 1 80 x 24	
2 80 x 48	
3 132 x 27	
4 80 x 25	
Select Editing Extent Mode (SELM)	Esc [arg Q
arg = 0 Fdit in display	
1 Ldit in line	
3 Fdit in area	
Repeat (RIP)	Esc [arg b
Erase and Delete Commands	
Delete Character (DCH)	Esc [arg P
Delete Line (DL)	Esc [arg M
Erase Character (ECH)	Esc [arg X
Erase in Area (EA)	Esc [arg O
arg = 0 Active position to end of area	
1 Start of area to active position	
2 All of area	
Erase in Display (ED)	Esc [arg J
arg = 0 Active position to end of display	
1 Start of display to active position	
2 All of display	
Erase in Line (EL)	Esc [arg K
arg = 0 Active position to end of line	
1 Start of line to active position	
2 All of line	
Insert Commands	
Insert Character (ICH)	Esc [arg @
Insert Line (IL)	Esc [arg I
I/O Commands	
Set Transmit State (STS)	Esc S
Set Page Dump (SPD)	Esc =
Dump Block Data (DBD)	Esc 6
Send Block Data (SBD)	Esc 5

COMMAND LISTINGS

*TABLE B-3. PT250 Commands by Function
(continued)*

<i>Command</i>	<i>Escape Sequence</i>
----------------	------------------------

Media Copy (MC)	Esc [arg 1
arg = 0 Screen print	
4 Turn off copying to auxiliary	
5 Turn on copying to auxiliary	
>0 Transfer area	
1 Screen transfer	
2 Page dump	
3 Nontransparent copy	

Keyboard Commands

Disable Manual Input (DMI)	Esc ^
Enable Manual Input (EMI)	Esc b
Escape Key Disable (FKD)	Esc \$ H
Escape Key Enable (FKF)	Esc \$ I
Soft Keyboard Lock (SKL)	Esc \$ I
Soft Keyboard Unlock (SKU)	Esc \$ G
Application Program Command (APC)	Esc _ arg Esc \
arg = 0 Menu	
1 Help	
2 Shift/Help	
3 Ctrl/Help	
4 Ctrl/Shift/Help	
5 Shift/Menu	
6 Ctrl/Menu	
7 Ctrl/Shift/Menu	
Single Shift Three (SS3)	Esc O ch
Single Shift Two (SS2)	Esc N ch
Load keyboard table (LKT)	Esc data cksum Esc \

Mode Commands

Auto Line Feed Mode Reset	Esc [1 l
Auto Line Feed Mode Set	Esc [1 h
Character/Block Mode Reset	Esc [2 l
Character/Block Mode Set	Esc [2 h
DOS Merge Mode Reset	Esc [25 l
DOS Merge Mode Set	Esc [>25 h
* DSC Mode Reset	Esc [20 l
* DSC Mode Set	Esc [20 h
E2 Mode Reset	Esc [>21 l
F2 Mode Set	Esc [21 h
Erasure Mode Set	Esc [6 h
Erasure Mode Reset	Esc [6 l
Function Termination Mode Reset	Esc [18 l
Function Termination Mode Set	Esc [18 h
Hard/Soft Scroll Mode Reset	Esc [5 l
Hard/Soft Scroll Mode Set	Esc [5 h
Host Notification Mode Reset	Esc [16 l
Host Notification Mode Set	Esc [16 h
Insertion/Replacement Mode Reset	Esc [4 l
Insertion/Replacement Mode Set	Esc [4 h

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TABLE B-3. PT250 Commands by Function
(continued)

<i>Command</i>	<i>Escape Sequence</i>
Line Feed/New Line Mode Reset	Esc [20 l
Line Feed/New Line Mode Set	Lsc [20 h
Line Truncate Mode Reset	Lsc [9 l
Line Truncate Mode Set	Lsc [9 h
Local Cursor Action Mode Reset	Lsc [13 l
Local Cursor Action Mode Set	Lsc [13 h
Local Print Mode Reset	Esc [24 l
Local Print Mode Set	Lsc [>24 h
Logical Attribute Mode Reset	Esc [3 l
Logical Attribute Mode Set	Esc [3 h
Non-Erasable Fields in Character Mode Reset	Esc [>23 l
Non-Erasable Fields in Character Mode Set	Esc [23 h
Null/Space Mode Reset	Esc [>7 l
Null/Space Mode Set	Esc [>7 h
Numeric/Function Keypad Mode Reset	Lsc [>10 l
Numeric/Function Keypad Mode Set	Lsc [10 h
One/Two Page Boundary Mode Reset	Esc [>11 l
One/Two Page Boundary Mode Set	Lsc [>11 h
Page/Line Mode Reset	Esc [>4 l
Page/Line Mode Set	Lsc [4 h
Screen Wrap Mode Reset	Esc [>8 l
Screen Wrap Mode Set	Lsc [>8 h
Selected Area Transfer Mode Reset	Lsc [17 l
Selected Area Transfer Mode Set	Lsc [17 h
Selective Data Trap Mode Reset	Esc [>14 l
Selective Data Trap Mode Set	Lsc [>14 h
Send/Receive Mode Reset	Lsc [12 l
Send/Receive Mode Set	Esc [12 h
Send Tabs Mode Reset	Esc [>17 l
Send Tabs Mode Set	Lsc [17 h
Soft Lock Option Mode Reset	Esc [19 l
Soft Lock Option Mode Set	Lsc [>19 h
Transparent Data Mode Reset	Lsc [>15 l
Transparent Data Mode Set	Lsc [>15 h
Unprotected/Modified Mode Reset	Esc [>6 l
Unprotected/Modified Mode Set	Esc [>6 h
Visual Attribute Lock Mode Reset	Lsc [12 l
Visual Attribute Lock Mode Set	Lsc [12 h
Scrolling Commands	
Scroll Down (SD)	Esc [arg l
Scroll Inhibit Reset (SIR)	Esc \$ W
Scroll Inhibit Set (SIS)	Lsc \$ \
Scroll Up (SU)	Lsc [arg S
Page Up (PU)	Esc \$ a
Page Down (PD)	Lsc \$ b
Next Page (NP)	Lsc [arg U
Preceding Page (PP)	Lsc [arg \

COMMAND LISTINGS

TABLE B-3. PT250 Commands by Function (continued)

<i>Command</i>	<i>Escape Sequence</i>
Status and System Line Commands	
System Line Reset (SLR)	Esc S T
System Line Set (SLS)	Esc S V
System Line Display (SLD)	Esc S U
Display Error Message (DFM)	Esc string Esc \
Visual Attribute Commands	
Change Visual Attributes of Area (CVA)	Lsc [arg p
arg = 0 Active position to end of area	
1 Start of area to active position	
2 All of area	
Change Visual Attributes of Character (CVC)	Esc [arg q
Change Visual Attributes of Display (CVD)	Esc [arg r
arg = 0 Active position to end of display	
1 Start of display to active position	
2 All of display	
Change Visual Attributes of Line (CVL)	Esc [arg t
arg = 0 Active position to end of line	
1 Start of line to active position	
2 All of line	
Select Graphic Rendition (SGR)	Esc [args m
arg = 0 Normal video	
2 Low intensity	
4 Underscore	
5 Blink	
7 Reverse image	
-1 Strike through	
2 Invisible	
-3 Line drawing graphics	
-4 Block drawing graphics	



C

CHARACTER SETS

The PT250 terminal contains two character sets: Standard and Alternate. Each character set contains 256 characters. The low half of each character set, character codes 00 through 7F Hex, contains the standard ASCII characters. The upper half of each set, codes 80 through FF, contains a set of additional PT250 characters. (See Tables C-1 and C-3.)

The number of characters that can be accessed within each set depends on the operating environment. There are two operating environments: 7-bit (high-bit used as a parity bit) and 8-bit (no parity bit used).

In the 8-bit operating environment, the Standard and Alternate character sets are identical. All 256 characters can be accessed from either the Standard or the Alternate set.

In the 7-bit operating environment, only the low half (codes 00 through 7F Hex) of either the Standard or Alternate set can be accessed. However, in the 7-bit operating environment, the upper half of the Alternate character set (that is, character codes 80 through FF Hex) is copied into the low half of the Alternate character set.

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This allows accessing of all 256 characters when in the 7-bit environment by switching from the Standard to the Alternate character set using Shift Out (Hex 0E) and Shift In (Hex 0F) characters.

Table C-1 shows the full, 256-character set along with numerical equivalents for each character. Table C-2 shows bit patterns for the low half of the PT250 character set, and Table C-3 shows bit patterns for the upper half of the character set.

Note that in Table C-1 the ^ character represents the Ctrl key, except in the case of ^^ which is the Ctrl key plus the caret (^) key.

CHARACTER SETS

TABLE C-1. Numerical Equivalents to PT250 Characters

Standard Characters					Alternate Characters			
Dec	Oct	Hex	Char	Name	Dec	Oct	Hex	Char
0	0	00	^@	NUL	128	200	80	
1	1	01	^A	SOH	129	201	81	
2	2	02	^B	STX	130	202	82	
3	3	03	^C	ETX	131	203	83	
4	4	04	^D	EOT	132	204	84	
5	5	05	^E	ENQ	133	205	85	
6	6	06	^F	ACK	134	206	86	
7	7	07	^G	BEL	135	207	87	
8	10	08	^H	BS	136	210	88	
9	11	09	^I	HT	137	211	89	
10	12	0A	^J	LF	138	212	8A	
11	13	0B	^K	VT	139	213	8B	
12	14	0C	^L	FF	140	214	8C	
13	15	0D	^M	CR	141	215	8D	
14	16	0E	^N	SO	142	216	8E	
15	17	0F	^O	SI	143	217	8F	
16	20	10	^P	DLE	144	220	90	
17	21	11	^Q	DC1	145	221	91	
18	22	12	^R	DC2	146	222	92	
19	23	13	^S	DC3	147	223	93	
20	24	14	^T	DC4	148	224	94	
21	25	15	^U	NAK	149	225	95	
22	26	16	^V	SYN	150	226	96	
23	27	17	^W	ETB	151	227	97	
24	30	18	^X	CAN	152	230	98	
25	31	19	^Y	EM	153	231	99	
26	32	1A	^Z	SUB	154	232	9A	
27	33	1B	^[	ESC	155	233	9B	
28	34	1C	^\ ^	FS	156	234	9C	
29	35	1D	^] ^	GS	157	235	9D	
30	36	1E	^^	RS	158	236	9E	
31	37	1F	^_ ^	US	159	237	9F	

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TABLE C-1. Numerical Equivalents to PT250 Characters (continued)

Standard Characters				Alternate Characters			
Dec	Oct	Hex	Char	Dec	Oct	Hex	Char
32	40	20	Space	160	240	A0	
33	41	21	!	161	241	A1	i
34	42	22	"	162	242	A2	¢
35	43	23	#	163	243	A3	£
36	44	24	\$	164	244	A4	◻
37	45	25	%	165	245	A5	¥
38	46	26	&	166	246	A6	|
39	47	27	'	167	247	A7	§
40	50	28	(	168	250	A8	..
41	51	29	)	169	251	A9	©
42	52	2A	*	170	252	AA	a
43	53	2B	+	171	253	AB	<<
44	54	2C	,	172	254	AC	⌋
45	55	2D	-	173	255	AD	-
46	56	2E	.	174	256	AE	®
47	57	2F	/	175	257	AF	-
48	60	30	0	176	260	B0	°
49	61	31	1	177	261	B1	±
50	62	32	2	178	262	B2	²
51	63	33	3	179	263	B3	³
52	64	34	4	180	264	B4	⁴
53	65	35	5	181	265	B5	μ
54	66	36	6	182	266	B6	¶
55	67	37	7	183	267	B7	•
56	70	38	8	184	270	B8	₪
57	71	39	9	185	271	B9	ʹ
58	72	3A	:	186	272	BA	∅
59	73	3B	;	187	273	BB	>>
60	74	3C	<	188	274	BC	¼
61	75	3D	=	189	275	BD	½
62	76	3E	>	190	276	BE	¾
63	77	3F	?	191	277	BF	¿

CHARACTER SETS

TABLE C-1. Numerical Equivalents to PT250 Characters (continued)

Standard Characters				Alternate Characters			
Dec	Oct	Hex	Char	Dec	Oct	Hex	Char
64	100	40	@	192	300	C0	À
65	101	41	A	193	301	C1	Á
66	102	42	B	194	302	C2	Â
67	103	43	C	195	303	C3	Ã
68	104	44	D	196	304	C4	Ä
69	105	45	E	197	305	C5	Å
70	106	46	F	198	306	C6	Æ
71	107	47	G	199	307	C7	Ç
72	110	48	H	200	310	C8	È
73	111	49	I	201	311	C9	É
74	112	4A	J	202	312	CA	Ê
75	113	4B	K	203	313	CB	Ë
76	114	4C	L	204	314	CC	Ì
77	115	4D	M	205	315	CD	Í
78	116	4E	N	206	316	CE	Î
79	117	4F	O	207	317	CF	Ï
80	120	50	P	208	320	D0	Ð
81	121	51	Q	209	321	D1	Ñ
82	122	52	R	210	322	D2	Ò
83	123	53	S	211	323	D3	Ó
84	124	54	T	212	324	D4	Ô
85	125	55	U	213	325	D5	Õ
86	126	56	V	214	326	D6	Ö
87	127	57	W	215	327	D7	×
88	130	58	X	216	330	D8	Ø
89	131	59	Y	217	331	D9	Ù
90	132	5A	Z	218	332	DA	Ú
91	133	5B	[	219	333	DB	Û
92	134	5C	\	220	334	DC	Ü
93	135	5D]	221	335	DD	Ý
94	136	5E	^	222	336	DE	Ë
95	137	5F	_	223	337	DF	β

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TABLE C-1. Numerical Equivalents to PT250 Characters (continued)

Standard Characters				Alternate Characters			
Dec	Oct	Hex	Char	Dec	Oct	Hex	Char
96	140	60	'	224	340	E0	à
97	141	61	a	225	341	E1	á
98	142	62	b	226	342	E2	â
99	143	63	c	227	343	E3	ã
100	144	64	d	228	344	E4	ä
101	145	65	e	229	345	E5	å
102	146	66	f	230	346	E6	æ
103	147	67	g	231	347	E7	ç
104	150	68	h	232	350	E8	è
105	151	69	i	233	351	E9	é
106	152	6A	j	234	352	EA	ê
107	153	6B	k	235	353	EB	ë
108	154	6C	l	236	354	EC	ì
109	155	6D	m	237	355	ED	í
110	156	6E	n	238	356	EE	î
111	157	6F	o	239	357	EF	ï
112	160	70	p	240	360	F0	ð
113	161	71	q	241	361	F1	ñ
114	162	72	r	242	362	F2	ò
115	163	73	s	243	363	F3	ó
116	164	74	t	244	364	F4	ô
117	165	75	u	245	365	F5	õ
118	166	76	v	246	366	F6	ö
119	167	77	w	247	367	F7	÷
120	170	78	x	248	370	F8	ø
121	171	79	y	249	371	F9	ù
122	172	7A	z	250	372	FA	ú
123	173	7B	{	251	373	FB	û
124	174	7C	|	252	374	FC	ü
125	175	7D	}	253	375	FD	ý
126	176	7E	~	254	376	FE	ÿ
127	177	7F		255	377	FF	ÿ

CHARACTER SETS

TABLE C-2. Bit Patterns for PT250 Character Set
(Lower Half)

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

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TABLE C-3. Bit Patterns for PT250 Character Set
(Upper Half)

				b7	1	1	1	1	1	1	1	1	1
				b6	0	0	0	0	1	1	1	1	
				b5	0	0	1	1	0	0	1	1	
				b4	0	1	0	1	0	1	0	1	
b	b	b	b										
3	2	1	0										
0	0	0	0		°	À	Ð	à	ð				
0	0	0	1		ı	±	Á	Ñ	á	ñ			
0	0	1	0		ç	²	Â	Ò	â	ò			
0	0	1	1		£	³	Ã	Ó	ã	ó			
0	1	0	0		□	´	Ä	Ô	ä	ô			
0	1	0	1		¥	µ	Å	Õ	å	õ			
0	1	1	0		ı	¶	Æ	Ö	æ	ö			
0	1	1	1		§	•	Ç	×	ç	÷			
1	0	0	0		¨	¸	È	Ø	è	ø			
1	0	0	1		©	¹	É	Ù	é	ù			
1	0	1	0		ª	º	Ê	Ú	ê	ú			
1	0	1	1		«	»	Ë	Û	ë	û			
1	1	0	0		¬	¼	Ì	Ü	ì	ü			
1	1	0	1		-	½	Í	Ý	í	ý			
1	1	1	0		®	¾	Î	Þ	î	þ			
1	1	1	1		-	¿	Ï	ß	ï	ÿ			

D

DCS BYTES

This appendix describes how to interpret and construct a Device Control String (DCS) byte.

Interpreting DCS Bytes

To interpret a DCS byte, convert the DCS character into its ASCII hexadecimal number and subtract 20 (Hex). This gives a number between 0 and 5F. After converting the byte to a number, convert it to a bit string. For example, the space character (20 Hex), after it is converted, represents a bit pattern of all zeros (0000 0000). As another example, the = character has a Hex value of 3D. Subtracting 20 Hex yields 1D, which is the bit pattern 0001 1101.

After the P1250 receives the DCS command with no arguments, it might return the following string:

```
Esc P! ~L"~ P~ ~"&~T Esc\
```

Only 11 of the 20 bytes sent by the terminal need translation. This is because four characters delimit the string (Esc P and Esc \) and five characters (the tildes) act as separators. Note that spaces are returned as part of

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this sample string. A Space character is interpreted as a byte containing all zeros.

The following four steps illustrate converting the second grouping (which are the two characters, L and double-quote):

1. Find the hexadecimal equivalents of these two characters in Table C-1. This yields 4C and 22.
2. Subtract 20 Hex from both numbers. This yields 2C and 2.
3. Convert these two numbers into binary. This yields 0010 1100 and 0000 0010.
4. Read the value of the last six bits of each string from Group 2 of Table D-1.

The L translates into:

Group 2, Byte 1

Bit	1
0	Repeat rate of medium with a long delay
1	Keyboard Click set
0	White letters on a black background
0	Control Representation off

The double quote translates into:

Group 2, Byte 2

Bit	0	DSC mode off
	0	Soft Lock Option off
	0	Function Termination mode off
	0	Send Tabs mode off
	1	Function Keypad activated
	0	Margin Bell off

TABLE D 1 Device Control String Bits

Group	Byte	Bit	Meaning		
1	1	Bit 5	Hard/Soft Scroll (0 = Hard, 1 = Soft)		
		Bit 3,4	Screen Size (see note at end of table) 00 = 80 x 24 01 = 80 x 48 10 = 132 x 27 11 = 80 x 25		
		Bit 2	Page/Line (0 = Page, 1 = Line)		
		Bit 1	Character/Block mode (0=Character, 1=Block)		
		Bit 0	Local/Online (0 = Local, 1 = Online)		
		1	2	Bit 5	Modem Link (always = Computer)
				Bit 1-4	Simulation Standard (always = ANSI)
Bit 0	Reserved for future use				
2	1	Bit 3 5	Keyboard Repeat Rate (cps) 000 = No repeat 001 = 5 cps/short delay 010 = 10 cps short delay 011 = 15 cps short delay 100 = 5 cps/long delay 101 = 10 cps long delay 110 = 15 cps long delay 111 = Reserved for future use		
		Bit 2	Keyboard Click (0 = Off, 1 = On)		
		Bit 1	Screen Video 0 = Light characters on dark background 1 = Dark characters on light background		
		Bit 0	Control Representation mode (0 = Off 1 = On)		

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TABLE D-1. Device Control String Bits (continued)

Group	Byte	Bit	Meaning
2	2	Bit 5	DSC mode (0=Off, 1=On)
		Bit 4	Soft Lock Option (0 = Off,1 = On)
		Bit 3	Function Termination mode (0 = Off,1 = On)
		Bit 2	Send Tabs mode (0 = Off,1 = On)
		Bit 1	Numeric/Function Keypad 0 = Numeric Keys 1 = Function Keys
		Bit 0	Margin Bell (0 = Off,1 = On)
		3	1
Bit 0-3	Host Baud Rate (50/75/.../19.2K) (cannot be altered here)		
	0000 = 50 1000 = 1800		
	0001 = 75 1001 = 2000		
	0010 = 110 1010 = 2400		
	0011 = 134.5 1011 = 3600		
	0100 = 150 1100 = 4800		
	0101 = 300 1101 = 7200		
	0110 = 600 1110 = 9600		
	0111 = 1200 1111 = 19200		
3	2	Bit 5,4	Reserved for future use
		Bit 0-3	Auxiliary Baud Rate (50/75/.../19.2K) (cannot be altered here) Same bit patterns as host baud rates

TABLE D-1. Device Control String Bits (continued)

Group Byte	Bit	Meaning	
3	3	Bit 5	Frame (0 = One Stop Bit, 1 = Two Stop Bits) (cannot be altered here)
		Bit 4	Rollover (0 = disabled, 1 = enabled)
	1-3	Bit 1-3	Parity (Space/Mark/Odd/Even/ 8-bit none) (cannot be altered here) 000 = Space (7-bit) 001 = Mark (7-bit) 010 = Odd (7-bit) 011 = Even (7-bit) 100 = None (8-bit)
		Bit 0	Duplex (always = Full) (cannot be altered here)
4	1	Bit 4,5	Cursor Type 00 = Underline 01 = Blinking Underline 10 = Block Cursor 11 = Blinking Block Cursor
		Bit 3	Reserved for future use
		Bit 2	Reserved for future use
		Bit 0,1	Soft Scroll Speed 00 = 1 (Slowest) 01 = 2 10 = 3 11 = 4 (Fastest)

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TABLE D-1. Device Control String Bits (continued)

<i>Group</i>	<i>Byte</i>	<i>Bit</i>	<i>Meaning</i>
5	1	Bit 5	Line Truncate mode 0 = Wrap cursor to next line at line end 1 = Leave cursor at line end
		Bit 4	Line Feed/New Line mode 0 = Move cursor vertically to next line 1 = Move cursor to beginning of next line
		Bit 3	Visual Attribute Lock mode 0 = Apply SGR value to character 1 = Lock SGR value to position
		Bit 2	Insertion/Replacement mode 0 = Replacement 1 = Insertion
		Bit 1	Send/Receive mode 0 = Local display of keyed input 1 = Transmit keyed input
		Bit 0	Erasement mode 0 = Erase unprotected data only 1 = Erase protected and unprotected data

TABLE D-1 Device Control String Bits (continued)

Group Byte	Bit	Meaning	
5	2	Bit 5	Host Notification mode 0 = No host notification 1 = Send host notification
		Bit 4	Transparent Data mode 0 = \-ON \-OFF, Ctrl-P sent immediately 1 = \-ON, \-OFF, Ctrl P stored in buffer
	Bit 3	Selective Data Trap mode 0 = Act on all control characters 1 = Act on all control characters except carriage return and horizontal tab	
	Bit 2	Local Cursor Action mode 0 = Perform cursor action locally 1 = Send control code or sequence to host	
	Bit 1	Selected Area Transfer mode 0 = Send selected data only 1 = Send data as determined by Unprotected/Modified mode	
	Bit 0	Reserved for future use	

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TABLE D-1. Device Control String Bits (continued)

Group Byte	Bit	Meaning
6	1	Bit 5 One/Two Page Boundary mode (see note at end of table) 0 = One Page 1 = Two Page
		Bit 4 Unprotected/Modified mode 0 = Transmit Unprotected data 1 = Transmit Modified data
		Bit 3 Screen Wrap mode 0 = No screen wrap 1 = Screen wrap
		Bit 2 Null/Space mode 0 = Use null as pad character 1 = Use space as pad character
		Bit 1 Logical Attributes mode (Off/On) 0 = Logical Attributes not asserted 1 = Assert Logical Attributes
		Bit 0 Auto Line Feed mode (Yes/No) 0 = No auto line feed 1 = Auto line feed

Note

If a single DCS command sets both the screen size and One/Two Page Boundary to conflicting screen lengths, the One/Two Page Boundary takes precedence. This occurs only when both are defined within the same DCS command. In all other cases, the Screen Size value takes precedence.

Constructing the DCS Byte

If the DCS command contains arguments, the PT250 uses these arguments to set the terminal to the states indicated. A DCS argument consists of one, two, or three characters (or bytes). The procedure for constructing a DCS character to be used in a DCS argument is just the opposite of the procedure illustrated in the last section for interpreting the character.

When sending a DCS command to the terminal, you must include all characters that could occur in an argument *or* you can omit all characters between two tildes. You would omit a grouping (but not the tilde separator) if the states indicated by those bytes will not change. Consequently, the way to omit an argument is to send adjacent tildes. Only changed groups need be sent. However, be sure to send tildes for placement purposes whether or not you send character arguments.

The following steps show how to construct a DCS byte and how to send it to the terminal.

1. Determine the bit pattern needed for the settings. For example, if you want to set the terminal so that it is Online, in Character and Page mode, 132 x 27 format, and set to Soft Scroll, the bit pattern for the first byte in group 1 would be 0011 0001.
2. Translate the bit pattern into a number. This pattern translates to 31 Hex.
3. Add 20 Hex. This yields 51 Hex, which is the ASCII character Q. (See Table C-1.)
4. Send the DCS command with the new settings as follows:

```
Esc PQ ~~~~~Esc\
```

Note that the Space character (20 Hex) represents a bit pattern of all zeros. In the example above, all bits in Group 1, Byte 2 will be set to zero.



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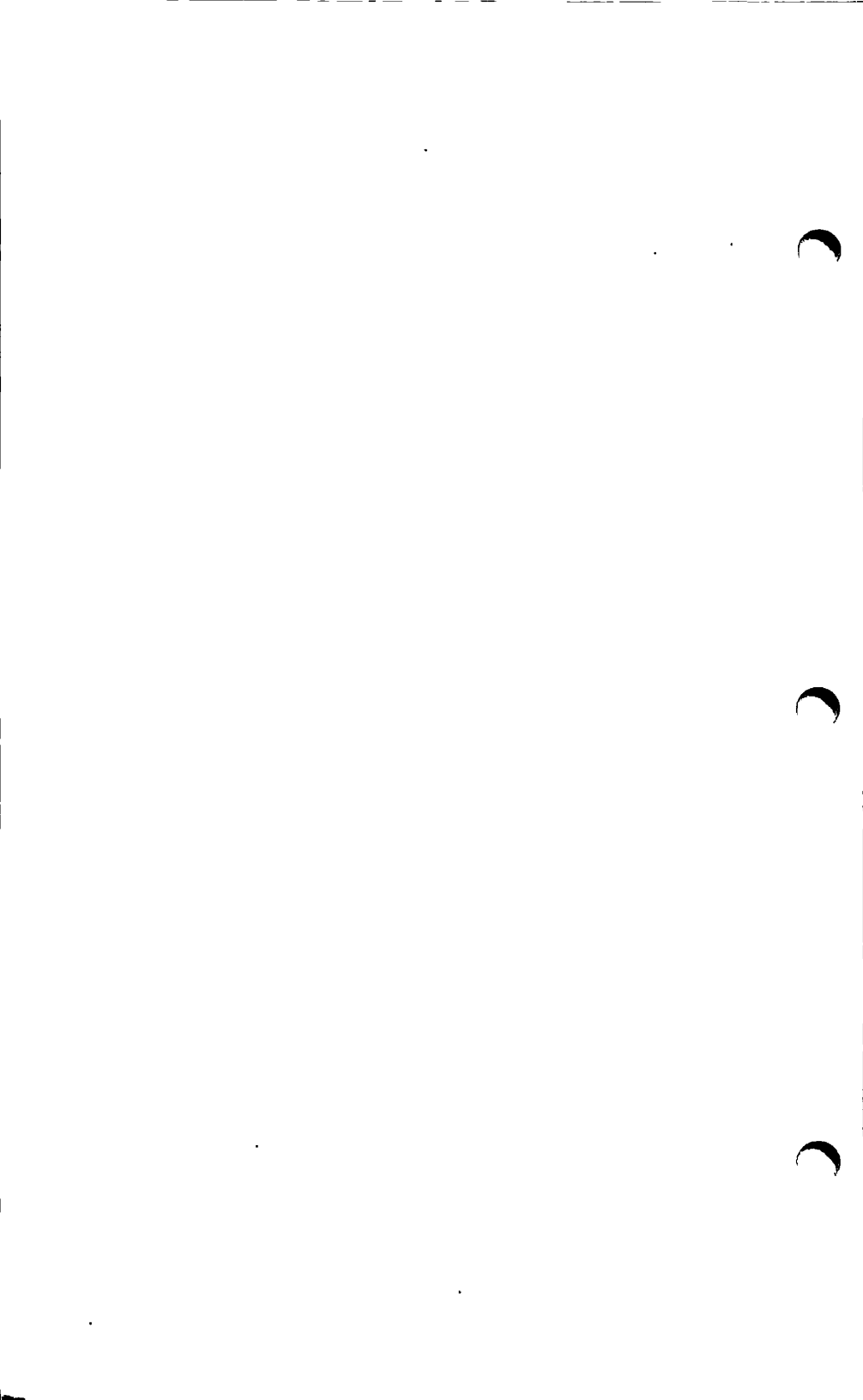
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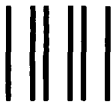
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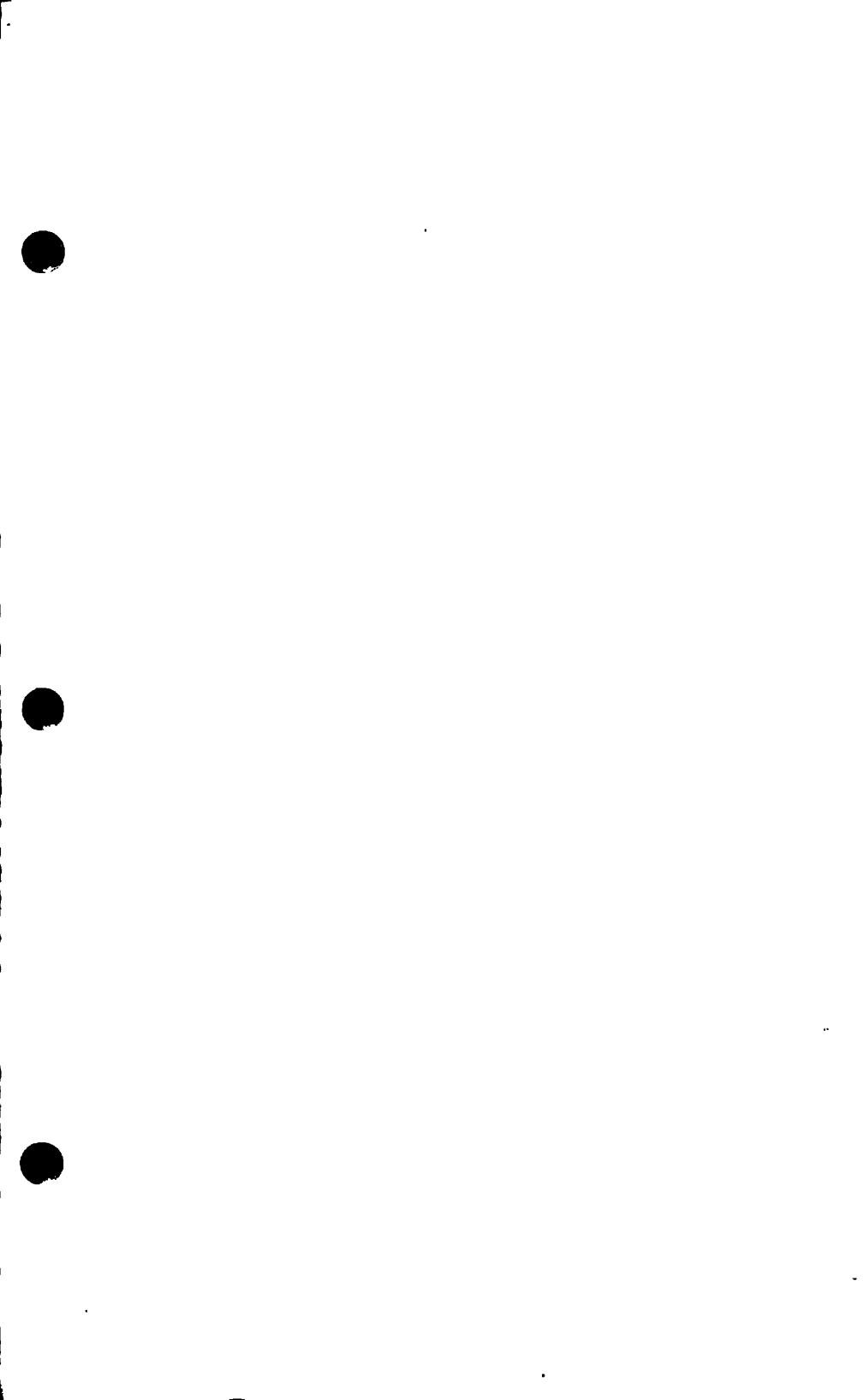


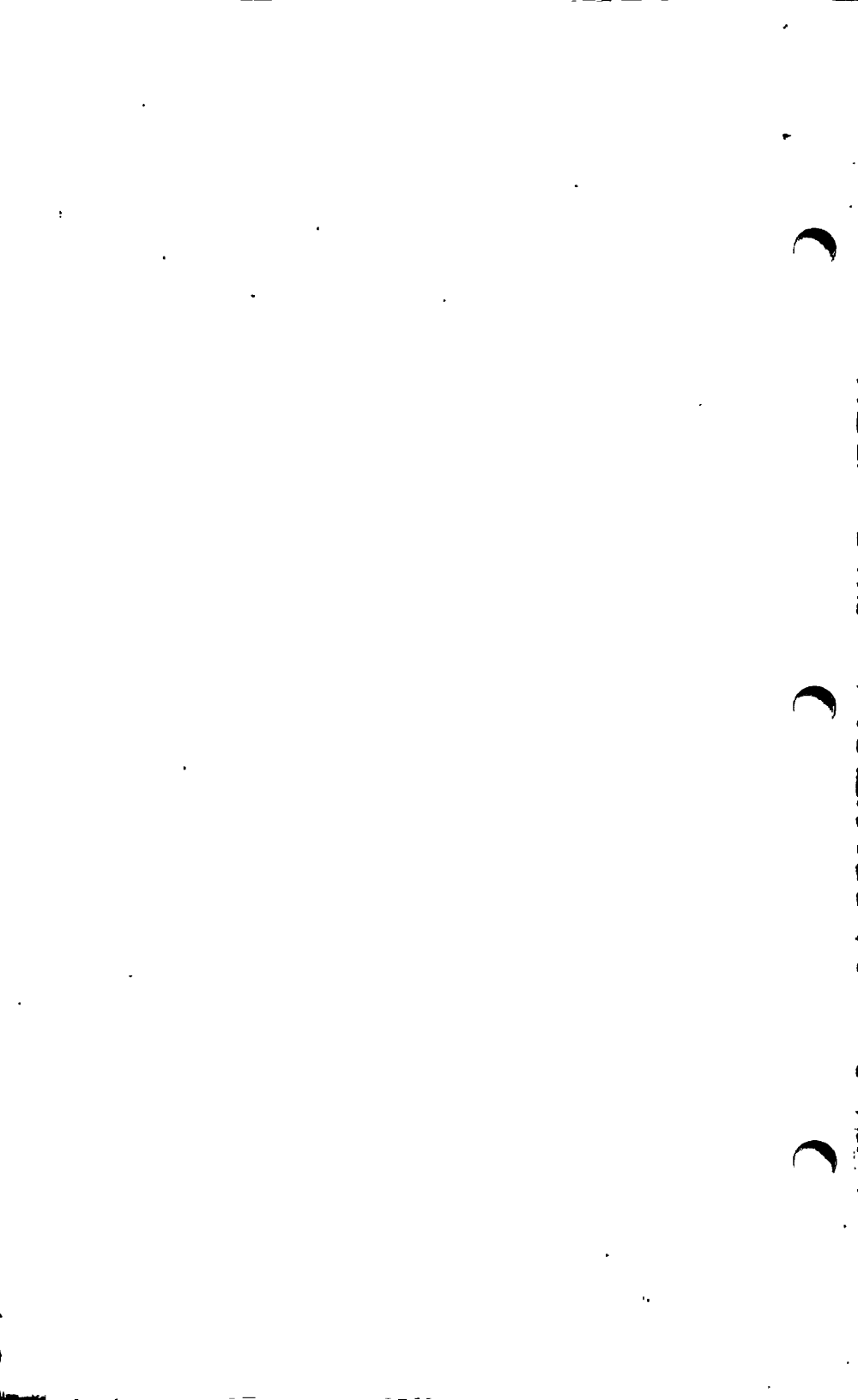
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PT250™ Documentation Addendum

IDR11070-1XA

September 1987

- A. The following are additions and corrections to the *PT250 Programmer's Guide* (DOC11069-1XA):

DEVICE ATTRIBUTES (DA), p. 5-24

The following text replaces the last sentence in the Device Attributes command description:

If a DA command without arguments is issued by a program, the terminal returns a DA sequence with an argument of 10.

DOS MERGE MODE, p. 5-42

The following text replaces the entire DOS Merge Mode command description:

If DOS Merge Mode is set:

1. Depressing the Num Lock key alternately sends set and reset Numeric/Function Keypad mode escape sequences to the host (see Numeric/Function Keypad mode).
2. The existing display size is saved.
3. The IBM PC Group 1 character set is loaded and the display size changes to 80 by 25 (no status

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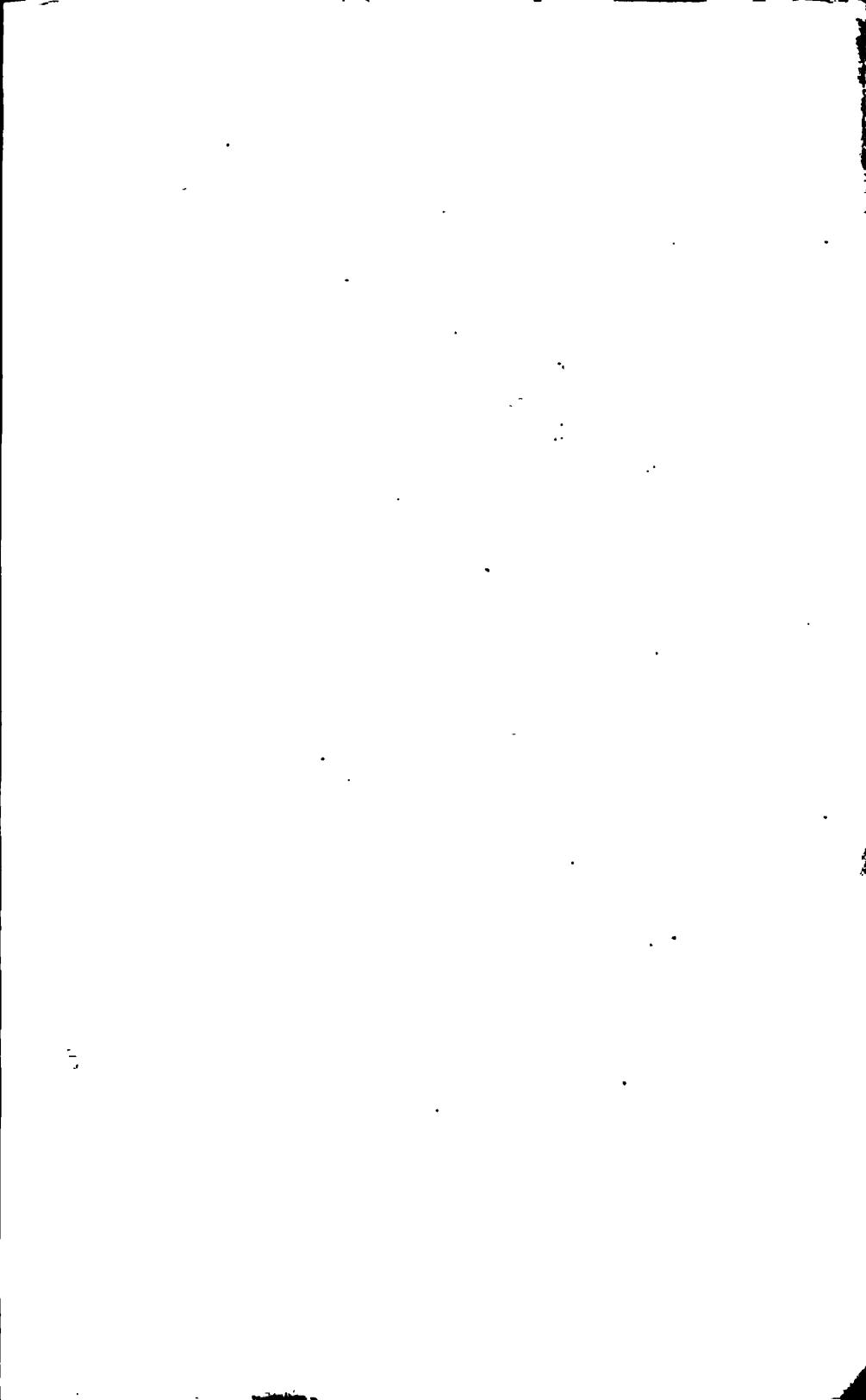
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If DOS Merge Mode is **reset** (the default):

1. You can set and reset Numeric/Function Keypad mode locally, without host intervention.
2. The original display size and character set are restored.

SET DISPLAY SIZE (SDS), p. 5-61

Add the following parameter:

<i>Argument</i>	<i>Meaning</i>
4	80 columns by 25 rows

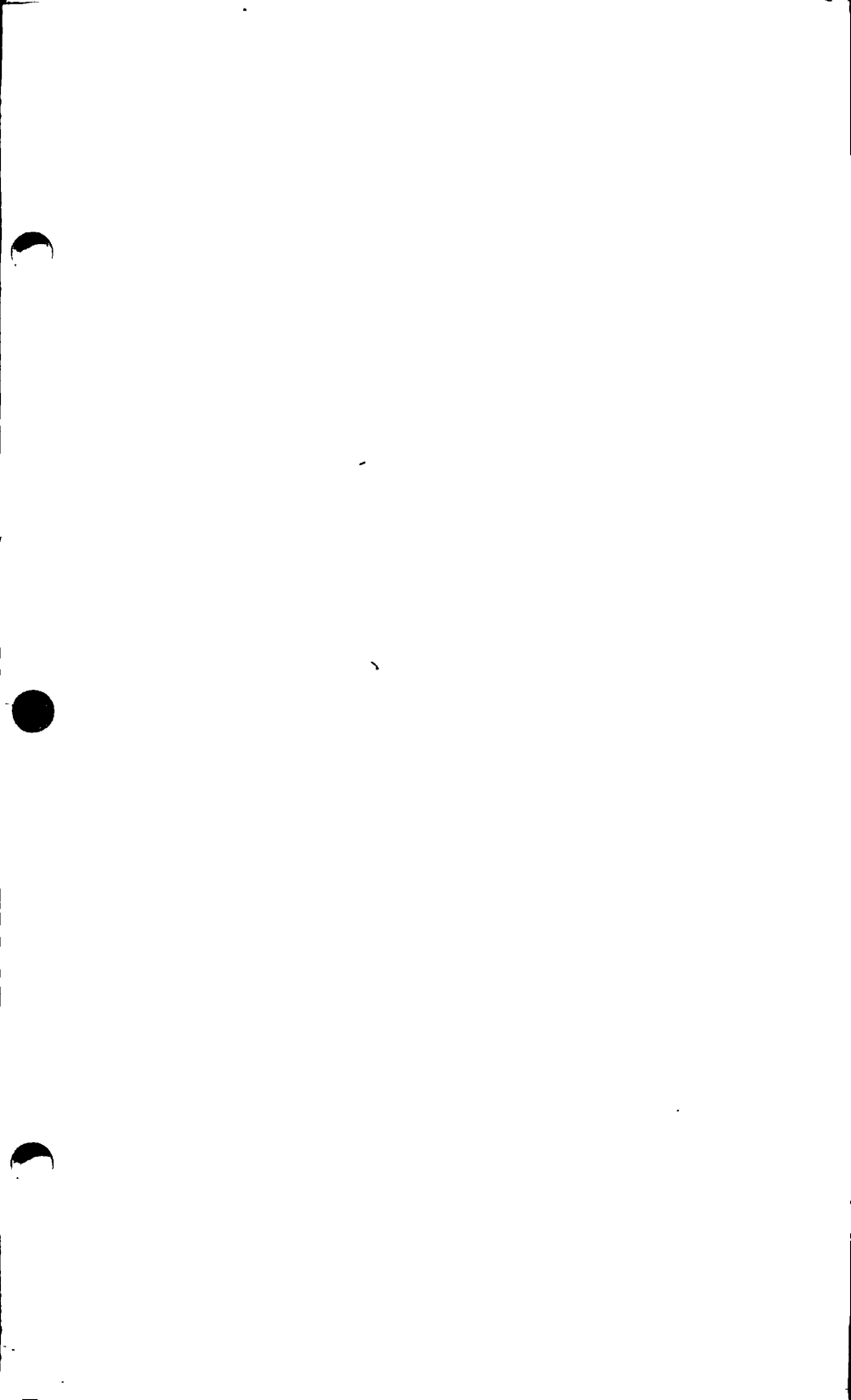
- B. The following are additions to the *PT250 User's Guide* (DOC11070-1XA):

SET UP MENU, p. C-2

Add 80 x 25 to the parameter list in the **Screen Size** field.

SCREEN SIZE SECTION, p. C-4

- 80 x 25 means 80 characters by 25 lines of display memory format. The actual screen size (number of characters by number of lines) is also 80 x 25. No status line is displayed. The 80 x 25 size specifies 1-page mode transmission.





DOC 11069-2:JA