



**VP TERMINAL EMULATION
OF IBM 3270**

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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Table of contents

| | |
|--|----------|
| 1. VP Terminal Emulation of IBM 3270 overview | 1 |
| Related information | 2 |
| VP Series reference library | 2 |
| VP Series training guides | 2 |
| Hardware/software requirements | 2 |
| Hardware | 2 |
| Software | 2 |
| Network services | 3 |
| Benefits of emulation | 3 |
| Emulation protocols | 4 |
| Using 3270 emulation at the workstation | 5 |
| Emulation icons | 5 |
| Emulation properties | 7 |
| Emulation window | 7 |
| Virtual function keys | 8 |
| Emulation keyboards | 9 |
| IBM 3270 display commands | 11 |
| Copying and moving conditions | 12 |
| Statistics and facts | 12 |

| | |
|---|-----------|
| 2. Actions and procedures | 15 |
| Retrieving a 3270 icon | 16 |
| Setting properties for a 3270 emulator icon | 16 |
| Starting an emulation session | 17 |
| Displaying the 3270 keyboard | 18 |
| Using the alternate 3270 keyboard | 18 |
| Conducting an emulation session | 19 |
| Transferring information | 20 |
| Workstation information to host computer | 20 |
| [MAKE SCREEN] - Transferring 3270 information to document form | 20 |
| Ending an emulation session | 21 |
| Work strategies | 21 |
| 3. Property/option sheets and windows | 23 |
| 3270 property sheet | 25 |
| 3270 option sheet | 29 |
| 3270 window | 33 |

List of figures

| | | |
|-----|---|----|
| 1-1 | IBM 3270 Emulators divider opened within the domain divider | 6 |
| 1-2 | IBM 3270 Emulators | 6 |
| 1-3 | Virtual function key layout (for 8010 workstation) | 8 |
| 1-4 | The main 3270 keyboard | 10 |
| 1-5 | 3270 alternate keyboard | 10 |
| 3-1 | 3270 property sheet | 24 |
| 3-2 | 3270 option sheet | 28 |
| 3-3 | 3270 window | 32 |

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1. VP Terminal Emulation of IBM 3270 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 emulates 3270 terminals, specifically the IBM Model 3278-2 display station. A networked workstation with the appropriate software installed can establish a connection with a host computer and behave as if it were an IBM 3270 BSC (bisynchronous) or IBM 3270 SNA (System Network Architecture) emulation terminal.

Related information

The following materials provide information related to the VP Terminal Emulation of IBM 3270 application.

VP Series reference library

- Xerox ViewPoint

VP Series training guides

- VP ViewPoint
- VP Terminal Emulation of IBM 3270

Hardware/software requirements

The following are the hardware, software, and network services requirements for VP Terminal Emulation of IBM 3270.

Hardware

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

Software

- Xerox ViewPoint software
- VP Terminal Emulation of IBM 3270 software
- VP NetCom software

- VP Document Editor software - required if [MAKE SCREEN] is used to transfer information from a host computer to a workstation document

VP Terminal Emulation of IBM 3270 software and all prerequisite software must be installed, enabled, and running on the workstation. Before using the software, open the application loader icon and verify that the appropriate software is loaded and running.

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 3270 BSC or SNA communication protocol, and standard services software)

Benefits of emulation

3270 emulation provides many benefits for users who access data stored on host computers. Specifically, 3270 emulation enables users to:

- Communicate with host computers from a single piece of equipment. Normally, in standard IBM installations, the 3278-2 display station must be located within 2,000 feet of the cluster controller for physical connection
- 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

- Work with other workstation functions, such as mailing or printing, if the host computer is busy processing user requests
- Transfer information created on the workstation into a 3270 emulation window

Emulation protocols

All data that is sent and received is handled at the workstation level. The translation between IBM protocols and Xerox Network System standard protocols to enable emulation is described in the following paragraphs.

In a typical computer installation running IBM 3270 bisynchronous communication, there is a central processing unit (CPU). Attached to the CPU is a 3705 communications controller, which controls all communication between the processor and remote devices. The 3705, in turn, manages one or more 3276-2 (for BSC) or 3276-12 (for SNA) cluster controllers, each of which can control up to eight 3278-2 display stations.

The display station can be used only for input to the host computer, which can transmit data back to the receiving terminal as output.

Each of the display stations is connected by cable (no further than 2,000 feet) to the cluster controller. Each cluster controller is connected to the 3705 controller (and thus the host computer) through a high-speed, leased telecommunications line.

In the Xerox environment, the 3270 package emulates these components in the following ways:

- A workstation with VP Terminal Emulation of IBM 3270 software installed emulates the IBM 3278-2 display station.

This allows the workstation to receive information from the host and to accept user inputs much like a real 3278-2 display station. This information is then sent through the Ethernet to the network's 3270 communication server, which converts it into IBM protocols for transmission to the host over a dedicated communication line.

- The External Communication Service, with the appropriate software installed, emulates either the IBM 3276-2 or 3276-12 cluster controller, each of which controls up to eight 3278-2 display stations.

Specifically, the 3270 communication protocol maintains communication with the IBM host, using the Xerox implementation of the IBM BSC or SNA communication protocol that an actual IBM cluster controller would use. It also converts information from IBM protocols to Ethernet protocols for transmission to the workstation.

Using 3270 emulation at the workstation

Emulation icons

To perform 3270 emulation, it is necessary to retrieve the IBM 3270 icon in the IBM 3270 Emulators divider, which is located in the domain divider of the directory (refer to Figure 1-1). This divider lists all the 3270 emulators for the domain (refer to Figure 1-2).

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>.

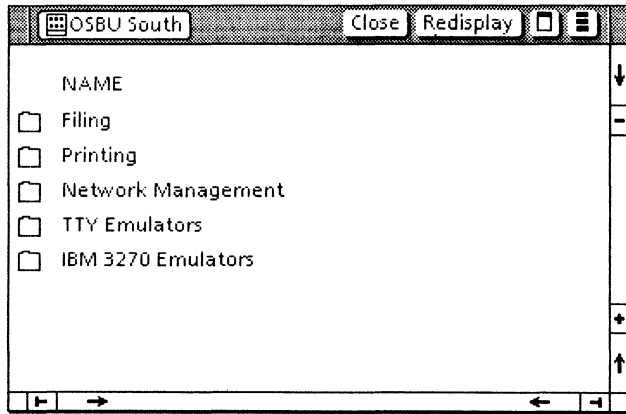


Figure 1-1 IBM 3270 Emulators divider opened within the domain divider

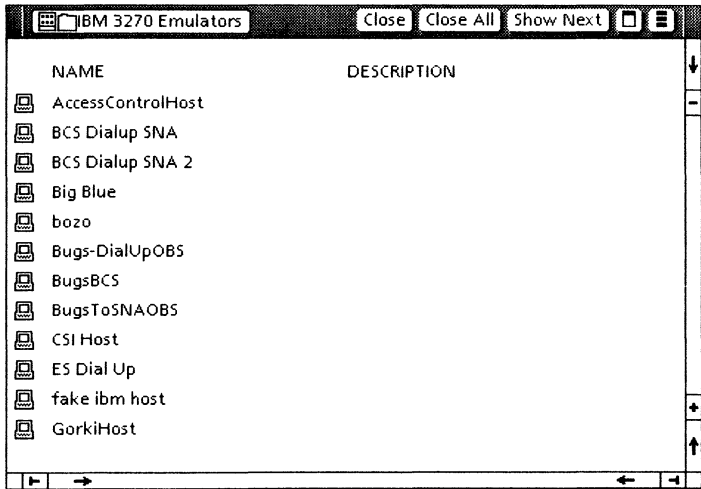


Figure 1-2 IBM 3270 Emulators

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 to a company's own computer, while another might represent a port supporting a connection to an outside database.

Emulation properties

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

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 3270 display screen opens. This means the connection with the host computer is successfully completed, using the connection parameters specified in the 3270 icon's option sheet.

The 3270 window is divided into the following areas:

- **Screen data area** - All user interaction with the host terminal is conducted inside this main area. This area is a 1920-character matrix consisting of 24 lines of 80 characters each. Information is entered and displayed here.

Text is entered directly through the keyboard or by copying or moving it from an existing document.

The exact location for text can be determined by using the pointer and clicking the left mouse button or using the four cursor control virtual function keys.

All data displayed on the screen can be captured and transferred to a document using [MAKE SCREEN]. This command transfers a single screen of information from the host computer into a document. Chapter 2 contains detailed information regarding [MAKE SCREEN].

Once a document is captured using [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 charts.

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

- **Screen status area** - Graphically displayed status indicators and messages identical to the IBM 3278-2 display station are contained in this area.

Virtual function keys

When a selection is made inside the emulation window, the 3270 virtual function keys are displayed. Figure 1-3 shows the virtual function keys.

Note: The keytop 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:

- <RESET> - Equivalent to the actual function of the 3270 RESET key.
- <3270> - Used to return to the main 3270 keyboard from the alternate keyboard.
- <ALT> - Used to go to the 3270 alternate keyboard, which contains additional keys found on the 3270 terminal.
- Arrow keys - Equivalent to the four cursor keys on the 3278-2 display station for manipulating the 3270 cursor.

Note: Options for a light pen or joystick on a 3278-2 terminal are not supported in this application.

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 an IBM 3270 terminal. The keyboard's new meanings are displayed on the screen in a virtual keyboard window.

The 3270 emulation uses two virtual keyboards: the main 3270 keyboard and the alternate keyboard.

Main keyboard

When a selection is made inside the 3270 emulation window, the main keyboard is in effect. Pressing <KEYBOARD> and the function key corresponding to <SHOW> displays the interpretation of the keyboard as illustrated in Figure 1-4.



Figure 1-4 The main 3270 keyboard

Alternate keyboard

The 3270 alternate keyboard contains most of the keys unique to the 3270 terminal. It is accessed by pressing the <ALT> virtual function key (refer to Figure 1-5).

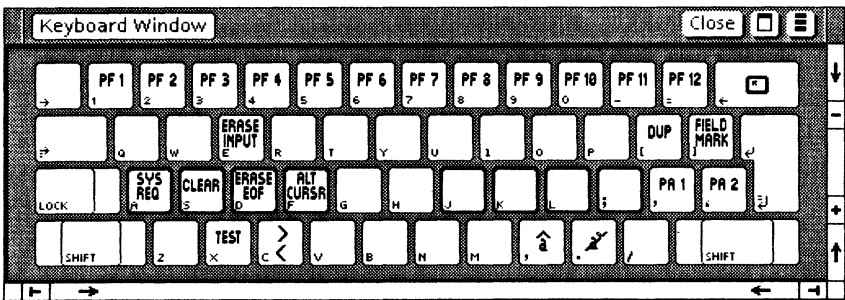


Figure 1-5 3270 alternate keyboard

IBM 3270 display commands

Application programs communicate with the host using commands and orders. The following commands (both chained and unchained) are supported by VP Terminal Emulation of IBM 3270 software:

- ERASE ALL UNPROTECTED
- WRITE
- ERASE/WRITE
- ERASE/WRITE ALTERNATE
- READ MODIFIED

The following orders are acted on by the emulation software:

- SET BUFFER ADDRESS (SBA)
- START FIELD (SF)
- INSERT CURSOR (IC)
- PROGRAM TAB (PT)
- REPEAT TO ADDRESS (RA)
- ERASE ALL UNPROTECTED TO ADDRESS

Copying and moving conditions

Copying and moving text into the IBM 3270 emulation window can be done. However, note the following conditions:

- Character properties are ignored.
- Characters or symbols without emulation equivalents appear as hyphens.
- New line and new paragraph characters are converted to hyphens.
- Text copied into an emulation window always appears at the cursor location.

Statistics and facts

- IBM 3274 cluster controllers, which allow a maximum of 32 connections instead of 8, are not supported at this time.
- Magnetic strip reading devices, printers, and light pen options are not supported.
- Certain commands currently not supported by the VP Terminal Emulation of IBM 3270 software include:

The PRINT command, which would allow IBM 3270 output to be sent directly to a printer (such as the IBM 3284), is not supported. To print information received in an emulation session, [MAKE SCREEN] must be selected to create a document

- COPY
- SELECT (all select commands)
- READ commands such as Read Buffered, Read Modified ALL, Chained Read
- TEST REQUEST
- STRUCTURED FIELDS

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2. Actions and procedures

The actions and procedures contained in this chapter provide the information necessary to use 3270 emulation on a networked workstation. They do not provide information on how to use the 3270 terminal. The System Administrator can provide instructions on actual use.

Retrieving a 3270 icon

Emulator icons represent pathways to specific host computers. They are copied from the IBM 3270 Emulators divider in the directory. The number of emulator icons that appear within a 3270 icon divider depends on the number of host computers registered in the Clearinghouse Service for that domain.

To retrieve a 3270 icon:

1. Open the directory icon, and open the domain divider.
2. Open the IBM 3270 Emulators divider. The number of 3270 icons available depends on the number of host computer entries.
3. Copy the desired 3270 icon to the desktop. The pointer changes into a miniature emulator icon until a location is selected on the desktop.

Note: The name of each icon is initially set by the System Administrator. The 3270 icon on the desktop can be renamed using the property sheet.

Setting properties for a 3270 emulator icon

The 3270 icon has properties and options that can be changed to fit individual needs. The 3270 property sheet is used to set desired emulation variables, such as the terminal address, each time an emulation session is started.

To set properties for a 3270 emulator icon:

1. Select the 3270 icon and press <PROP'S>. Retrieve a 3270 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 3270 option sheet does not appear and the properties set on the 3270 option sheet are used in the emulation session.

3. Select the desired terminal address. This enables use of an emulation session to a certain terminal address by selecting from the displayed choices. If the choice is already in use, the connection is not made, and a message is displayed at the workstation. If the address is not important, select [ANY]; the first available address, if any, will be assigned.
4. 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 a connection with the desired host computer is established. Once it is connected, the 3270 icon expands into an emulation window.

To start an emulation session:

1. Open the 3270 icon. Copy the desired 3270 icon from the directory if one is not already on the desktop.
2. Fill in the option sheet and select [START]. 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, or any other information necessary to start the session appropriate for the host computer.

Displaying the 3270 keyboard

Any time a selection is made within a 3270 emulation window, the function keys and the keyboard are assigned new meanings that correspond to the keys of the 3278-2 display station.

To see the keyboard meanings, hold down <KEYBOARD> and then select the function 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 3270 keyboard

The 3270 alternate keyboard contains most of the keys unique to the 3270 terminal. Once a selection is made inside the emulation window, one of the virtual function keys is redefined as <ALT>. Pressing <ALT> switches the meanings from the main keyboard to the alternate keyboard.

To use the 3270 alternate keyboard:

1. Select inside the 3270 window.
2. Press the function key corresponding to <ALT>. Hold down <KEYBOARD> and press the function key corresponding to <SHOW> for a visual representation of the keyboard. Then press the desired emulation key.
3. Press the function key corresponding to <3270> to return to the main 3270 keyboard.

Note: While using the main keyboard, it is possible to hold down the function key corresponding to <ALT> to temporarily use the alternate keyboard for a few key strokes. When the key is released, the keyboard returns to the initial state.

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 mouse to select the position in which the caret is to appear. The mouse may be used in conjunction with the four cursor keys found on IBM's 3278-2 keyboard.

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.

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 3270 emulation window. The cursor location marks the location in which the next input character is inserted.

[MAKE SCREEN] -

Transferring 3270 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 that displays the 3270 icon's name and a time stamp. For example:

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

Notes:

- Pressing <STOP> interrupts the [MAKE SCREEN] process; however, any information being transferred may be lost or incomplete.
- Boldface properties are preserved when [MAKE SCREEN] is selected.

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 emulator 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 3270 option sheet, and then deselect [DISPLAY OPTIONS]. As a result, the 3270 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").

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3. Property/option sheets and windows

This chapter describes the property sheet, option sheet, and window related to VP Terminal Emulation of IBM 3270.

The property sheet, option sheet, and window are used to specify such properties as assigning emulation sessions to a certain terminal address. The window contains commands such as [MAKE SCREEN], which is used to transfer information on the 3270 screen into a document.

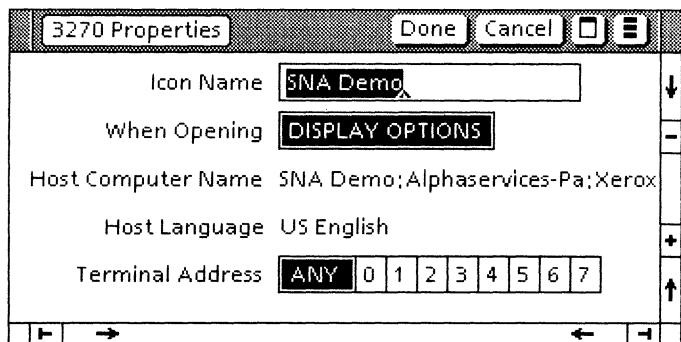


Figure 3-1 3270 property sheet

3270 property sheet

The 3270 property sheet (Figure 3-1) is used to set the options that control the host connections. This information is retained when the user is finished for that session.

The 3270 property sheet is displayed by selecting the 3270 icon and pressing <PROP'S>.

Note: The 3270 property sheet contains the same properties as the 3270 option sheet, with the following additional items: Icon Name and When Opening.

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 it. Information stays the same until the property sheet is modified again.

If any information is incorrect, the property sheet remains open and an error message is displayed.

[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 this 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 3270 icon to be uniquely named.

When Opening

Selecting [DISPLAY OPTIONS] causes the option sheet to be displayed the next time the 3270 window is opened. If [DISPLAY OPTIONS] is not selected, the 3270 option sheet does not open and all options set on the property sheet are used for that session.

Host Computer Name

Contains the name of the IBM host the System Administrator enters in the Clearinghouse database in read-only format.

Host Language

Displays the host language of the IBM system in read-only format. The System Administrator enters the appropriate choice when the Clearinghouse entry for the IBM host is made. This parameter allows the 3270 window to properly translate codes sent from the IBM host, and to properly interpret the 3270 keyboard keys to emulate the desired I/O interface code.

Terminal Address

Allows the user to assign an emulation session to a certain terminal address by selecting from the displayed choices. If the choice is already in use, the connection is not made and an appropriate message is displayed. If the address is not important, [ANY] can be selected; the first available address will be assigned.

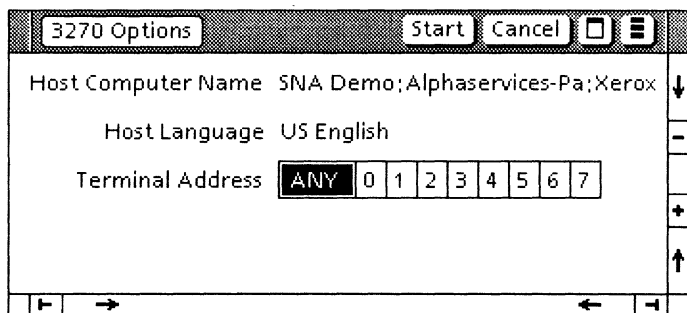


Figure 3-2 3270 option sheet

3270 option sheet

The 3270 option sheet (Figure 3-2) is used to set the options that control the host connections. For that reason, options include the host controller and the terminal address.

The 3270 option sheet is displayed by selecting the 3270 icon and pressing <OPEN>.

Note: The 3270 option sheet contains the same properties as the 3270 property sheet, with the exception of Icon Name and When Opening properties.

Menu commands

The following is a description of the commands located at the top of the property 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 displays 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.

Host Computer Name

Contains the name of the IBM host the System Administrator enters in the Clearinghouse database in read-only format.

Host Language

Displays the host language of the IBM system in read-only format. The System Administrator enters the appropriate choice when the Clearinghouse entry for the IBM host is made. This parameter allows the 3270 window to properly translate character codes sent from the IBM host, and to properly interpret the 3270 keyboard keys to emulate the I/O interface code.

Terminal Address

Allows the user to assign an emulation session to a certain terminal address by selecting from the displayed choices. If the chosen terminal address is already in use, the connection is not made and an appropriate message is displayed. If the address is not important, [ANY] can be selected; the first available address will be assigned.

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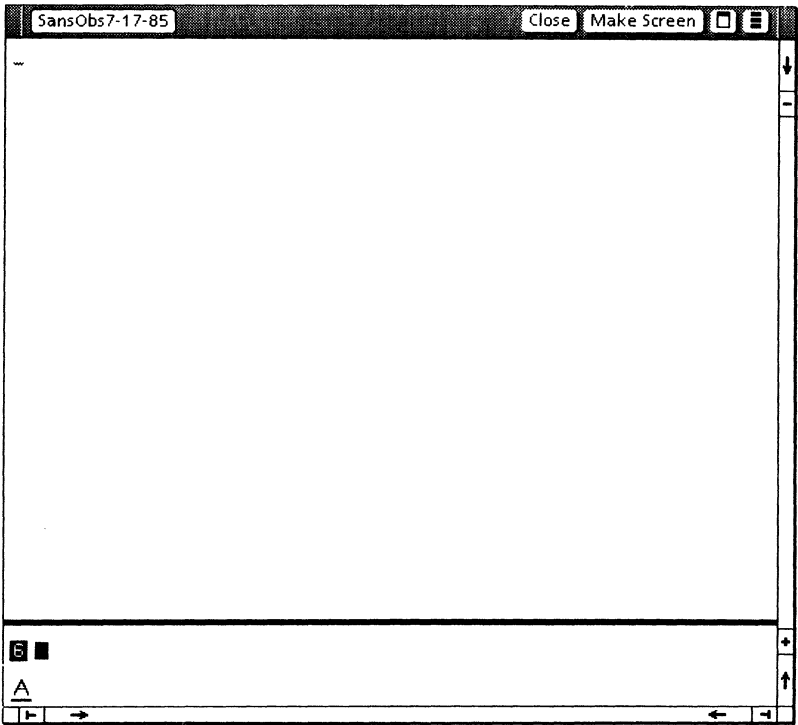


Figure 3-3 3270 window

3270 window

The 3270 window (Figure 3-3) is used to display the data that travels to and from the host computer along with the status information.

Note: It is possible to open a 3270 window icon within a divider.

The 3270 window is displayed by selecting an emulator icon and pressing <OPEN>. After the sheet is completed, [START] should be selected.

The 3270 emulation window is divided into two areas:

- **Screen data area** - The large central area is the screen data area, which consists of 24 lines of 80 characters each. This area is used to interact with the forms and data from the 3270 application. When the window is first opened, the data area is filled with blanks, and the cursor is in the upper lefthand corner. It is moved automatically when data is entered by the user or the host. It is necessary to select inside the 3270 window to direct type-ins to that window. When a selection is made outside the 3270 window, the 3270 cursor shading changes from black to gray, indicating the selection is no longer in the 3270 window. The cursor is positioned by moving it with the mouse and clicking the left button.
- **Screen status area** - The small area beneath the screen data area is the status area, which contains all the status indicators and messages.

Note: Graphic figures and messages in this area are identical to those used in an actual 3270 display. Their meanings are found in Appendix A of the *IBM 3270 Information Display System* component description.

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 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.

There are no auxiliary menu commands currently implemented.

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