



**VP TERMINAL EMULATION
OF DEC VT100**

XEROX

VP Series Reference Library
Version 1.0

This publication could contain technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of this publication.

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1. VP Terminal Emulation of DEC VT100 overview

The workstation can be used to emulate many different types of terminals. Specific terminals that can be emulated include Digital Equipment Corporation (DEC) VT100, International Business Machine (IBM) 3270, and Teletype Model 35 (KSR) terminals.

This chapter provides information on how the workstation can emulate DEC VT100 and VT52 terminals. A networked workstation with the appropriate software installed can establish a connection with a host computer through asynchronous communication, to behave as if it were a VT100 terminal.

Related information

The following materials provide information related to the VP Terminal Emulation of VT100 application.

VP Series reference library

- Xerox ViewPoint

VP Series training guides

- Xerox ViewPoint
- VP Terminal Emulation of DEC VT100

Hardware/software requirements

The following are the hardware, software, and network services requirements for VP Terminal Emulation of DEC VT100.

Hardware

- A 6085 Professional Computer System, or an 8010 Information System

Software

- Xerox ViewPoint software
- Remote System Administration software
- VP Terminal Emulation of DEC VT100 software
- VP NetCom software
- VP Document Editor software

VP Terminal Emulation of DEC VT100 software and all prerequisite software must be installed, enabled, and running on the workstation. The VP Terminal Emulation of VT100 software is an optional purchase, and is an added feature of TTY emulation. To verify if this software package is running and loaded on the workstation, open the TTY property sheet and select [VT100]. If the VT100 software is not loaded and running, a message displays this status.

The sub-tab titled "Application Loader" in the VP Series reference library contains additional information on the application loader.

Network services

- External Communication Service (requires the purchase of asynchronous communication protocol and standard services software)

Benefits of emulation

VT100 emulation provides many benefits for users who access data stored on host computers. Specifically, VT100 emulation enables users to:

- Communicate with multiple host computers from a single piece of equipment
- Establish a connection for multiple sessions with the same host computer, or establish connections for sessions on several hosts, using the ViewPoint interface, which allows multiple windows to be opened at the same time
- Manipulate information captured through the emulation process, including printing, filing, formatting, editing, and mailing this information
- Complete other workstation functions, such as mailing or printing, while the host computer is busy processing user requests

- Transfer information created on the workstation into a VT100 emulation window
- Interface with a VT100-compatible IBM PC through the workstation's VT100 terminal emulation window. This feature is called PC Resource (PCR)

Emulation protocols

All data that is sent and received is handled at the workstation level. The conversion process that takes place between Ethernet protocols and asynchronous protocols to enable emulation is described in the following paragraphs.

Display terminals are used for interactive communication with many different types of host processors using the asynchronous communication protocol. Typically, a display terminal communicates with the host computer using a modem and dial-up telephone line to establish and maintain an interactive session.

In the Xerox environment, the workstation becomes the display terminal. Instead of using asynchronous communication protocol, the workstation uses Ethernet standard protocol, thus offering greater capabilities than a normal display terminal, including printing, filing, formatting, editing, and mailing.

VP Terminal Emulation of VT100 software converts information sent and received between the workstation and the host computer from Ethernet standard protocol to asynchronous communication protocol and vice versa. Additionally, it enables information received at the workstation to be presented as it would appear on a DEC VT100 terminal, and it correspondingly enables the user to handle this information as it would be handled on a VT100 terminal.

The conversion between Ethernet protocol and asynchronous protocol is performed on the network level by the External Communication Service.

Using VT100 emulation at the workstation

Emulation icons

To perform VT100 emulation, it is necessary to retrieve the VT100 icon in the TTY Emulators divider, which is located in the domain divider in the directory (refer to Figure 1-1). This divider lists all RS232C ports that are suitable for TTY emulation use (refer to Figure 1-2). Currently, the following two asynchronous types are available: KSR-35 and VT100 (including the VT100 extended feature of PCR).

Note: The same operations can be performed with emulation icons inside the divider as those on the desktop, with the exception of using <PROP'S>.

Multiple emulation icons, representing different access paths from the Xerox network to specific host computers, can reside on the desktop. One icon, for example, might represent a Xerox port set up to support communication with a company's own computer, while another might represent a port supporting a connection to an outside database.

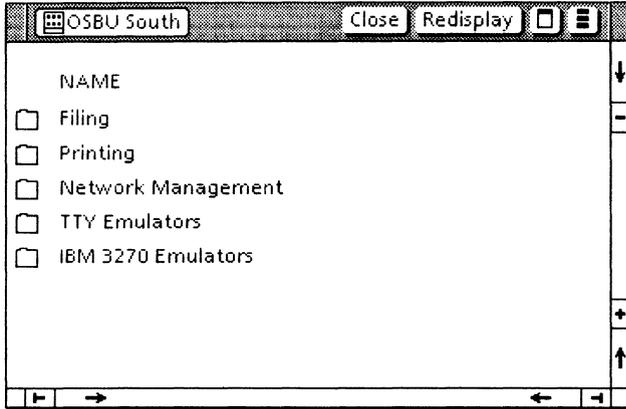


Figure 1-1 TTY Emulators divider opened within the domain divider

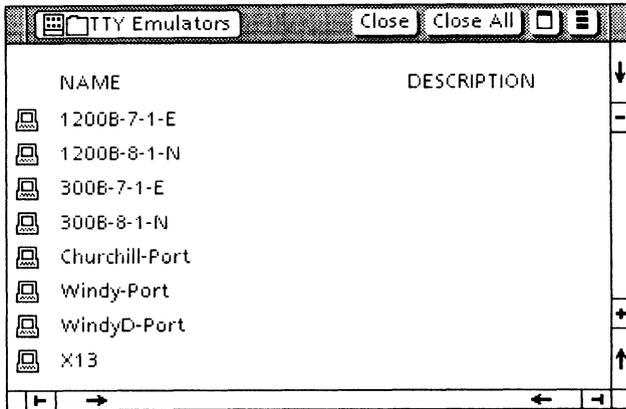


Figure 1-2 TTY Emulators divider contents

Emulation properties

Like all objects, emulation icons have properties and options that can be set and changed to fit individual needs. Some information is supplied by the System Administrator, while other information is supplied by the user.

The following are set by the user: icon name, the phone number of the host computer, screen width, autowrap, local echo, line terminators, formatting, and XON/XOFF flow control or line-by-line flow control.

VT100 terminal emulation is based on teletypewriter (TTY) properties and uses the TTY property sheet. When VT100 is selected as the terminal type, additional TTY options become available. They include the following: VT100 or VT52, cursor shape, margin bell, and PCR, which is the extended VT100 feature that enables interfacing with VT100-compatible computers.

Once a session has been established, the workstation becomes bound to a particular port for the duration of the session. At other times, that port can be used by any other workstation with VT100 emulation installed.

Chapter 3 contains information on changing emulation properties.

Emulation window

When the selected emulation icon opens and [START] is selected, a display window that resembles the VT100 display screen opens. This means the connection with the host computer is completed, using the connection parameters specified in the TTY icon's option sheet.

The VT100 emulation window is divided into the following areas:

- **Status area** - Read-only information that cannot be set from the workstation is contained in this area. During emulation, LED indicator lights indicate options that are set.
- **Main text area** - All user interaction with the host terminal is conducted inside this 24-line emulation window. Text is entered directly through the keyboard or by copying or moving it from a document. The number of columns is determined on the Screen Width option of the TTY option sheet.

Incoming characters are placed at the cursor position. When the carriage return is pressed or as information is received from the host, the contents of the window are scrolled up a line at a time. Unlike workstation scrolling, this continuous session scrolling cannot be rescrolled once it is out of view.

All data that has been shown on the screen can be captured and transferred for workstation use by selecting [MAKE DOCUMENT]. Selecting [MAKE SCREEN] transfers a single screen of information from the host computer into a document. Chapter 2 contains detailed information regarding [MAKE DOCUMENT] and [MAKE SCREEN].

Once information is captured using [MAKE DOCUMENT] or [MAKE SCREEN], the resulting document can be manipulated the same as any other document. This includes printing, filing, formatting, editing, and mailing.

Using VP Data Capture software, such information can be run through a program that formats it as a table, thus permitting easy transfer of data into record files or bar charts.

The tab titled "VP Data Capture" in the VP Series reference library contains detailed information on data capture software.

Virtual function keys

When a selection is made within the emulation window, the VT100 virtual function keys display. Figure 1-3 shows the virtual function property keys.

Note: The keypad labels and positioning of keys are different for the 8010 and 6085 workstations.

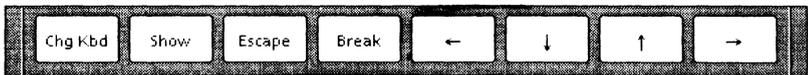


Figure 1-3 Virtual function key layout (for 8010 workstation)

The virtual function keys include:

- <CHG KBD> - Used to go between the main and alternate VT100 keyboards. If the key is pressed and released, the keyboard redefines to the main keyboard (or to the alternate keyboard). If this key is held down while one or more keys are pressed, the VT100 keyboard interpretation remains what it was, allowing quick access to the alternate keyboard (for example, for a few keystrokes).
- <ALT> - Used to interface with IBM's PC-VT100, if available.
- <ESCAPE> - Equivalent to the actual VT100 ESCAPE key.

- **<BREAK>** - Equivalent to the actual VT100 BREAK key.
- **Arrow keys** - Equivalent to the actual VT100 cursor control keys.

Emulation keyboards

When a selection is made within the emulation window, the workstation's keyboard is remapped by the system software to represent the keyboard and functions normally found at a VT100 terminal. The keyboard's new meanings are displayed on the screen in a virtual keyboard window. This allows full access to all ASCII control codes, plus the function key corresponding to **<BREAK>**.

VT100 emulation uses two virtual keyboards: the main or generic TTY alphanumeric keyboard used by all asynchronous type terminals, and an alternate keyboard. Additionally, a PCR auxiliary keyboard is available when the PCR feature is used.

Main keyboard

When a selection is made inside the VT100 emulation window, the keyboard redefines to reflect the main TTY keyboard. Pressing the function key corresponding to **<SHOW>** displays the interpretation of the current keyboard. Figures 1-4 and 1-5 illustrate the main TTY keyboard for the 8010 and 6085 workstations.

Note: For the 8010 workstation, the para-tab key is equivalent to **<CTRL>**. For the 6085 workstation, **<KEYBOARD>** is equivalent to **<CTRL>**; it is not shown in the illustration.

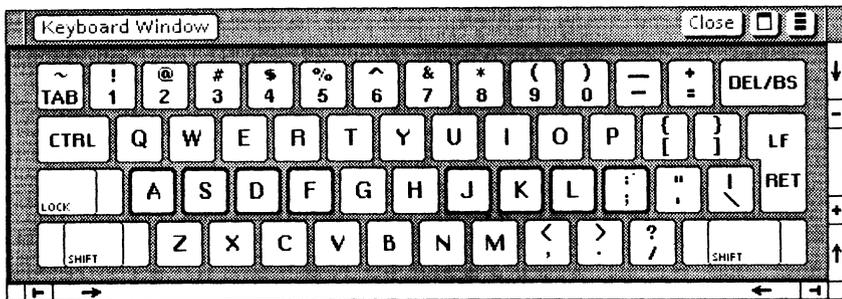


Figure 1-4 Main TTY virtual keyboard (for 8010 workstation)

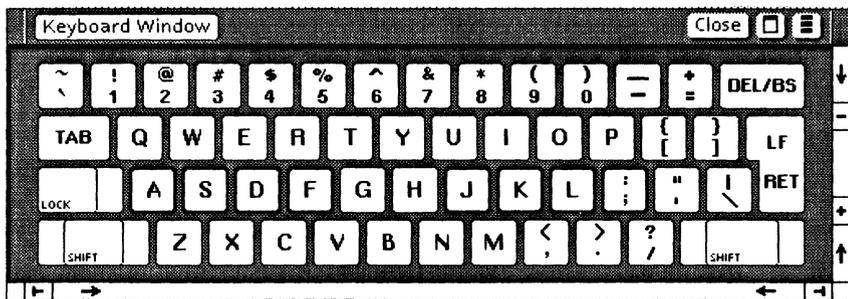


Figure 1-5 Main TTY virtual keyboard (for 6085 workstation)

Alternate keyboard

The alternate keyboard contains the numeric keypad, four function keys, and several other keys. It is accessed by pressing the function key that corresponds to <CHG KBD>. Figure 1-6 illustrates the VT100 alternate keyboard.

Refer to Appendix A for detailed information on the VT100 alternate keyboard.

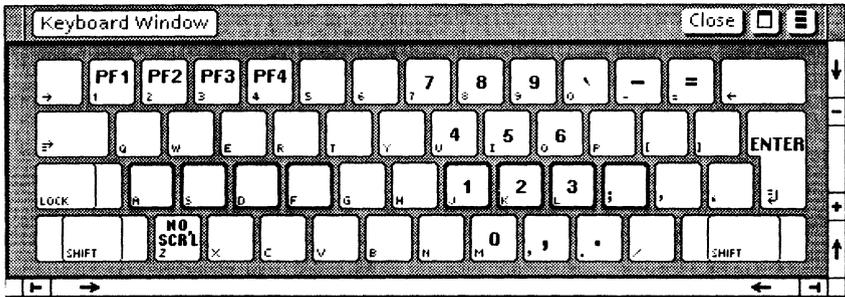


Figure 1-6 VT100 alternate keyboard (for 8010 workstation)

PCR auxiliary keyboard

When using the PCR feature, <ALT> in the virtual function keys corresponds to the ALT key on an IBM PC keyboard. It is used when the VT100 emulation window is interfaced with a PC-VT100-compatible computer. The PCR auxiliary keyboard contains VT100 keys and IBM PC keys.

The auxiliary keyboard contains ten special keys (labeled X1 through X10) for applications or equipment requiring more keys than are present on the actual VT100 and PC keyboards.

Refer to Appendix A for control sequences and additional information on the PCR auxiliary keyboard keys.

Explicit control of the cursor

The VT100 emulator cursor appears as an underscore or, optionally, as a hollow rectangle (corresponding to a VT100 block cursor). The emulator cursor appears in the emulation window at all times. When the current selection is inside the window, the cursor is black. When the selection is outside the window, the cursor is gray.

The cursor may be placed anywhere in the VT100 window screen area and marks the position where the next input character is inserted. Its location is set by the host computer, the mouse cursor, or the cursor control keys.

Note: [ENABLE/MOUSE CURSOR] must be selected in the document auxiliary menu to have mouse tracking.

When the host computer sets the emulator cursor, it does so independently of the workstation's current selection. Thus, work in progress in another window continues despite activity within the emulation window.

The emulator cursor can be set to any character location in the window by moving the mouse cursor to the desired location. The emulator cursor changes to a temporary gray box as it tracks the mouse. The emulator cursor sets to the character position pointed at by the mouse.

- If the location selected is different from the previous emulator cursor, a series of cursor control commands specifying the new location is sent to the host computer.
- If the selection is made on the emulator cursor, then no cursor control sequence is generated.
- If the mouse moves outside the VT100 window while the point button is pressed, the emulator

cursor does not move from its original position. Any subsequent keystrokes are entered at the current selection. The emulator cursor must be reset in the VT100 window for input into the VT100.

Note: Even if the mouse cursor (up arrow) is located within the VT100 window, information does not appear until a selection to set the emulator cursor has been made within the window. The cursor control keys on the VT100 keyboard cannot be used unless the current selection is already inside the VT100 window.

Once the current selection is inside a VT100 window, the cursor or the cursor control keys can be used to position the emulator cursor within the screen data window. Whenever the emulator cursor is moved, the cursor control sequence specifying the new location of the emulator cursor is sent to the host computer.

If <CTRL> and the function key corresponding to <BREAK> are pressed simultaneously, transmission of the answerback messages begins.

Copying and moving conditions

- Character properties are ignored.
- Characters or symbols without emulation equivalents appear as question marks.
- New line and new paragraph characters are converted to standard carriage returns.
- Copying or moving large amount of text into a window varies between host systems.
- If [ENABLE MOUSE CURSOR] is not selected in the document auxiliary menu, text copied or moved into the VT100 emulation window always appears at the cursor location. Cursor control escape sequences are not sent to the host during a copy or move operation to a VT100 window.

- If [ENABLE MOUSE CURSOR] is selected in the document auxiliary menu, the appropriate cursor control escape sequences cause the cursor to move to the new selected location before the move or copy operation occurs.
- If the host computer does not support flow control, a copy or move operation may result in data lost at the host.

The following copying and moving conditions apply when [FORMATTING] is selected in the TTY property or option sheet.

- Lines in the document are broken at space, paragraph, paragraph tab, normal tab, hyphen, or discretionary hyphen characters if at all possible. These are referred to as line break characters. Line break conditions are as follows:
 - If the line has no line break characters, it is broken at the line limit.
 - If the break occurs immediately after the line limit, the line is broken at the line limit.
 - If the break occurs as a result of a space or tab, then that character is placed in the first column of the next line.
 - If the source document has lines that are longer than the line limit setting, they are also broken at the line break character that appears on or before the line limit. This is not the same line breaking point seen in the open document.
 - Paragraphs entered without explicit new line characters are broken at the line break character that appears closest to the line limit.

Statistics and facts

- Only the International Standard (ISO) 646 7-bit code character set interchange (characters without special properties such as boldfacing, underlining, or italicizing) is supported by TTY.
- The emulator does not attempt to always keep the current type-in point (such as the bottom line) visible. The current type-in point is always viewable by scrolling the window.
- Information within the emulation window cannot be copied or moved to another location within the emulation window.
- Lines in the document are broken at space, paragraph, tab, normal tab, hyphen, or discretionary hyphen characters if at all possible. These are referred to as line break characters. Line break conditions are as follows:
 - If the line has no line break characters, it is broken at the line limit.
 - If the break occurs immediately after the line limit, the line is broken at the line limit.
 - If the break occurs as a result of a space or tab, then that character is placed in the first column of the next line.
 - If the source document has lines that are longer than the line limit setting, they are also broken at the line break character that appears on or before the line limit. This is not the same line break point seen in the open document.
 - Paragraphs entered without explicit new line characters are broken at the line break character that appears closest to the line limit.

2. Actions and procedures

The actions and procedures contained in this chapter provide the information necessary to use VT100 emulation on a networked workstation. They do not provide information on how to use the VT100 terminal. The System Administrator can provide instructions on actual use.

Retrieving a TTY icon

The current set of emulated asynchronous TTY terminals consists of DEC VT100, IBM 3270, and Teletype KSR-35. VT100 terminal emulation is based on TTY properties. Therefore, VT100 icons are located within the TTY divider.

Each icon represents a different access path from the Xerox network to specific host computers. These icons are copied from the TTY emulators divider, which is located in the domain divider in the directory. The System Administrator should be contacted for the names of terminal emulator icons to use, or when there are no TTY icons in the directory.

To retrieve a VT100 icon:

1. Open the directory icon, and then open the domain divider.
2. Open the TTY Emulators divider. The number of TTY icons available depends on the number of ports available.
3. Copy the desired VT100 icon to the desktop. The pointer changes into a miniature TTY icon until a location is selected on the desktop.

Note: The name of each icon is initially set by the System Administrator. The VT100 icon on the desktop can be renamed using the property sheet.

Setting properties for a VT100 emulator icon

The VT100 icon has properties and options that can be changed to fit individual needs. The TTY property sheet is used to set the desired VT100 emulation properties, such as port, modem, and terminal type, each time an emulation session is started.

To set properties for a VT100 emulator icon:

1. Select the VT100 icon and press <PROP'S>. Retrieve a VT100 icon from the directory if one does not already exist.
2. Select [DISPLAY OPTIONS] so the option sheet appears each time the emulator icon is opened.

Note: If [DISPLAY OPTIONS] is not selected, the TTY option sheet does not appear and the properties set on the TTY property sheet are used in the emulation session.

3. Select the port items desired. Port items can be changed only if the emulator icon is using a local port on the External Communication Service. If a Communication Interface Unit (CIU) port is being used, only the phone number can be changed.
4. Select the modem items desired.

Note: Modem items can only be changed if the emulator icon is using a local port on the External Communication Service. If a CIU port is being used, no changes can be made.

5. Select VT100 as the terminal type.
6. Select the terminal items desired.
7. Select [DONE] in the window menu to close the property sheet and store any changes made to the property sheet. Select [CANCEL] to close the property sheet without storing the changes.

Starting an emulation session

An emulation session begins when connection with the desired host computer is established. Once it is connected, the TTY icon expands into an emulation window.

To start an emulation session:

1. Open the VT100 icon. Copy the desired VT100 icon from the directory if one is not on the desktop.
2. Fill in the option sheet and select [START]. (These changes will be effective only for the duration of the session.) Change options or add information as desired. Relevant information can be supplied by the System Administrator.
3. Select inside the open emulation window.
4. Log on by entering the following information: name, password, and any other information necessary to start the session appropriate for the host computer.

Displaying the VT100 keyboard

Any time a selection is made within an emulation window, the keyboard is assigned new meanings that correspond to the keys of the main TTY alphanumeric keyboard. This keyboard is used by all asynchronous type terminals.

To see the keyboard meanings, select the function key corresponding to <SHOW>.

Note: If the PCR feature is used, hold down <KEYBOARD> and then press the key corresponding to <SHOW>.

Select anywhere outside the emulation window to return the keyboard to its original meanings.

Note: The new interpretation takes effect only when the caret is inside the emulation window.

Using the alternate VT100 keyboard

The specific VT100 keys are contained on an alternate keyboard. When a selection is made inside the emulation window, one of the virtual function keys is redefined as <CHG KBD>. Pressing the function key corresponding to <CHG KBD> switches the meanings from the main TTY keyboard to the VT100 alternate keyboard.

To use the VT100 alternate keyboard:

1. Select inside the VT100 window.
2. Press the function key corresponding to <SHOW> for a visual representation of the keyboard, and then press the desired emulation key.
3. Press the function key corresponding to <CHG KBD> again to return to the main TTY keyboard.

Note: While using the main TTY keyboard, it is possible to press the function key corresponding to <CHG KBD> to temporarily use the alternate keyboard for a few key strokes. Releasing <CHG KBD> returns the keyboard to its initial state.

Using the PCR keyboard

<ALT> can be used when the VT100 emulation window is interfaced with a PC-VT100-compatible computer. When a selection is made inside the emulation window, <ALT> appears on the virtual function key (in place of <SHOW> when PCR is used). This key is equivalent to the IBM ALT key.

Note: Refer to Chapter 1 for a description of the PCR auxiliary keyboard, and to Appendix A for detailed information on the use of the control sequence and PCR auxiliary keyboard keys.

To use the PCR alternate keyboard:

1. Select inside the VT100 window.
2. Press the function key corresponding to <ALT>. Hold down <KEYBOARD> and select the function key corresponding to <SHOW> for a visual representation of the keyboard, and then press the desired key.
3. Press the function key corresponding to <CHG KBD> to return to the main TTY keyboard.

Conducting an emulation session

Once a connection has been made using the steps described in "Starting an emulation session," a session can begin.

To conduct a session, follow the normal instructions for running programs as defined by the host computer. Use the control cursor keys (in the virtual function keys) or the mouse to select the place where the caret appears.

Log off from the host computer when a session is completed. Then select [CLOSE] at the top of the emulation window.

Note: Closing the emulator window alone does not automatically log a user off the host computer.

Changing properties during an emulation session

The VT100 set-up property sheet is used to change terminal properties any time during an emulation session. On a VT100 terminal, this feature is known as set-up mode and is normally divided into two screens: set-up A and set-up B. The VT100 set-up property sheet combines this information.

To change properties during an emulation session:

1. Select [SHOW TERMINAL PROPS] in the emulation window auxiliary menu.
2. Select the variables desired.
3. Select [SAVE DATA] if changes are to be retained; if [SAVE DATA] is not selected, changes made last only for the duration of the emulation session.
4. Select [DONE] to close the property sheet and apply the variables selected, or [CANCEL] to close the property sheet and reset the properties to the options defined the last time [SHOW TERMINAL PROPS] was selected.

Transferring information

Workstation information to host computer

The emulation process allows information to be transferred to a host computer. Select the desired text in the document that is to be transferred, press <COPY> or <MOVE> as appropriate, and then select the destination inside the VT100 window. The cursor marks the location in which the next input character is inserted.

[MAKE DOCUMENT] -

Transferring VT100 information to document form

When [MAKE DOCUMENT] is selected, information from the host computer is transferred into a document. All information appearing on the current screen, plus all the information that has been scrolled off the screen since [MAKE DOCUMENT] was last selected, is available.

To transfer information from an emulation window, select [MAKE DOCUMENT]. This information appears as an icon with a name and a time stamp. For example:

1200B-VAX of 4-MAR-86 11:46:52PST

Notes:

- Character properties, such as boldfacing or underlining, are not preserved when [MAKE DOCUMENT] is selected.
- Pressing <STOP> interrupts the [MAKE DOCUMENT] process; however, any information being transferred may be lost or incomplete.
- [RECORD DATA] must be selected in the window management auxiliary menu before [MAKE DOCUMENT] can be selected.

[MAKE SCREEN] -

Transferring specific VT100 information to document form

When [MAKE SCREEN] is selected, a single, screen of information is transferred from the host computer into a document.

To transfer information from an emulation window, run the session until the desired information appears on the screen, and then select [MAKE SCREEN] in the window menu. This information appears as a

document icon with the VT100 icon's name and a time stamp. For example:

1200B-VAX of 4-MAR-86 11:46:52PST

Notes:

- Character properties, such as boldfacing or underlining, are preserved when [MAKE SCREEN] is selected. It does not, however, preserve double height, double width, or reverse video.
- Pressing <STOP> interrupts the [MAKE SCREEN] process; however, any information being transferred may be lost or incomplete.

Ending an emulation session

Once an emulation session is completed, log off from the host computer. Then select [CLOSE] at the top of the emulation window.

Note: Closing the emulation window alone does not automatically log a user off the host computer.

Work strategies

- To accelerate opening the emulation window, set the desired options in the TTY option sheet, and then deselect [DISPLAY OPTIONS]. As a result, the TTY option sheet will not appear each time the emulator icon opens. Change the icon label as a reminder (for example, "Set Options" or "Fast Open").
- To improve performance, deselect [RECORD DATA] in the TTY window auxiliary menu if [MAKE DOCUMENT] will not be selected in the current session.

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3. Property/option sheets and windows

This chapter describes the property sheets, option sheet, and window related to VP Terminal Emulation of DEC VT100.

Property and option sheets are used to specify such information as ports, modems, and terminal properties in order to reflect the actual hardware environment the VT100 emulator uses. Windows relevant to VT100 emulation allow the user to select commands such as [MAKE DOCUMENT], which is used to transfer information on the VT100 screen into a document.

TTY Properties Done Cancel

Icon Name

When Opening

Port Items

Port Name

Phone Number

Stop Bits

Character Length

Parity

Modem Items

Duplexity

Line Speed

Terminal Items

Type

Language

Screen Width columns

Screen Height

DEL/BS Key Shift for

Local Echo

Line Termination Sequence

Formatting

XON/XOFF Method

Figure 3-1 TTY property sheet

TTY property sheet

VT100 terminal emulation is based on asynchronous TTY emulation and makes use of the TTY property sheet. The TTY property sheet (Figure 3-1) is used to set various port, modem, and terminal properties to reflect the actual hardware environment the emulator is to be used in. Information entered on the option sheet is used for the duration of the current session and then discarded.

The TTY option sheet is displayed by selecting the TTY icon and pressing <OPEN>.

Notes:

- The TTY property sheet contains the same properties as the TTY option sheet, with two additional properties: Icon Name and When Opening.
- The property sheet is grouped into three main areas. These areas deal with port configuration, modem settings, and terminal emulation behavior. Port and modem information may be fixed or variable, depending on whether the TTY port used is on a Communication Interface Unit (CIU) or an External Communication Service (ECS) port. The ECS port options are variables and can be changed on this sheet, while the CIU port options are in read-only format. This is because the CIU does not allow its ports to be dynamically configured after it is operational. Because the ECS port allows this possibility, its options can be changed through the property sheet.

Menu commands

The following is a description of the commands located at the top of the property sheet in the gray area.

[DONE]

Closes the property sheet and stores any changes made to the property sheet. Information stays the same until the property sheet is modified again. If any information is incorrect, the property sheet remains open and displays an error message.

[CANCEL]

Closes the property sheet without applying any changes to the properties.



Causes the window management commands to appear when the pointer is placed over the window management auxiliary menu and the left mouse button is held down. The sub-tab titled "Windows" in the VP Series reference library contains detailed information on the window management commands.



Causes the window commands that have been placed in the floating item auxiliary menu to appear when the pointer is placed over the menu and the left mouse button is held down. Window commands are placed in the floating item auxiliary menu when the window is not wide enough to accommodate the commands.

Properties

The following is a list of the properties.

Icon Name

Used to change the name of the emulator icon on a desktop. This allows each VT100 icon to be uniquely named.

When Opening

Selecting [DISPLAY OPTIONS] causes the option sheet to be displayed the next time the VT100 window is opened. If [DISPLAY OPTIONS] is not selected, the TTY option sheet does not open and all options set on the property sheet are used for that session.

PORT ITEMS:**Port Name**

Displays the name given to the port in the Clearinghouse Service in read-only format.

Phone Number

Specifies the full phone number to be dialed for the connection. Valid characters in this item are governed by the autodialer used.

Note: If no phone number is entered and the port is not currently being used, the emulator unconditionally opens the window. This is useful when the RS232C port is configured for manual dialing.

Stop Bits

Indicates the end of a character. This option cannot be changed for CIU port. It can be set to 0, 1, or 2 if the TTY port is attached to a local server port. The communication hardware used in the TTY connection determines what values are legal, as well as whether or not they are electronically changeable.

Character Length

Designates the length of characters, in bits. This option cannot be changed for CIU ports. This option can be set at 5, 6, 7, or 8 for the local server port. The communication hardware used in the TTY connection determines what values are legal, as well as whether or not they are electronically changeable.

Note: The workstation only supports ISO 646 7-bit ASCII character codes. This option governs the physical length of the character on the transmission line and not the size of the character set supported.

Parity

Designates the method used to check that data is not garbled in transmission. This option cannot be changed for CIU ports. If it is attached to a local server port, it can be set to [NONE], [EVEN], or [ODD].

MODEM ITEMS:

Duplexity

Designates whether communication can occur in both directions simultaneously (full duplexity) or in one direction at a time (half duplexity). This setting is in read-only format.

Line Speed

Specifies the rate at which data passes to and from the host computer (also known as baud rate). This option cannot be changed for CIU ports. The communication hardware used in the TTY connection determines what values are legal, as well as whether or not they are electronically changeable.

TERMINAL ITEMS:

Type

Specifies the asynchronous terminal to be emulated for the session. For terminal emulation of VT100, [VT100] is selected (VT52-mode runs as a component of the VT100 emulator). [PCR] is selected if VT100 emulation is interfaced with a PC-VT100-compatible computer.

Language

Specifies the TTY ISO 646 7-bit ASCII character translation table from the TTY translations data file to be used for the session. (For additional information on character codes, refer to Appendix A.) These tables control the mapping of ISO characters to and from XC1 (Xerox Character Code Standard, Version 1) characters. This does not affect which virtual keyboard is used. That is always determined by the version of the keyboard file that is loaded.

Screen Width

Allows a selection of various screen widths (number of characters that will fit on one line in the window). For terminals in which width is optional (for example, the Teletype Model 35), [OTHER] may be selected.

[OTHER]

Displayed if the terminal being emulated does not require a specific screen width. If it is displayed, the screen width can be set between 10 and 132 columns inclusive.

Screen Height

The screen height is fixed at 24 lines to reflect the height of the actual VT100 terminal.

[UPPERCASE ALWAYS]

Causes all lowercase alphabetical ISO 646 characters (for example, a-z in English) to be translated to their uppercase counterparts (for example, A-Z) before they are sent to the host computer. This applies to all workstation characters that have a reasonable uppercase equivalent; otherwise, the lowercase character is used. This mapping applies to characters entered into the TTY window from both the keyboard and from copy or move operations.

[AUTOWRAP]

Causes a carriage return - line feed (<CR> - <LF>) feed action to automatically occur when a line in the window becomes full. Thus, when [AUTOWRAP] is selected and the last character position is reached, the next character received is automatically placed in the first character position of the next line.

Note: If this option is not selected and the last character position is reached, the next character typed in displays on top of the previous character in the last position (overwrites).

DEL/BS Key

Specifies the placement of the delete and backspace functions on the DEL/BS key (the upper-right key above the return key). The function that is selected is the one performed when <SHIFT> is pressed. For example, if BS is chosen, pressing <SHIFT> and <DEL/BS> will perform a backspace action.

Local Echo

Specifies whether the terminal echoes (displays) the characters typed in, or if the host computer sends these characters to the terminal to be displayed. If [ON] is selected, the terminal displays each character before sending it to the host computer and does not expect the host computer to echo it back. If two characters appear on the screen, it indicates that both the workstation and the host computer are echoing the character. In this case, the local echo should be turned off at the workstation. The local echo state is reflected in the generic status area by the Local Echo indicator.

Line Termination Sequence (LTS)

Specifies what character, or sequence of characters, replaces a carriage return just before it is sent to the host computer. When [OFF] is selected, the carriage return is sent unchanged. When [ON] is selected, the carriage return is replaced by the LTS. The LTS is inserted whenever a line break occurs in the TTY window. This happens at the following times:

- If the user is copying text from a document, this sequence is inserted each time the current line is full or a new paragraph character is encountered.
- If the user is typing, this sequence is inserted each time CR is entered.

From 1 to 8 octal characters (separated by spaces or commas) may be specified in the sequence. These octal numbers represent any byte from the standard ISO 646 7-bit character set. Valid separator characters are spaces (" ") or commas (",") in any combination. A comma is legal after a number or space. For example, the following are valid sequences:

- 15,012,23 (= carriage return - line feed - DC3)
- 015, 12 (= carriage return - line feed)
- 23, 015,12 (= DC3 - carriage return - line feed, with any number of spaces)
- 23
- 0 0 0 1 2 377 10 023 (= 0,0,0,1,2,377,10,23)
- 015, 12, 23, 15 0 23 (combinations of blanks and commas = 15,12,23,15,0,23)

Whatever the sequence is, it is defined by the host computer to which the emulator connects. It is the user's responsibility to enter an LTS that is legal for the host computer.

The legal octal values range from 0 to 377₈. The legal characters are the digits 0 to 7, a space, and a comma. If any illegal entry is made, the option sheet does not allow the user to proceed until it is corrected. Using octal digits allows the following:

- Total flexibility in specifying any possible ISO character sequence
- Multinational character codes
- Ease of conversion from display representation to binary (and thus better performance)

It is assumed that once they are set, LTS and XON/XOFF do not change often for a given installation.

Formatting and Line Length

Selecting [ON] causes the Line Length option to appear on the property sheet, allowing specification of the number of characters to be considered per line during copy or move operations. The line length is independent of the screen width. It also automatically inserts an LTS at the end of each transmitted line.

When this option is used while copying or moving data from a document, the TTY emulator determines where a line break should occur to keep the line at or below the specified line limit, and it inserts an LTS at that point. If the source document has been prepared in fixed pitch as recommended, with margins equal to the line length, these line breaks should occur at approximately the same point in the TTY stream as in the displayed document. This option does not affect the processing of text that is entered at the keyboard.

Chapter 1 describes the emulation conditions relative to the document.

[TAB SIMULATION]

Specifies if tab characters are automatically converted to spaces in the transmit stream. When this option is used while copying or moving data into the TTY window, the emulator determines how many spaces to insert in the line so the character will be properly aligned on the next tab stop. If the document has been prepared in fixed pitch as recommended, the tabs should appear much as they do in the displayed document. When this option is turned off and text is copied or moved from a document, both normal and paragraph tabs are converted to ASCII horizontal tab characters.

Note: This option does not affect the processing of text that is entered at the keyboard.

[FORMATTING] must be selected for tab simulation to work. This feature should not be confused with the screen tabs available on the set-up property sheet. Set-up tabs are used only as a quick way of moving the cursor on the screen; they do not get sent to the host computer.

XON/XOFF Method

Allows specification of the type of flow control the terminal should use. There are two types of flow control: overflow or line-by-line. When [OVERFLOW] is selected, it issues the XOFF sequence whenever the rate of incoming data is greater than the rate at which it can be processed (after a certain internal threshold is exceeded). When [LINE-BY-LINE] is selected, the workstation suffixes each line sent to the host computer with the XOFF sequence, then waits for the host to send back the XON sequence before sending the next line.

Note: If a value other than [NONE] is selected, it implies that the host computer accepts and uses the specified form of flow control. If the user does not ensure that this is true, unpredictable results may occur. The system may even appear to stop processing (as it waits for an XON that never comes). In this case, pressing <STOP> terminates the process.

If a CIU port that has its own flow control is used, no terminal flow control is allowed (a message is posted). If the CIU port has flow control disabled, then the terminal may display [NONE] (no flow control specified), [OVERFLOW], or [LINE-BY-LINE]. (Local ports always display these options.) The CIU's flow control should be used whenever possible, because it is the system element closest to the port. It has the best chance, therefore, of issuing XOFF before any data is lost.

When [OVERFLOW] or [LINE-BY-LINE] is selected, two additional lines appear that allow the XON and XOFF sequences to be specified. Each sequence may have up to 8 octal numbers in it. The rules governing the entry of these sequences are the same as for specifying the LTS. However, if

XON and XOFF sequences are to be used, they must not be empty or the property sheet will not close.

When [LINE-BY-LINE] is selected, the XOFF sequence is appended to each line sent to the host computer. That is, the XOFF sequence is sent after each LTS is sent. The emulator then waits for the host computer to send back the XON sequence before it transmits the next line of data. For example, a CR could be the line termination sequence, a DC3 could be the XOFF sequence, and a DC1 could be the XON sequence received from the host computer to resume transmission. The emulator places the characters CR DC3 at the end of each transmitted line, and then waits to receive DC1 from the host computer before transmitting the next line, and so forth.

<STOP> can be used to terminate the copy or move action at any time in order to restart keyboard entry and/or reselect text for another copy or move action from a document.

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VT100 Set Up Properties		Done	Cancel		
NVR Option	<input type="button" value="SAVE DATA"/>				
Scroll	Jump				
Cursor	<input checked="" type="button" value="UNDERLINE"/> <input type="button" value="BLOCK"/>				
Margin Bell	<input type="button" value="ON"/> <input checked="" type="button" value="OFF"/>				
Ansi / VT52	<input checked="" type="button" value="ANSI"/> <input type="button" value="VT52"/>				
# / £	<input checked="" type="button" value="#"/> <input type="button" value="£"/>				
Auto Wrap	<input checked="" type="button" value="ON"/> <input type="button" value="OFF"/>				
LTS (New Line)	<input type="button" value="ON"/> <input checked="" type="button" value="OFF"/>				
Parity	None				
T & R Speed	9600 bits per second				
Answer Back Message	<input type="text"/>				
Screen Tabs	<input checked="" type="button" value="SET"/> <input type="button" value="CLEAR"/>				
Column	<input type="text" value="9"/>				
Column	<input type="text" value="17"/>				
Column	<input type="text" value="25"/>				
Column	<input type="text" value="33"/>				
Column	<input type="text" value="41"/>				
Column	<input type="text" value="49"/>				

Figure 3-2 VT100 set-up property sheet

VT100 set-up property sheet

The VT100 set-up property sheet (Figure 3-2) is used to change various terminal properties any time during an emulation session. On a VT100 terminal, this application is known as set-up mode and is normally divided into two screens, set-up A and set-up B. Both screens are combined in this property sheet.

The VT100 set-up property sheet is displayed by selecting [SHOW TERMINAL PROPS] in the window auxiliary menu.

Changes made on the VT100 set-up property sheet are retained if [SAVE DATA] is selected. If [SAVE DATA] is not selected, any changes made will only last for the duration of the emulation session.

Note: This property sheet contains many of the options normally displayed on the VT100's set-up A and set-up B screens, along with some that are contained in the TTY property sheets. These options are explained fully in the *VT100 User's Guide*. Their values are preserved until they are changed, or until the icon is deleted.

Menu commands

The following is a description of the commands located at the top of the property sheet in the gray area.

[DONE]

Closes the property sheet and applies the properties selected to the current emulation session.

[CANCEL]

Closes the property sheet without applying any changes to the properties.



Causes the window management commands to appear when the pointer is placed over the window management auxiliary menu and the left mouse button is held down. The sub-tab titled "Windows" in the VP Series reference library contains detailed information on the window management commands.



Causes the window commands that have been placed in the floating item auxiliary menu to appear when the pointer is placed over the menu and the left mouse button is held down. Window commands are placed in the floating item auxiliary menu when the window is not wide enough to accommodate the commands.

Properties

The following is a list of the properties.

NVR

Nonvolatile memory (NVR) allows the set-up parameters to be used for just the current session, or saved across sessions. This allows options to be set for the most often used settings via [SAVE DATA], and also allows for temporary changes in those options that would only be active until the end of the current session (or until they are changed). This directly emulates the set-up save operation into NVR on the real VT100.

Scroll

[JUMP] is currently the only type of scrolling available. Upward scrolling places blank lines at the bottom of the scrolling region line by line. Downward scrolling places blank lines at the top of the scrolling region line by line. Lines scrolled

off the screen in this manner are placed in the [MAKE DOCUMENT] file.

Cursor

Provides a choice of two cursors shapes used to indicate the active position: underline (—) or open block (□).

Margin Bell

Turns the margin bell on or off. If the margin bell is turned on, the bell provides a warning sound when the cursor is eight characters from the end of the line.

[ANSI]/[VT52]

Allows the emulator to be switched to a DEC VT100 or a VT52 terminal.

#/£

Determines what character appears when <SHIFT> and <3> are pressed. There are two options available: # and £.

Auto Wrap

Causes a carriage return line feed (<CR> <LF>) action to automatically occur when a line in the window becomes full. Thus, when [AUTOWRAP] is selected and the last character position is reached, the next character received is automatically placed in the first character position of the next line.

Note: If this option is not selected and the last character position is reached, the next character typed in is displayed on top of the previous character in the last position (overwrites).

LTS (New Line)

This option, which is the same as the line termination sequence (LTS) on the icon's property sheet, provides an alternative means for changing the setting of this feature during a session. Host-bound carriage returns are replaced by the LTS when this feature is on. It replaces the VT100's new line set-up feature, replacing incoming <LF> characters with <CR><LF> when it is selected.

Parity

Provides the parity setting for the current session, in read-only format, based on the property set on the TTY property sheet.

T & R (transmit and receive) Speed

Provides the line speed "baud rate" setting for the current session, in read-only format based on the property set on the TTY property sheet.

Answer Back Message

Allows a message of up to 20 characters, including spaces and control characters, to be sent to the host computer when one of the following occurs: the host sends an ENQ signal, or <CTRL> and the function key corresponding to <BREAK> are pressed at the same time.

Screen Tabs

Used to set the location of tab stops for columns on a line. These tabs can be changed individually, or they can be totally cleared and then reset. (These tab settings are not to be confused with the tab settings obtained during a move or copy operation, in which tab stops are interpreted from the source selection.)

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TTY Options		Start	Cancel		
Port Items					
Port Name	Cyrus-VAX-Port				
Phone Number	<input type="text"/>				
Stop Bits	2				
Character Length	8 bits				
Parity	None				
Modem Items					
Duplexity	Full				
Line Speed	9600 bits per second				
Terminal Items					
Type	<input type="button" value="KSR35"/> <input checked="" type="button" value="VT100"/> <input type="button" value="PCR"/>				
Language	<input checked="" type="button" value="US ENGLISH"/> <input type="button" value="UK ENGLISH"/> <input type="button" value="860 FRENCH"/> <input type="button" value="860 GERMAN"/>				
Screen Width	<input type="button" value="☰"/> <input type="text" value="80"/> columns				
Screen Height	24 rows				
	<input type="button" value="UPPERCASE ALWAYS"/> <input checked="" type="button" value="AUTOWRAP"/>				
DEL/BS Key	Shift for <input checked="" type="button" value="DELETE"/> <input type="button" value="BACKSPACE"/>				
Local Echo	<input type="button" value="ON"/> <input checked="" type="button" value="OFF"/>				
Line Termination Sequence	<input type="button" value="ON"/> <input checked="" type="button" value="OFF"/>				
Formatting	<input type="button" value="ON"/> <input checked="" type="button" value="OFF"/> <input type="button" value="TAB SIMULATION"/>				
XON/XOFF Method	<input checked="" type="button" value="NONE"/> <input type="button" value="OVERFLOW"/> <input type="button" value="LINE-BY-LINE"/>				

Figure 3-3 TTY option sheet

TTY option sheet

VT100 terminal emulation is based on asynchronous TTY emulation and makes use of the TTY option sheet. The TTY option sheet (Figure 3-3) is used to set various port, modem, and terminal properties to reflect the actual hardware environment the emulator is to be used in. Information entered on the option sheet is used for the duration of the current session and then discarded.

The TTY option sheet is displayed by selecting the TTY icon and pressing <OPEN>.

Notes:

- The TTY option sheet contains the same properties as the TTY property sheet, with the exception of two properties: Icon Name and When Opening.
- The option sheet is grouped into three main areas. These areas deal with port configuration, modem settings, and terminal emulation behavior. Port and modem information may be fixed or variable, depending on whether the TTY port used is on a Communication Interface Unit (CIU) or an External Communication Service (ECS) port. The ECS port options are variables and can be changed on this sheet, while the CIU port options are in read-only format. This is because the CIU does not allow its ports to be dynamically configured after it is operational. Because the ECS port allows this possibility, its options can be changed through the option sheet.

Menu commands

The following is a description of the commands located at the top of the option sheet in the gray area.

[START]

Opens the emulator window and establishes a connection with the host. If the connection cannot be made, an error message is displayed and the window does not open.

[CANCEL]

Closes the option sheet without applying any changes to the properties.



Causes the window management commands to appear when the pointer is placed over the window management auxiliary menu and the left mouse button is held down. The sub-tab titled "Windows" in the VP Series reference library contains detailed information on the window management commands.



Causes the window commands that have been placed in the floating item auxiliary menu to appear when the pointer is placed over the menu and the left mouse button is held down. Window commands are placed in the floating item auxiliary menu when the window is not wide enough to accommodate the commands.

Options

The following is a list of the options.

PORT ITEMS:

Port Name

Displays the name given to the port in the Clearinghouse Service in read-only format.

Phone Number

Specifies the full phone number to be dialed for the connection. Valid characters in this item are governed by the autodialer used.

Note: If no phone number is entered and the port is not currently being used, the emulator unconditionally opens the window. This is useful when the RS232C port is configured for manual dialing.

Stop Bits

Indicates the end of a character. This option cannot be changed for CIU port. It can be set to 0, 1, or 2 if the TTY port is attached to a local server port. The communication hardware used in the TTY connection determines what values are legal, as well as whether or not they are electronically changeable.

Character Length

Designates the length of characters, in bits. This option cannot be changed for CIU ports. This option can be set at 5, 6, 7, or 8 for the local server port. The communication hardware used in the TTY connection determines what values are legal, as well as whether or not they are electronically changeable.

Note: The workstation only supports ISO 646 7-bit ASCII character codes. This option governs the physical length of the character on the transmission line and not the size of the character set supported.

Parity

Designates the method used to check that data is not garbled in transmission. This option cannot be changed for CIU ports. If it is attached to a local server port, it can be set to [NONE], [EVEN], or [ODD].

MODEM ITEMS:

Duplexity

Designates whether communication can occur in both directions simultaneously (full duplexity) or in one direction at a time (half duplexity). This setting is given in read-only format.

Line Speed

Specifies the rate at which data passes to and from the host computer (also known as baud rate). This option cannot be changed for CIU ports. The communication hardware used in the TTY connection determines what values are legal, as well as whether or not they are electronically changeable.

TERMINAL ITEMS:

Type

Specifies the asynchronous terminal to be emulated for the session. For terminal emulation of VT100, [VT100] is selected (VT52-mode runs as a component of the VT100 emulator). [PCR] is selected if VT100 emulation is interfaced with a PC-VT100-compatible computer.

Language

Specifies the TTY ISO 646 7-bit ASCII character translation table from the TTY translations data file to be used for the session. (For additional information on character codes, refer to Appendix A.) This table controls the mapping of ISO characters to and from XC1 (Xerox Character Code Standard, Version 1) characters. This does not affect which virtual keyboard is used. That is always determined by the version of the keyboard file that is loaded.

Screen Width

Allows a selection of various screen widths (number of characters that will fit on one line in the window). For terminals in which screen width is optional (for example, the Teletype Model 35), [OTHER] may be selected.

[OTHER]

Displayed if the terminal being emulated does not require a specific screen width. If it is displayed, the screen width can be set between 10 and 132 columns inclusive.

Screen Height

The screen height is fixed at 24 lines to reflect the height of the actual VT100 terminal.

[UPPERCASE ALWAYS]

Causes all lowercase alphabetical ISO 646 7-bit characters (for example, a-z in English) to be translated to their uppercase counterparts (for example, A-Z) before they are sent to the host computer. This applies to all workstation characters that have a reasonable uppercase equivalent; otherwise, the lowercase character is used. This mapping applies to characters entered into the TTY window from both the keyboard and from copy or move operations.

[AUTOWRAP]

Causes a carriage return - line feed (<CR> - <LF>) action to automatically occur when a line in the window becomes full. Thus, when [AUTOWRAP] is selected and the last character position is reached, the next character received is automatically placed in the first character position of the next line.

Note: If this option is not selected and the last character position is reached, the next character typed in displays on top of the previous character in the last position (overwrites).

DEL/BS Key

Specifies the placement of the delete and backspace functions on the DEL/BS key (the upper-right key above the return key). The function that

is selected is the one performed when <SHIFT> is pressed. For example, if BS is chosen, pressing <SHIFT> <DEL/BS> will perform a backspace action.

Local Echo

Specifies whether the terminal echoes (displays) the characters typed in, or if the host computer sends these characters to the terminal to be displayed. If [ON] is selected, the terminal displays each character before sending it to the host computer, and does not expect the host computer to echo it back. If two characters appear on the screen, it indicates that both the workstation and the host computer are echoing the character. In this case, the local echo should be disabled at the workstation. The local echo state is reflected in the generic status area by the Local Echo indicator.

Line Termination Sequence (LTS)

Specifies what character, or sequence of characters, replaces a carriage return just before it is sent to the host computer. When [OFF] is selected, the carriage return is sent unchanged. When [ON] is selected, the carriage return is replaced by the LTS. The LTS is inserted whenever a line break occurs in the TTY window. This happens at the following times:

- If the user is copying text from a document, this sequence is inserted each time the current line is full or a new paragraph character is encountered.
- If the user is typing, this sequence is inserted each time CR is entered.

From 1 to 8 octal characters (separated by spaces or commas) may be specified in the sequence. These octal numbers represent any byte from the standard ISO 646 7-bit character set. Valid separator characters are spaces (" ") or commas (" , ") in any combination. A comma is legal after a number or space.

For example, the following are valid sequences:

- 15,012,23 (= carriage return - line feed - DC3)
- 015, 12 (= carriage return - line feed)
- 23, 015,12 (= DC3 - carriage return - line feed, with any number of spaces)
- 23
- 0 0 0 1 2 377 10 023 (= 0,0,0,1,2,377,10,23)
- 015, 12, 23, 15 0 23 (combinations of blanks and commas = 15,12,23,15,0,23)

Whatever the sequence is, it is defined by the host computer to which the emulator connects. It is the user's responsibility to enter an LTS that is legal for the host computer.

The legal octal values range from 0 to 377₈. The legal characters are the digits 0 to 7, a space, and a comma. If any illegal entry is made, the option sheet does not allow the user to proceed until it is corrected. Using octal digits allows the following:

- Total flexibility in specifying any possible ISO character sequence
- Multinational character codes
- Ease of conversion from display representation to binary (and thus better performance)

It is assumed that once they are set, LTS and XON/XOFF do not change often for a given installation.

Formatting and Line Length

Selecting [ON] causes the Line Length option to appear on the property sheet, allowing specification of the number of characters to be

considered per line during copy or move operations. The line length is independent of the screen width. It also automatically inserts an LTS at the end of each transmitted line.

When this option is used while copying or moving data from a document, the TTY emulator determines where a line break should occur to keep the line at or below the specified line limit, and it inserts an LTS at that point. If the source document has been prepared in fixed-pitch Terminal 12 Font as recommended, with margins equal to the line length, these line breaks should occur at approximately the same point in the TTY stream as in the displayed document. This option does not affect the processing of text that is entered at the keyboard.

Chapter 1 describes the emulation conditions relative to the document.

[TAB SIMULATION]

Specifies if tab characters are automatically converted to spaces in the transmit stream. When this option is used while copying or moving data into the TTY window, the emulator determines how many spaces to insert in the line so the character will be properly aligned on the next tab stop. If the document has been prepared in fixed-pitch Terminal 12 Font as recommended, the tabs should appear much as they do in the displayed document. When this option is turned off and text is copied or moved from a document, both normal and paragraph tabs are converted to ASCII horizontal tab characters.

Note: This option does not affect the processing of text that is entered at the keyboard. [FORMATTING] must be selected for tab simulation to work. This feature should not be confused with the screen tabs available on the set-up property sheet. Set-up tabs are used only as a quick way of moving the cursor on the screen; they do not get sent to the host computer.

XON/XOFF Method

Allows specification of the type of flow control the terminal should use. There are two types of flow control: overflow or line-by-line. When [OVERFLOW] is selected, it issues the XOFF sequence whenever the rate of incoming data is greater than the rate at which it can be processed (after a certain internal threshold is exceeded). When [LINE-BY-LINE] is selected, the workstation suffixes each line sent to the host computer with the XOFF sequence, then waits for the host to send back the XON sequence before sending the next line.

Note: If a value other than [NONE] is selected, it implies that the host computer accepts and uses the specified form of flow control. If the user does not ensure that this is true, unpredictable results may occur. The system may even appear to stop processing (as it waits for an XON that never comes). In this case, pressing <STOP> terminates the process.

If a CIU port that has its own flow control is used, no terminal flow control is allowed (a message is posted). If the CIU port has flow control disabled, then the terminal may display [NONE] (no flow control specified), [OVERFLOW], or [LINE-BY-LINE]. (Local ports always display these options.) The CIU's flow control should be used whenever possible, because it is the system element closest to the port. It has the best chance, therefore, of issuing XOFF before any data is lost.

When [OVERFLOW] or [LINE-BY-LINE] is selected, two additional lines appear that allow the XON and XOFF sequences to be specified. Each sequence may have up to 8 octal numbers in it. The rules governing the entry of these sequences are the same as for specifying the LTS. However, if XON and XOFF sequences are to be used, they must not be empty or the option sheet will not close.

When [LINE-BY-LINE] is selected, the XOFF sequence is appended to each line sent to the host computer (the XOFF sequence is sent after each

LTS is sent). The emulator then waits for the host computer to send back the XON sequence before it transmits the next line of data. For example, CR could be the line terminating sequence, DC3 could be the XOFF sequence, and DC1 could be the XON sequence received from the host computer to resume transmission. The emulator places the characters <CR><DC3> at the end of each transmitted line, and then waits to receive DC1 from the host computer before transmitting the next line, and so forth.

<STOP> can be used to terminate the copy or move action at any time in order to restart keyboard entry and/or reselect text for another move or copy action from a document.

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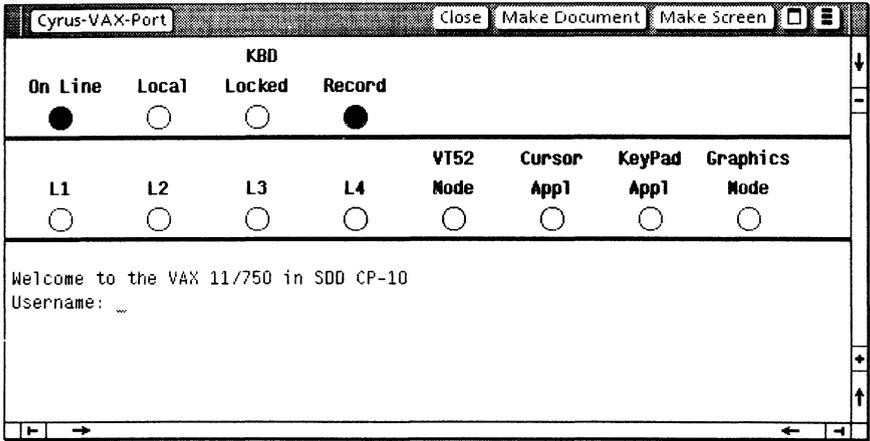


Figure 3-4 VT100 window

VT100 window

The VT100 window (Figure 3-4) is used to display the data that travels to and from the host computer. It is divided into two areas, a status area and a main text area

Note: It is possible to open a VT100 icon within a divider.

The VT100 window is displayed by selecting an emulator icon and pressing <OPEN>. After all options are chosen, [START] should be selected.

Menu commands

The following is a description of the commands located at the top of the window in the gray area.

[CLOSE]

Closes the window and returns the emulator to icon form.

[MAKE DOCUMENT]

Provides a document containing all information appearing in the current screen plus all the information that has been scrolled off the screen since the last time [MAKE DOCUMENT] was selected. The document title is in the following form:

<icon name> of <date/time of day>

The document can be renamed through its property sheet.

[MAKE SCREEN]

Captures the textual information currently displayed on the screen and copies it into a document. The captured information is displayed as defined by the screen width and height set on the icon's property sheet. The document title is in the following form:

<icon name> of <date/time of day>

The document can be renamed through its property sheet.



Causes the window management commands to appear when the pointer is placed over the window management auxiliary menu and the left mouse button is held down. The sub-tab titled "Windows" in the VP Series reference library contains detailed information on the window management commands.



Causes the window commands that have been placed in the floating item auxiliary menu to appear when the pointer is placed over the menu and the left mouse button is held down. Window commands are placed in the floating item auxiliary menu when the window is not wide enough to accommodate the commands.

The commands typically found in the floating item auxiliary menu are as follows:

[ENABLE/DISABLE LOCAL ECHO]

Controls whether or not the emulator echoes each character sent to the host computer. Its setting is reflected in the Local Echo indicator line in the terminal status area.

[ENABLE/DISABLE ON-LINE]

Controls whether the emulator runs off-line locally or is connected to a remote host computer. Its setting is reflected in the On-Line indicator line in the terminal status area.

[ENABLE/ DISABLE MOUSE CURSOR]

Controls whether selecting in the emulator window causes the current selection to be inside the emulator or additionally causes series of VT100 cursor-positioning escape sequences are sent to the host to reposition the old cursor to the new selection point. If this option is enabled, the user can select anywhere in the window to change the current cursor position. If this option is disabled, the user can change the selection to generic TTY and move the cursor.

[RESET MODES]

Sets the following VT100 properties to their off state: VT52, Cursor Appl, Keypad Appl, and Graphics Mode.

[RECORD/DON'T RECORD DATA]

Allows the user to control when incoming data is recorded to the backing document for [MAKE DOCUMENT]. It can be turned on and off at any time, and it provides the user with the option of not recording data that does not need to be saved. Performance is increased slightly when [DON'T RECORD DATA] is selected, because the data is not being copied to the backing file. When [RECORD] is selected, data is placed in the backing file as it is scrolled out of the TTY window.

[SHOW TERMINAL PROPS]

Displays the VT100's set-up property sheet.

Status area

Status area symbols are displayed only when the terminal being emulated provides some sort of visual feedback. Information in the status area is displayed in a read-only format, and scrolling within this area is currently not available. During emulation, LED indicators appear in the status area. A filled-in circle indicates that the light is on.

The following symbols in the status area display for all TTY emulation terminal types.

On-Line

When on, indicates the emulator is on-line and ready to transmit or receive messages. When off, indicates the emulator is off-line and does not communicate with the host device. It is set and cleared by selecting [ENABLE/DISABLE ON-LINE] in the floating point auxiliary menu.

Local Echo

Indicates the emulator is operating in local echo mode. It is set and cleared by selecting [ENABLE/DISABLE LOCAL ECHO] in the floating point auxiliary menu.

KBD Locked

Indicates that the keyboard has been turned off. The emulator is still able to receive data from the host computer. This can be cleared by entering and exiting the set-up mode.

Record

When on, indicates that screen data is being saved to a backing document as it gets scrolled off the screen. It can be turned on and off at any time, and it provides the user with the option of not recording data that does not need to be saved. Performance is increased slightly when Record is off, because the data is not being copied to the backing file.

When the TTY emulator is operating as a VT100, the following symbols are added to the status area:

L1 - L4

Application programmable function "lights" are turned on and off by the host computer.

VT52 Mode

When on, indicates that the emulator is operating in VT52 compatibility mode. When off, indicates that the emulator is operating as a VT100.

Cursor Appl

When on, indicates that the VT100 emulator is in cursor key mode.

KeyPad Appl

When on, indicates that the VT100 emulator is in keypad application mode.

Graphics Mode

When on, indicates that the VT100 emulator is using ISO character translations according to those defined by graphic code set. When off, the emulator is using ISO character translations according to those defined by the Language option on the property sheet.

Main text area

The main text area can contain up to 24 lines, each with the length set by the Screen Width option in the TTY property sheet. It may be regarded as a depiction of the last lines of interaction between the operator and the remote computer. Each line of input or output normally appears on the bottom line of the window; when the carriage return is encountered, the contents of the window are scrolled up one line to make room for the next line. Not all 24 lines may be visible if the window is smaller than its standard size; the scroll bar may be used to bring any of the last 24 lines into view in this case. In particular, the last line can be scrolled out of view, in which case user type-in and computer response become invisible. The emulator does not attempt to always keep the current type-in point (that is, the bottom line) visible; however, it is always viewable using the window scroll bars or adjusting size of window.

For some terminal types, no random cursor movement is possible. In this case, the cursor always remains at the last line sent for the host computer. This is the case when the mouse cursor is disabled in VT100 mode. Pressing a mouse button anywhere in the window changes the selection to the emulator, but does not affect the current emulator cursor.

The cursor control keys or the mouse can be used to generate a cursor control sequence to the host computer. When the mouse is used to randomly position the cursor, the following occurs:

- When the left mouse button is pressed in the emulation window, the cursor that is currently being displayed disappears. A temporary box cursor appears at the character position indicated by the arrow cursor. While the mouse moves in the emulation window (the right mouse button must be held down) the temporary box cursor tracks it, indicating where the actual VT100 cursor will be placed.
- When the left button is released, the emulator sends a series of cursor positioning commands to the host computer. The VT100 cursor moves to the new position. (This is similar to using the actual VT100 cursor control keys.)

Appendix A: Control sequence and auxiliary PCR keyboard

PCR is an extended feature of VT100 that enables workstations to interface with PC-VT100 compatible computers. This appendix describes how the workstation as auxiliary PCR keyboard relates to the DEC VT100 and the IBM PC keyboard. It also lists the escape sequence issued by each key on the VT100 auxiliary keyboard.

Key modifiers

The <CTRL>, <LEFT SHIFT>, and <RIGHT SHIFT> keys on the auxiliary keyboard and the <ALT> function key are used as key modifiers. They behave differently from other keys: While a modifier key is pressed, the escape sequence issued for any non-modifier key is always preceded by the escape sequence of the modifier.

For example, when <LEFT SHIFT> is pressed and the <F5> and <F6> keys are typed in, the escape sequence for the <LEFT SHIFT> is sent prior to the escape sequences of <F5> and <F6>. If <ALT> and <X1> are entered before <ALT> is released, the escape sequence sent is Esc, \, A, Esc, \, A for <ALT> and Esc, \, H for <X1>.

Auxiliary PCR keyboard

The auxiliary PCR keyboard shown in Figure A-1 contains keys that are on the actual VT100 keyboard but not on the workstation's main TTY keyboard. This keyboard also contains ten special keys labeled <X1> through <X10>, for applications or equipment requiring more keys than those present on the VT100 and PC keyboards.

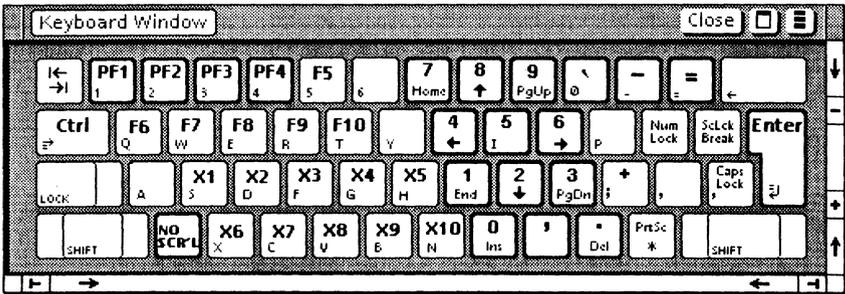


Figure A-1 Auxiliary PCR keyboard

Escape sequence

The auxiliary PCR keyboard keys are classified into four groups. Each group, along with its issuing escape sequence, is described in the following paragraphs.

Group 1

Consists of the keys that are not present on the DEC VT100 keyboard but appear on the IBM PC keyboard (refer to Table A-1). A special escape sequence is issued by these keys.

Table A-1 Group 1 keys

Key	Escape Sequence
Num Lock	Esc, \, N
ScLck / Break	Esc, \, S
Alt	Esc, \, A
PrtSc / *	Esc, \, P
F5	Esc, \, 5
F6	Esc, \, 6
F7	Esc, \, 7
F8	Esc, \, 8
F9	Esc, \, 9
F10	Esc, \, 0

Group 2

Consists of keys that appear to be duplicates on the DEC VT100 terminal keyboard but have special requirements (refer to Table A-2). A special escape sequence is issued by these keys.

Table A-2 **Group 2 keys**

Key	Escape Sequence
Shift (Left)	Esc, \, L
Shift (Right)	Esc, \, R
Ctrl	Esc, \, C
Caps Lock	Esc, \, K
⇌	Esc, \, T
+	Esc, \, +

Group 3

Consists of keys that are duplicates of those on the DEC VT100 terminal keyboard (refer to Table A-3). The escape sequence associated with these keys is the same as that of the VT100.

Table A-3 Group 3 keys

Key	Escape Sequence
F1	See VT100 Programming Reference card
F2	See VT100 Programming Reference card
F3	See VT100 Programming Reference card
F4	See VT100 Programming Reference card
Esc	See VT100 Programming Reference card
0 / Ins	See VT100 Programming Reference card
1 / End	See VT100 Programming Reference card
2 / ↓	See VT100 Programming Reference card
3 / PgDn	See VT100 Programming Reference card
4 / ←	See VT100 Programming Reference card
5	See VT100 Programming Reference card
6 / →	See VT100 Programming Reference card
7 / Home	See VT100 Programming Reference card
8 / ↑	See VT100 Programming Reference card
9 / PgUp	See VT100 Programming Reference card
. / Del	See VT100 Programming Reference card
ENTER	See VT100 Programming Reference card
-	See VT100 Programming Reference card

Group 4

Consists of keys that do not appear on the IBM PC keyboard or the DEC VT100 keyboard (refer to Table A-4). Special escape sequences are provided for these keys.

Table A-4 Group 4 keys

Key	Escape Sequence
X1	Esc, \, H
X2	Esc, \, G
X3	Esc, \, U
X4	Esc, \, D
X5	Esc, \, 1
X6	Esc, \, E
X7	Esc, \, F
X8	Esc, \, Y
X9	Esc, \, Z
X10	Esc, \, 2

Appendix B: Character codes

This appendix contains technical information relating to character codes.

Character codes and translation files

The TTY emulator supports the International Standards Organization (ISO) 646 7-bit coded character set interchange standard, of which ASCII is a subset. Character codes are translated to and from workstation characters by means of translation tables within the TTY translations data file. This file contains one translation table for each variation of the ISO 646 character set. The translation tables within this file are enumerated in the Language option of the TTY property/option sheet. The first table in the file is listed as the first option, the second table is listed as the second option, and so on.

The TTY translation data is separate; it can be changed or replaced without having to change the system it is used with. This flexibility allows the workstation to handle multinational TTY emulation in a uniform manner. ISO 646 characters can be mapped into XC1 characters. All variations in the character sets are taken care of within the data files.

The translation file contains the appropriate mappings between the ISO 646 Character Standard and the Xerox Character Encoding Standard. The character mappings for the USA English characters are shown in Table B-1.

The keyboard is used to send various codes to the host computer. Some keys do not produce displayable characters but do send codes to the host computer. These keys include the carriage return (015₈), line feed (012₈), backspace (010₈), <ESC> (033₈), and <DELETE> (177₈). Other keys, such as <CTRL> and <SHIFT>, do not transmit codes when typed; instead, they modify the codes transmitted by other keys. Table B-2 shows the control codes sent when <CTRL> is held down.

Table B-1 US English ASCII character codes

Key	Lower-case Octal Code	Upper-case Octal Code	Key	Octal Code	Key	Octal Code
A	141	101	(Space)	040	:	072
B	142	102	!	041	;	073
C	143	103	"	042	<	074
D	144	104	#	043	=	075
E	145	105	\$	044	>	076
F	146	106	%	045	?	077
G	147	107	&	046	@	100
H	150	110	'	047	[133
I	151	111	(050	\	134
J	152	112)	051]	135
K	153	113	*	052	^	136
L	154	114	+	053	_	137

Table B-1 US English ASCII character codes
(continued)

Key	Lower- case Octal Code	Upper- case Octal Code	Key	Octal Code	Key	Octal Code
M	155	115	,	054	\	140
N	156	116	-	055	{	173
O	157	117	.	056		174
P	160	120	/	057	}	175
Q	161	121	0	060	~	176
R	162	122	1	061		
S	163	123	2	062		
T	164	124	3	063		
U	165	125	4	064		
V	166	126	5	065		
W	167	127	6	066		
X	170	130	7	067		
Y	171	131	8	070		
Z	172	132	9	071		

Table B-2 Control codes sent using <CTRL> + <Key>

<CTRL> + <Key>	Octal Code Trans- mitted	Mne- monic Function	<CTRL> + <Key>	Octal Code Trans- mitted	Mne- monic Function
(Space)	000	NUL	P	020	DLE
A	001	SOH	Q	021	DC1
B	002	STX	R	022	DC2
C	003	ETX	S	023	DC3
D	004	EOT	T	024	DC4
E	005	ENQ	U	025	NAK
F	006	ACK	V	026	SYN
G	007	BELL	W	027	ETB
H	010	BS	X	030	CAN
I	011	HT	Y	031	EM
J	012	LF	Z	032	SUB
K	013	VT	[033	ESC
L	014	FF	\	034	FS
M	015	CR]	035	GS
N	016	SO	^	036	RS
O	017	SI	_	037	US