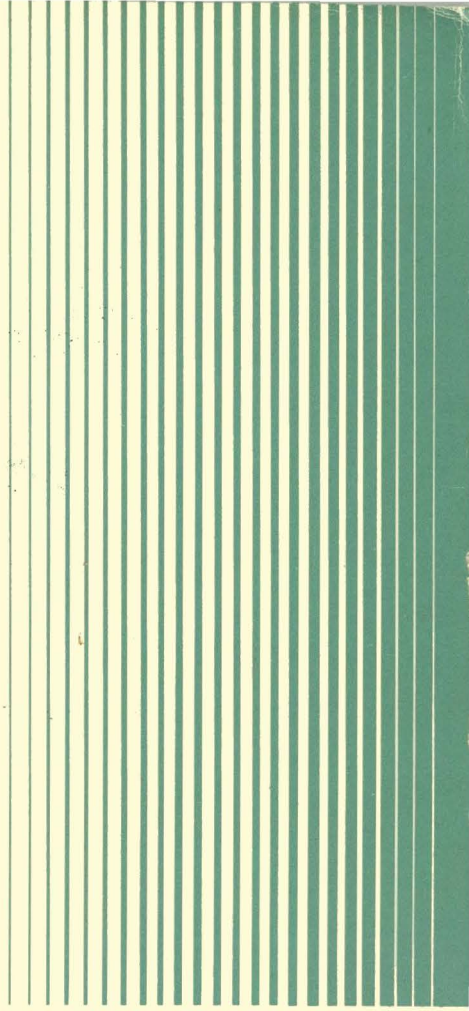

# WY-185
# User's Guide

WYSE

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# Overview

## TERMINAL FEATURES

The WY-185 sets new standards for an ANSI display terminal by integrating performance, state-of-the-art ergonomics, and design. High performance is achieved through Wyse-designed application-specific circuitry.

The WY-185 offers a VT320 personality (a command set characteristic of the DEC VT320 terminal) as well as DEC VT220, VT100, and VT52 personalities. Other features are VT320-style international keyboard language support and the ISO Latin-1 supplementary character set.

The terminal is available in two models:

- A North American model with English and French Canadian keyboard language support
- An international model that supports 15 keyboard languages and user-selectable French or German setup screens and status line messages

## ABOUT THIS MANUAL

This user's guide contains the information you need to quickly install, set up, and operate the terminal.

- Chapter 1 tells you how to turn on and adjust the terminal and describes some of its basic operating capabilities.
- Chapter 2 describes how to configure the terminal—that is, tailor its operating characteristics to the hardware requirements of your system installation and the software requirements of your application programs.
- Chapters 3, 4, and 5 describe the terminal's keyboard, display, and communications capabilities.
- Appendix A gives instructions for terminal installation and cable connections.

- The remaining appendixes contain technical reference material, including a summary of all the programming commands supported by the terminal.

The information in Chapters 1 through 5 applies to the terminal's VT320 *default personality*, which embodies the complete set of functions for which the terminal was designed.

## Terms and Conventions

You'll encounter the following basic terms frequently throughout this manual:

**application** A software program that directs the computer and terminal to accomplish a specific task, such as word processing or financial spreadsheets

**cursor** A position indicator on the screen showing where the next character will display

**default** The factory setting or response for a terminal operating feature unless specifically changed

**host** The computer system connected directly or indirectly to the terminal

**mode** A specific operating state in which the terminal exhibits a defined pattern of action

**personality** A combination of operating characteristics typical of a particular terminal command set

Keys on the keyboard are represented by boxed letters or symbols, for example Return

## Related Publication

The *WY-185 Programmer's Guide* contains detailed information on how to take advantage of the terminal's programmable features in computer programs. For availability, pricing, and ordering information,

- In the United States and Canada, call (408) 435-2770.
- In all other countries, contact your regional sales office.

# Table of Contents

# 1 Introducing the Terminal

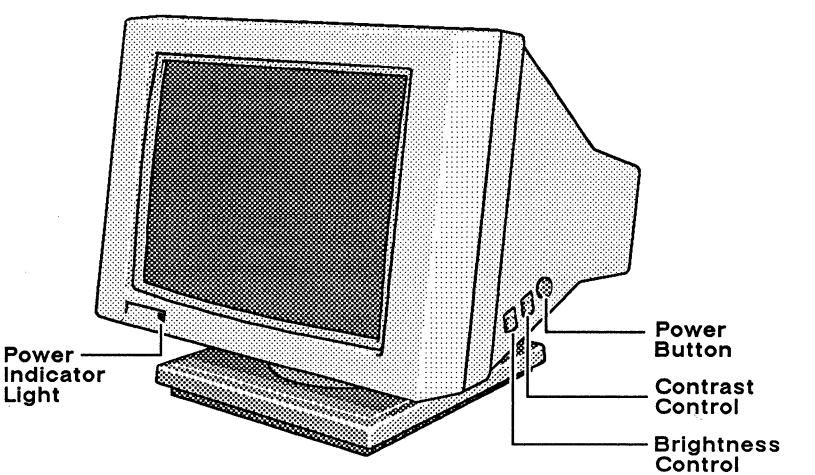
## GETTING STARTED

If your terminal has not been installed for you, refer to Appendix A for step-by-step instructions on connecting the terminal to a host computer, terminal server, or modem.

## Turning on the Terminal

Press the power button (Figure 1-1) to turn on the terminal. You'll hear an immediate beep and see the power indicator light go on as the terminal receives power. At power-on the terminal immediately executes a brief self-test in which patterns or messages may display on the screen. When the cursor appears at the top of the screen, the terminal is ready for operation.

**Figure 1-1 Terminal Controls**



☐ **Note** If the bell sounds and an error code P, K, 0, 1, 2, or 3 appears at the bottom of the screen, make a note of the letter or number and press F3 to clear the error condition. If it doesn't clear, or if the error code continues to appear at power-on, or if the terminal subsequently does not operate properly, call your service representative and report the error code—the terminal may need to be serviced by a qualified technician.

### Adjusting the Terminal

You'll probably find it best to have the center of the screen just slightly below eye level. Tilt and swivel the screen sideways and up and down until you find a comfortable viewing angle.

Position the keyboard at or below your elbow height. If you prefer the keyboard tilted slightly, turn it over and pull out the hinged feet.

To adjust the brightness and contrast of the screen display, locate the controls at the right side of the terminal (Figure 1-1). Start by setting both controls to their maximum levels by rolling them toward you as far as they will go. Then roll the brightness control slowly away from you until the brightness level is comfortable for you. Do the same with the contrast control.

### Configuring the Terminal

If you know that the terminal has already been correctly configured for you, you are ready to begin operation. However, before you do, you may want to read over the remaining sections of this chapter to become familiar with how the terminal works and with some of the features that you can change to suit your personal preferences.

The terminal is factory-set for certain predefined, or *default,* operating parameters. The default settings are designed to be appropriate for the most common system installations and application programs. However, you need to consult your system and application user manuals to determine which of these default settings you may need to change.

Chapter 2 describes how to put the terminal in *setup mode* and change the default settings.

## HOW THE TERMINAL WORKS

The terminal's two main components—the processor/display unit and the keyboard—work together to communicate with your computer system and respond to the instructions of your application programs. Typically, data you enter at the keyboard is

sent to the application program (for example, a spreadsheet or word-processing program), which instructs the terminal to display the data on the screen. The terminal performs other application-specific functions in response to commands received from the program.

The following sections briefly describe the terminal's operating characteristics.

## Operating Modes

The terminal has three operating modes: setup, on-line, and local.

- Setup mode displays the terminal's operating parameters and their current settings on a series of display screens. In setup mode you can change the settings, set tab stops, define an answerback message, and redefine some of the keyboard's top-row function keys. Chapter 2 describes setup mode.
- On-line mode allows the terminal to communicate with the computer and interact with your application programs. Chapter 5 describes on-line communication.
- Local mode, selectable in setup mode, allows you to experiment with the terminal's operating characteristics without physically disconnecting it from the host system. In local mode data from the keyboard is sent only to the terminal, not to the host. Data coming from the host is ignored.

## Personalities

The terminal can operate in several different *personalities* to allow for smooth interaction with application programs written for typical terminal command sets. The following personalities are available for selection in setup mode:

- VT320, 7-bit (default)
- VT320, 8-bit
- VT220, 7-bit
- VT220, 8-bit
- VT100
- VT52

All the terminal's personalities except VT52 are compatible with American National Standards Institute (ANSI) command functions. The VT52 personality is for use with application programs written for the DEC VT52 terminal.

The default VT320 7-bit personality supports all the terminal's features and is recommended for most applications. Both the VT320 and VT220 7-bit personalities support either 7 or 8 data bits (Data/Parity Bits setup parameter), but the terminal only transmits 7-bit control characters. In the VT320 and VT220 8-bit personalities the terminal transmits 8-bit control characters in an 8 data-bit communication environment.

VT100 and VT52 are 7-bit personalities in which the terminal transmits, recognizes, and executes only 7-bit characters.

## Display Features

The screen can display 25 lines down the screen and 80 or 132 columns across the screen.

### The Status Line

Normally, one of the 25 lines serves as a *status line*, which displays messages from the terminal or the host computer. Depending on selections made in setup mode, the status line can be at the top or bottom of the screen and can display either local terminal messages or messages received from the host. It can also be turned off so that no messages are displayed.

Unless the factory-default settings have been changed in setup mode, when you first turn on the terminal it displays the *local* status line at the top of the screen. Appendix B lists the meaning of the terminal messages displayed on the local status line. Host messages depend on your operating system or application program.

### The Data Area

The data area is the area of the screen that is available for displaying data from the keyboard or an application program. The default data area is 24 lines and 80 columns. In setup mode you can redefine the number of data lines to 25 and the number of columns to 132 as required by your application. (A 25th data line replaces the status line.)

### Character Sets

Individual characters to be displayed on the screen are stored in the terminal's memory in predefined *character sets*. Chapter 4 describes the terminal's character sets and how you can compose from the keyboard many characters not represented on the keycaps.

### Scroll Speed

In setup mode you can choose a *smooth scrolling* speed that slows down the rate at which data received from the computer is displayed on the screen.

### Screen Saver

The terminal's screen saver feature prolongs the life of the screen's phosphor. If the terminal receives no data for approximately 15 minutes, the screen display turns off. The data reappears when you press any key or when the terminal receives data from the host. If you turn the screen saver feature off in setup mode (General setup screen), data continues to display during terminal inactivity.

## Keyclick and Bell

The keyboard's bell and keyclick features are optional indicators that can be turned off in setup mode. Keyclick can also be turned off and on from the keyboard by pressing Ctrl Enter.

When keyclick is on, the keys make a muted beep each time they are pressed.

The bell serves as both a warning bell and a margin bell. The warning bell indicates special alerts or errors. For example, the bell sounds at power-on or if an error occurs during a compose character sequence. The margin bell works like a typewriter bell alerting you that text entries are getting close to the right margin.

# 2 Configuring the Terminal

## INTRODUCTION

This chapter explains how to configure the terminal's operating parameters and redefine the function keys in setup mode.

In general, the parameters fall into three groups:

- Parameters that must be set to match the requirements of your computer or printer for communication to be successful (see COMM and Printer setup screens). For example, the terminal and the computer must agree on the rules for the speed (baud rate) at which they will send and receive data or they won't be able to communicate at all.
- Parameters that allow for the requirements of a particular application program. For example, does your application require an 80- or 132-column screen? (Many application programs set these parameters for you.)
- Parameters that can be set according to your preference. For example, do you want the cursor to appear on the screen as a block or underline, blinking or nonblinking?

Consult your computer, printer, and application user manuals for instructions on their setup requirements.

## ENTERING AND LEAVING SETUP MODE

Press F3 to put the terminal in setup mode. Data on the screen disappears, and the setup directory screen appears; the data is restored when the terminal returns to normal operating mode.

**Caution** Don't enter setup mode while data is being transmitted. The terminal can't process data received from the computer while in setup mode, and data may be lost as a result.

## Setup Directory Screen

From the setup directory screen you can display other setup screens, or you can exit setup mode and return the terminal to the normal operating mode. On the setup directory screen

- Fields at the bottom of the screen identify the setup screens you can display to change the terminal's operating parameters.
- Fields at the top of the screen identify key functions.
- Fields in the middle of the screen identify options for restoring parameter settings to previous values and for performing some local reset or clear functions.

## Leaving Setup Mode

You have three choices to return the terminal to the normal operating mode:

- Press F3 to exit without saving parameter changes. New settings will be in effect until the terminal is turned off or reset.
- Press F4 to save parameter settings in nonvolatile memory, where they will stay in effect until you change the settings again. Nonvolatile memory holds setup parameter settings after the terminal is turned off and restores them at power-on.
- Press the cursor keys to highlight one of the fields in the middle of the screen and press Enter to activate the command. Table 2-1 explains the function of each of these fields.

**Table 2-1 Setup Directory Screen Exit Functions**

| Field | Function |
|---|---|
| Restore Last Saved | Restores all settings and definitions to values last saved in nonvolatile memory. (Keypad and Cursor Keys parameters are reset to their default settings.) |
| Restore Defaults | Restores all settings (operating parameters, tabs, key definitions, answerback message) to factory-default values. |
| Clear Display | Clears the screen and homes the cursor. |
| Reset Communication | Resets communications parameters. The terminal<br>• Turns off controller print mode<br>• Clears keyboard and receive buffers<br>• If handshaking is enabled, sends signal to host indicating the terminal is ready to receive data<br>• Aborts control and escape sequences |

**Table 2-1 Setup Directory Screen Exit Functions, Continued**

| Field | Function |
|---|---|
| Reset Terminal | Performs soft terminal reset to return the terminal's operating parameters to the default settings used by most application programs. The terminal<br>• Redisplays cursor if off<br>• Resets insert mode (to replace)<br>• Resets top margin to line 1<br>• Resets bottom margin to line 24, 25, 48, or 50<br>• Unlocks keyboard<br>• Resets numeric keypad keys to numeric mode<br>• Resets cursor keys to normal mode<br>• Turns off autowrap mode<br>• Returns character set labels to default selections<br>• Restores display attribute to normal<br>• Resets erase attribute to erasable<br>• Resets save cursor state to default<br>• Resets national mode to multinational<br>• Restores user-preferred supplemental character set last saved in nonvolatile memory (Multinational or ISO Latin-1)<br>• Changes data destination to screen data area<br>• Clears handshaking state, raises DTR if low, sends Xon if Xon/Xoff handshaking is selected |

## CHANGING THE OPERATING PARAMETERS

To select one of the setup screens named on the bottom line, press the indicated function key.

- The screen displays a group of operating parameters
- Each parameter field indicates the current setting for that parameter

To change the setting, press the cursor keys to highlight the parameter field and Enter to select the new setting

Press F3 to return to the setup directory screen.

Tables 2-2 through 2-7 describe each screen's setup parameters and the meaning of their settings. *The default setting is always listed first.*

**Table 2-2 Display Setup Parameters**

| Parameter | Explanation |
|---|---|
| Columns= | The screen displays |
| — 80 | 80 columns |
| 132 | 132 columns |
| Controls= | Escape and control sequences are |
| — Interpret | Executed normally |
| Display | Displayed, not executed (controls display mode) |
| Autowrap= | When additional characters are entered at the end of a line, |
| — Off | Characters at the cursor position are replaced (overwritten) |
| On | The cursor wraps to the start of the next line |
| Scroll=[1] | The screen displays new lines on the screen at |
| — Jump | The rate data is received |
| Smooth-8 lines/sec | Eight lines per second |
| Smooth-4 lines/sec | Four lines per second |
| Smooth-2 lines/sec | Two lines per second |
| Smooth-1 line/sec | One line per second |
| Reverse Screen= | The screen displays |
| — Off | Light characters on a dark background |
| On[2] | Dark characters on a light background |
| Cursor= | The cursor display is |
| — Blinking Block | A blinking rectangle |
| Blinking Line | A blinking underline |
| Steady Block | A steady rectangle |
| Steady Line | A steady underline |
| Off | Invisible |
| Status Line= | The status line |
| — Local | Displays local terminal messages |
| Host | Displays host application messages |
| Off | Does not display |
| Status Position= | The status line displays at the |
| — Top | Top of the screen |
| Bottom | Bottom of the screen |
| Width Change Clear= | When executing a command to change the number of columns, the terminal |
| — On | Clears the screen and homes the cursor |
| Off | Doesn't clear the screen or home the cursor |

1. If smooth scrolling is selected, some form of handshaking should be enabled.
2. The overscan region is lighted only in 15x12 character resolution.

**Table 2-2 Display Setup Parameters, Continued**

| Parameter | Explanation |
|---|---|
| Page Format=[3] | The terminal's display memory is arranged as |
| 1x24 | A single 24-line page (24-line display) |
| 1x25 | A single 25-line page (25-line display) |
| 1x48 | A single 48-line page (24-line display) |
| 1x50 | A single 50-line page (25-line display) |
| 2x24 | Two 24-line pages (24-line display) |
| 2x25 | Two 25-line pages (25-line display) |
| Cursor Coupling= | In a 48- or 50-line page, when the cursor is addressed outside the current data area, the display |
| On | Changes to keep the cursor displayed |
| Off | Doesn't change when the cursor moves off the screen |
| Page Coupling= | When two pages are defined, and the alternate page is addressed, the display |
| On | Changes to display the page addressed |
| Off | Continues to display the current page |

3. When the page format is changed, the terminal clears the entire display memory, homes the cursor, and resets the scroll margin. In 15x12 resolution mode, 1x24 or 1x25 must be selected for an application to access both 80- and 132-column softfonts.

**Table 2-3 General Setup Parameters**

| Parameter | Explanation |
|---|---|
| Personality=[1] | The terminal can run programs using command sets characteristic of the following terminals: |
| VT320, 7 Bit | Digital Equipment VT320 7-bit mode |
| VT320, 8 Bit | Digital Equipment VT320 8-bit mode |
| VT220, 7 Bit | WY-85[2], Digital Equipment VT220 7-bit mode |
| VT220, 8 Bit | WY-85[2], Digital Equipment VT220 8-bit mode |
| VT100 | WY-85[2], WY-75, Digital Equipment VT100 |
| VT52 | WY-85[2], WY-75, Digital Equipment VT52 |
| Terminal ID= | In answer to a host request, the terminal identifies itself as a |
| VT320 | VT320-type terminal |
| VT220 | VT220-type terminal |
| VT100 | VT100-type terminal |
| VT101 | VT101-type terminal |
| VT102 | VT102-type terminal |

1. When the personality is changed, the terminal performs a soft reset on exit from setup mode.
2. The following WY-85 features are not supported: 20mA current loop interface port, Alternate Character set, block mode, and selectable function key transmit speed.

**Table 2-3 General Setup Parameters, Continued**

| Parameter | Explanation |
|---|---|
| Resolution=[3] | The terminal displays |
| 15x12 | A 15x12 character cell in 80-column mode and a 9x12 character cell in 132-column mode |
| 10x20 | A 10x20 character cell |
| On-Line/Local= | Data is |
| On-Line | Sent to and received from the host or other external device connected to the ports |
| Local | Sent from the keyboard to the terminal only, where it is processed locally and sent to the screen; data sent by the host is ignored |
| Char Set= | The terminal's character set is |
| Multinational | Multinational |
| ISO Latin-1 | ISO 8859-1, Latin Alphabet Number 1 |
| Recognize DEL= | An ASCII DEL character received by the terminal is |
| Off | Ignored |
| On | Interpreted as a *destructive backspace* (character at left of cursor deleted and cursor moved left one position). |
| Screen Saver= | If the terminal receives no data for approximately 15 minutes, the screen |
| On | Blanks until the display is turned back on when a key is pressed or a character is received |
| Off | Continues to display data |
| Newline=[4] | When Return or Enter is pressed, the terminal sends |
| Off | A carriage return code (CR) |
| On | Both a carriage return (CR) and a linefeed code (LF) |
| User Feature Lock=[5] | User-preference features |
| Off | Can be redefined by host application programs |
| On | Are locked so that they cannot be redefined by the host |
| Setup=[6] | Setup screens are displayed in the indicated language. |
| English | |
| Français | |
| Deutsch | |

3. When the resolution is changed, the terminal clears all softfonts, clears the display memory, and homes the cursor. Set to 15x12 for full VT320 compatibility, 85Hz screen refresh, and full screen overscan (when Reverse Screen = on). Set to 10x20 for full VT220 compatibility, high-resolution characters, and 60 Hz screen refresh.
4. If a linefeed command (LF, VT, FF) is received from the host when this parameter is set to off, the cursor moves down one line in the same column; if the parameter is set to on, the cursor moves to the start of the next line.
5. User-preference features are key repeat, scrolling speed, reverse screen, tab stops, and keyboard lock. Locking these features may cause problems for an application program that expects to control them.
6. Field is displayed only on international models.

**Table 2-4 COMM Setup Parameters**

| Parameter | Explanation |
|---|---|
| Transmit Baud Rate=<br>- 9600<br>19200<br>38400<br>75[1]<br>110<br>150<br>300<br>600<br>1200<br>2400<br>4800 | Selects host port transmit baud rate (speed at which the terminal sends data to the host). The transmit baud rate must match the host's receive baud rate. |
| Receive Baud Rate=<br>- Xmit<br>75[2]<br>110<br>150<br>300<br>600<br>1200<br>2400<br>4800<br>9600<br>19200<br>38400 | Selects host port receive baud rate (speed at which data is received from the host). The receive baud rate must match the host's transmit baud rate. |
| Data/Parity Bits=<br>- 8/None<br>7/Space<br>7/Odd<br>7/Even<br>7/Mark | Selects the number of data bits in characters sent to and expected from the host and the type of parity for each character sent. |
| Stop Bits= | After the terminal sends a character to the host port, it sends |
| - 1 | One stop bit |
| 2 | Two stop bits |
| Local Echo= | Terminal's on-line communication mode is |
| - Off | Full duplex; data is sent only to the host and doesn't appear on the screen unless echoed by the host |
| On[3] | Half duplex; data is sent to the host and to the screen |

1. Don't select this setting if the receive baud rate is set to 110 or 38400.
2. Don't select this setting if the transmit baud rate is set to 110 or 38400.
3. Don't select this setting unless you know it is required. If the host also echoes the data, duplicated characters will appear on the screen.

**Table 2-4 COMM Setup Parameters, Continued**

| Parameter | Explanation |
|---|---|
| Handshake= | The terminal regulates the flow of data through the host port |
| XON/XOFF | By sending and recognizing Xon or Xoff characters |
| DTR | By raising and lowering the DTR line voltage |
| Both | With both Xon/Xoff and DTR handshaking protocols |
| None[4] | Without any handshaking protocol |
| Parity Check= | Parity of data received from the host is |
| Off | Not checked |
| On | Checked |
| Transmit Limit= | The terminal sends data through the host port |
| None | As fast as the baud rate allows |
| 60 cps | At a maximum rate of 60 characters per second |
| 150 cps | At a maximum rate of 150 characters per second |
| Host Port= | The terminal communicates with the host through |
| RS-232C | Port A |
| Modular 423 | Port B |
| Modem Control= | Modem control pins on the host port are |
| Off | Ignored |
| On[5] | Enabled |
| Disconnect Delay=[6] | The terminal disconnects after the receive line signal detect (RLSD) goes low for |
| 2 s | Two seconds |
| 60 ms | Sixty milliseconds |
| Auto Answerback= | At power-on or a communications reconnect, the answerback message is |
| Off | Not sent |
| On | Automatically sent to the host |

4. Don't select this setting with baud rates of 19200 or greater or with smooth scrolling.
5. Set to on only when a modem is connected to the port.
6. Modem protocol when Modem Control parameter is set to on. In the United Kingdom, set to 60 ms.

**Table 2-5 Printer Setup Parameters**

| Parameter | Explanation |
|---|---|
| Printer Speed= | Selects printer port baud rate (rate at which data is transmitted and received through the printer port). The baud rate must match the printer baud rate. |
| 4800 | |
| 9600 | |
| 19200 | |
| 38400 | |
| 75 | |
| 110 | |
| 150 | |
| 300 | |
| 600 | |
| 1200 | |
| 2400 | |
| Data/Parity Bits= | Selects number of data bits in characters sent to the printer and type of parity for each character sent. (Parity for data received is ignored.) |
| 8/None | |
| 7/Space | |
| 7/Odd | |
| 7/Even | |
| 7/Mark | |
| Stop Bits= | After the terminal sends a character to the printer port, it sends |
| 1 | One stop bit |
| 2 | Two stop bits |
| Handshake= | The terminal regulates the flow of data through the printer port |
| XON/XOFF | In response to received Xon or Xoff characters |
| Both | In response to both Xon/Xoff and DSR handshaking protocols |
| None | Without any handshaking protocol |
| DSR | In response to the raising and lowering of the DSR line voltage |
| Print Terminator= | At the end of a page print operation |
| None | No terminator character is sent |
| FF | A form feed character (FF) is sent |
| End Print at Cursor= | A page print operation |
| Off | Continues through the cursor position to the end of the line or page (or scrolling region) |
| On | Terminates at the cursor position |
| Print= | During a page print operation, the terminal |
| Full Screen | Sends the entire screen |
| Scroll Region | Sends the scrolling region |
| All Data | Sends all data in display memory |
| Print Data To Host= | Data received by the terminal through the printer port is |
| Off | Ignored |
| On | Sent to the host through the host port |

**Table 2-5 Printer Setup Parameters, Continued**

| Parameter | Explanation |
|---|---|
| Print Mode= | Data is sent to the printer port |
| Normal | In response to print page and print line commands from the keyboard or the host |
| Autoprint | Line by line as received from the host and displayed on the screen (sometimes called *copy print*) |
| Controller | Directly from the host without being displayed on the screen (sometimes called *transparent print*) |
| Print Data=* | During a print page or print line operation, the characters sent to the printer port are |
| National Only | 7-bit ASCII or national replacement characters only |
| Natl/Line Draw | 7-bit line-drawing characters as well as ASCII or national replacement characters |
| All | All characters (both 7- and 8-bit) |

* Select the setting according to the type of characters supported by your printer.

**Table 2-6 Keyboard 1 Setup Parameters**

| Parameter | Explanation |
|---|---|
| Lock= | When [Lock] is engaged, |
| Caps | Alphabetic keys display uppercase characters; number and symbol keys are unaffected |
| Reverse | The action of [Shift] is reversed so shifted alphabetic keys display lowercase characters and unshifted alphabetic keys generate uppercase characters |
| Shift | Alphabetic keys display uppercase characters; number and symbol keys display the upper characters shown on the keys |
| Key Repeat= | When held down for more than half a second, the keys |
| On | Repeat |
| Off | Do not repeat |
| Keyclick= | Each time a key is pressed or repeated, |
| On | A muted beep sounds |
| Off | No sound is made |
| Margin Bell= | The terminal's bell |
| Off | Doesn't ring when the cursor approaches the right margin |
| On | Rings when the cursor reaches the column where the margin bell is set (column 72 in 80-column mode, column 124 in 132-column mode) |
| Warning Bell= | The terminal's bell |
| On | Rings when the terminal receives the appropriate command |
| Off | Doesn't ring |

**Table 2-6 Keyboard 1 Setup Parameters, Continued**

| Parameter | Explanation |
|---|---|
| Break Key=* | F5 sends |
| On | A break signal when pressed |
| Off | No break signal |
| Compose= | Compose Character performs one of the following functions: |
| Compose Char | When pressed in sequence with certain other keys, composes nonstandard characters |
| Meta | When pressed simultaneously with another key, sends the other key's code with the high bit set |
| Keypad Compose | When pressed simultaneously with one or more number keys on the numeric keypad, composes the hexadecimal equivalent of the decimal number entered |
| Off | None (disabled) |
| Shift , and . Key= | When shifted, the comma and period keys send |
| , and . | Comma and period characters |
| < and > | Less than (<) and greater than (>) characters |
| ⌫ Key= | The unshifted ⌫ key sends a |
| DEL/CAN | Delete character (DEL); the shifted key sends a cancel character (CAN) |
| BS/DEL | Backspace character (BS); the shifted key sends a delete character (DEL) |
| < and > Key= | The unshifted key sends |
| < and > | A less than character (<); the shifted key sends a greater than (>) character |
| ` and ~ | An accent grave character (`); the shifted key sends a tilde character (~) |
| ` and ~ Key= | The unshifted key sends |
| ` and ~ | An accent grave character (`); the shifted key sends a tilde character (~) |
| ESC | An escape character (ESC); the shifted key sends the same |

* When a modem is connected, pressing Shift F5 causes a communications disconnect regardless of this setting.

**Table 2-7 Keyboard 2 Setup Parameters**

| Parameter | Explanation |
|---|---|
| Keypad=[1] | The numeric keypad keys send |
| Numeric | Numeric or other codes according to the characters on the keycaps |
| Application | Application-specific control codes and escape sequences |

1. Setting cannot be saved in nonvolatile memory. Parameter always returns to default setting at power on.

**Table 2-7 Keyboard 2 Setup Parameters, Continued**

| Parameter | Explanation |
|---|---|
| Cursor Keys=[1] | The cursor keys send |
| Normal | Normal cursor movement commands |
| Application | Application-specific control codes and escape sequences |
| Fkey Definition Lock= | The shifted programmable function key definitions ([F6]-[F20]) |
| Off | Can be redefined by host application programs |
| On | Cannot be redefined by the host |
| Keyboard=[2] | Choose the setting that matches your keyboard language. |
| North American | |
| British | |
| Flemish | |
| French Canadian | |
| Danish | |
| Finnish | |
| German | |
| Dutch | |
| Italian | |
| Swiss (French) | |
| Swiss (German) | |
| Swedish | |
| Norwegian | |
| French/Belgian | |
| Spanish | |
| Portuguese | |
| Keys=[3] | Keys with two sets of legends send |
| Typewriter | Typewriter characters corresponding to the legend on the left side of the key |
| Data Processing | Data processing characters corresponding to the legend on the right side of the key |
| National Mode= | 8-bit characters are |
| Off | Processed normally (multinational mode) |
| On | Translated to 7-bit national replacement characters based on the keyboard language selected by the Keyboard parameter |

2. Most settings displayed only on international model.
3. International model only.

## SETTING TAB STOPS

By default, tab stops are set every eight columns across the screen, starting at column nine. On the tabs setup screen, the terminal's current tab stops are indicated by uppercase T's displayed along a line of periods that mark each column position.

- A tab stop in columns 1 through 78 is shown as a T in the upper line of periods.
- A tab stop in columns 79 through 132 is shown as a T in the lower line of periods.

Set or clear tabs anywhere on the line, as follows:

- To move the cursor across the line, press [▶] or [◀]
- To either clear or set (toggle) an individual tab stop at the cursor position, press [Enter] or [Spacebar]
- To clear all tab stops, press [⌫]
- To restore all default tab stops, press [Tab]

## DEFINING THE ANSWERBACK MESSAGE

From the answerback setup screen you can program a message of up to 30 characters to identify the terminal to the computer. Enter the message at the cursor position. Correct errors by pressing [⌫] to delete characters or [Shift] [⌫] to clear the message.

The message is sent to the computer when

- The terminal receives an ASCII ENQ character from the host
- [F5] is pressed with both [Ctrl] and [Shift] held down
- A communication reset occurs when the Auto Answerback parameter is set to *on*

To conceal the anwerback message, keeping it from being displayed in setup mode, press [Enter]. The answerback message is replaced by the word *<Concealed>*. The message cannot be redisplayed or modified until you clear it by pressing [Shift] [⌫].

To save the answerback message, press [F4] to exit setup mode.

## REDEFINING THE FUNCTION KEYS

You can program function keys [F6] through [F20], shifted and unshifted, to send multiple characters with one keystroke. You can define a unique character string of up to 255 characters. The warning bell rings if the number of characters is exceeded.

If the unshifted function keys have not been redefined, they transmit a set of standard default codes (see Appendix D). The shifted function keys do not transmit any code unless they have been redefined.

**Caution** Applications that have defined actions for the function keys may not run properly if you redefine these keys. If you encounter a problem, you can restore the default codes by selecting the Restore Defaults function on the setup directory screen.

## Fkeys Setup Screen

To redefine a key, press [F14] to display the function keys setup screen, and follow these steps:

1. Select the key ([F6] through [F20]) to be redefined by pressing that key together with [Ctrl].
2. Press [▲] or [▼] to highlight the unshifted or shifted key definition field.
3. Enter the key definition at the cursor position. Correct errors by pressing [⌫] to delete characters or [Shift] [⌫] to clear the definition.

## Example

To program [F7] (shifted) to send the command DIR CR to display a disk directory follow these steps:

1. Press [F3] to enter setup mode.
2. Press [F14] to display the FKEY screen.
3. Press [Ctrl] [F7].
4. Press [▲] to highlight the shifted key field.
5. Type the command:

   **DIR**

6. To enter the CR control code, press [Ctrl] [M] or [Return].
7. Press [F4] to exit setup mode and save the key definition.

Now to display the directory you can press [Shift] [F7] instead of having to type the command.

## Saving the Definitions

To save key definitions in nonvolatile memory, press [F4] to exit setup mode. Key definitions occupy 512 bytes of nonvolatile memory space. If you enter more than the allowed 255 characters for any one key or reach the 512-character overall limit, you'll hear a warning beep and won't be able to enter more characters.

# 3 Controlling the Keyboard

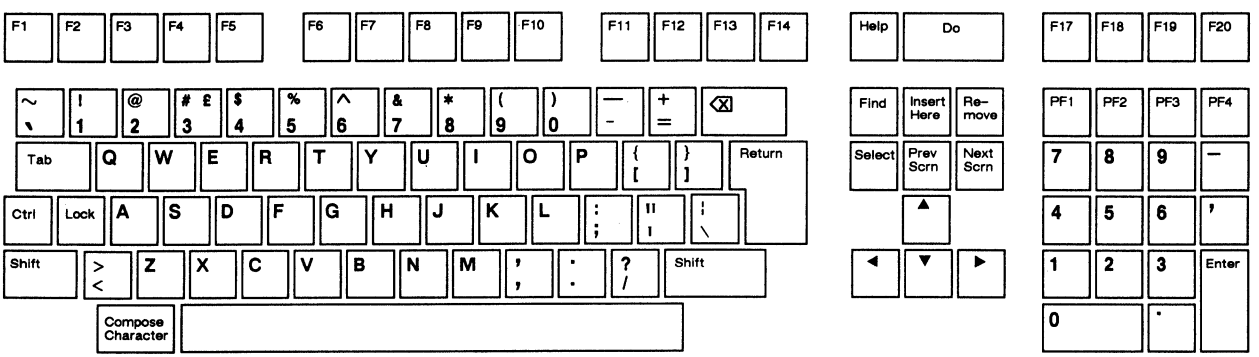
## KEYBOARD DESCRIPTION

The keyboard (Figure 3-1) has four key groups:

- The *main keypad* includes the standard alphanumeric and punctuation keys found on a typewriter keyboard, as well as some special keys. When pressed together with Ctrl, many of the letters and symbols send operating commands (control codes) that direct the system to perform special functions.
- The *editing keypad* includes cursor keys and special editing keys whose functions are defined by your application program.
- The *numeric keypad* includes numeric and arithmetic symbol keys, which are positioned like those of a 10-key calculator, and four PF (*private function*) keys. The functions of the PF keys are always defined by your application program.

  Most of the *top row function keys* are user-definable or have application-assigned functions. F1 through F5 perform predefined functions that cannot be modified.

**Figure 3-1 Keyboard Layout**




☐ **Note** International keyboard layouts are shown in Appendix F.

## KEY FUNCTIONS

When the terminal is communicating with the computer (on-line mode), most keys perform *remote* functions. That is, they send codes that are interpreted and acted upon by the computer's operating system and your application program.

- The alphanumeric keys send the standard ASCII characters shown on the keycaps.
- The codes sent by the other keys depend on the terminal's current personality and on the settings of some of the keyboard setup mode parameters. Appendix D lists the key codes of these other keys.

Certain keys and key combinations perform *local* command functions that initiate actions by the terminal. For example, [▶], pressed with [Ctrl], turns the local status line display on and off. The local keyboard commands are listed in Appendix C. Several keys have special functions when the terminal is in setup mode.

### Main Keypad

Table 3-1 lists the functions of the special keys on the main keypad.

**Table 3-1 Main Keypad Key Functions**

| Key | Description |
|---|---|
| [Compose Character] | Allows you to display many nonstandard characters that don't appear on your keyboard (see Chapter 4). |
| [Ctrl] | Pressed by itself, has no effect. Pressed simultaneously with another key, sends a control code that can cause the terminal to take special action. |
| [⌫] | When the ⌫ Key setup parameter is set to *DEL/CAN*, sends the DEL (delete) character. Pressed with [Shift], sends the ASCII CAN (cancel) character.<br>When the ⌫ Key setup parameter is set to *BS/DEL*, sends the BS (backspace) character. This usually moves the cursor left one position. Pressed with [Shift], sends the DEL character.<br>The precise effect of these codes depends on your application program. |
| [Lock] | Acts as a caps lock, shift lock, or reverse shift lock key depending on the setting of the Lock setup parameter (see Table 2-6 in Chapter 2). |

**Table 3-1 Main Keypad Key Functions, Continued**

| Key | Description |
|---|---|
| [Return] | Sends the ASCII carriage return character (CR). If the Newline setup parameter is set to *on*, sends a linefeed (LF) character also. In most applications, pressing this key moves the cursor to the start of the next line or signals that the entry of a command has been completed. |
| [Shift] | Pressed simultaneously with another key, selects the upper character shown on the key, capitalizes alphabetic characters, and causes the top-row function keys to send their shifted definitions. |
| [Tab] | Sends the ASCII horizontal tab character HT, which usually moves the cursor to the next tab stop on the line. |

## Editing Keypad

The functions of the editing keys are defined by your application program. When pressed with [Shift] or [Ctrl], several of them have local command functions (see Appendix C). Normally, the cursor keys move the cursor in the direction of the arrow.

## Numeric Keypad

The functions of the number and arithmetic symbol keys depend on the setting of the Keypad setup parameter: In numeric mode the keys provide a convenient way of entering numeric data; [Enter] works like [Return]. In application mode, key functions are determined by your application program.

The PF (private function) keys always send predefined program sequences specific to your application program.

## Top-Row Function Keys

Function keys [F1] through [F5] perform predefined functions which you cannot change and which are independent of your application program. Table 3-2 describes these functions.

The remaining top-row function keys ([F6] through [F14], [Help], [Do], and [F17] through [F20]) are application- or user-definable. See "Redefining the Function Keys" in Chapter 2 for a discussion of how to redefine these keys to send unique character strings.

☐ **Note** In VT100 personality, [F11], [F12], [F13], and [F14] are not redefinable; they send the predefined codes indicated on the

keyboard legend strip (see Table D-5 in Appendix D). In VT320 and VT220 personalities, the functions of these keys are often defined by application programs.

**Table 3-2 F1 Through F5 Functions**

| Key | Function | Description |
|---|---|---|
| F1 | Hold | If Xon/Xoff handshaking is enabled, freezes the data on the screen, suspending data transmission until the key is pressed again. |
| F2 | Local Print | Sends the data on the current page (from the cursor position to the end of the page) to the printer port (page print). |
| F3 | Reset/Setup | Unshifted, puts the terminal in setup mode. When pressed with Shift, causes the terminal to reset all terminal modes and error conditions (soft reset). |
| F4 | Switch | Turns local mode on and off. |
| F5 | Break | When the terminal is in on-line mode, sends a break signal to the host port (see Chapter 5). |

## Typewriter and Data Processing Keys

On some international keyboards certain keys have three or four characters on the keycap. Normally, pressing the key invokes the characters on the left half of the keycap, called *typewriter characters*. The characters on the right half of the key are called *data processing* characters. To access the data processing characters, change the setting of the Keys setup parameter to *data processing*.

# 4 Controlling the Display

## CHARACTER SETS

Individual characters to be displayed on the screen are stored in the terminal's memory in predefined *character sets*, which are made available for display according to commands sent from the keyboard or from a host application program. In addition, application programs can define their own *softfont* character sets for special purposes.

The terminal's predefined character sets are illustrated at the end of Table E-1 in Appendix E (Figure E-1).

The setting of the National Mode setup parameter (Keyboard 2 setup screen) defines the *character set mode*: multinational mode (*off*) or national mode (*on*). In multinational mode, both 7- and 8-bit character sets are available; national mode supports only 7-bit characters.

## Multinational Mode

In the terminal's default *multinational mode* two character sets are available in setup mode: the Multinational set and the ISO Latin-1 set (International Standards Organization 8859-1 Latin Alphabet Number 1). The setting of the Character Set parameter (General setup screen) determines which set is active.

Each of these character sets includes a 7-bit character set and a supplemental 8-bit set. The only difference between the two is their supplemental 8-bit set.

### 7-Bit Characters

The 7-bit characters that are included in both the Multinational and the ISO Latin-1 character set are determined by the keyboard language selected by the Keyboard setup parameter (Keyboard 2 setup screen).

- In the default North American keyboard language, the 7-bit character set is the ASCII (American Standard Code for

Information Interchange) set, containing the letters, numbers, and punctuation for English-speaking countries.

- If you have selected any other keyboard language, the ASCII character set is modified by certain replacement characters for that language. The terminal supports 15 of these 7-bit sets, called *National Replacement Character* (NRC) sets.

Table 4-1 lists the characters in each NRC set that are different from the ASCII set.

**Table 4-1 National Replacement Characters**

| Keyboard Language / ASCII Hex | # (23H) | @ (4OH) | [ (5BH) | \ (5CH) | ] (5DH) | ^ (5EH) | _ (5FH) | ` (6OH) | { (7BH) | \| (7CH) | } (7DH) | ~ (7EH) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Danish | | | Æ | Ø | Å | | | | æ | ø | å | |
| Dutch | £ | ¾ | ij | ½ | \| | | | | ¨ | ƒ | ¼ | ´ |
| Finnish | | | Ä | Ö | Å | Ü | | é | ä | ö | å | ü |
| Flemish | £ | à | ° | ç | § | | | | é | ù | è | ¨ |
| French | £ | à | ° | ç | § | | | | é | ù | è | ¨ |
| French Canadian | | à | â | ç | ê | î | | ô | é | ù | è | û |
| German | | § | Ä | Ö | Ü | | | | ä | ö | ü | ß |
| Italian | £ | § | ° | ç | é | | | ù | à | ò | è | í |
| Norwegian | | | Æ | Ø | Å | | | | æ | ø | å | ì |
| Portuguese | | | Ã | Ç | Õ | ^ | | ` | ã | ç | õ | |
| Spanish | £ | § | ¡ | Ñ | ¿ | | | | º | ñ | ç | |
| Swedish | | É | Ä | Ö | Å | Ü | | é | ä | ö | å | ü |
| Swiss(Fr/Ger) | ù | à | é | ç | ê | î | è | ô | ä | ö | ü | û |
| United Kingdom | £ | | | | | | | | | | | |

### 8-Bit Characters

The supplemental 8-bit character set is selected by the setting of the Character Set setup parameter (General setup screen).

- The Multinational supplemental character set contains most of the characters found in the European languages, as well as special symbols, such as the copyright symbol (©). This is the default supplemental set.

- The ISO Latin-1 supplemental character set follows the standard defined by the International Standards Organization (ISO). It contains most of the same characters as the Multinational supplemental set and some additional characters.

### National Mode

In *national mode* (National Mode setup parameter set to *on*) the terminal supports only the 7-bit NRC set defined by the Keyboard setup parameter. In national mode 8-bit characters are not recognized.

### Control Characters

The terminal also has two *control character* sets—a 7-bit control set (C0) and an 8-bit control set (C1)—for displaying graphic representations of the terminal's control codes. Control codes cause the terminal to take specific actions.

Normally, the terminal does not display control characters but only interprets them as actions to be executed. However, when the Controls setup parameter (Display setup screen) is set to *display*, the terminal displays symbolic representations of these characters instead of interpreting them. This is useful for programmers when they are debugging programs.

The control characters recognized by the terminal are listed in Tables E-3 and E-4 in Appendix E.

## COMPOSING CHARACTERS

You can compose many of the 8-bit characters not normally available on your keyboard by entering *compose sequences*. You enter a compose sequence at the keyboard by pressing either two or three keys:

- In multinational mode, you can compose characters with a three-key sequence in any keyboard language. The characters you can compose with a two-key sequence depend on the keyboard language you have selected.
  - A three-key sequence is entered by pressing Compose Character and two additional keys.
  - A two-key sequence is entered by pressing a nonspacing diacritical mark and one additional key. Table 4-2 lists the keyboard languages that support diacritical marks.
- In national mode, the characters you can compose with either a three-key or two-key sequence depend on your keyboard language.

**Table 4-2 Nonspacing Diacritical Marks in Multinational Mode**

| Keyboard Language | Grave Accent | Acute Accent | Circumflex Accent | Tilde | Umlaut |
|---|---|---|---|---|---|
| Flemish | ` | | ^ | ~ | ¨ |
| Finnish | ` | | ^ | ~ | |
| French/Belgian | ` | | ^ | ~ | ¨ |
| French Canadian | ` | | ^ | ~ | |
| German | ` | ´ | ^ | ~ | |
| Italian | ` | | ^ | ~ | |
| Portuguese | ` | ´ | ^ | ~ | |
| Spanish | ` | ´ | ^ | ~ | ¨ |
| Swedish | ` | | ^ | ~ | |
| Swiss (Fr/Ger) | ` | | ^ | ~ | ¨ |

To compose a character with a three-key sequence, the Compose setup parameter (Keyboard 1 setup screen), which controls the function of [Compose Character], must be set to *compose char*.

☐ **Note** When the Compose setup parameter (Keyboard 1 setup screen) is set to *keypad compose*, you can send the hexadecimal equivalent for any character in the character sets by holding down [Compose Character] and entering the decimal value of the character on the numeric keypad. The character displays on the screen when [Compose Character] is released. The character set illustrations in Appendix E show the decimal and hexadecimal values for the characters.

## Canceling a Sequence

When you begin a compose character sequence, *COMP* appears on the (local) status line. The *COMP* message turns off when you complete the sequence. If you enter an invalid character during the sequence the warning bell sounds and the sequence is canceled.

You can cancel a compose character sequence at any time by pressing [⌫].

## Composing Characters in Multinational Mode

Table 4-3 lists the characters you can compose in multinational mode. To compose a character with a three-key sequence,

1 Find the character you want to compose in the first column of the table.

2 Press and release [Compose Character].

3 Enter the two characters listed in the column headed "Three-Key Sequence." The two characters can be entered in either order.

For example, to compose the copyright symbol (©), press and release [Compose Character], then press [C] and [O].

To compose a character with a two-key sequence,

1 Find the character you want to compose in the first column of Table 4-3.

2 If a sequence is listed in the "Two-Key Sequence" column, and your keyboard language supports the indicated diacritical mark (see Table 4-2), enter the characters *in the order shown*.

For example, to compose à on the Italian keyboard, press [`] first and then [a].

☐ **Note** Characters from the ISO Latin-1 supplemental character set are listed separately at the end of Table 4-3. You can compose these characters only when *ISO Latin-1* is selected in setup mode (Character Set parameter on the General setup screen).

## Composing Characters in National Mode

When the terminal is in national mode, the characters you can compose depend on your keyboard language. Table 4-4 lists the characters you can compose in each keyboard language. (The table includes only those characters that do not appear on the keyboard itself.)

**Table 4-3 Compose Character Sequences: Multinational Mode**

| Composed Character | Description | 3-Key[1] Sequence | 2-Key[2] Sequence | Composed Character | Description | 3-Key[1] Sequence | 2-Key[2] Sequence |
|---|---|---|---|---|---|---|---|
| " | Quotation mark | SP " | ·· SP | © | Copyright [3] | C O | |
| # | Number/pound | + + | | a | Feminine ordinal[3] | A _ | |
| ' | Apostrophe | SP ' | ´ SP | « | Left angle brackets | < < | |
| @ | At[3] | A A | | ° | Degree | 0 ^ | |
| [ | Left bracket | ( ( | | | | SP * | |
| \ | Backslash | / / | | ± | Plus or minus | + _ | |
| | | / < | | ² | Superscript 2 | 2 ^ | |
| ] | Right bracket | ) ) | | ³ | Superscript 3 | 3 ^ | |
| ^ | Circumflex | SP ^ | ^ SP | µ | Micro[3] | / U | |
| ` | Grave accent | SP ` | ` SP | ¶ | Paragraph[3] | P ! | |
| { | Left brace | ( - | | · | Middle dot | ^ . | |
| ¦ | Pipe | / ^ | ^ / | ¹ | Superscript 1 | 1 ^ | |
| } | Right brace | ) - | | º | Masculine ordinal[3] | O _ | |
| ~ | Tilde | SP ~ | ~ SP | » | Right angle brackets | > > | |
| ¡ | Inverted ! | ! ! | | ¼ | One-fourth[2] | 1 4 | |
| ¢ | Cent[3] | C / | | ½ | One-half[2] | 1 2 | |
| | | C \| | | ¿ | Inverted ? | ? ? | |
| £ | Pound[3] | L - | | À | A grave | A ` | ` A |
| | | L = | | Á | A acute | A ´ | ´ A |
| ¥ | Yen[3] | Y - | | Â | A circumflex | A ^ | ^ A |
| | | Y = | | Ã | A tilde | A ~ | ~ A |
| § | Section[3] | S ! | | Ä | A umlaut | A " | ·· A |
| | | S O | | Å | A ring | A * | ° A |
| ¤ | Currency[3] | X O | | | | | |

1. First press Compose Character.
2. Press keys in the order shown.
3. Alphabetic characters can be entered in uppercase or lowercase.

**Table 4-3 Compose Character Sequences: Multinational Mode, Continued**

| Composed Character | Description | 3-Key[1] Sequence | 2-Key[2] Sequence | Composed Character | Description | 3-Key[1] Sequence | 2-Key[2] Sequence |
|---|---|---|---|---|---|---|---|
| Æ | AE ligature[2] | A E | | à | a grave | a ` | ` a |
| Ç | C cedilla | C , | | á | a acute | a ´ | ´ a |
| È | E grave | E ` | ` E | â | a circumflex | a ^ | ^ a |
| É | E acute | E ´ | ´ E | ã | a tilde | a ~ | ~ a |
| Ê | E circumflex | E ^ | ^ E | ä | a umlaut | a " | ¨ a |
| Ë | E umlaut | E " | ¨ E | å | a ring | a * | o a |
| Ì | I grave | I ` | ` I | æ | ae ligature[2] | a e | |
| Í | I acute | I ´ | ´ I | ç | c cedilla | c , | |
| Î | I circumflex | I ^ | ^ I | è | e grave | e ` | ` e |
| Ï | I umlaut | I " | ¨ I | é | e acute | e ´ | ´ e |
| Ñ | N tilde | N ~ | ~ N | ê | e circumflex | e ^ | ^ e |
| Ò | O grave | O ` | ` O | ë | e umlaut | e " | ¨ e |
| Ó | O acute | O ´ | ´ O | ì | i grave | i ` | ` i |
| Ô | O circumflex | O ^ | ^ O | í | i acute | i ´ | ´ i |
| Õ | O tilde | O ~ | ~ O | î | i circumflex | i ^ | ^ i |
| Ö | O umlaut | O " | ¨ O | ï | i umlaut | i " | ¨ i |
| Œ | OE ligature[2] | O E | | ñ | n tilde | n ~ | ~ n |
| Ø | O slash | O / | | ò | o grave | o ` | ` o |
| Ù | U grave | U ` | ` U | ó | o acute | o ´ | ´ o |
| Ú | U acute | U ´ | ´ U | ô | o circumflex | o ^ | ^ o |
| Û | U circumflex | U ^ | ^ U | õ | o tilde | o ~ | ~ o |
| Ü | U umlaut | U " | ¨ U | ö | o umlaut | o " | ¨ o |
| Ÿ | Y umlaut | Y " | ¨ Y | œ | oe ligature[2] | o e | |
| ß | German double s | s s | | ø | o slash | o / | |

1. First press Compose Character.
2. Press keys in the order shown.

**Table 4-3 Compose Character Sequences: Multinational Mode, Continued**

| Composed Character | Description | 3-Key[1] Sequence | 2-Key[2] Sequence | Composed Character | Description | 3-Key[1] Sequence | 2-Key[2] Sequence |
|---|---|---|---|---|---|---|---|
| ù | u grave | u ` | ` u | ü | u umlaut | u " | " u |
| ú | u acute | u ' | ' u | ÿ | y umlaut | y " | " y |
| û | u circumflex | u ^ | ^ u | | | | |
| **ISO Latin-1 Characters** | | | | | | | |
| | No break space | SP SP | | ´ | Acute accent | ´ ´ | |
| ¦ | Pipe | \| \| | | ¸ | Cedilla | , , | |
| | | ! ^ | | ¨ | Diaeresis (umlaut) | " " | ¨ SP |
| ¬ | Logical not[2] | - , | | Ý | Y acute | Y ' | ' Y |
|  | Soft (syllable) hyphen | - - | | ý | y acute | y ' | ' y |
| ® | Registered trademark | R O | | Þ | Capital Icelandic thorn | T H | |
| ¯ | Macron | - ^ | | þ | Small Icelandic thorn | t h | |
| ¾ | Three-fourths [2] | 3 4 | | Ð | Capital Icelandic Eth | - D | |
| ÷ | Division sign | - : | | ð | Small Icelandic Eth | - d | |
| × | Multiplication sign | x x | | | | | |

1. First press Compose Character
2. Press keys in the order shown.

**Table 4-4 Compose Character Sequences: National Mode**

| Composed Character | Description | 3-Key[1] Sequence | 2-Key[2] Sequence | Composed Character | Description | 3-Key[1] Sequence | 2-Key[2] Sequence |
|---|---|---|---|---|---|---|---|
| **North American/British Keyboard** | | | | | | | |
| £ | Pound [3] | - L | | | | | |
| | | = L | | | | | |
| **Danish Keyboard** | | | | | | | |
| # | Number/pound | + + | | @ | At | A A | |
| **Dutch Keyboard** | | | | | | | |
| £ | Pound [3] | - L | | ¾ | Three-fourths [2] | 3 4 | |
| | | = L | | ij | i j sign [2] | i j | |
| ¼ | One-fourth [2] | 1 4 | | ƒ | Florin [2] | f - | |
| ½ | One-half [2] | 1 2 | | ¦ | Pipe | / ^ | |
| **Finnish Keyboard** | | | | | | | |
| # | Number/pound | + + | | é | e acute | ' e | |
| **Flemish Keyboard** | | | | | | | |
| £ | Pound [3] | - L | | ` | Grave accent | ` SP | |
| | | = L | | ^ | Circumflex | ^ SP | |
| **French/Belgian Keyboard** | | | | | | | |
| £ | Pound [3] | - L | | ` | Grave accent | ` SP | |
| | | = L | | ^ | Circumflex | ^ SP | |
| **French (Canadian) Keyboard** | | | | | | | |
| à | a grave | ` a | ` a | î | i circumflex | ^ i | ^ i |
| â | a circumflex | ^ a | ^ a | ô | o circumflex | ^ o | ^ o |
| è | e grave | ` e | ` e | ù | u grave | ` u | ` u |
| é | e acute | ' e | | û | u circumflex | ^ u | ^ u |
| ê | e circumflex | ^ e | ^ e | | | | |

1. First press Compose Character.
2. Press keys in the order shown.
3. Alphabetic keys can be entered in uppercase or lowercase.

**Table 4-4 Compose Character Sequences: National Mode, Continued**

| Composed Character | Description | 3-Key[1] Sequence | 2-Key[2] Sequence | Composed Character | Description | 3-Key[1] Sequence | 2-Key[2] Sequence |
|---|---|---|---|---|---|---|---|
| **German Keyboard** | | | | | | | |
| ´ | Acute accent | ´ SP | ´ SP | ` | Grave accent | ` SP | ` SP |
| **Italian Keyboard** | | | | | | | |
| ^ | Circumflex | ^ SP | ^ SP | | | | |
| **Norwegian Keyboard** | | | | | | | |
| # | Number/pound | + + | | @ | At[2] | A A | |
| **Portuguese Keyboard** | | | | | | | |
| ' | Apostrophe | ' SP | ' SP | Ã | A tilde | A ~ | |
| ^ | Circumflex | ^ SP | ^ SP | Õ | O tilde | O ~ | |
| ` | Grave accent | ` SP | ` SP | ã | a tilde | a ~ | |
| ´ | Acute accent | ´ SP | ´ SP | õ | o tilde | o ~ | |
| ~ | Tilde | ~ SP | | | | | |
| **Spanish Keyboard** | | | | | | | |
| £ | Pound[3] | - L | | § | Section[2] | S O | |
| | | = L | | | | ! S | |
| º | Degree | ^ 0 | | ª | Circumflex | ^ SP | ^ SP |
| ` | Grave accent | ` SP | ` SP | ~ | Tilde | ~ SP | ~ SP |
| **Swedish Keyboard** | | | | | | | |
| # | Number/pound | + + | | é | e acute | ´ e | |
| É | E acute | ´ E | | | | | |
| **Swiss (French) and Swiss (German) Keyboards** | | | | | | | |
| ê | e circumflex | ^ e | ^ e | ù | u grave | ` u | ` u |
| î | i circumflex | ^ i | ^ i | û | u circumflex | ^ u | ^ u |
| ô | o circumflex | ^ o | ^ o | | | | |

1. First press Compose Character
2. Press keys in the order shown.
3. Alphabetic keys can be entered in uppercase or lowercase.

# 5 Communications

## ON-LINE COMMUNICATIONS

The terminal must be in on-line mode (On-Line/Local setup parameter on the General setup screen) to communicate with a host computer, or other externally connected device. Successful communication also depends on the correct setting of the setup parameters on the COMM and Printer setup screens, such as baud rate, data bits, and stop bits (see Chapter 2).

## Communications Modes

In on-line mode, the terminal communicates with the host according to the setting of the Local Echo setup parameter.

- When the Local Echo parameter is set to *off* (default), the communications mode is called *full-duplex*. This means that data sent by the terminal is not displayed on the screen unless the host echoes it. In practice, most application programs do instruct the host to echo the data to the screen for the user to monitor.
- Setting the Local Echo parameter to *on* puts the terminal in *half-duplex* communications mode, where keyboard data is sent to the screen at the same time as to the host. Half-duplex mode should not be selected unless required—characters will display twice if the host application also echoes the data to the screen.

## Handshaking

*Handshaking* is an exchange of signals between the terminal and external devices to ensure an orderly flow of data over the cable lines. The terminal and the computer, for example, both store incoming and outgoing data in receive and transmit buffers. To prevent loss of data should these buffers become full, they send handshaking signals to indicate when they are ready or not ready to send or receive more data.

The type of handshaking signal sent and recognized by the terminal is selected by the setting of the Handshake parameter on the COMM and Printer setup screens. The device connected

to the port must be able to recognize the type of handshaking selected.

☐ **Note** Some type of handshaking is always recommended to ensure against loss of data. It is especially critical at baud rates of 19200 or greater or when smooth scrolling is enabled (Scroll setup parameter).

### Host Port Handshaking

When Xon/Xoff handshaking is selected, the terminal regulates the flow of data through the host port by sending and responding to software control codes. The terminal sends a DC3 character (Xoff) to tell the host to stop sending data and a DC1 character (Xon) when it's ready to receive data again, Similarly, the terminal stops sending data when it receives an Xoff control code from the host and resumes transmission on receipt of an Xon control code.

When DTR (hardware) handshaking is selected, the flow of data between the terminal and the host is regulated by the raising and lowering of the voltage on the DTR (Data Terminal Ready) line. The terminal lowers the voltage to signal the host to stop sending data and raises it again to signal readiness to receive.

### Printer Port Handshaking

When Xon/Xoff handshaking is selected for the printer port, the printer regulates the flow of data from the terminal by sending a DC3 character (Xoff) to tell the terminal to stop sending data and a DC1 character (Xon) when it's ready to receive data again.

When DSR handshaking is selected, the terminal stops sending data to the printer in response to a lowering of the voltage on the terminal's DSR (Data Set Ready) line and resumes transmission when a rise in voltage signals that the printer is ready to receive data again.

☐ **Note** When the Print Data to Host parameter in setup mode is set to *on*, DTR handshaking automatically supersedes any handshaking protocol selected in setup mode. In DTR handshaking, the terminal regulates the flow of data from the printer by raising and lowering the voltage on the DTR (Data Terminal Ready) line.

## Modem Connections

When connected to the host through a modem, the terminal establishes communication by performing the following actions to ensure it is ready to send and receive data:

- Unlocks keyboard
- Clears any data transmission in progress
- Clears the keyboard and receive buffers
- Clears Xoff handshaking codes
- Sends answerback message if Auto Answerback setup parameter is set to *on*.

The letters *DSR* appear on the (local) status line when the modem is ready for operation.

## Disconnections and Break Operations

The terminal disconnects from the host system

- When you invoke the Restore Last Saved or Restore Defaults functions from the setup directory screen in setup mode
- When modem control mode is on and the terminal detects a lowering of the DSR line
- When modem control mode is on and the terminal doesn't detect a raising of the RLSD line within 30 seconds after the DSR line goes high
- When modem control mode is on and the terminal detects a lowering of the RLSD line for the period of time selected by the Disconnect Delay parameter in setup mode
- When you press [Shift] [F5] (regardless of the Break Key parameter setting in setup mode)

[F5] performs the following communication functions unless it has been disabled in setup mode (Break Key parameter set to *off*):

- Suspends communication with the host by lowering the TXD (transmit data) line for 250 milliseconds
- When pressed together with [Shift], suspends communication with a modem by lowering the RTS (request to send) line for two seconds, regardless of the Break Key parameter setting
- When pressed together with [Ctrl] and [Shift], sends the answerback message to the host

## PRINTING

This section describes print operations when a serial printer is connected to the printer port. Successful communication depends on the correct setting of the setup parameters on the Printer setup screen, such as baud rate, data bits, and stop bits (Chapter 2).

### Print Modes

The terminal has three print modes, selectable by the Print Mode setup parameter:

- In *normal* mode, the terminal sends data from the host or from the keyboard to the printer in response to a print page or print line command. You can print the current page from the keyboard by pressing F2.
- In *autoprint* mode (sometimes called *copy print*), data from the host is received and displayed on the screen. The terminal sends each line to the printer as the cursor moves to the next line (if autowrap mode is on or in response to a linefeed [LF], form feed [FF], or vertical tab [VT] command). In autoprint mode you can still press F2 to print a page.

  You can turn autoprint mode on and off from the keyboard by pressing Ctrl F2. When autoprint mode is on, the letters *CPRT* display on the local status line.
- In *controller* print mode (sometimes called *transparent print*), data from the host is sent directly to the printer port without being displayed on the screen. You can't print a page with F2 when the terminal is in controller print mode.

  You can turn controller print on and off from the keyboard by pressing Shift F2. When controller mode is on, the letters *XPRT* display on the local status line.

### Bidirectional Communication

When the Print Data to Host parameter in setup mode is set to *on*, data can be received as well as sent through the printer port. Data received through the printer port is sent out the host port without being displayed on the screen. This mode does not affect data being sent to the printer and can be active alongside other print modes to provide two-way communication between the ports.

### Character Set Compatibility

The Print Data parameter selections in setup mode are intended to ensure that during normal print operations (page print) the terminal activates the appropriate character sets for the particular printer connected to it. Consult your printer manual for information on the type of characters supported.

Appendix

# A Installation

## ENVIRONMENTAL AND POWER REQUIREMENTS

Choose a location away from direct sunlight or other sources of bright direct lighting.

Place the terminal on a flat, hard surface, allowing three inches on all sides for ventilation and external cabling.

Check that you have a grounded power outlet that accommodates a three-pronged plug, and that your source of electricity is in the range of the voltage shown on the back of the terminal—120 V in the U.S., 240 V in many other locations.

## PORTS

You can connect the terminal directly to a host computer or indirectly to a remote system by way of a terminal server or modem. For use with applications that support it, you can also connect a serial printer directly to the terminal.

The terminal's back panel houses the power connector, two data communications ports, and a printer port. You can connect a host computer, terminal server, or modem to

- The Port A RS-232C 25-pin connector. You'll need a shielded interface cable with a 25-pin connector on the terminal end.
- The Port B 6-pin RJ-11/modified modular 423 jack. You'll need an interface cable with a 6-pin connector on the terminal end.

You can connect a serial printer to the PR port's 6-pin RJ-11/modified modular 423 jack with an interface cable having a 6-pin connector on the terminal end.

☐ **Note** The 6-pin jack on both Port B and the PR port accepts either a standard RJ-11 type of interface cable or a DEC 423-type interface cable (DEC P/N BC16E-*XX*/FP).

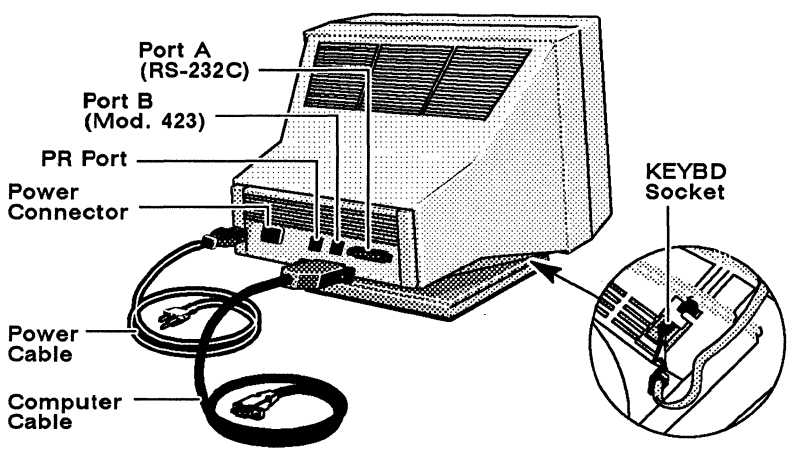
**Caution** If you are connecting the terminal to a WY-995 Multiport Adapter from Wyse Technology, use the Port A 25-pin connector. Port B should not be used unless the 6-pin interface cable has been modified for the pin assignments specified in Figure A-3.

Be sure that the pin assignments for your interface cables are compatible with those of the port to which they are connected. Pin assignments are shown in "Connector Pin Assignments" in this appendix.

## CONNECTING THE TERMINAL

To connect the terminal, refer to Figure A-1 and follow the steps below. (In the illustration, the computer is being connected to the default RS-232C host port A.)

**Figure A-1 Connecting the Terminal**




1. Make sure the power button is in the off position (not pushed in).
2. Plug the keyboard cable into the keyboard jack.
3. Connect your computer system cable to Port A (RS-232C) or Port B (RJ-11/modified modular 423).
4. If you are connecting a serial printer, connect its cable to the PR port (RJ-11/modified modular 423).
5. Connect one end of the power cable to the three-pronged power connector on the back of the terminal and plug the other end into a grounded power outlet.

## CONFIGURATION REQUIREMENTS

Only one host port can be active at a time. The default host port is Port A. If you want Port B to be the active host port, you need to set the Host Port setup parameter in setup mode to *modular 423*.

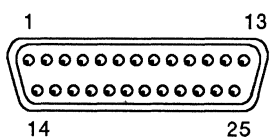
Chapter 2 describes how to enter setup mode and change the terminal's operating parameters. The following parameters on the COMM and Printer setup screens must be set to match the requirements of the devices connected to the ports: Transmit Baud Rate, Receive Baud Rate, Data/Parity Bits, Stop Bits, Handshake, and Modem Control (if a modem is connected).

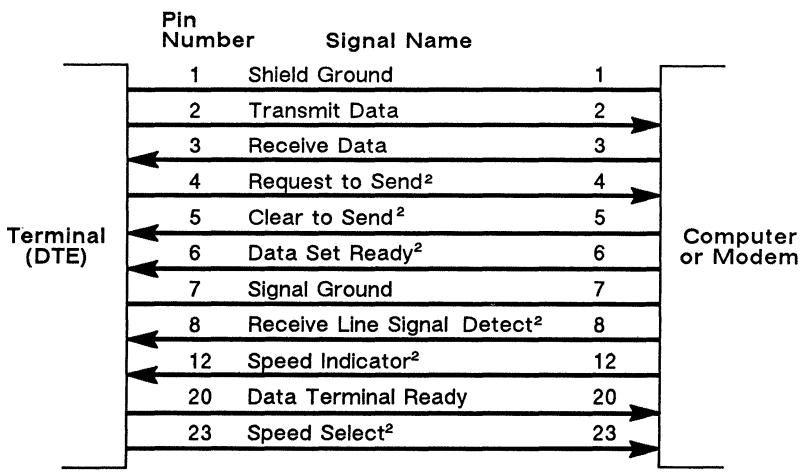
Consult your system and printer user manuals for instructions on their setup requirements.

## CONNECTOR PIN ASSIGNMENTS

Pin assignments for the ports are described in the following figures and tables.

**Figure A-2 Port A Connector Pin Assignments[1]**



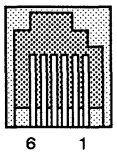

1. For most terminal-to-host connections, only pins 1, 2, 3, and 7 need to be connected if Xon/Xoff handshaking is used. Pin 20 must be connected also if DTR handshaking is used.
2. Modem protocol. Line is active only when a modem is controlling communication with the terminal (Modem Control parameter in setup mode set to on). Otherwise, input signals are ignored and output lines are held high.

**Table A-1 Port A Signals**

| Pin | Signal | Mnemonic | Description |
|---|---|---|---|
| 1 | Shield Ground | PGND | Ground to which cable shield should be connected. |
| 2 | Transmit Data | TXD | (Output) Sends serial data. Line is held high during idle, lowered during break operations. If modem control mode is on, data is sent only when DSR, CTS, and RLSD are high. |
| 3 | Receive Data | RXD<br>RTS | (Input) Receives serial data. |
| 4 | Request to Send* | RTS | (Output) Line is held high to tell the modem the terminal is ready to send data. Line is lowered for two seconds when [Shift] [F5] is pressed (break signal). |
| 5 | Clear to Send* | CTS | (Input) Terminal sends data to the modem only when this line is high. |
| 6 | Data Set Ready* | DSR | (Input) Line is held high when the modem is operational. If the line goes low, the terminal performs a communications disconnect. |
| 7 | Signal Ground | SGND | Common ground reference for all connector signals. |
| 8 | Receive Line Signal Detect* | RLSD | (Input) If line goes low for the period of time selected in setup mode (Disconnect Delay parameter), the terminal performs a communications disconnect. |
| 12 | Speed Indicator* | SPDI | (Input) Modem controls terminal send and receive speed at 1200 baud regardless of baud rate selected in setup mode. |
| 20 | Data Terminal Ready | DTR | (Output) When DTR handshake is enabled (in setup mode), line is lowered when the terminal is not ready to receive more data. |
| 23 | Speed Select* | SPDS | (Output) Line is lowered if terminal's receive baud rate (selected in setup mode) is less than 1200 baud. |

* Modem protocol. Line is active only when a modem is controlling communication with the terminal (Modem Control parameter in setup mode set to on). Otherwise, input signals are ignored and output lines are held high.

**Figure A-3 Port B Connector Pin Assignments**



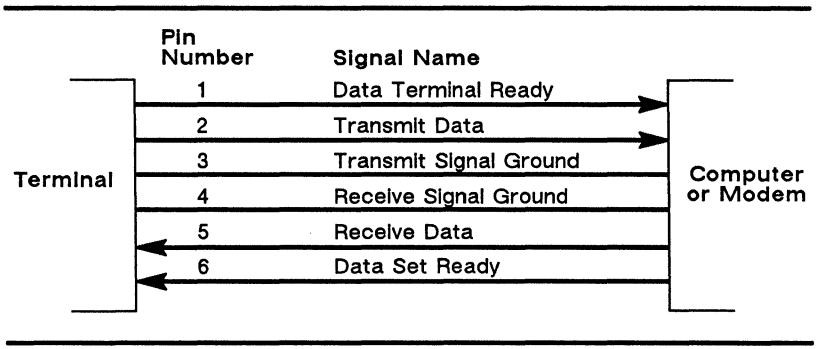
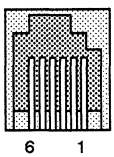




**Table A-2 Port B Signals**

| Pin | Signal | Mnemonic | Description |
|---|---|---|---|
| 1 | Data Terminal Ready | DTR | (Output) When DTR handshake is enabled in setup mode, line is lowered when the terminal is not ready to receive more data. |
| 2 | Transmit Data | TXD+ | (Output) Sends serial data. Held in the mark state when idle. |
| 3 | Transmit Signal Ground | TDX- | Common ground reference for TXD+ and DTR signals. |
| 4 | Receive Signal Ground | RXD- | Common ground reference for RXD+ and DSR signals. |
| 5 | Receive Data | RXD+ | (Input) Receives serial data. |
| 6 | Data Set Ready* | DSR | (Input) When line is low, data is not sent. When line is high, terminal performs a communications reconnect. |

* Modem protocol. Line is active only when a modem is controlling communication with the terminal (Modem Control parameter in setup mode set to on); otherwise, signal is ignored.

**Figure A-4 PR Port Connector Pin Assignments**



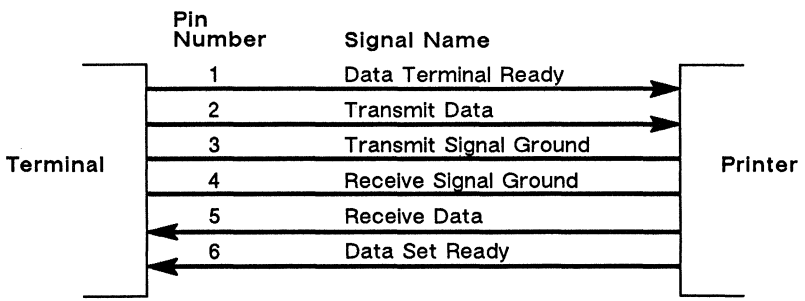




**Table A-3 PR Port Signals**

| Pin | Signal | Mnemonic | Description |
|---|---|---|---|
| 1 | Data Terminal Ready | DTR | (Output) When Print Data to Host setup parameter is set to *on*, line is lowered when the terminal is not ready to receive more data. |
| 2 | Transmit Data | TXD+ | (Output) Sends serial data. Held in mark state when idle. |
| 3 | Transmit Signal Ground | TDX- | Common ground reference for TXD+ and DTR signals. |
| 4 | Receive Signal Ground | RXD- | Common ground reference for RXD+ and DSR signals. |
| 5 | Receive Data | RXD+ | (Input) Receives serial data. |
| 6 | Data Set Ready | DSR | (Input) When printer port DSR handshake has been selected in setup mode, terminal stops sending data to the printer port when line is low and resumes transmission when line is high. |

Appendix B

# Terminal Status Messages

The terminal status messages listed in Table B-1 display when the Status Line setup parameter is set to *local*.

**Table B-1 Terminal Status Messages**

| Message | Meaning |
|---|---|
| LINE | The terminal is on-line in full-duplex mode. |
| ECHO | The terminal is on-line in half-duplex mode. |
| LOCL | The terminal is in local mode. |
| CPRT | Autoprint (copy print) mode is on. |
| XPRT | Controller (transparent) print mode is on. |
| HOLD | Data is being held on the screen (processing is suspended). |
| LOCK | Caps, shift, or reverse lock is in effect. |
| COMP | A compose character sequence is in process. |
| WAIT | Terminal transmission is suspended by the host (by sending Xoff or locking the keyboard). |
| INS | Insert mode is on. |
| * | Controls display mode is on. |
| *p* | Page number (0 or 1) is displayed (when more than one page is defined). |
| *nn-nnn* | Cursor line and column numbers are displayed. |
| PRINTER READY | Printer is ready. |
| PRINTER NOT READY | Printer is not ready. |
| NO PRINTER | Nothing is connected to the printer port. |
| DSR | Modem is ready (DSR line is high). |
| NO DSR | Modem is not ready (DSR line is low). |

Appendix C

# Local Keyboard Commands

**Table C-1 Local Keyboard Commands**

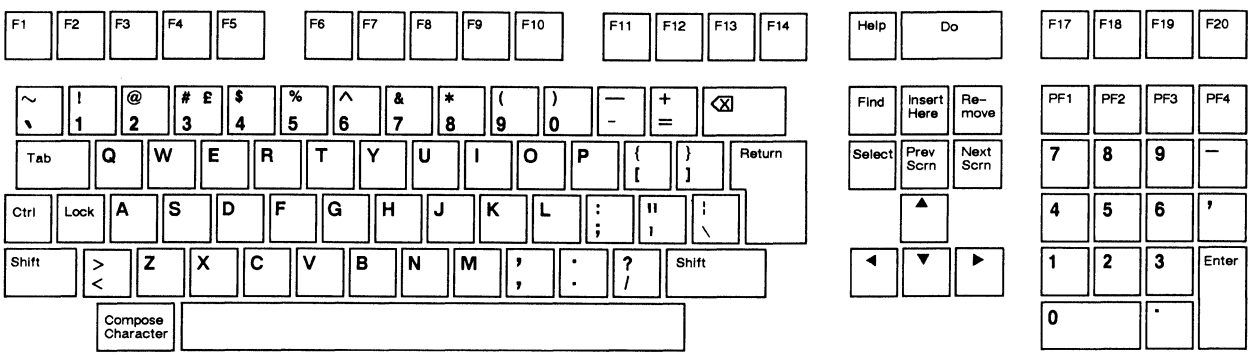
| Command | Key Sequence |
|---|---|
| Home cursor and clear screen | Ctrl Prev Screen |
| Clear from cursor to end of page | Ctrl Next Screen |
| Pan display up one line (if one 48- or 50-line page defined) | Ctrl ▲ |
| Display other page (if two 24- or 25-line pages defined) | Ctrl ▲ |
| Speed scrolling rate | Ctrl Shift ▲ |
| Slow scrolling rate | Ctrl Shift ▼ |
| Pan display down one line (if one 48- or 50-line page defined) | Ctrl ▼ |
| Display other page (if two 24- or 25-line pages defined) | Ctrl ▼ |
| Turn local status line display off/on | Ctrl ▶ |
| Turn controls display mode on/off | Ctrl ◀ |
| Turn keyclick on/off | Ctrl Enter |
| Turn hold screen mode on/off[1] | F1 |
| Print page | F2 |
| Turn autoprint mode on/off | Ctrl F2 |
| Turn controller print mode on/off | Shift F2 |
| Put terminal in setup mode | F3 |
| Perform a soft terminal reset | Shift F3 |
| Perform a hard terminal reset | Ctrl Shift F3 |
| Turn local mode on/off | F4 |
| Send break signal to host[2] | F5 |
| Suspend communication with modem (two seconds) | Shift F5 |
| Send answerback message | Ctrl Shift F5 |

1. When Xon/Xoff handshaking is enabled.
2. If terminal is in on-line mode and Break Key setup parameter is set to on.

Appendix D

# Key Codes

## Figure D-1 Keyboard Layout




## Table D-1 Editing and Special Key Codes

| Key[1] | VT320/VT220 7-Bit | VT320/VT220 8-Bit | VT100 | VT52 |
|---|---|---|---|---|
| ▲ | ESC [ A | CSI A | ESC [ A | ESC A |
| ▼ | ESC [ B | CSI B | ESC [ B | ESC B |
| ▶ | ESC [ C | CSI C | ESC [ C | ESC C |
| ◀ | ESC [ D | CSI D | ESC [ D | ESC D |
| ⌫[2] | DEL or BS | Same | Same | Same |

1. Unless otherwise noted, the shifted and unshifted key sends the same code. Codes for cursor keys apply only in normal mode.

**Table D-1 Editing and Special Key Codes, Continued**

| Key[1] | VT320/VT220 7-Bit | VT320/VT220 8-Bit | VT100 | VT52 |
|---|---|---|---|---|
| Shift ⌫[2] | CAN or DEL | Same | Same | Same |
| Find | ESC [ 1 ~ | CSI 1 ~ | | |
| Insert Here | ESC [ 2 ~ | CSI 2 ~ | | |
| Next Screen | ESC [ 6 ~ | CSI 6 ~ | | |
| Prev Screen | ESC [ 5 ~ | CSI 5 ~ | | |
| Remove | ESC [ 3 ~ | CSI 3 ~ | | |
| Return[3] | CR or CRLF | Same | Same | Same |
| Select | ESC [ 4 ~ | CSI 4 ~ | | |
| Tab→ | HT | Same | Same | Same |
| Shift Tab→ | ESC [ Z | CSI Z | ESC [ Z | HT |

2. Action or code depends on ⌫ Key parameter selection in setup mode.
3. Code depends on Newline parameter setting in setup mode.

**Table D-2 Cursor Key Application Mode Codes**

| Key | VT320/VT220 7-Bit | VT320/VT220 8-Bit | VT100 |
|---|---|---|---|
| ▲ | ESC O A | SS3 A | ESC O A |
| ▼ | ESC O B | SS3 B | ESC O B |
| ▶ | ESC O C | SS3 C | ESC O C |
| ◀ | ESC O D | SS3 D | ESC O D |

**Table D-3 Numeric Keypad Application Mode Codes**

| Key* | VT320/VT220 7-Bit | VT320/VT220 8-Bit | VT100 | VT52 |
|---|---|---|---|---|
| [-] | ESC O m | SS3 m | ESC O m | ESC ? m |
| [,] | ESC O l | SS3 l | ESC O l | ESC ? l |
| [.] | ESC O n | SS3 n | ESC O n | ESC ? n |
| [0] | ESC O p | SS3 p | ESC O p | ESC ? p |
| [1] | ESC O q | SS3 q | ESC O q | ESC ? q |
| [2] | ESC O r | SS3 r | ESC O r | ESC ? r |
| [3] | ESC O s | SS3 s | ESC O s | ESC ? s |
| [4] | ESC O t | SS3 t | ESC O t | ESC ? t |
| [5] | ESC O u | SS3 u | ESC O u | ESC ? u |
| [6] | ESC O v | SS3 v | ESC O v | ESC ? v |
| [7] | ESC O w | SS3 w | ESC O w | ESC ? w |
| [8] | ESC O x | SS3 x | ESC O x | ESC ? x |
| [9] | ESC O y | SS3 y | ESC O y | ESC ? y |
| [Enter] | ESC O M | SS3 M | ESC O M | ESC ? M |

* In the default numeric mode, these keys generate the appropriate code for the character on the keycap. [Enter] sends a carriage return code that is interpreted as CR or CRLF, depending on the setting of the Newline setup parameter.

**Table D-4 PF-Key Codes**

| Key* | VT320/VT220 7-Bit | VT320/VT220 8-Bit | VT100 | VT52 |
|---|---|---|---|---|
| [PF1] | ESC O P | SS3 P | ESC O P | ESC P |
| [PF2] | ESC O Q | SS3 Q | ESC O Q | ESC Q |
| [PF3] | ESC O R | SS3 R | ESC O R | ESC R |
| [PF4] | ESC O S | SS3 S | ESC O S | ESC S |

* Shifted keys send the same code as unshifted.

**Table D-5 Function Key Default Codes**

| Key* | VT320/VT220 7-Bit | VT320/VT220 8-Bit | VT100 | VT52 |
|---|---|---|---|---|
| F6 | ESC [ 17 ~ | CSI 17 ~ | | |
| F7 | ESC [ 18 ~ | CSI 18 ~ | | |
| F8 | ESC [ 19 ~ | CSI 19 ~ | | |
| F9 | ESC [ 20 ~ | CSI 20 ~ | | |
| F10 | ESC [ 21 ~ | CSI 21 ~ | | |
| F11 | ESC [ 23 ~ | CSI 23 ~ | ESC | ESC |
| F12 | ESC [ 24 ~ | CSI 24 ~ | BS | BS |
| F13 | ESC [ 25 ~ | CSI 25 ~ | LF | LF |
| F14 | ESC [ 26 ~ | CSI 26 ~ | ESC [ H | ESC H |
| Help | ESC [ 28 ~ | CSI 28 ~ | | |
| Do | ESC [ 29 ~ | CSI 29 ~ | | |
| F17 | ESC [ 31 ~ | CSI 31 ~ | | |
| F18 | ESC [ 32 ~ | CSI 32 ~ | | |
| F19 | ESC [ 33 ~ | CSI 33 ~ | | |
| F20 | ESC [ 34 ~ | CSI 34 ~ | | |

* Shifted keys send no default codes. Function keys F1 through F5 have local functions only (see Appendix C).

Appendix **E**

# Command Guide

Table E-1 lists the commands supported by the terminal in VT320, VT220, and VT100 personalities. Table E-2 lists the commands supported by the terminal in VT52 personality. Tables E-3 and E-4 list the control codes recognized in the terminal's VT320 personality.

In Table E-1 mnemonics beginning with WY are Wyse private mnemonics; those beginning with DEC are Digital Equipment Corporation private mnemonics; all others are ANSI mnemonics.

Command sequences and terminal report responses are shown in 8-bit format, which is recognized in VT320 and VT220 personalities. The following 7-bit equivalents for the 8-bit C1 control characters are recognized in VT320, VT220, and VT100 personalities.

| 8-Bit Control Character | 7-Bit Equivalent |
|---|---|
| IND | ESC D |
| NEL | ESC E |
| HTS | ESC H |
| RI | ESC M |
| SS2 | ESC N |
| SS3 | ESC O |
| DCS | ESC P |
| CSI | ESC [ |
| ST | ESC \ |
| OSC | ESC ] |
| PM | ESC ^ |
| APC | ESC _ |

Within a command sequence, parameters are shown in italics. *Pn* represents a numerical parameter; *Ps* represents a selective parameter. Parameter values are listed immediately following the command.

## Table E-1 Supported Commands

| Command | Command Sequence VT320 | VT220 | VT100 | Mnemonic |
|---|---|---|---|---|
| **Controlling Terminal Modes** | | | | |
| Terminal modes on (set) | (1) CSI *Ps;...;Ps* h | Same | Same | SM |
| | (2) CSI *? Ps;...;Ps* h | Same | Same | SM |
| Terminal modes off (reset)[1] | (1) CSI *Ps;...;Ps* l | Same | Same | RM |
| | (2) CSI *? Ps;...;Ps* l | Same | Same | RM |

| (1) *Ps*[2] | Mode | Mnemonic | Default[3] |
|---|---|---|---|
| 2 | Keyboard lock | KAM | Off |
| 4 | Insert | IRM | Off |
| 12 | Local echo disable | SRM | NVR |
| 13 | Control execution disable | FEAM | NVR |
| 16 | Transfer termination | TTM | NVR |
| 20 | Newline | LNM | NVR |
| 30 | Display disable | WYDSCM | Off |
| 31 | Status line display | WYSTLINM | NVR |
| 32 | Screen saver | WYCRTSAVM | NVR |
| 33 | Steady cursor | WYSTCURM | NVR |
| 34 | Underline cursor | WYULCURM | NVR |
| 35 | Width change clear disable | WYCLRM | NVR |
| 36 | Delete key redefinition | WYDELKM | NVR |
| 40 | 25 data line | WYEXTDM | NVR |
| 46 | Data size (48/50 data lines) | WYDSZM | NVR |
| 47 | Page size (2x data lines) | WYPSZM | NVR |
| 48 | Status line position | WYSTLPM | NVR |
| 53 | Character cell size | WYCELL | NVR |

| (2) *? Ps*[2] | Mode | Mnemonic | Default[3] |
|---|---|---|---|
| 1 | Cursor key application | DECCKM | Off |
| 2 | ANSI/VT52[4] | DECANM | NVR |
| 3 | 132 column | DECCOLM | NVR |
| 4 | Scrolling | DECSCLM | NVR |
| 5 | Reverse screen | DECSCNM | NVR |
| 6 | Origin | DECOM | Off |
| 7 | Autowrap | DECAWM | NVR |
| 8 | Key autorepeat | DECARM | NVR |
| 16 | Local key | DECEKEM | NVR |
| 18 | Print form feed | DECPFF | NVR |
| 19 | Print extent | DECPEX | NVR |
| 25 | Text cursor enable | DECTCEM | NVR |
| 42 | National replacement character set | DECNRCM | NVR |
| 61 | Cursor coupling | DECVCCM | NVR |
| 64 | Page coupling | DECPCCM | NVR |
| 66 | Keypad application | DECNKM | Off |
| 67 | Delete key redefinition | DECBKM | NVR |
| 68 | Key legend | DECKBUM | NVR |

| | | | | |
|---|---|---|---|---|
| Save cursor position, attributes, character sets, wrap flag, origin mode, and single-shift status | ESC 7 or CSI s | Same | Same | DECSC WYSC |
| Restore last saved cursor position, attributes, character sets, wrap flag, origin mode, and single-shift status | ESC 8 or CSI u | Same | Same | DECRC WYRC |
| Delay processing about 250 ms | ESC , | Same | Same | WYDELAY |
| Sound bell, if enabled | CTRL G | Same | Same | BEL |
| Abort escape sequence | CTRL X | Same | Same | CAN |

1. Final character in sequence is a lowercase L.
2. Ps values are listed in two groups: In the first group are the values for terminal modes that can be set with SM command sequence (1) or reset with RM command sequence (1); in the second group are the values for terminal modes that can be set with SM sequence (2) or reset with RM sequence (2). The latter group is shown as ? Ps to indicate that sequence (2) includes a question mark immediately following the control sequence introducer CSI. Up to 16 Ps values can be specified (separated by semicolons) in any one SM or RM command sequence.
3. Mode status when terminal is turned on or reset. "NVR" means that the status depends on the value last saved in nonvolatile memory in setup mode.
4. When off, VT52 personality is enabled and you cannot change to ANSI mode with a CSI command.

**Table E-1 Supported Commands, Continued**

| Command | Command Sequence VT320 | VT220 | VT100 | Mnemonic |
|---|---|---|---|---|
| Abort escape sequence; display reverse question mark in VT320 and VT220 personalities; display checkerboard character in VT100 personality | CTRL Z | Same | Same | SUB |
| Ignore all subsequent data until ST (or ESC \) received | ESC ]<br>or ESC ^<br>or ESC _ | Same | Same | OSC<br>PM<br>APC |
| **Controlling the Screen Display** | | | | |
| Control execution off (controls display mode on) | CSI 13 h | Same | Same | FEAM |
| Control execution on | CSI 13 l | Same | Same | FEAM |
| Display off (blank screen) | CSI 30 h | Same | Same | WYDSCM |
| Display on | CSI 30 l | Same | Same | WYDSCM |
| Status line displayed | CSI 31 h | Same | Same | WYSTLINM |
| Status line not displayed | CSI 31 l | Same | Same | WYSTLINM |
| Screen saver on | CSI 32 h | Same | Same | WYCRTSAVM |
| Screen saver off | CSI 32 l | Same | Same | WYCRTSAVM |
| Width change clear off | CSI 35 h | Same | Same | WYCLRM |
| Width change clear on | CSI 35 l | Same | Same | WYCLRM |
| 25 data lines | CSI 40 h | Same | Same | WYEXTDM |
| 24 data lines | CSI 40 l | Same | Same | WYEXTDM |
| Data size = 48 (or 50) lines | CSI 46 h | Same | Same | WYDSZM |
| Data size = 24 (or 25) lines | CSI 46 l | Same | Same | WYDSZM |
| Select 15x12 character cell[5] | CSI 53 h | Same | Same | WYCELL |
| Select 10x20 character cell | CSI 53 l | Same | Same | WYCELL |
| Status line displays at top of screen | CSI 48 h | Same | Same | WYSTLPM |
| Status line displays at bottom of screen | CSI 48 l | Same | Same | WYSTLPM |
| 132-column display | CSI ? 3 h | Same | Same | DECCOLM |
| 80-column display | CSI ? 3 l | Same | Same | DECCOLM |
| Reverse screen | CSI ? 5 h | Same | Same | DECSCNM |
| Normal screen | CSI ? 5 l | Same | Same | DECSCNM |
| Line 1 is top line of scrolling region | CSI ? 6 h | Same | Same | DECOM |

5. 9x12 in 132-column mode

**Table E-1 Supported Commands, Continued**

| Command | Command Sequence VT320 | VT220 | VT100 | Mnemonic |
|---|---|---|---|---|
| Line 1 is top line of data area | CSI ? 6 l | Same | Same | DECOM |
| Autowrap on | CSI ? 7 h | Same | Same | DECAWM |
| Autowrap off | CSI ? 7 l | Same | Same | DECAWM |
| Cursor coupled to display during vertical movement (always visible) | CSI ? 61 h | Same | Same | DECVCCM |
| Cursor disappears when moves past top or bottom line of display | CSI ? 61 l | Same | Same | DECVCCM |
| Cursor stays visible when new page is displayed | CSI ? 64 h | Same | Same | DECPCCM |
| Cursor disappears when new page is displayed | CSI ? 64 l | Same | Same | DECPCCM |
| Cursor displayed | CSI ? 25 h | Same | Same | DECTCEM |
| Cursor invisible | CSI ? 25 l | Same | Same | DECTCEM |
| Cursor steady (nonblinking) | CSI 33 h | Same | Same | WYSTCURM |
| Cursor blinking | CSI 33 l | Same | Same | WYSTCURM |
| Underline cursor on | CSI 34 h | Same | Same | WYULCURM |
| Block cursor on | CSI 34 l | Same | Same | WYULCURM |
| Data sent to screen's data area | CSI 0 $ } | Same | Same | DECSASD |
| Data sent to host-writable status line | CSI 1 $ } | Same | Same | DECSASD |
| Status line display off | CSI 0 $ ~ | Same | Same | DECSSDT |
| Local status line displayed | CSI 1 $ ~ | Same | Same | DECSSDT |
| Host-writable status line displayed | CSI 2 $ ~ | Same | Same | DECSSDT |
| Set top/bottom margins<br>*Pn* Top line number<br>*Pn1* Bottom line number | CSI *Pn* ; *Pn1* r | Same | Same | DECSTBM |
| Smooth scrolling on | CSI ? 4 h | Same | Same | DECSCLM |
| Jump scrolling on | CSI ? 4 l | Same | Same | DECSCLM |
| Set 1 lps smooth scrolling speed | CSI 1 z | Same | Same | WYSCRATE |
| Set 2 lps smooth scrolling speed | CSI 2 z | Same | Same | WYSCRATE |
| Set 4 lps smooth scrolling speed | CSI 3 z<br>or CSI 0 z | Same | Same | WYSCRATE |
| Set 8 lps smooth scrolling speed | CSI 4 z | Same | Same | WYSCRATE |

## Table E-1 Supported Commands, Continued

| Command | Command Sequence VT320 | VT220 | VT100 | Mnemonic |
|---|---|---|---|---|
| **Display Memory** | | | | |
| Page size = 2x data lines | CSI 47 h | Same | Same | WYPSZM |
| Page size = 1x data lines | CSI 47 l | Same | Same | WYPSZM |
| Move window down *n* lines in page (48- or 50-line page only) | CSI *Pn* S | Same | Same | SU |
| Move window up *n* lines in page (48- or 50-line page only) | CSI *Pn* T | Same | Same | SD |
| **Selecting Terminal Personalities**[6] | | | | |
| VT320 8-bit on | CSI 63; 2 " p | Same | Same | DECSCL |
| VT320 7-bit on | CSI 63; 1 " p | Same | Same | DECSCL |
| VT220 8-bit on | CSI 62; 2 " p | Same | Same | DECSCL |
| VT220 7-bit on | CSI 62; 1 " p | Same | Same | DECSCL |
| VT100 on[7] | CSI 61; " p | Same | Same | DECSCL |
| VT52 on | CSI ? 2 l | Same | Same | DECANM |
| **Labeling Character Sets**[8] | | | | |
| Label character set | ESC *fcode scode* | Same | Same | SCS |

| *fcode* | Font Bank | *fcode* | Font Bank |
|---|---|---|---|
| ( | G0 94 character | - | G1 96 character (VT320 and VT220 only) |
| ) | G1 94 character | . | G2 96 character (VT320 and VT220 only) |
| * | G2 94 character | / | G3 96 character (VT320 and VT220 only) |
| + | G3 94 character | | |

| *scode* | Character Set |
|---|---|
| 0 | Special Graphics |
| A | ISO Latin-1 Supplemental (VT320 only)[10] or UK ASCII (VT220 or VT100 personalities)[11] |
| B | ASCII |
| < | User-preferred supplemental[12] or Multinational (VT220 or VT100 personalities) |
| % 5 | Multinational Supplemental (VT320 only) |
| *name* | Softfont name assigned by the *name* parameter in softfont load command (DECDLD) |

| *scode* | Character Set (National Mode)[9] |
|---|---|
| A | UK |
| 4 | Dutch |
| 5 or C | Finnish |
| R | French/Belgian |
| 9 or Q | French Canadian |
| K | German |
| Y | Italian |
| ' or E or 6 | Norwegian/Danish |
| % 6 | Portuguese |
| Z | Spanish |
| 7 or H | Swedish |
| = | Swiss |

6. When the personality is changed, the terminal clears all softfonts and performs a soft reset.
7. Terminal performs hard reset (RIS).
8. See Figure E-1 for character set illustrations.
9. Valid only when national replacement character mode is set and when Keyboard setup parameter is set to this language. Only one set is available at a time.
10. 96-character set only.
11. 94-character set. UK ASCII is the same as ASCII except for British pound sign (£) substituted in position 23H.
12. Multinational or ISO Latin-1 as defined by DECAUPSS or by Character Set parameter in setup mode (default is Multinational).

**Table E-1 Supported Commands, Continued**

| Command | Command Sequence VT320 | VT220 | VT100 | Mnemonic |
|---|---|---|---|---|
| Assign Multinational as user-preferred supplemental set (default) | DCS 0 ! u % 5 ST | | | DECAUPSS |
| Assign ISO Latin-1 as user-preferred supplemental set | DCS 1 ! u A ST | | | DECAUPSS |
| National replacement character set mode on | CSI ? 42 h | Same | Same | DECNRCM |
| National replacement character set mode off | CSI ? 42 l | Same | | DECNRCM |
| **Assigning Character Sets** | | | | |
| Assign G0 character set to GL | CTRL O | Same | Same | SI or LS0 |
| Assign G1 character set to GL | CTRL N | Same | Same | SO or LS1 |
| Assign G1 character set to GR | ESC ~ | Same | | LS1R |
| Assign G2 character set to GL | ESC n | Same | | LS2 |
| Assign G2 character set to GR | ESC } | Same | | LS2R |
| Assign G3 character set to GL | ESC o | Same | | LS3 |
| Assign G3 character set to GR | ESC \| | Same | | LS3R |
| Assign G2 character set to GL for the next character only | ESC N | Same | | SS2 |
| Assign G3 character set to GL for the next character only | ESC O | Same | | SS3 |
| **Loading Softfonts** | | | | |
| Load soft character font | DCS *Ps*; *Ps1*; *Ps2; Ps3; Ps4; Ps5; Ps6; Ps7* { *name Sxbp ;...; Sxbp* ST | Same | | DECDLD |

*Ps* Font number (ignored)

*Ps1* **Initial Character Position**
A decimal number identifying the position of the initial character to be loaded. Character positions are numbered consecutively starting with 1 = 21H for a 94-character set or 0 = 20H for a 96-character set (i.e., position 20H is not available for a 94-character set).

*Ps2* **Erase Control**
0 Erase all characters in the set before redefining (default)
1 Erase each character as it is redefined

## Table E-1 Supported Commands, Continued

| Command | Command Sequence VT320 | VT220 | VT100 | Mnemonic |
|---|---|---|---|---|

*Ps3*[13] **Character Matrix Width**[14]

| | |
|---|---|
| 0 | 15 pixels wide in 80-column mode (15x12 resolution—default)<br>9 pixels wide in 132-column mode (15x12 resolution)<br>8x10 in 10x20 resolution (default) |
| 1 | 4x10 (10x20 resolution) |
| 2 | 5x10 (10x20 resolution) |
| 3 | 6x10 (10x20 resolution) |
| 4 | 7x10 (10x20 resolution) |
| 5 | 5 pixels wide (15x12 resolution)<br>8x10 (10x20 resolution) |
| 6 | 6 pixels wide |
| 7 | 7 pixels wide |
| 8 | 8 pixels wide |
| 9 | 9 pixels wide (15x12 resolution) |
| 10 | 10 pixels wide (15x12 resolution) |
| 11 | 11 pixels wide (15x12 resolution) |
| 12 | 12 pixels wide (15x12 resolution) |
| 13 | 13 pixels wide (15x12 resolution) |
| 14 | 14 pixels wide (15x12 resolution) |
| 15 | 15 pixels wide (15x12 resolution) |

*Ps4* **Font Width** (ignored in 10x20 resolution)

| | |
|---|---|
| 0 or 1 | 80-column (default) |
| 2 | 132-column |

*Ps5* **Font Type**[15] (ignored in 10x20 resolution)

| | |
|---|---|
| 0 or 1 | Text (default) |
| 2 | Full cell |

| *Ps6* | **Cell Height**[16] | *Ps6* | **Cell Height**[16] |
|---|---|---|---|
| 0 | 12 pixels (15x12 resolution—default)<br>10 pixels (10x20 resolution—default) | 10 | 10 pixels |
| 1 | 1 pixel | 11 | 11 pixels |
| 2 | 2 pixels | 12 | 12 pixels |
| 3 | 3 pixels | 13 | 13 pixels (10x20 resolution) |
| 4 | 4 pixels | 14 | 14 pixels (10x20 resolution) |
| 5 | 5 pixels | 15 | 15 pixels (10x20 resolution) |
| 6 | 6 pixels | 16 | 16 pixels (10x20 resolution) |
| 7 | 7 pixels | 17 | 17 pixels (10x20 resolution) |
| 8 | 8 pixels | 18 | 18 pixels (10x20 resolution) |
| 9 | 9 pixels | 19 | 19 pixels (10x20 resolution) |
| | | 20 | 20 pixels (10x20 resolution) |

13. In 15x12 resolution, the Ps3 parameter value overrides the sixel patterns that are specified. For example, if Ps3 = 5, only the first five Sxbp values are recognized. In 10x20 resolution, all Sxbp values specified are recognized, regardless of the Ps3 value.
14. Ps3 values of 2, 3, or 4 cause scan lines to be doubled in 10x20 resolution, or characters to be loaded in the upper left pixels in 15x12 resolution.
15. If a full-cell font is selected, all pixels in the cell can be individually addressed. If a text font is selected, the terminal automatically provides character spacing by blanking the first two columns and the last column of the cell.
16. Values greater than 12 are illegal in 15x12 resolution. In 10x20 resolution, values less than 11 cause scan lines to double. Ps6 is ignored in 15x12 resolution if Ps3 = 2, 3, or 4 and ignored in 10x20 resolution if Ps3 = 1, 2, 3, 4, or 5.

## Table E-1 Supported Commands, Continued

| Command | Command Sequence VT320 | VT220 | VT100 | Mnemonic |
|---|---|---|---|---|

*Ps7* **Character Set Size** (VT320 personality only)
0 94-character set (default)
1 96-character set

{ A separator

*name* A one- two- or three-character name assigned to the softfont character set and referenced when labeling the set (SCS).
First character (optional): ASCII character from SP to / (20H-2FH)
Second character (optional): ASCII character from SP to / (20H-2FH)
Third character (required): ASCII character from 0 to ~ (30H-7EH)

*Sxbp* The sixel bit pattern defining the character loaded. Up to 94 or 96 individual character bit patterns (separated by semicolons) may be specified, depending on character set size (*Ps7* parameter setting).

ST String terminator

**Controlling Attributes**

| | | | | |
|---|---|---|---|---|
| Define character attributes | CSI *Ps*;...; *Ps* m | Same | Same | SGR |

| *Ps* | Character Attribute[17] | *Ps* | Character Attribute[17] |
|---|---|---|---|
| 0 | Normal (all attributes off) | 8 | Concealed (bold, dim off) |
| 1 | Bold (dim, concealed off) | 9 | Second underline |
| 2 | Dim (bold, concealed off) | 22 | Normal intensity (bold, dim off) |
| 4 | First underline | 24 | Underline off |
| 5 | Blink | 25 | Blink off |
| 7 | Reverse | 27 | Reverse off |

| | | | | |
|---|---|---|---|---|
| Position first underline | CSI ? *Pn* z | Same | Same | WY1ULPOS |
| Position second underline[18] | CSI " *Pn* z | Same | Same | WY2ULPOS |

*Pn* Number of line in character cell matrix where underline is positioned
15x12 cell: 1 to 12 (default is 12—bottom line)
10x20 cell: 1 to 20 (default is 20—bottom line)

| | | | | |
|---|---|---|---|---|
| Define erasable character | CSI 0 " q or CSI 2 " q | Same | | DECSCA |
| Define nonerasable character | CSI 1 " q | Same | | DECSCA |
| Define top half of double-high, double-wide line | ESC # 3 | Same | Same | DECDHL |
| Define bottom half of double-high, double-wide line | ESC # 4 | Same | Same | DECDHL |
| Define single-high, single-wide line | ESC # 5 | Same | Same | DECSWL |
| Define single-high, double-wide line | ESC # 6 | Same | Same | DECDWL |

17. Up to 16 attributes may be combined by separating character attribute parameters with semicolons (;).
18. Second underline is displayed only when the first underline is active; default position is the last scan line of the character cell.

**Table E-1 Supported Commands, Continued**

| Command | Command Sequence VT320 | VT220 | VT100 | Mnemonic |
|---|---|---|---|---|
| Define top half of double-high, single-wide line | ESC # : | Same | Same | WYDHL |
| Define bottom half of double-high, single-wide line | ESC # ; | Same | Same | WYDHL |
| **Controlling Cursor Movement** | | | | |
| Move cursor to column *n* | CSI *Pn* G<br>or CSI *Pn* | Same | Same | CHA<br>HPA |
| Move cursor up *n* lines | CSI *Pn* A | Same | Same | CUU |
| Move cursor down *n* lines | CSI *Pn* B<br>or CSI *Pn* e | Same | Same | CUD<br>VPR |
| Move cursor right *n* columns | CSI *Pn* C<br>or CSI *Pn* a | Same | Same | CUF<br>HPR |
| Move cursor left *n* columns | CSI *Pn* D | Same | Same | CUB |
| Move cursor to line *n* | CSI *Pn* d | Same | Same | VPA |
| Move cursor to line *n*, column *n* | CSI *Pn*; *Pn* H<br>or CSI *Pn*; *Pn* f | Same | Same | CUP<br>HVP |
| Move cursor down one line in current column, or scroll up if at bottom line of scrolling region | ESC D | Same | Same | IND |
| Move cursor down one line in current column; execute CR if newline mode is on | CTRL J<br>or CTRL K<br>or CTRL L | Same | Same | LF<br>VT<br>FF |
| Move cursor up one line in current column, or scroll down if at top line of scrolling region | ESC M | Same | Same | RI |
| Move cursor down one line and to column 1 | ESC E | Same | Same | NEL |
| Move cursor down *n* lines and to column 1 | CSI *Pn* E | Same | Same | CNL |
| Move cursor up *n* lines and to column 1 | CSI *Pn* F | Same | Same | CPL |
| Backspace cursor | CTRL H | Same | Same | BS |
| Move cursor to next tab stop | CTRL I | Same | Same | HT |
| Move cursor to column 1 of current line | CTRL M | Same | Same | CR |
| Home cursor on next page | CSI 1 U | Same | Same | NP |
| Home cursor on preceding page | CSI 1 V | Same | Same | PP |

**Table E-1 Supported Commands, Continued**

| Command | Command Sequence VT320 | VT220 | VT100 | Mnemonic |
|---|---|---|---|---|
| Move cursor to same line and column on next page | CSI 1 SP Q | Same | Same | PPR |
| Move cursor to same line and column on preceding page | CSI 1 SP R | Same | Same | PPB |
| Move cursor to same line and column on specified page<br>*Pn* Page number (1 or 2) | CSI *Pn* SP P | Same | Same | PPA |
| **Editing Functions** | | | | |
| Insert mode on | CSI 4 h | Same | Same | IRM |
| Insert mode off | CSI 4 l | Same | Same | IRM |
| Erase from cursor to end of display[19] | CSI 0 J | Same | Same | ED |
| Erase from start of display to cursor[19] | CSI 1 J | Same | Same | ED |
| Erase entire display[19] | CSI 2 J | Same | Same | ED |
| Erase from cursor to end of line[19] | CSI 0 K | Same | Same | EL |
| Erase from start of line to cursor[19] | CSI 1 K | Same | Same | EL |
| Erase entire line[19] | CSI 2 K | Same | Same | EL |
| Erase erasable characters from cursor to end of display | CSI ? 0 J | Same | | DECSED |
| Erase erasable characters from start of display to cursor | CSI ? 1 J | Same | | DECSED |
| Erase erasable characters in entire display | CSI ? 2 J | Same | | DECSED |
| Erase erasable characters from cursor to end of line | CSI ? 0 K | Same | | DECSEL |
| Erase erasable characters from start of line to cursor | CSI ? 1 K | Same | | DECSEL |
| Erase erasable characters from entire line | CSI ? 2 K | Same | | DECSEL |
| Erase *n* characters beginning at cursor | CSI *Pn* X | Same | Same | ECH |
| Insert *n* blank characters beginning at cursor | CSI *Pn* @ | Same | Same | ICH |
| Insert *n* blank lines beginning at cursor line | CSI *Pn* L | Same | Same | IL |

19. Erases characters and character attributes. When an entire line is erased, erases line attributes also.

**Table E-1 Supported Commands, Continued**

| Command | Command Sequence VT320 | VT220 | VT100 | Mnemonic |
|---|---|---|---|---|
| Delete *n* lines beginning at cursor line | CSI *Pn* M | Same | Same | DL |
| Delete *n* characters beginning at cursor | CSI *Pn* P | Same | Same | DCH |
| Clear tab stop at cursor | CSI 0 g<br>or CSI 2 W | Same | Same | TBC<br>CTC |
| Clear all tab stops | CSI 3 g<br>or CSI 5 W | Same | Same | TBC<br>CTC |
| Set tab stop at cursor | CSI 0 W<br>or ESC H | Same | Same | CTC<br>HTS |
| Set tab stop every 8th column | CSI ? 5 W | Same | Same | CTC |
| Move forward *n* tab stops | CSI *Pn* I | Same | Same | CHT |
| Move backward *n* tab stops | CSI *Pn* Z | Same | Same | CBT |
| Move cursor to next tab stop | CTRL I | Same | Same | HT |
| **Controlling the Keyboard** | | | | |
| Keyboard lock on | CSI 2 h | Same | Same | KAM |
| Unlock keyboard | CSI 2 l | Same | Same | KAM |
| Set delete key to BS/DEL | CSI 36 h | Same | Same | WYDELKM |
| Reset delete key to DEL/CAN | CSI 36 l | Same | Same | WYDELKM |
| Key autorepeat on | CSI ? 8 h | Same | Same | DECARM |
| Key autorepeat off | CSI ? 8 l | Same | Same | DECARM |
| Keys send data processing values (right legend) | CSI ? 68 h | Same | Same | DECKBUM |
| Keys send typewriter values (left legend) | CSI ? 68 l | Same | Same | DECKBUM |
| Cursor keys send application-dependent codes | CSI ? 1 h | Same | Same | DECCKM |
| Cursor keys send cursor movement codes | CSI ? 1 l | Same | Same | DECCKM |
| Auxiliary keypad numeric mode on | ESC ><br>or CSI ? 66 l | Same | Same | DECKPNM<br>DECNKM |
| Auxiliary keypad application mode on | ESC =<br>or CSI ? 66 h | Same | Same | DECKPAM<br>DECNKM |
| Unshifted function keys operate locally | CSI ? 16 h | Same | Same | DECEKEM |

**Table E-1 Supported Commands, Continued**

| Command | Command Sequence VT320 | VT220 | VT100 | Mnemonic |
|---|---|---|---|---|
| Unshifted function keys operate remotely | CSI ? 16 l | Same | Same | DECEKEM |
| Program function keys[20] | DCS *Ps; Ps1* ¦ *kc/hc* ST | Same | Same | DECUDK |

| *Ps* | Clear |
|---|---|
| 0 | Clear all key definitions (default) |
| 1 | Clear keys only as they are redefined |

| *Ps1* | Key Lock |
|---|---|
| 0 | Lock key definitions |
| 1 | Don't lock key definitions |

| *kc* | Shifted Function Key | *kc* | Unshifted Function Key |
|---|---|---|---|
| 17 | F6 | 37 | F6 |
| 18 | F7 | 38 | F7 |
| 19 | F8 | 39 | F8 |
| 20 | F9 | 40 | F9 |
| 21 | F10 | 41 | F10 |
| 23 | F11 | 43 | F11 |
| 24 | F12 | 44 | F12 |
| 25 | F13 | 45 | F13 |
| 26 | F14 | 46 | F14 |
| 28 | Help | 48 | Help |
| 29 | Do | 49 | Do |
| 31 | F17 | 51 | F17 |
| 32 | F18 | 52 | F18 |
| 33 | F19 | 53 | F19 |
| 34 | F20 | 54 | F20 |

*hc* Key definition (hexadecimal character string)

| **Transmission/Printer Control** | | | | |
|---|---|---|---|---|
| Local echo disable | CSI 12 h | Same | Same | SRM |
| Local echo on | CSI 12 l | Same | Same | SRM |
| Print through cursor position | CSI 16 h | Same | Same | TTM |
| Print to end of line or end of screen | CSI 16 l | Same | Same | TTM |
| Send form feed after print screen operation | CSI ? 18 h | Same | Same | DECPFF |
| No form feed sent after print screen operation | CSI ? 18 l | Same | Same | DECPFF |
| Print full screen | CSI ? 19 h | Same | Same | DECPEX |

20. Multiple function key definitions can be programmed by entering the kc/hc parameters for each, separated by semicolons (;).

**Table E-1 Supported Commands, Continued**

| Command | Command Sequence VT320 | VT220 | VT100 | Mnemonic |
|---|---|---|---|---|
| Print scrolling region | CSI ? 19 l | Same | Same | DECPEX |
| 8-bit transmission mode on | ESC SP G | Same | | S8C1T |
| 7-bit transmission mode on | ESC SP F | Same | | S7C1T |
| Print page | CSI 0 i | Same | Same | MC |
| Print line | CSI ? 1 i | Same | Same | MC |
| Controller print mode off | CSI 4 i | Same | Same | MC |
| Controller print mode on | CSI 5 i | Same | Same | MC |
| PR receive mode off | CSI 6 i | Same | Same | MC |
| PR receive mode on | CSI 7 i | Same | Same | MC |
| Autoprint mode off | CSI ? 4 i | Same | Same | MC |
| Autoprint mode on | CSI ? 5 i | Same | Same | MC |
| Send answerback message | CTRL E | Same | Same | ENQ |
| Suspend transmission | CTRL S | Same | Same | DC3 |
| Resume transmission | CTRL Q | Same | Same | DC1 |
| **Terminal Reports** | | | | |
| Request primary device attributes | CSI 0 c | CSI 0 c or ESC Z | CSI 0 c or ESC Z | DA DECID |
| Response:[21] | | | | |
| VT320 (8 bit)[22] | CSI ? 63; 1; 2; 6; 7; 8 c | | | |
| VT320 (7 bit)[23] | ESC [ ? 63; 1; 2; 6; 7; 8 c | | | |
| VT220 (8 bit)[24] | CSI ? 62; 1; 2; 6; 7; 8; 11; 14 c | | | |
| VT220 (7 bit)[25] | ESC [ ? 62; 1; 2; 6; 7; 8; 11; 14 c | | | |
| VT100 | ESC [ ? 1; 2 c | | | |
| VT101 | ESC [ ? 1; 0 c | | | |
| VT102 | ESC [ ? 6 c | | | |
| Request secondary device attributes | CSI > 0 c | Same | Same | DA |
| Response: | CSI > 24; *Ps*; 0 c | | | |
| *Ps* Current firmware revision | | | | |
| Request terminal status | CSI 5 n | Same | Same | DSR |
| Response: Terminal functioning and ready | CSI 0 n | | | |

21. Response depends on personality selected in setup mode and on setting of Terminal ID setup parameter.
22. In international models, response is CSI ? 63; 1; 2; 6; 7; 8; 9 c
23. In international models, response is ESC [ ? 63; 1; 2; 6; 7; 8; 9 c
24. In international models, response is CSI ? 63; 1; 2; 6; 7; 8; 9; 11; 14 c
25. In international models, response is ESC [ ? 63; 1; 2; 6; 7; 8; 9; 11; 14 c

**Table E-1 Supported Commands, Continued**

| Command | Command Sequence VT320 | VT220 | VT100 | Mnemonic |
|---|---|---|---|---|
| Request cursor position | CSI 6 n | Same | Same | DSR |
| Response: Cursor at line *n*, column *n* | CSI *Pn*; *Pn* R | | | |
| Request printer status | CSI ? 15 n | Same | Same | DSR |
| Response: | | | | |
| Printer ready | CSI ? 10 n | | | |
| Printer not ready | CSI ? 11 n | | | |
| Printer not connected | CSI ? 13 n | | | |
| Request function key definition lock | CSI ? 25 n | Same | Same | DSR |
| Response: | | | | |
| Key definitions not locked | CSI ? 20 n | | | |
| Key definitions locked | CSI ? 21 n | | | |
| Request keyboard language | CSI ? 26 n | Same | Same | DSR |
| Response: | CSI ? 27; *Ps* n | | | |

| *Ps* | Language[26] | *Ps* | Language[26] |
|---|---|---|---|
| 1 | North American | 9 | Italian |
| 2 | British | 10 | Swiss (French) |
| 3 | Flemish | 11 | Swiss (German) |
| 4 | French Canadian | 12 | Swedish |
| 5 | Danish | 13 | Norwegian |
| 6 | Finnish | 14 | French/Belgian |
| 7 | German | 15 | Spanish |
| 8 | Dutch | 16 | Portuguese |

| | | |
|---|---|---|
| Request terminal state | CSI 1 $ u | DECRQTSR |
| Response: | DCS 1 $ s *ds...ds c1 c2* ST[27] | DECTSR |
| Restore terminal state | DCS 1 $ p *ds...ds* ST | DECRSTS |
| Response: | CSI ? 27; *Ps* n | |
| Request cursor information | CSI 1 $ w | DECRQPSR |
| Response: | DCS 1 $ u *ds...ds* ST[28] | DECCCIR |
| Restore cursor information | DCS 1 $ t *ds...ds* ST | DECRSPS |
| Request tab stop information | CSI 2 $ w | DECRQPSR |
| Response: | DCS 2 $ u *ds...ds* ST[28] | DECTABSR |
| Restore tab stop information | DCS 2 $ t *ds...ds* ST | DECRSPS |

26. North American model supports only North American and French Canadian keyboard languages.
27. ds...ds is a data string that encodes the information on the terminal's current operating state. c1 and c2 are checksums.
28. ds...ds is the data string that encodes the information.

## Table E-1 Supported Commands, Continued

| Command | Command Sequence VT320 | VT220 | VT100 | Mnemonic |
|---|---|---|---|---|
| Request control function selection or setting | DCS $ q *Ps* ST | Same | Same | DECRQSS |

| *Ps* | Control Function | Mnemonic |
|---|---|---|
| $ } | Data destination | DECSASD |
| " q | Erase attribute | DECSCA |
| " p | Personality | DECSCL |
| $ ~ | Status line type | DECSSDT |
| r | Top and bottom margins | DECSTBM |
| m | Character attributes | SGR |

| Response: | DCS *Ps* $ r *ds...ds* ST[29] | Same | Same | DECRPSS |
|---|---|---|---|---|

| *Ps* | Request Validity |
|---|---|
| 0 | Host request is valid |
| 1 | Host request is invalid |

| Request terminal mode status | (1) CSI *Ps* $ p | Same | Same | DECRQM |
|---|---|---|---|---|
| | (2) CSI ? *Ps* $ p | Same | Same | DECRQM |

(1) *Ps*

| *Ps* | Mode | Mnemonic |
|---|---|---|
| 2 | Keyboard lock | KAM |
| 4 | Insert | IRM |
| 10 | Horizontal editing | HEM[30] |
| 12 | Local echo disable | SRM |
| 20 | Newline | LNM |

(2) ? *Ps*

| *Ps* | Mode | Mnemonic |
|---|---|---|
| 1 | Cursor key application | DECCKM |
| 2 | VT100 | DECANM |
| 3 | 132 column | DECCOLM |
| 4 | Scrolling | DECSCLM |
| 5 | Reverse screen | DECSCNM |
| 6 | Origin | DECOM |
| 7 | Autowrap | DECAWM |
| 8 | Key autorepeat | DECARM |
| 18 | Print form feed | DECPFF |
| 19 | Print extent | DECPEX |
| 25 | Text cursor enable | DECTCEM |
| 42 | National replacement character set | DECNRCM |
| 66 | Keypad application | DECNKM |
| 67 | Back arrow key | DECBKM |
| 68 | Key legend | DECKBUM |

| Response: | | | |
|---|---|---|---|
| (1) | CSI *Ps*; *Ps1* $ y | Same | Same |
| (2) | CSI ? *Ps*; *Ps1* $ y | Same | Same |

| *Ps* | Mode |
|---|---|
| (1) | Same as request (DECRQM) |
| (2) | Same as request (DECRQM) |

| *Ps1* | Mode Setting |
|---|---|
| 0 | Unrecognized mode |
| 1 | Mode set |
| 2 | Mode reset |
| 3 | Mode permanently set |
| 4 | Mode permanently reset |

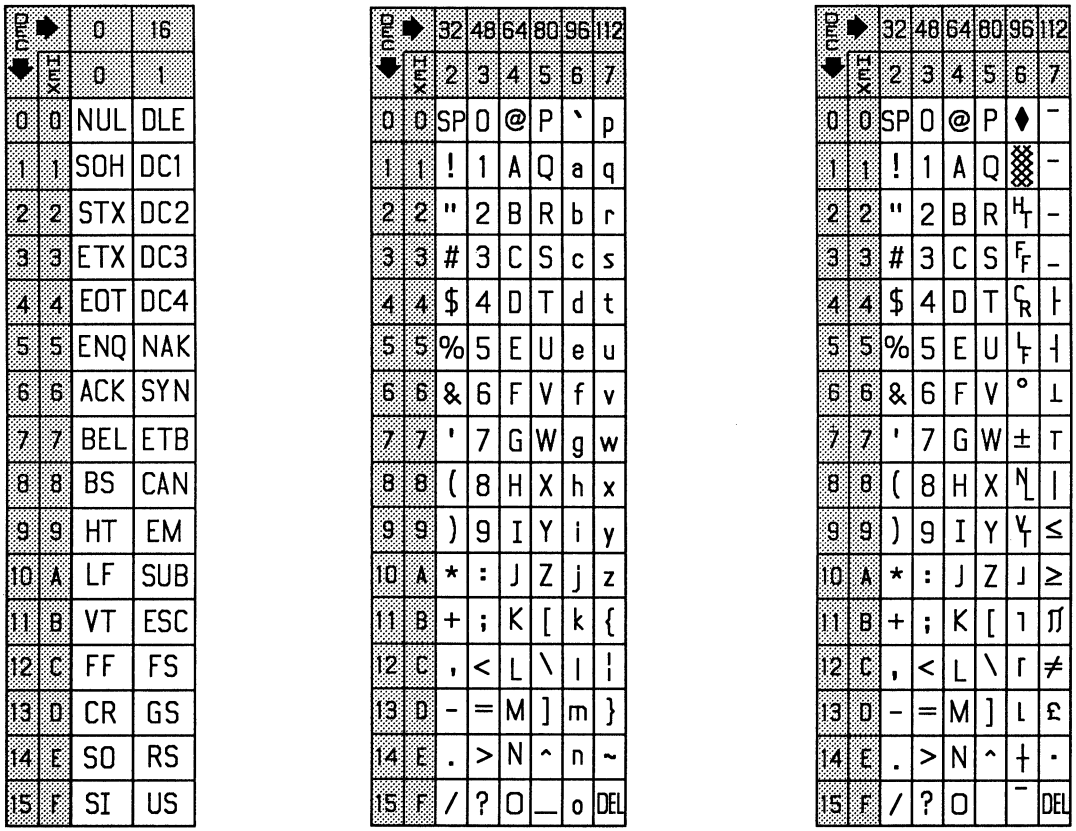
29. ds...ds is a data string that reports the current setting of the control function.
30. Mode permanently reset.

**Table E-1 Supported Commands, Continued**

| Command | Command Sequence VT320 | VT220 | VT100 | Mnemonic |
|---|---|---|---|---|
| **Resetting and Testing the Terminal** | | | | |
| Display screen adjustment pattern | ESC #8 | Same | Same | DECALN |
| Soft terminal reset[31] | CSI ! p | Same | | DESSTR |
| Hard terminal reset[32] | ESC c | Same | | RIS |

31. Performs the following functions:
    Turns cursor on (if off)
    Resets insert mode
    Resets origin mode
    Resets autowrap mode
    Resets keyboard lock mode
    Resets keypad application mode
    Resets cursor key application mode
    Resets top margin to line 1
    Resets bottom margin to line 24, 25, 48, or 50 (according to Page Format setup parameter)
    Resets G0, G1, G2, G3, GL, and GR to defaults
    Resets character attributes to normal
    Resets selective erase attribute to erasable
    Resets save cursor state to default
    Resets national mode (7-bit) to multinational mode (8-bit)
    Resets user-preferred character sets to value last saved in setup mode
    Resets data destination to screen data area
    Clears handshake state, raises DTR if low, sends Xon if Xon/Xoff handshake is on
32. Performs the following functions in addition to all the functions of a soft terminal reset:
    Performs communication line disconnect, reconnect
    Restores all setup mode parameter settings to values last saved
    Restores tab stops, answerback message, and function key definitions to values last saved in setup mode
    Clears softfonts
    Clears screen
    Homes cursor
    Clears screen hold (no scroll)
    Turns on display if off
    Clears CAPS LOCK mode
    Clears Xoff receive state on COMM port (transmit lock)
    Clears Xoff receive state on PR port (print lock)

**Figure E-1 Character Sets**



| Dec ▶ | | 0 | 16 |
|---|---|---|---|
| ▼ | Hex | 0 | 1 |
| 0 | 0 | NUL | DLE |
| 1 | 1 | SOH | DC1 |
| 2 | 2 | STX | DC2 |
| 3 | 3 | ETX | DC3 |
| 4 | 4 | EOT | DC4 |
| 5 | 5 | ENQ | NAK |
| 6 | 6 | ACK | SYN |
| 7 | 7 | BEL | ETB |
| 8 | 8 | BS | CAN |
| 9 | 9 | HT | EM |
| 10 | A | LF | SUB |
| 11 | B | VT | ESC |
| 12 | C | FF | FS |
| 13 | D | CR | GS |
| 14 | E | SO | RS |
| 15 | F | SI | US |

C0

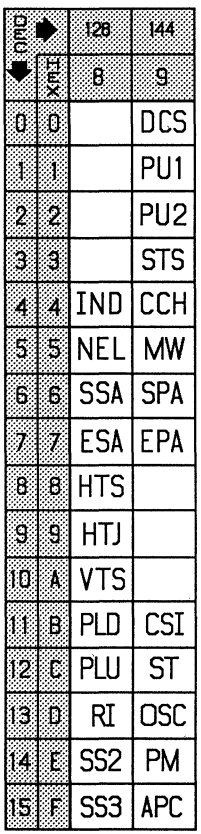
| Dec ▶ | | 32 | 48 | 64 | 80 | 96 | 112 |
|---|---|---|---|---|---|---|---|
| ▼ | Hex | 2 | 3 | 4 | 5 | 6 | 7 |
| 0 | 0 | SP | 0 | @ | P | ` | p |
| 1 | 1 | ! | 1 | A | Q | a | q |
| 2 | 2 | " | 2 | B | R | b | r |
| 3 | 3 | # | 3 | C | S | c | s |
| 4 | 4 | $ | 4 | D | T | d | t |
| 5 | 5 | % | 5 | E | U | e | u |
| 6 | 6 | & | 6 | F | V | f | v |
| 7 | 7 | ' | 7 | G | W | g | w |
| 8 | 8 | ( | 8 | H | X | h | x |
| 9 | 9 | ) | 9 | I | Y | i | y |
| 10 | A | * | : | J | Z | j | z |
| 11 | B | + | ; | K | [ | k | { |
| 12 | C | , | < | L | \ | l | ¦ |
| 13 | D | - | = | M | ] | m | } |
| 14 | E | . | > | N | ^ | n | ~ |
| 15 | F | / | ? | O | _ | o | DEL |

ASCII

| Dec ▶ | | 32 | 48 | 64 | 80 | 96 | 112 |
|---|---|---|---|---|---|---|---|
| ▼ | Hex | 2 | 3 | 4 | 5 | 6 | 7 |
| 0 | 0 | SP | 0 | @ | P | ♦ | ¯ |
| 1 | 1 | ! | 1 | A | Q | ▒ | ¯ |
| 2 | 2 | " | 2 | B | R | HT | ¯ |
| 3 | 3 | # | 3 | C | S | FF | _ |
| 4 | 4 | $ | 4 | D | T | CR | ┼ |
| 5 | 5 | % | 5 | E | U | LF | ┤ |
| 6 | 6 | & | 6 | F | V | ° | ┴ |
| 7 | 7 | ' | 7 | G | W | ± | ┬ |
| 8 | 8 | ( | 8 | H | X | NL | │ |
| 9 | 9 | ) | 9 | I | Y | VT | ≤ |
| 10 | A | * | : | J | Z | ┘ | ≥ |
| 11 | B | + | ; | K | [ | ┐ | π |
| 12 | C | , | < | L | \ | ┌ | ≠ |
| 13 | D | - | = | M | ] | └ | £ |
| 14 | E | . | > | N | ^ | ┼ | · |
| 15 | F | / | ? | O |  | ¯ | DEL |

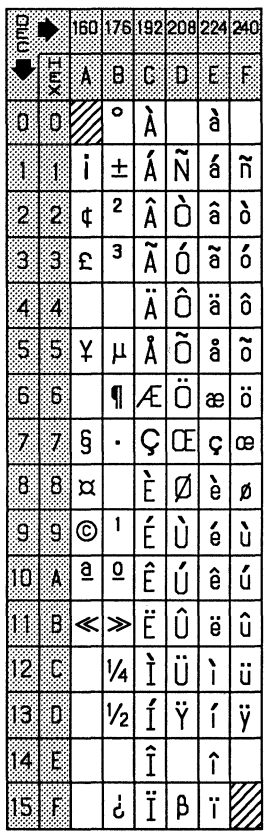
Special Graphics

**Figure E-1 Character Sets, Continued**



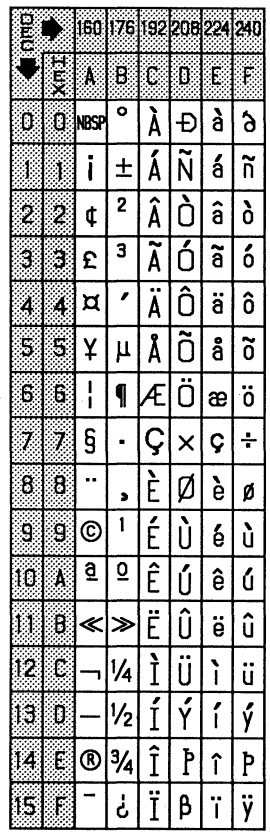
| Dec → / Hex ↓ | 128 | 144 |
|---|---|---|
| | 8 | 9 |
| 0 | | DCS |
| 1 | | PU1 |
| 2 | | PU2 |
| 3 | | STS |
| 4 | IND | CCH |
| 5 | NEL | MW |
| 6 | SSA | SPA |
| 7 | ESA | EPA |
| 8 | HTS | |
| 9 | HTJ | |
| A | VTS | |
| B | PLD | CSI |
| C | PLU | ST |
| D | RI | OSC |
| E | SS2 | PM |
| F | SS3 | APC |

C1



| Dec → / Hex ↓ | 160 | 176 | 192 | 208 | 224 | 240 |
|---|---|---|---|---|---|---|
| | A | B | C | D | E | F |
| 0 | | ° | À | | à | |
| 1 | ¡ | ± | Á | Ñ | á | ñ |
| 2 | ¢ | ² | Â | Ò | â | ò |
| 3 | £ | ³ | Ã | Ó | ã | ó |
| 4 | | | Ä | Ô | ä | ô |
| 5 | ¥ | µ | Å | Õ | å | õ |
| 6 | | ¶ | Æ | Ö | æ | ö |
| 7 | § | · | Ç | Œ | ç | œ |
| 8 | ¤ | | È | Ø | è | ø |
| 9 | © | ¹ | É | Ù | é | ù |
| A | ª | º | Ê | Ú | ê | ú |
| B | ≪ | ≫ | Ë | Û | ë | û |
| C | | ¼ | Ì | Ü | ì | ü |
| D | | ½ | Í | Ÿ | í | ÿ |
| E | | | Î | | î | |
| F | | ¿ | Ï | ß | ï | |

Multinational Supplemental



| Dec → / Hex ↓ | 160 | 176 | 192 | 208 | 224 | 240 |
|---|---|---|---|---|---|---|
| | A | B | C | D | E | F |
| 0 | NBSP | ° | À | Ð | à | ð |
| 1 | ¡ | ± | Á | Ñ | á | ñ |
| 2 | ¢ | ² | Â | Ò | â | ò |
| 3 | £ | ³ | Ã | Ó | ã | ó |
| 4 | ¤ | ´ | Ä | Ô | ä | ô |
| 5 | ¥ | µ | Å | Õ | å | õ |
| 6 | ¦ | ¶ | Æ | Ö | æ | ö |
| 7 | § | · | Ç | × | ç | ÷ |
| 8 | ¨ | ¸ | È | Ø | è | ø |
| 9 | © | ¹ | É | Ù | é | ù |
| A | ª | º | Ê | Ú | ê | ú |
| B | ≪ | ≫ | Ë | Û | ë | û |
| C | ¬ | ¼ | Ì | Ü | ì | ü |
| D | — | ½ | Í | Ý | í | ý |
| E | ® | ¾ | Î | Þ | î | þ |
| F | ¯ | ¿ | Ï | ß | ï | ÿ |

ISO Latin-1 Supplemental

**Table E-2 VT52 Mode Escape Sequences**

| Command | Sequence |
|---|---|
| Move cursor up one line | ESC A |
| Move cursor down one line | ESC B |
| Move cursor right one column | ESC C |
| Move cursor left one column | ESC D |
| Move cursor to home position | ESC H |
| Move cursor up one line with scroll | ESC I |
| Move cursor to line *line*, column *col* | ESC Y *line col* |
| Select graphics character set | ESC F |
| Select standard ASCII character set | ESC G |
| Erase from cursor to end of display | ESC J |
| Erase from cursor to end of line | ESC K |
| Print cursor line | ESC V |
| Print display | ESC ] |
| Transparent print mode on | ESC W |
| Transparent print mode off | ESC X |
| Copy print mode on | ESC ^ |
| Copy print mode off | ESC _ |
| Keypad application mode on | ESC = |
| Keypad application mode off | ESC > |
| Select VT100 personality | ESC < |
| Identify terminal | ESC Z |
| Respond VT52 | ESC / Z |

**Table E-3 7-Bit Control Codes (C0)**

| C0 Character | Symbol[1] | Control Key[2] | Decimal Value | Hex Value | Action[3] |
|---|---|---|---|---|---|
| NUL | NU | @ or Spacebar | 000 | 00 | |
| SOH | SH | A | 001 | 01 | |
| STX | SX | B | 002 | 02 | |
| ETX | EX | C | 003 | 03 | |
| EOT | ET | D | 004 | 04 | |
| ENQ | EQ | E | 005 | 05 | Send answerback message, if defined in setup mode |
| ACK | AK | F | 006 | 06 | |

1. Control representations when control characters are displayed (Controls setup parameter set to display).
2. Key pressed with Ctrl. Can be shifted or unshifted.
3. A blank in this column indicates that the code is ignored when received.

**Table E-3 7-Bit Control Codes (C0), Continued**

| C0 Character | Symbol[1] | Control Key[2] | Decimal Value | Hex Value | Action[3] |
|---|---|---|---|---|---|
| BEL | BL | G | 007 | 07 | Sound bell, if enabled |
| BS | BS | H | 008 | 08 | Cursor left (backspace) |
| HT | HT | I | 009 | 09 | Tab cursor |
| LF | LF | J | 010 | 0A | Cursor down (linefeed; CR executed if newline mode is on) |
| VT | VT | K | 011 | 0B | Same as LF |
| FF | FF | L | 012 | 0C | Same as LF |
| CR | CR | M | 013 | 0D | Cursor to start of line |
| SO | SO | N | 014 | 0E | Assign G1 character set to GL (LS1) |
| SI | SI | O | 015 | 0F | Assign G0 character set to GL (LS0) |
| DLE | DL | P | 016 | 10 | |
| DC1 (Xon) | D1 | Q | 017 | 11 | Resume transmission (when transmit handshake is Xon/Xoff) |
| DC2 | D2 | R | 018 | 12 | |
| DC3 (Xoff) | D3 | S | 019 | 13 | Stop transmission (when transmit handshake is Xon/Xoff) |
| DC4 | D4 | T | 020 | 14 | |
| NAK | NK | U | 021 | 15 | |
| SYN | SY | V | 022 | 16 | |
| ETB | EB | W | 023 | 17 | |
| CAN | CN | X | 024 | 18 | Abort escape sequence |
| EM | EM | Y | 025 | 19 | |
| SUB | ? | Z | 026 | 1A | Abort escape sequence; display reverse question mark (VT320 or VT220 personality) or checkerboard character (VT100 or VT52 personality) |
| ESC | EC | [ or 3 | 027 | 1B | Initiate escape sequence |
| FS | FS | \ or 4 | 028 | 1C | |
| GS | GS | ] or 5 | 029 | 1D | |
| RS | RS | ~ or 6 | 030 | 1E | |
| US | US | / or 7 | 031 | 1F | |
| DEL | DT | 8 | 127 | 7F | Erase character to left of cursor and move cursor to erased character position[4] |

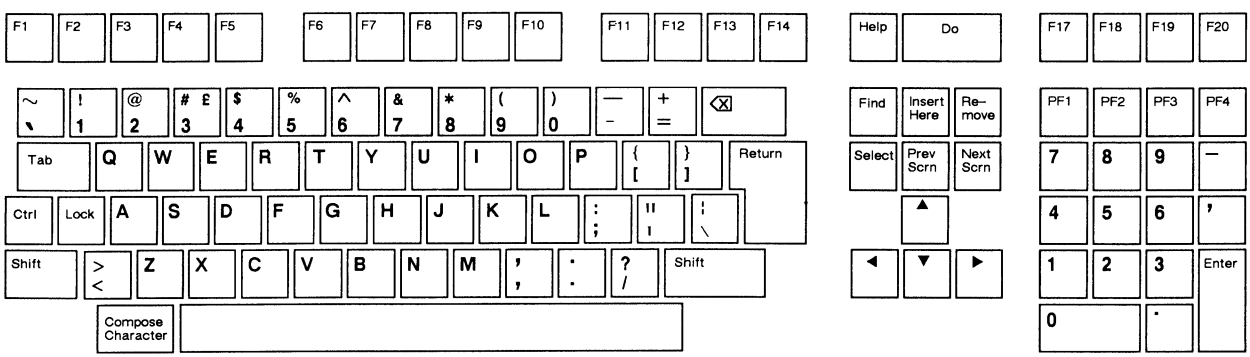
4. If Recognize DEL setup parameter is set to on.

**Table E-4 8-Bit Control Codes (C1)**

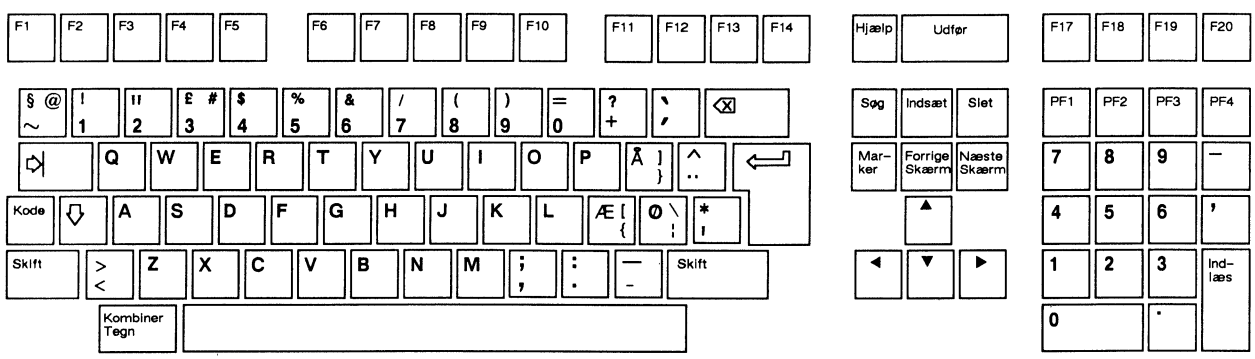
| C1 Character | Equivalent 7-Bit Code | Symbol | Decimal Value | Hex Value | Action |
|---|---|---|---|---|---|
| | | 80 | 128 | 80 | |
| | | 81 | 129 | 81 | |
| | | 82 | 130 | 82 | |
| | | 83 | 131 | 83 | |
| IND | ESC D | ID | 132 | 84 | Cursor down |
| NEL | ESC E | NE | 133 | 85 | Cursor to start of next line |
| SSA | | SA | 134 | 86 | |
| ESA | | EA | 135 | 87 | |
| HTS | ESC H | HS | 136 | 88 | Set tab stop at cursor position |
| HTJ | | HJ | 137 | 89 | |
| VTS | | VS | 138 | 8A | |
| PLD | | PD | 139 | 8B | |
| PLU | | PU | 140 | 8C | |
| RI | ESC M | RI | 141 | 8D | Cursor up |
| SS2 | ESC N | S2 | 142 | 8E | Assign G2 character set to GL for next character |
| SS3 | ESC O | S3 | 143 | 8F | Assign G3 character set to GL for next character |
| DCS | ESC P | DS | 144 | 90 | Introduce device control string |
| PU1 | | P1 | 145 | 91 | |
| PU2 | | P2 | 146 | 92 | |
| STS | | SS | 147 | 93 | |
| CCH | | CH | 148 | 94 | |
| MW | | MW | 149 | 95 | |
| SPA | | SP | 150 | 96 | |
| EPA | | EP | 151 | 97 | |
| | | 98 | 152 | 98 | |
| | | 99 | 153 | 99 | |
| | | 9A | 154 | 9A | |
| CSI | ESC [ | CI | 155 | 9B | Introduce control sequence |
| ST | ESC \ | ST | 156 | 9C | End device control string |
| OSC | | OC | 157 | 9D | |
| PM | | PM | 158 | 9E | |
| APC | | AC | 159 | 9F | |

Appendix

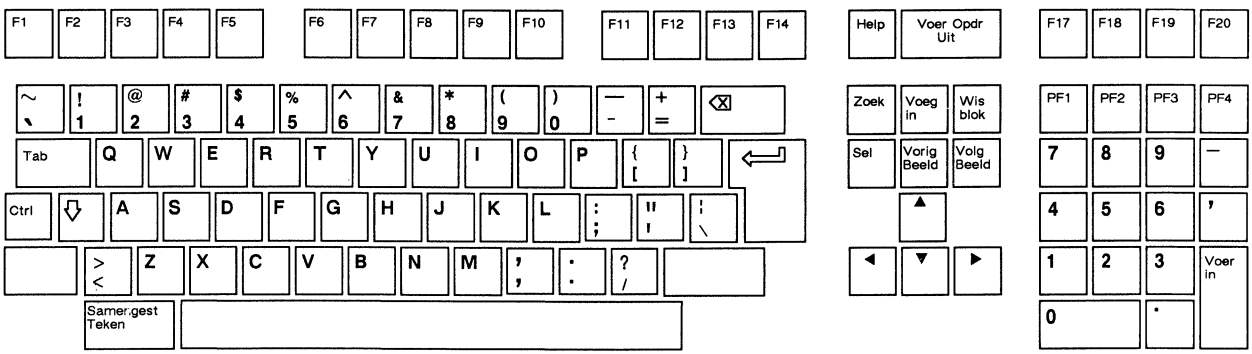
# F International Keyboards



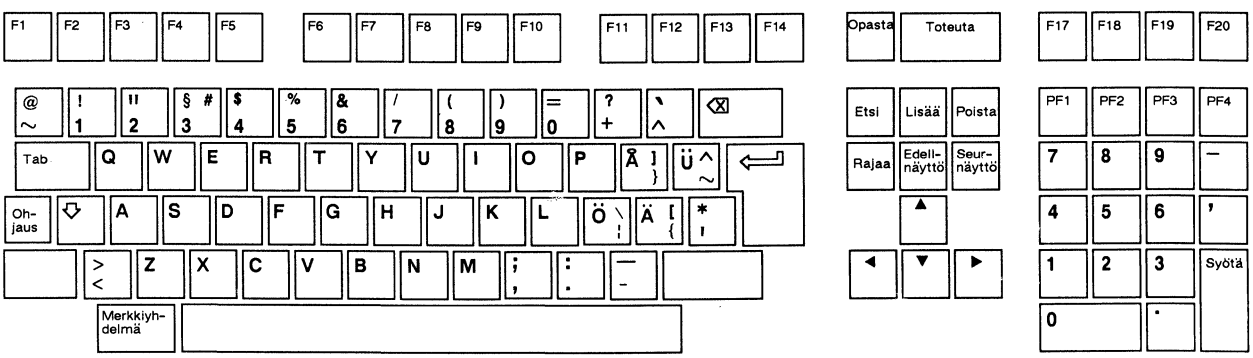

North American/British



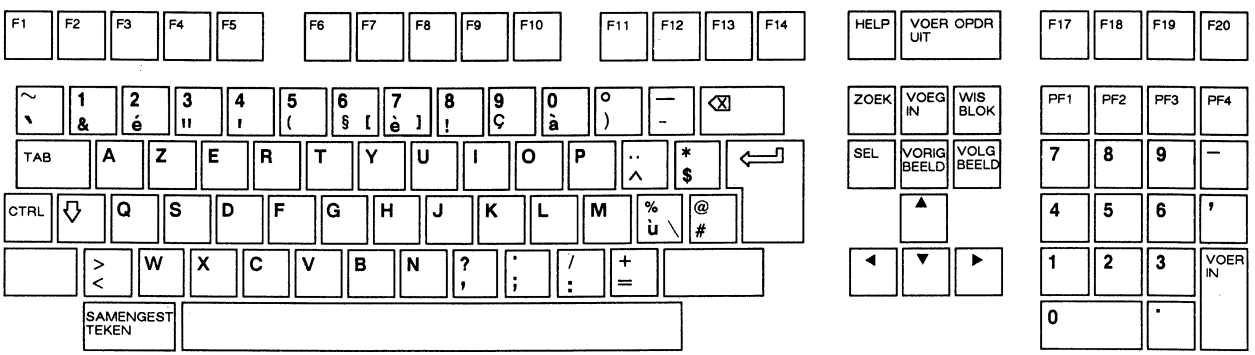

Danish



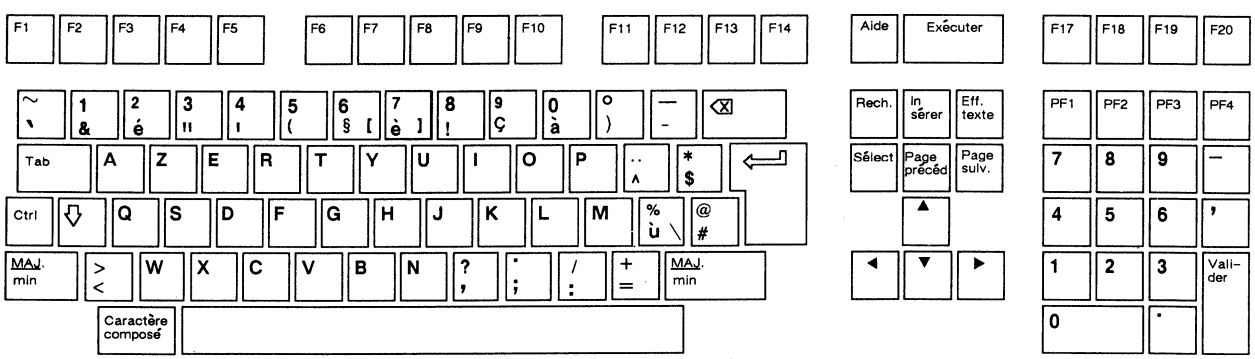

**Dutch**



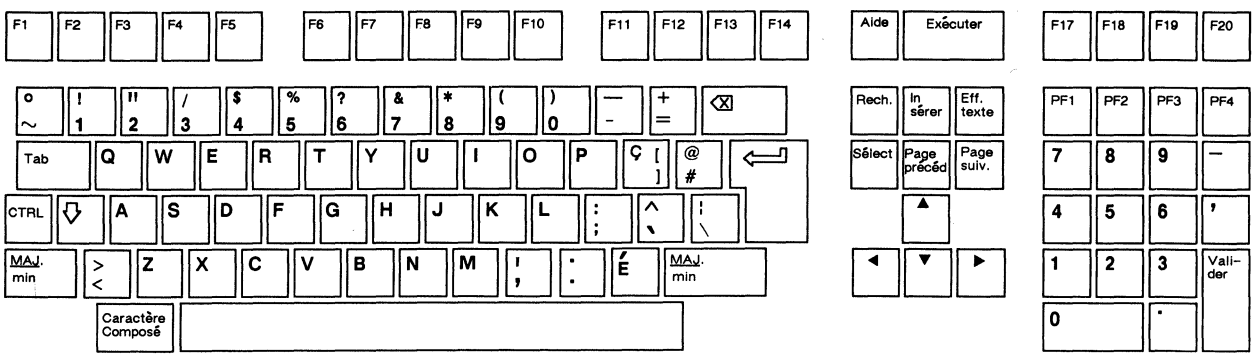

**Finnish**



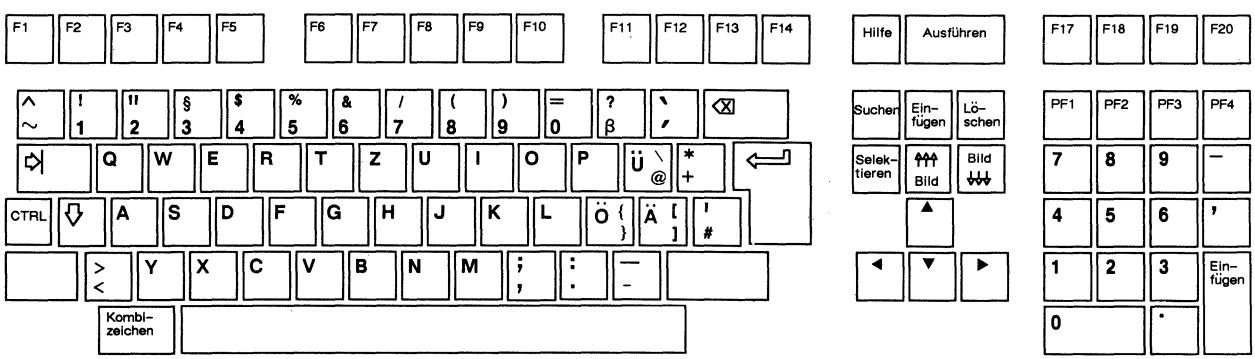

**Flemish**



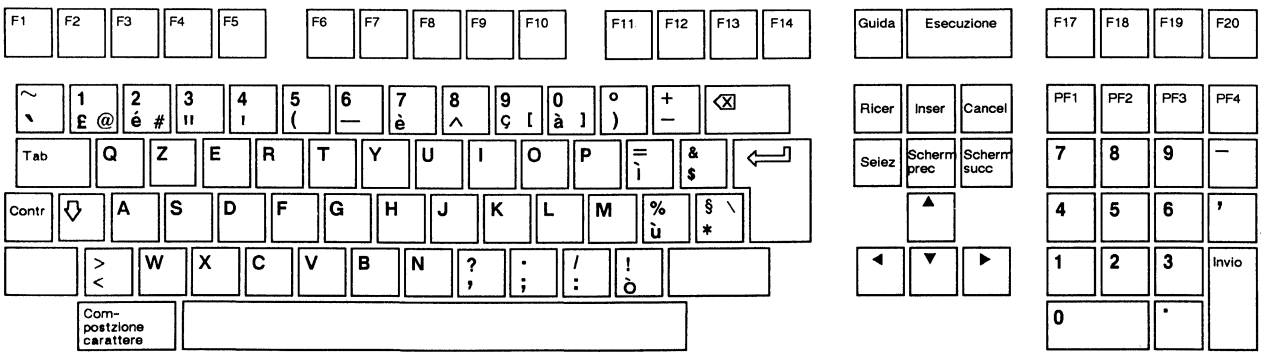

**French/Belgian**



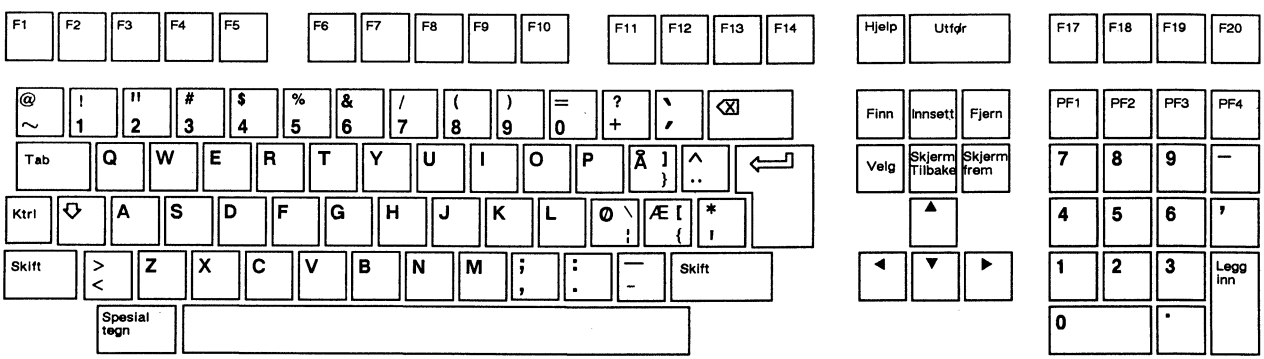

**French Canadian**



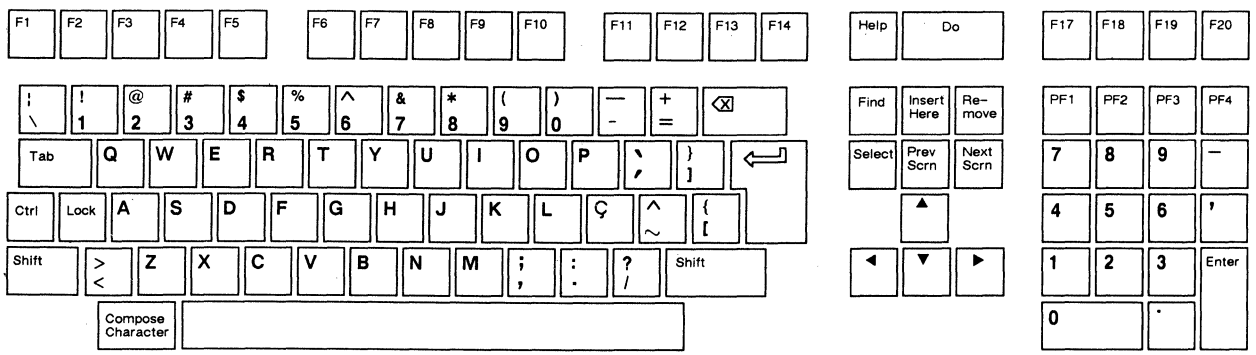

**German**



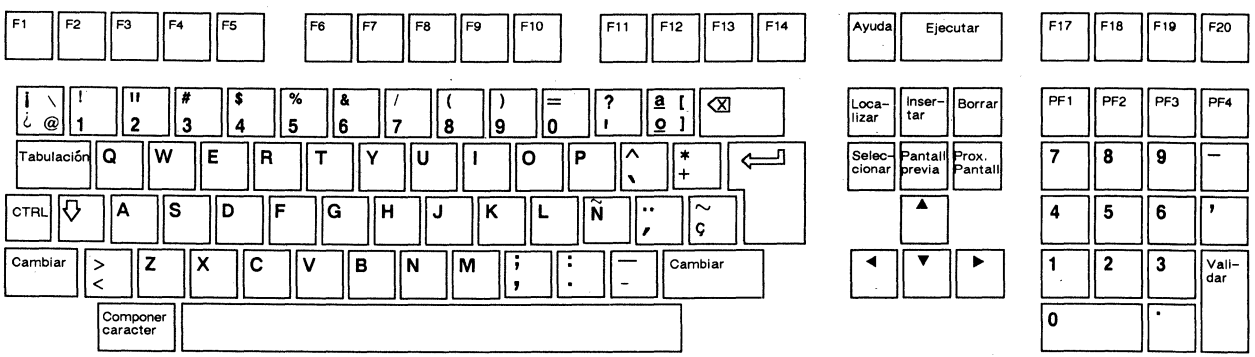

**Italian**



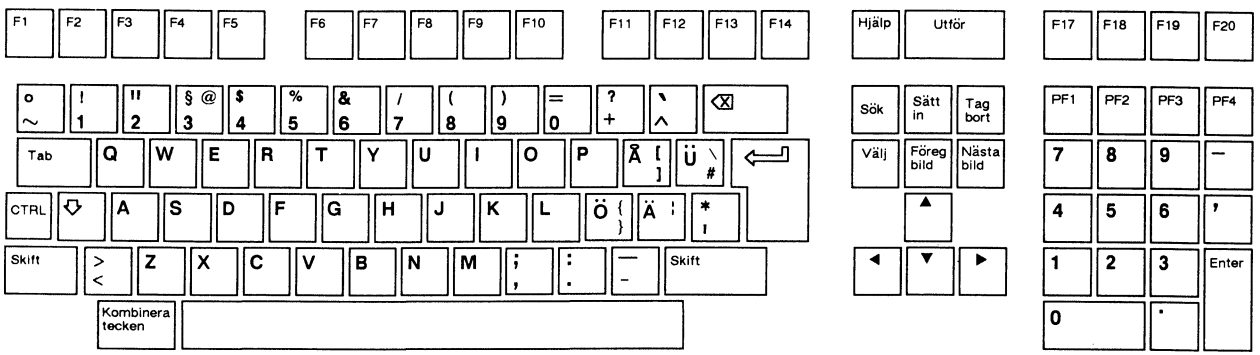

**Norwegian**



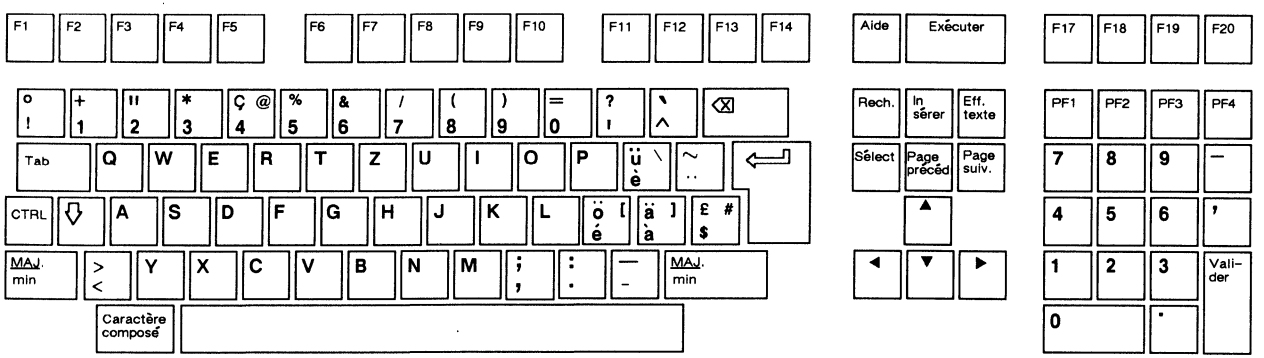

**Portuguese**



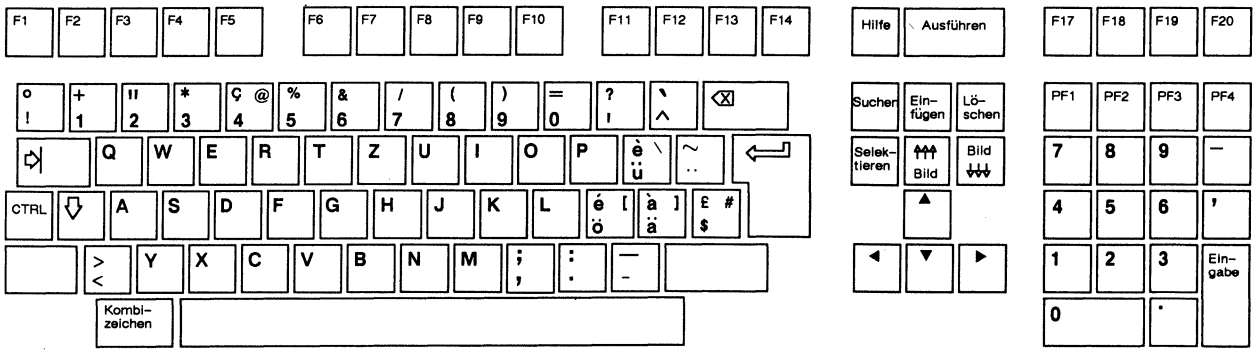

**Spanish**




**Swedish**




**Swiss (French)**




**Swiss (German)**

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## FCC NOTICE

**WARNING:** This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operating in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

Only devices certified to comply with the limits for a Class A computing device may be attached to this equipment. Operation with noncertified device(s) is likely to result in interference to radio and TV reception.

This equipment is intended for commercial use only and is not suited for operation in Class B environments.

The use of shielded I/O cables is required when connecting this equipment to any and all optional peripheral or host devices. Failure to do so may violate FCC rules.

## CANADIAN DOC NOTICE

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le Ministère des Communications du Canada.

880900-02 Rev. A
September 1988
Printed in Taiwan R.O.C.

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San Jose, CA 95134

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