NCSA Telnet for the Macintosh
User's Guide

Version 2.6 · October 1994

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Introduction

NCSA Telnet for the Macintosh provides interactive access from a Macintosh computer to telnet hosts on TCP/IP networks. NCSA Telnet is an implementation of ARPA standard telnet. You can have simultaneous connections to numerous computers across the network, and a standard file transfer server (FTP) lets you transfer files to and from remote machines and other users.

This introduction presents an overview of the capabilities and features of Version 2.6 of NCSA Telnet for the Macintosh. Notational conventions used in this manual are also explained.

Features of NCSA Telnet

Special features of NCSA Telnet include:

- VT102/VT220 emulation
- FTP client
- File transfer server (standard FTP)
- Simultaneous telnet connections to a number of computers
- Tektronix 4014 and 4105 emulation
- Color raster graphics capabilities
- Domain name lookup using MacTCP
- Scrollback with ability to print and copy
- User-defined macro keys
- Customized window arrangement facility
- Support for window contents of fewer or greater than 24 lines
- Support for any font, font size, or color
- Line-mode support (RFC 1184)
- Encrypted and authenticated telnet sessions

Differences between Version 2.5 and Version 2.6

New Features in Version 2.6

- Encrypted sessions
- Authenticated sessions
- Cornell Kerberos driver
- Translation Tables
- Graphical configuration
- PAGE UP, PAGE DOWN, HOME, and END keys
- EMACS mode for arrow keys
- MacBinary II
- Resizeable TEK windows
- VT printing escape sequence

- · CDUP command for FTP server
- · Optional inhibition of TEK emulation
- · Two paste modes, quick and block
- · Directly specified answerback message
- · Integrated Telpass functionality
- · Default transfer directory for each FTP user
- · Optional FTP ISO translation
- · User modification of default file type and creator type for binary files
- · User modification of creator type for text files
- · Xterm change window title sequence from remote host
- · User modification of window title
- · Error message system

Discontinued Features

The most important difference between Version 2.5 and Verion 2.6 is the removal of all external configuration files. All parameters of NCSA Telnet Version 2.6 can and *must* be configured from within the application. Although the `config.tel` file is no longer required, we recommend that you retain a copy in case you have to use an older version of NCSA Telnet.

Version 2.6 maintains all of its configuration in the NCSA Telnet `Preferences` file, which is stored in the `Preferences` folder of your `System` folder. You cannot edit the format of this file.

These other Version 2.5 features are no longer available in Version 2.6:

- · Serial Connections
- · SLIP Connections via built-in drivers
- · NCSA TCP/IP drivers

Bugs Fixed from Version 2.5

Many of the bugs present in Version 2.5 have been corrected in Version 2.6. The bugs and problems that have been fixed include:

- · **Next Session** no longer redraws windows unnecessarily.
- · Dropped connections no longer ignore the **Windows don't go away** option in the **Global Preferences** dialog box.
- · Several memory leaks have been plugged.

System Requirements

To run Version 2.6, you need a Macintosh running Version 6.0 or later system software and MacTCP. You also need an IP address assigned to your Macintosh.

Notational Conventions

Before using NCSA Telnet for the Macintosh, you should know how to use the mouse, issue commands from menus, work with windows, and locate files using directory dialog boxes. If you are unfamiliar with the Macintosh user interface or need more detailed information regarding these procedures, please refer to your Macintosh user's guide.

Material in this manual is presented in text, screen displays, or command-line notation. Different typefaces indicate different functions.

- *New concepts or terms* are generally in italic type when they first occur in text, which indicates that they are defined in the paragraph.
- *Cross references* usually include the title of the referenced section or chapter enclosed in quotation marks (e.g., see Chapter 1, "Getting Started") and the number of the page on which the section begins.
- `Boldface type` represents characters you enter as shown (*literal expressions*).
- Lowercase italic type represents a *variable*, a placeholder for the text you actually enter. A variable can consist of different characters each time you make the entry.
- You may be instructed to enter specific characters on the keyboard. These entry instructions (*command lines*) are printed in nonproportional (mono-spaced) boldface type (e.g., **dothis**) and appear either within a paragraph or on a separate line. Command lines are normally entered in lowercase type.
- Monospace type that is not boldbace (e.g., the `list` command) indicates UNIX commands and options, filenames, directory and folder names, and machine addresses and names.
- Helvetica boldface type (e.g., the **Cancel** button) represents boxes and buttons (options) in dialog boxes, commands on pull-down menus, menu names, and window and dialog box names.
- Keys that are labeled on your keyboard with more than one character, such as the RETURN key, are identified by all-uppercase letters in normal font.
- Keys that you are to press simultaneously or in succession are linked with a hyphen (e.g., press SHIFT-OPTION-D).
- A check mark (✔) appears in a pull-down menu when a command is selected, as is standard in software for Macintosh computers.

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If you want to see more software like NCSA Telnet, please contact us by email or U.S. mail, telling us what you are doing with NCSA Telnet. We need to know: (1) What science you are working on—an abstract of your work would be fine; and (2) How NCSA Telnet has helped you, for example, by increasing your productivity or allowing you to do things you could not do before.

We encourage you to cite the use of NCSA Telnet, and any other NCSA software you have used, in your publications. A bibliography of your work would be extremely helpful.

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Acknowledgment

A great deal of thanks goes to Rick Watson of the University of Texas for help ing incorporate his authentication and encryption code into NCSA Telnet and for his permission to use parts of his documentation for this manual. See "Authentication and Encryption" on page 3–5.

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NCSA Contacts

Mail user feedback, bug reports, questions, and software and manual suggestions to:

> Software Development Group
> NCSA Telnet
> 152 Computing Applications Bldg.
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Send electronic mail to one of the following:

About NCSA Telnet: `mactelnet@ncsa.uiuc.edu`

About other SDG products: `softdev@ncsa.uiuc.edu`

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1 *Getting Started*

This chapter introduces the basic steps involved in using NCSA Telnet for the Macintosh Version 2.6:

- · beginning an NCSA Telnet session
- · opening and closing a connection
- · copying, pasting, and printing the contents of session windows
- · ending an NCSA Telnet session

It is assumed that you already know how to click and drag using the mouse, how to move and resize windows, and how to select items from menus. If you are unfamiliar with the Macintosh user interface or need additional information regarding these procedures, please refer to your Macintosh user's guide.

Installation Note

This chapter assumes that your system or network administrator has already installed NCSA Telnet on your system, assigned an IP address to your Macintosh, and given you a login name and password for the computer to which you want to connect. For information regarding installation and customization procedures, see the second chapter ("Configuration" on page 2–1).

Beginning an NCSA Telnet Session

Invoke NCSA Telnet by double-clicking on the NCSA Telnet file or application icon. The NCSA Telnet application icon is shown below:

Telnet2.6

A box introducing NCSA Telnet appears on your screen, then disappears.
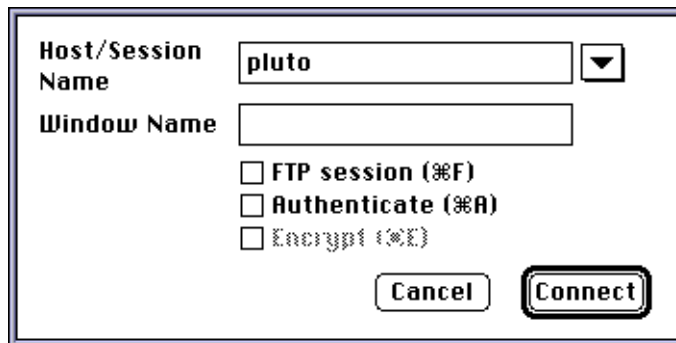
Opening and Closing a Connection

Opening a Connection

To open a connection to a host:

1. Select **Open Connection**... from the **File** menu, which displays the **Open Connection** dialog box:

```
┌─────────────────────────────┐
│ File                        │
├─────────────────────────────┤
│ Open Connection...    ⌘O    │
│ Open Special            ▶   │
│ Close                 ⌘W    │
├─────────────────────────────┤
│ Load Set...             ▶   │
│ Save Set...                 │
├─────────────────────────────┤
│ MacBinary II Enabled        │
├─────────────────────────────┤
│ Show FTP Log                │
├─────────────────────────────┤
│ Print Selection...    ⌘P    │
│ Page Setup...               │
├─────────────────────────────┤
│ Quit                  ⌘Q    │
└─────────────────────────────┘
```

2. Fill out the **Open Connection** dialog box. In the **Host/Session Name** box, enter the name of the host to which you want to connect. The session name can be any hostname, IP address, or alias. You may optionally append an alternate port number to connect to after the hostname, IP address, or alias. In the sample **Open Connection** dialog box below, the hostname is `pluto`:

```
┌──────────────────────────────────────────────┐
│  Host/Session  ┌─────────────────┐  ┌───┐    │
│  Name          │ pluto           │  │ ▼ │    │
│                └─────────────────┘  └───┘    │
│  Window Name   ┌─────────────────┐           │
│                └─────────────────┘           │
│                                              │
│                ☐ FTP session (⌘F)            │
│                ☐ Authenticate (⌘A)           │
│                ☐ Encrypt (⌘E)                │
│                                              │
│                   ┌────────┐ ┌─────────┐     │
│                   │ Cancel │ │ Connect │     │
│                   └────────┘ └─────────┘     │
└──────────────────────────────────────────────┘
```

In the **Window Name** box, enter any name you wish for the connection's window. This optional feature is not necessary with single connections but is very useful when you open multiple connections. If you do not specify a window name, the connection's window title is set to the contents of the **Host/Session Name** box and a number is appended.

3. If you want to connect as an FTP client, check the **FTP Session** box. For more information, see "Using an FTP Client" on page 4–2.

4. If you want to start an authenticated or encrypted connection, check the **Authenticate** box. **Authenticate** must be checked if you wish to use encryption. For more information, see "Authentication and Encryption" on page 3–5.

5. Click the **Connect** button, or press the RETURN key on your keyboard.

NCSA Telnet attempts to connect to the host you specify, a process that generally takes only a few seconds. When a connection is established, a **Connection** window appears. The **Window Name** you specify in the **Open Connection** dialog box appears both in the title bar of the **Connection** window and in the **Connections** menu.

See the second chapter ("Configuration" on page 2–1) for alternative ways to open a connection, for session names other than the hostname, and for a discussion of aliases. For information about working with multiple sessions, see "Multiple Connections" on page 3–1.

Logging on to Your Host

The **Connection** window indicates the name and type of your host machine and prompts you to enter your login name. For example, if you attempt to connect to a Sun system named `pluto`, the login prompt may look like this:

```
SunOS UNIX (pluto)
login:
```

To log on:

1. Enter your login name at the login prompt and press RETURN. The host prompts you to enter your password.

2. Enter your password and press RETURN.

Now that you are logged on and running NCSA Telnet, your Macintosh operates as a VT102 or VT220 terminal that is remotely connected to the host.

NOTE: The response time of a host can vary. If the remote host is heavily loaded, a few minutes may elapse after the connection opens before the host prompts you to log on.

Setting the BACKSPACE/DELETE Key

NCSA Telnet automatically translates BACKSPACE/DELETE keypresses into `delete` codes. This makes NCSA Telnet compatible with systems that prefer delete to backspace. If your backspaces are not accepted, the host you are using may accept only backspace codes.

To test this possibility, select **Backspace** from the **Session** menu, which changes the setting of the BACKSPACE/DELETE key to backspace. This resets the default translation so that the key sends a backspace code. If your backspaces are now accepted, the host prefers backspace codes.

Change the setting of the BACKSPACE/DELETE key by selecting the desired keycode (**Backspace** or **Delete**) from the **Session** menu. For more information regarding the configuration of the BACKSPACE/DELETE key, see "Editing Session Configuration Records" on page 2–5.

Setting a VT Terminal Type

NCSA Telnet can emulate either a VT102 or a VT220 terminal. When you log on to a host, the host operating system does not always know what type of terminal you are using. For instructions on setting terminal type, consult the operating system manual for your host.

Try setting the terminal type to VT100 or VT102. Many UNIX and some other system do not support VT102. For such systems, set terminal type to VT100 or `tab132` (which is compatible with VT102 emulators).

The following examples demonstrate how to set the terminal type for two popular operating systems and hosts, UNIX (using the C shell) and VAX/VMS.

For UNIX using a C shell and VT100 terminal type:	% **set term=vt100;tset**
For UNIX using a C shell and VT220 terminal type:	% **set term=vt220;tset**
For VAX/VMS:	B$ **set term /inq**

Emulating the VT Terminal Keyboard

Many keys are the same on both the Macintosh and VT keyboards. These keystrokes are transmitted by NCSA Telnet without modification. However, the VT keyboard has some keys that the Macintosh keyboard does not have and also treats or labels other keys differently. In addition, many VT keys have special meanings when they are transferred to the host.

You can use the Macintosh keyboard to provide full VT220 functionality. Note that the position of the Macintosh numeric keypad is identical to that of the VT keypad, although the labels are different. If you are accustomed to using a VT keypad, you can ignore the Macintosh labels and enter as usual on the VT keypad.

Macintosh key commands that correspond to key commands on a VT terminal are listed below.

VT Keyboard	Macintosh Plus Keyboard	Apple Desktop Bus Keyboard
` (backquote)	⌘-` *or* OPTION-` *	⌘-` *or* OPTION-` *
ESC†	`	ESC *or* `
DELETE‡	BACKSPACE	DELETE *or* DEL
BACKSPACE‡	OPTION-BACKSPACE	OPTION-DELETE
LINE FEED	CONTROL-J	CONTROL-J
PF1	CLEAR on keypad	CLEAR on keypad
PF2	/ on keypad	/ on keypad
PF3	= on keypad	= on keypad
PF4	* on keypad	* on keypad
CONTROL-SPACEBAR(NUL)	OPTION-SPACEBAR	CONTROL-SPACEBAR
Keypad keys	Keypad keys	Keypad keys

* You must use ⌘-` if the **Remap backquote to ESCape** option is on.
† Use of ` as ESC is governed by how you set the **Remap backquote to ESCape** option in the **Global Preferences** dialog box.
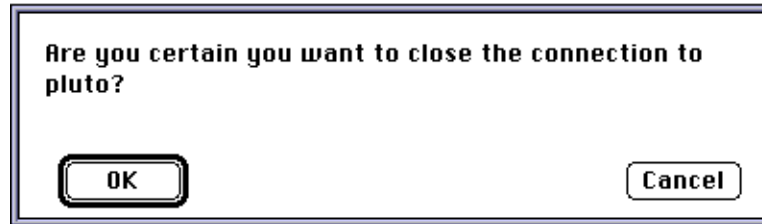‡ See the BACKSPACE/DELETE key discussion in the section above.

For more information regarding NCSA Telnet's emulation of VT terminals, see Appendix B ("VT Emulation" on page B-1) and Chapter 2 ("Configuration" on page 2-1). Appendix B also contains information about the mapping of VT220 function keys.

Closing a Connection

To close a connection to your host, use the logout procedure specific to that system. On a UNIX system, for example, enter the UNIX logout command at the command-line prompt:

% **logout**

If you cannot log out in this manner, select **Close** from the **File** menu. A **Close Connection** dialog box appears on the screen to confirm that you want to forcibly close the connection:

```
┌─────────────────────────────────────────────────┐
│  Are you certain you want to close the connection to │
│  pluto?                                             │
│                                                    │
│                                                    │
│  ┌─────────┐                         ┌──────────┐  │
│  │   OK    │                         │  Cancel  │  │
│  └─────────┘                         └──────────┘  │
└─────────────────────────────────────────────────┘
```

Click on the **OK** button, or press the RETURN key.

After you log out, the **Close Connection** window disappears. You can now safely quit the NCSA Telnet application.

Copying, Pasting, and Printing

NCSA Telnet lets you copy, paste, and print the contents of your session windows.

Copy and Paste from the Edit Menu

First select (*highlight*) text in the window.

To *copy* highlighted text of a window *as is*, choose **Copy** from the **Edit** menu.

To *copy* highlighted text of a window *as a table*, choose **Copy Table** from the **Edit** menu. White spaces in the highlighted text are replaced by tabs, according to the setting of the **Copy Table threshold** in the **Global Preferences** dialog box. You can paste the table into a word-processing program such as Microsoft Word or into a spread-sheet program such as Microsoft Excel.

To *paste* the clipboard contents into a session window, choose **Paste** from the **Edit** menu.

NOTE: Copying and pasting are also discussed in Chapter 5, "Tektronix 4014 and 4105 Emulation," and Chapter 6, "Interactive Color Raster Graphics." The **Copy Table Threshold** settings are discussed in the "Global Preferences" section of Chapter 2, "Configuration."

Print from the File Menu

First *highlight* the text you want to print.

To *print* highlighted text:

1. Choose **Page Setup** from the **File** menu, which opens the **Page Setup** dialog box.

2. In the **Page Setup** dialog box, specify the desired printing parameters, then click the **OK** button or press the RETURN key.

3. Choose **Print Selection** from the **File** menu.

4. In the **Print** dialog box, specify the number of copies, printer, feed, and other parameters. Then click the **OK** button or press the RETURN key.

For more information regarding the **Page Setup** and **Print** dialog boxes, refer to your Macintosh user's guide.

Ending an NCSA Telnet Session

To exit NCSA Telnet, select **Quit** from the **File** menu.

NOTE: You can quit NCSA Telnet any time during the program's execution. However, you should, whenever possible, close connections to each system *before* quitting NCSA Telnet to avoid loss of data or other complications. When you attempt to quit NCSA Telnet before closing current connections, a **Close Connection** dialog box appears to confirm that you want to forcibly close the connections. If you do, click the **OK** button or press the RETURN key; if you do not want to forcibly close connections, click the **Cancel** button.

2 *Configuration*

NCSA Telnet for the Macintosh allows you to customize the environment to suit special needs and habits. Version 2.6 of NCSA Telnet for the Macintosh uses an entirely new configuration system. This chapter describes global preferences you can set, the new configuration system, saved sets, and macro definitions.

For information about configuring file-transfer services, see "Configuring an FTP Server" on page 4–3.

Global Preferences

Several preference options affect every session or the operation of NCSA Telnet in general. You can set these options to best suit your environment and work habits.

To set your global preferences, select **Preferences ▶ Global** from the **Edit** menu. The **Global Preferences** dialog box appears:

Each option in this dialog box is described below.

Option	Description
Command Keys	When you check this box, the menus are configured to accept command key equivalents.
	NOTE: If the **Command Keys** box is not checked and if NCSA Telnet is running on a Macintosh that has no CONTROL key, the ⌘ key remaps to the CONTROL key. If the **Command Keys** box is checked on such machines, you cannot generate CONTROL key characters.
Remap backquote to ESCape	When you check this box, NCSA Telnet sends the ESCape character to the remote host when you press the grave accent (`). (This key is sometimes called the backquote.) This setting is helpful if you use an original Macintosh or Macintosh Plus keyboard.
	This option, however, is available no matter which type of keyboard you have. Pressing ⌘-` always produces a grave accent, regardless of whether you check **Remap backquote to ESCape** in the **Global Preferences** dialog box.

Copy Table threshold	The number you enter in this box determines the minimum number of spaces that are replaced by tabs when you use the `copy table` command instead of the standard `copy` command. You can select **Copy Table** from the **Edit** menu (or press ⌘-T) to copy a table from the NCSA Telnet screen onto the clipboard.
	When you select **Copy Table** from the **Edit** menu, all strings of contiguous spaces greater than the threshold are turned into tabs before being placed on the clipboard. This produces a format you can paste into most spreadsheet and graphing programs without losing data or doing additional formatting.
Timeslice	The number you enter in this box determines how much time NCSA Telnet gives to other applications that may be running. Increasing this number reduces NCSA Telnet's responsiveness but improves the performance of applications running in the background. The number you enter is measured in sixtieths of a second.
Windows don't go away	When you check this box, session windows remain open after their associated connections have terminated. The window title is placed in parentheses to signify that the associated connection has closed. You can view, copy, and print text in a window whose connection has been closed. You can also read connection error messages from hosts that—due to an error—may close connections immediately after they are established.
	To close such a window, either click in the window's close box or select **Close** from the **File** menu.
Staggered Windows	When you check this box, multiple windows are staggered by a whole title bar. This lets you see each window's title. If this box is not checked, each new window is staggered by only a few pixels.
Blink Cursor	When you check this box, NCSA Telnet makes the cursor blink periodically in session windows.
Block, Underline, Vertical Bar	You can choose the appearance of the cursor in session windows by clicking the appropriate button: **Block**, **Underline**, or **Vertical Bar**.
Capture File Creator	Enter an appropriate four-letter creator type in this box to specify the creator type assigned to the files in which NCSA Telnet saves text captured from sessions. Every Macintosh file has a file type and a file creator type. The *file type* specifies the type of file (e.g., text, word processing document, saved set). The *file creator type* tells the Finder which application to launch when you double-click on a filename.
	If you already know the four-letter creator type for the application you want to specify, enter it in the **Capture File Creator** box. If you do not know the four-letter creator type, click the **Select Application** button in the **Global Preferences** dialog box. This opens a standard **Open File** dialog box. Double-click on the name of the application whose creator type you want to find. NCSA Telnet then enters the four-letter creator type in the **Capture File Creator** box.

New Configuration System in Version 2.6

Version 2.6 of NCSA Telnet for the Macintosh uses an entirely new configuration system. Earlier versions required an external text file named `config.tel`, which contained keywords that specified the user's preferences. The configuration system for Version 2.6 is entirely graphical and does not require any external user-editable files.

Ideally, all configuration options for a connection would be combined into one entity. However, due to the large number of options for each connection, NCSA Telnet connection options are divided into two parts: a terminal configuration record and a session configuration record. The *terminal configuration record* contains the options that pertain primarily to NCSA Telnet's terminal emulation. The *session configuration record* contains the remaining options.

Each session configuration record has a terminal configuration record associated with it. You determine which terminal record is associated with a given session record.

Default Configuration Records

Reasonable default terminal and session configuration records are set when you launch NCSA Telnet for the first time. Although you can change the preferences in these defaults, you cannot delete the default configuration records.

The default terminal configuration record and default session configuration record are used when you enter a hostname in an **Open Connection** dialog box. The preferences contained in the default configuration records are used as the defaults for any connection that does not have a preconfigured session or terminal record. The default records are also used to set the initial values of any new terminal or session configuration records you may define.

Editing Configuration Records

When you select either **Preferences▶Terminal** or **Preferences▶Session** from the **Edit** menu, a **Preferences** dialog box appears similar to this one:
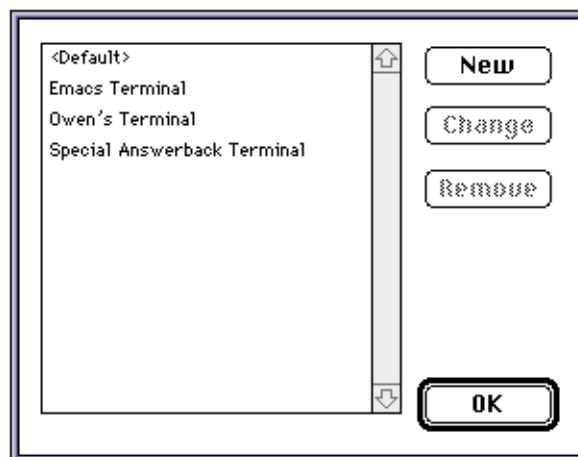
To add a new terminal or session configuration record, click the **New** button. To change an existing terminal or session record, click the **Change** button. To remove an existing terminal or session record, click the **Remove** button. You cannot remove the default.

Editing Terminal Configuration Records

When you click either **New** or **Change** in the **Preferences** dialog box, the **Terminal Configuration Record** dialog box appears:

Option	Description
Terminal Name	The terminal name you enter here is listed along with your other terminal configuration records in the **Terminal** popup menu of the **Session Configuration Record** dialog box.
	When you edit the default terminal configuration record, the **Terminal Name** field is hidden because you cannot rename the default record.
Xterm sequences	When you check this box, NCSA Telnet recognizes the Xterm escape sequences for changing window and icon titles. NCSA Telnet changes the title of the session's window in response to those sequences.
Use VT wrap mode	When you check this box, NCSA Telnet sets the VT emulator to use autowrap mode by default.
	The VT terminal maintains an internal setting to determine whether characters printed off the right-hand side of the screen cause the terminal to wrap. If you set the terminal to wrap, new characters appear on the next line of the screen and the screen scrolls as necessary. If you disable wrap mode, each new character replaces the last character on the current line and the cursor moves neither right nor onto the next line.
	NOTE: Any time you select **Reset Terminal** from the **Session** menu, wrap mode is disabled.
EMACS arrow keys	When you check this box, pressing your keyboard's arrow keys sends the appropriate control codes for moving around in the EMACS editor. When this box is not checked, NCSA Telnet sends the VT codes for the arrow keys. This option also affects the codes sent when you you use the optional mouseclick feature. For more information, see "Cursor Positioning with the Mouse" on page 3–1.

Map PgUp, etc.	When you check this box, NCSA Telnet uses the PAGE UP, PAGE DOWN, HOME, and END keys to change position in the session's scrollback buffer (instead of sending the VT control codes for these keys to the remote host).
Eight bit connections	When you check this box, NCSA Telnet does not strip out the eighth bit from the data it receives. If you do not check this box, only the first eight bits are retained and all other incoming data are stripped out.
Save cleared lines	When you check this box, any time a VT clear-screen code is received NCSA Telnet saves the screen in the scrollback buffer before clearing the screen. If you do not check this box, all data on the screen are lost.
CNTL-COMND is EMACS meta	When you check this box, pressing CONTROL-COMMAND-*anykey* is equivalent to pressing META-*anykey* on a keyboard with a META key. This option does not send META CONTROL keystrokes because the CONTROL key is needed to activate such a sequence. In future versions of NCSA Telnet, this option will be changed to better simulate META key sequences.
Emulation	Selecting the **VT100** or **VT220** button activates VT100 or VT220 emulation, respectively, for this connection.
Font	Use the two boxes after **Font** to specify the font and font size used in this connection.
Scrollback	In this box enter the number of lines you want in the scrollback buffer.
Screen Width, **Screen Height**	In these boxes enter the initial size of the VT emulation screen.
Screen Colors	This option is visible only on color-equipped Macintosh computers. Four boxes in the right-hand column (**Normal foreground**, **Normal background**, **Blinking foreground**, and **Blinking background**) let you set the foreground and background colors for the normal and blinking text modes. Clicking on any of the four boxes opens the standard **Color Wheel** dialog box in which boxes are filled with the current color selection. For additional information on using the **Color Wheel** dialog box, refer to the *Macintosh System Software User's Guide*.
Answerback Message	In this box specify the type of terminal you are using. NCSA Telnet sends this text to a remote host that asks the terminal type being used. The defaults are correct for almost all known systems.

Editing Session Configuration Records

Because the session configuration record is consulted only when NCSA Telnet initiates a connection, changes you make in the session configuration record affect only new connections initiated after your change. Think of it as your favorite cookie recipe: if you change the recipe today by adding nuts and chocolate chips, the cookies you baked last week are not affected.

When you click either **New** or **Change** in the **Preferences** dialog box, the **Session Configuration Record** dialog box appears:

Option	Description
Alias	In this box enter the name (*alias*) of the session configuration record. Then, when you enter this alias in the **Host/Session Name** field of the **Open Connection** dialog box, NCSA Telnet uses this session configuration record as well as terminal configuration record specified in the **Terminal** popup menu of the **Session Configuration Record** dialog box.
	NOTE: Spaces are not allowed in alias names.
	When you edit the default session configuration record, the **Alias** field is disabled because you cannot rename default records.
Hostname	In this box enter the name of the host to which you want to connect. This text is passed to the MacTCP Domain Name Resolver (DNR), which translates a host's domain name into an IP address.
Port	In this box enter the name of the port to which you want NCSA Telnet to attempt the connection to the remote machine.
TEK	There are three choices for Tektronix emulation in NCSA Telnet. **Inhibit** prevents NCSA Telnet from using any Tektronix emulation for this session. **4014** and **4105** select Tektronix 4014 emulation or Tektronix 4105 emulation, respectively.
Paste Method	NCSA Telnet offers two different methods for pasting data into a session. When you select the **Quick** button, NCSA Telnet sends all data to be pasted to the remote host at one time. The Quick method works well for small amounts of text and for sessions involving hosts that are close to you on the network. When you select the **Block** button, NCSA Telnet sends data to be pasted to the remote host in sections, or *blocks*, of text. The size of the block is determined by the number you enter in the box next to the **Block** button. Use the Block paste method when you need to paste large amounts of text or when you are connected to a machine that responds slowly.

Delete Sends	Some hosts expect the keyboard's DELETE character to delete, others expect it to backspace. Select the **Delete** or **Backspace** button to determine which character NCSA Telnet sends to the remote host when you press the DELETE key.
Forcesave	When you check this box, NCSA Telnet always saves the contents of the screen to the scrollback buffer. This option is available only to users of full-screen VMS environments, such as DEC All-in-One.
Berkeley 4.3 CR Mode	When you check this box, you enable a special compatibility option for 4.3 BSD UNIX. There is an official UNIX bug fix for this problem, but some hosts may still want CR–NULL used as the end-of-line character.
Allow linemode	When you check this box, NCSA Telnet uses linemode with hosts that support it. If this option is not checked, NCSA Telnet refuses to use linemode.
TEK page clears screen	When you check this box, NCSA Telnet's Tektronix emulation clears the current Tektronix window any time it receives a Tektronix clear screen command. If you do not check this box, NCSA Telnet creates a new window for the new Tektronix image. Each new screen created this way takes the session name and time as its name. For more information regarding the Tektronix clear screen command, see "Tektronix-Related Commands in the Session Menu" on page 5–2.
Half duplex	This option applies only to hosts that negotiate nonechoing mode but do not expect local line editing. If you check this box, all character keys are sent and echo to the screen immediately. If you do not check this box, characters echo locally and are queued until you press the RETURN or CONTROL key. This option has no effect when the local echo option is turned off.
Show low level errors	When you check this box, NCSA Telnet displays minor error conditions it normally does not. These error messages can be helpful when you are trying to diagnose a problem with NCSA Telnet.
Authenticate	When you check this box, NCSA Telnet tries to negotiate a Kerberos-authenticated connection to the remote host, if the remote host supports authentication and if your Macintosh is properly configured. For more information regarding authentication, see "Authentication and Encryption" on page 3–5.
Encrypt	When you check this box, NCSA Telnet tries to negotiate an encrypted connection to the remote host, if the remote host supports authentication and if your Macintosh is properly configured. For more information regarding encryption, see "Authentication and Encryption" on page 3–5.

NOTE: You must have an authenticated connection to use encryption. |
| **Interrupt, Suspend, Resume** | NCSA Telnet uses certain key combinations for the interrupt, suspend, and resume commands. Default key assignments for these commands correspond to the standard ASCII characters. These three commands and their default key assignments are:

Interrupt. Interrupt (CONTROL-C) sends a telnet interrupt process character that is equivalent to selecting **Send "Interrupt Process"** from the **Network** menu (see "Network-Related Commands" on page 3–4). The host's implementation of telnet is required to listen for and interrupt the current application when this function is received. |

`Interrupt` also does a *timing-mark operation* (also known as timing-mark flush and timing-mark processing). In many other implementations of telnet, pressing CONTROL-C can result in a several-minute delay while text scrolls on the screen. This occurs because the TCP protocol has buffered up to 16 Kbytes or even 32 Kbytes of data, which are waiting in the pipeline to be delivered even before you press CONTROL-C. To avoid this scrolling of buffered data, NCSA Telnet initiates a process known as *timing-mark flush* any time you issue an `Interrupt` command.

To do this, NCSA Telnet institutes *timing-mark processing* by sending to the host a special character that the host echoes back. The session appears to pause for up to 15 seconds and then resumes as usual. During the pause, NCSA Telnet throws away all buffered data. You end up pausing a few seconds instead of waiting several minutes.

Suspend. `Suspend` (CONTROL-S) instantly interrupts all output from the network. The current session does not produce any more characters on the screen until you issue the `Resume` command.

Resume. `Resume` (CONTROL-Q) restarts character printing to the current session. `Resume` does nothing unless a `Suspend` command is in effect.

Terminal

This box contains a popup menu that lets you choose which terminal configuration record will be used when the alias identifying this session configuration record is used to open a session.

Translation Table

This box contains a popup menu that lets you choose which translation table will be initially selected for this session.

Changing Configuration after Session Connected

Use the **Session** menu if you need to change configuration parameters after a session connection is opened. Think of the **Session** menu as table salt: you use the salt shaker to change food at the table after it's too late to go back to the kitchen and fix what you started with.

```
Session
  Backspace
✓ Delete

  Local Echo
✓ Wrap Mode
  EMACS arrow mapping
✓ Map PgUp/PgDown/Home/End
  Translation                    ▶
✓ Clear Screen Saves Lines
  Reset Terminal
  Jump Scroll                  ⌘J
  TEK Page...
  TEK form feed clears screen

  Set Screen Size...

  Setup Keys...                ⌘S
  Font                          ▶
  Size                          ▶
  Color...

  Capture Session to File      ⌘K
```

Command	Description
Backspace	When you select the **Backspace** command, pressing the DELETE key sends a backspace character.
Delete	When you select the **Delete** command, pressing the DELETE key sends a delete character.
Local Echo	When you select the **Local Echo** command, NCSA Telnet operates in *local echo mode* (characters are copied to the screen as soon as you press them on the keyboard). If you have not checked **Allow linemode** (see "Editing Session Configuration Records" on page 2–5), NCSA Telnet can operate in two different echo modes: local and remote. In *remote echo mode*, characters are sent to the host, which sends them back to be printed to the screen.
Wrap Mode	Selecting the **Wrap Mode** command turns on the wrap mode of the VT terminal emulator. When this command is not checked, wrap mode is disabled. See also the **Use VT wrap mode** option in "Editing Terminal Configuration Records" on page 2–4.
EMACS arrow mapping	When you select this command, pressing arrow keys on your keyboard sends the appropriate codes to move around in the EMACS editor. When the **EMACS arrow mapping** command is not checked, NCSA Telnet sends the VT codes for the arrow keys.

Map PgUp/PgDown/Home/End

When you select this command, NCSA Telnet uses the PAGE UP, PAGE DOWN, HOME, and END keys to move around in the session's scroll-back buffer. When the **Map PgUp/PgDown/Home/End** command is not checked, NCSA Telnet sends the VT codes for these keys.

Translation▶

The **Translation**▶ command opens a submenu that lets you choose the translation table for the session. In the sample below, no translation is desired.

```
✓Map PgUp/PgDown/Home/End
 Translation                  ▶ ✓None
✓Clear Screen Saves Lines        ISO 8859-1
 Reset Terminal                  DEC Multinational
 Jump Scroll              ⌘J      PC 850
 TEK Page...
```
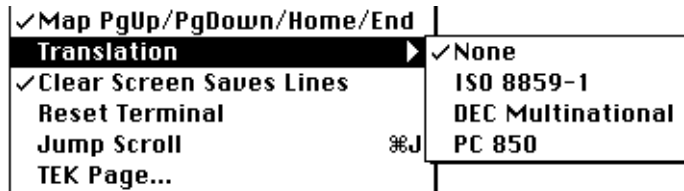
Clear Screen Saves Lines

When you select this command, all lines currently displayed on the screen scroll into the scrollback region before the screen is cleared. If **Clear Screen Saves Lines** is not checked, the cleared lines are permanently erased when the screen is cleared.

Reset Terminal

When you select the **Reset Terminal** command, NCSA Telnet resets all VT mode settings, disables wrap mode, resets VT graphics mode, resets the keypad mode to the default, and resets tabs to every eight spaces. Use this command, for example, when a host program accidentally sets VT graphics mode or fails to leave VT graphics mode.

Jump Scroll

Select the **Jump Scroll** command if you want to skip to the end of the local buffer. The screen pauses, then jumps ahead over scrolling text. The text is placed into the scrollback buffer, but the screen advances to the end of the local network buffer instead of printing every line on the screen. The purpose of this feature is to save time. For example, if you enter a command that produces a great deal of output, you can use the **Jump Scroll** command so you do not have to wait for the output to scroll by.

TEK Page...

When you select the **TEK Page**... command, you can quickly create or clear a **Tektronix emulation** window without intervention from host software. Normally the emulation window appears automatically when the `clear screen` command sequence is received from the host, but the **TEK Page**... command creates the window immediately.

To clear the current session window, use the **TEK Page**... command the same way you use the PAGE key on a Tektronix terminal.

The **TEK Page** command is disabled when you select **Inhibit** as the TEK Emulation in the session configuration record that creates this session.

For more information, see the description of **TEK** options in "Editing Session Configuration Records" on page 2–5. See also "Starting a Tektronix Emulation" on page 5–1 and "Tektronix-Related Commands in the Session Menu" on page 5–2.
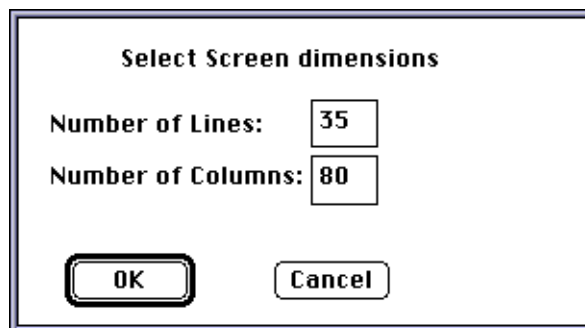
TEK form feed clears screen

When you select this command, NCSA Telnet's TEK emulation does *not* clear the screen when it encounters a form-feed command. TEK images often conclude with a `form feed` command so that the TEK screen clears as soon as it reaches the end of an image. However, immediately clearing the screen makes it hard to see the final image of a TEK file.

Set Screen Size...   Select this command to change the size of the VT emulation screen. NCSA Telnet's VT emulation screens defaults to 24 lines because an actual VT terminal screen has room for 24 lines of text. Some host systems let you define a VT-like terminal type with more or fewer than 24 lines. You can change the NCSA Telnet VT emulation screen default by editing the terminal configuration record. See the description of the **Screen Width** and **Screen Height** options in "Editing Terminal Configuration Records" on page 2–4.

How to Reset Screen Size. If you change the size of the VT emulation screen, the session window resizes itself to reveal the entire VT screen. To increase or decrease the size of the VT emulation screen from the **Session** menu:

First select **Set Screen Size...** from the **Session** menu. The **Select Screen Dimensions** dialog box appears, showing the current number of lines and columns in the VT emulation screen.

Change the values as desired, then click the **OK** button (or press the RETURN key) to return to your session window. Click the **Cancel** button to abort the change.

Shortcut to Reset Screen Size. To quickly change the size of the VT emulation screen, hold down the OPTION key while you use the size box to resize the window. As the window changes size, NCSA Telnet recalculates the number of lines in the window and displays the current dimensions in the upper-left corner of the window. When you release the mouse button, the new size of the VT emulation screen is set. This method is equivalent to selecting **Set Screen Size** from the **Session** menu.

NOTE: Resizing a session window without holding down the OPTION key only resizes the Macintosh window and does not change the size of the VT emulation screen.

Warnings and Suggestions. If you do not have a good working knowledge of how your host system uses terminals with more than 24 lines, we recommend that you use only 24-line windows. The following warnings and suggestions assume that you are familiar with UNIX-based software to control the number of lines for the terminal. Consult your host system documentation or system administrator for more information.

The `termcap` file, which is found only in UNIX systems, is commonly located in the `/etc/termcap` file. It can be set up to include the number of lines on the terminal. The default VT100 `termcap` file explicitly sets a 24-line window, so even if you enlarge your NCSA Telnet window, the host uses only the top 24 lines. You can create special term-

cap entries by editing the `/etc/termcap` file; copy the VT100 entry to a new name and change the number of lines to your preferred screen size.

Berkeley UNIX-based systems have a special feature in the stty program. The number of rows in a session window can be set to any value, and applications programs such as vi learn your window size from the stty setting. To set the window size to 33 lines, enter `stty rows 33`.

You can use the special macro variable # to create a macro that issues this command and automatically substitutes the number of lines for the current window. For example, you could define the macro for ⌘-0 as `stty rows \#`. Now you can reset the window size by pressing ⌘-0, then RETURN. The sequence \# is replaced with the proper number of lines. For information about creating and saving macros, see "Macro Definitions" on page 2–15.

Some systems have a program installed called resize. The resize program sends a special sequence of VT control characters to NCSA Telnet's VT emulator to determine the size of the screen. If resize is available on your system, adding `resize > /dev/null` to your `.cshrc` or `.login` file automatically sets your screen size correctly when you log on. To determine if the resize program is available at your site and for help using it, contact your system administrator.

NAWS (Negotiations About Window Size). NAWS is a relatively new option in the telnet standard. UNIX hosts that support NAWS allow NCSA Telnet to send information to the host regarding the VT window size. Consequently, when you select **Set Screen Size**… from the **Session** menu to change the VT screen size , the new screen size is sent over the network to the host and you do not need to use the stty program. The host knows how big the window is, which eliminates possible problems for screen-oriented applications such as the vi editor.

NOTE: NAWS is not supported by all UNIX machines. You can determine if the host you are connected to supports NAWS by changing the size of the VT emulation screen and then asking the remote host for the screen size. If the host responds with a screen size that matches the new screen size you have just set, the host supports NAWS.

Setup Keys… Use the **Setup Keys**… command to select which keys, if any, issue the telnet commands `interrupt`, `suspend`, and `resume`. See the description of the **Interrupt**, **Suspend**, **Resume** options in "Editing Session Configuration Records" on page 2–5.

Font ▶ The **Font ▶** command opens a submenu containing the fonts you can use to display text in a session window. When you select a font from this submenu, the current window is resized to contain the text and the selected font is used to display all text in the current window.

NOTE: Proportionally spaced fonts—which include most fonts except Courier and Monaco—display slowly and appear spread out.

Size ▶ The **Size ▶** command opens a submenu that contains the point sizes you can use to display text in a session window. The submenu lists several sizes, checks the current size, and outlines all sizes in your system. When you select a point size from this submenu, the current window is resized to contain all the resized text and the text is redrawn according to the specified point size.

NOTE: Sizes that are not outlined in the submenu must be scaled by the system software and therefore may be slow and less sharply defined than nonscaled point sizes.

Color...

The **Color...** command applies only to Macintosh computers that are color-equipped. To change the foreground and background colors of the current window for both normal text and blinking text:

First select **Color...** from the **Session** menu. The **Color Selection** dialog box appears:
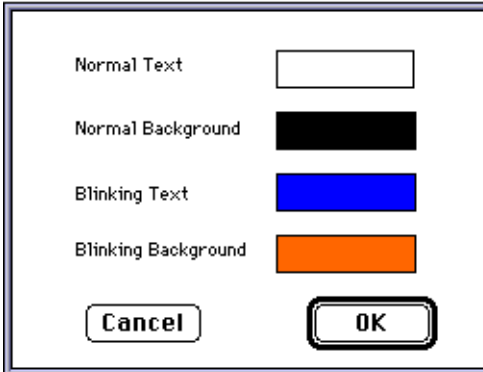
Then click the box next to the item to which you wish to assign a color: **Normal Text, Normal Background, Blinking Text**, or **Blinking Background.** This opens the **Color Wheel** dialog box. Select a new color by clicking in the color wheel. The color you select appears in the top rectangle under the heading **Please Select New Color**. Click **OK** (or press the RETURN key) to set the color change and return to the **Color Selection** dialog box. The box next to the item you selected in Step 2 reflects the color you chose from the **Color Wheel** dialog box. Repeat to assign colors to other items in the **Color Selection** dialog box. Click **OK** when you are done choosing colors. The new colors are applied to your current session window.

For additional information on using the **Color Wheel** dialog box, refer to your *Macintosh System Software User's Guide.*

Capture Session to File

NCSA Telnet can save the text from a session to a file. When you select thiscommand, all normal text output that appears on the screen is also saved to whatever file you specify in the **Save File** dialog box. When the **Capture Session to File** command is not checked, this functionality is turned off.

Saved Sets

NCSA Telnet makes it easy for you to begin multiple sessions quickly. If you use saved sets, you can log on and get right to work without resetting the special characteristics and configuration of a connection each time you start up.

A *set*—a snapshot of open sessions and their current configurations—consists of current macro settings and each session's window location and size, connected host, window name, scrollback setting, color, font, font size, backspace/delete settings, and all other configuration information.

Saving a Set

To save a set:

1. Log on to the desired host as instructed in "Logging on to Your Host" on page 1–3.

2. Customize the session by moving the session window to an ideal location on the screen, specifying a background or text color, choosing a font and font size, setting the desired number of scrollback lines, and choosing the function for the BACKSPACE/DELETE key.

3. Select **Save Set** from the **File** menu.

4. A **File** dialog box appears and prompts you to name the set.

5. After naming the set, click on the **Save** button in the dialog box to save the set.

Using a Saved Set

Saved sets let you bypass the start-up procedure described in "Opening and Closing a Connection" on page 1–2. Specifically, you do not need to select **Open Connection** from the **File** menu (or press ⌘-O) or to specify the connection host or window name. These operations are performed automatically when you load a set.

After you load a set, the session window automatically appears for the specified host at the specified location on the screen and with the specified window name, scrollback setting, color and other characteristics. The following characteristics are saved in a set:

· Session name
· Hostname
· Port number
· Window size and location
· Scrollback setting
· BACKSPACE/DELETE key setting
· Macro definitions
· Command-key setting
· Number of columns
· Tek clear-screen setting
· Font and font size
· Color characteristics
· Assigned keys for Interrupt, Suspend, and Resume functions
· CRMAP setting
· Linemode setting
· Eight-bit status
· Translation table setting
· TEK emulation setting
· Answerback message

Loading a Saved Set

From the Finder

To load a set from the Finder and automatically invoke NCSA Telnet, double-click on the saved-set icon or filename. The sample below shows the saved-set icon for a set named `Setup One`.

Setup One

From within NCSA Telnet

To load a set from within the NCSA Telnet application, select **Load Set** from the **File** menu. In the **File** dialog box that appears, select and open the set.

NOTE: You can edit a set datafile using any editor capable of editing files, even if the datafile's Macintosh file type is not TEXT. However, don't rely on this feature because it may not work with future versions of NCSA Telnet.

Macro Definitions

NCSA Telnet lets you use the key combinations ⌘-0 through ⌘-9 as macro keys. You can program these keys to send from 0 to 255 characters.

To define a macro:

1. Select **Set Macros** from the **Edit** menu or press ⌘-M. The **Macro Configuration** dialog box below shows several sample macro definitions.
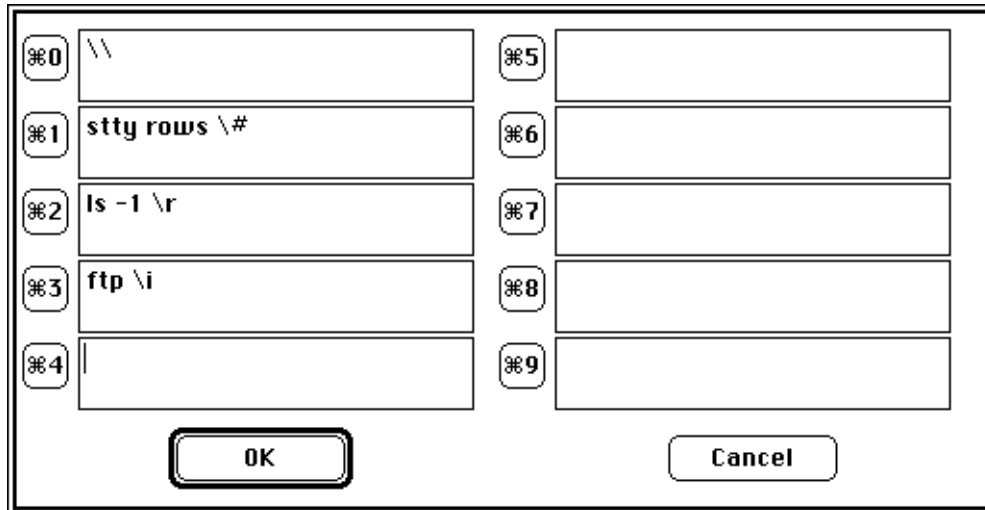
2. Click on the button of the command key you wish to define, or select the box next to that button.

3. Enter the appropriate macro key sequence. Unless you are familiar with the C programming language, the key sequences that generate special control characters in a macro may seem somewhat strange. To define a special character, you must first enter a backslash (\). Indicate nontypable control characters with their equivalents in the octal numbering system. Some common macro key combinations you might want to enter are listed below.

4. Click on the **OK** button (or press the RETURN key) to activate the new macros, or click on the **Cancel** button to invalidate the additions or changes you made. Clicking either **OK** or **Cancel** returns to the application.

Common Macro Key Combinations

Desired Character	Definition
Backslash (\)	\\
TAB	\t
ESC	\033
CONTROL-C	\003
CONTROL-D	\004
CONTROL-E	\005
CONTROL-H *or* BACKSPACE	\010
Size of current window	\# (Refers to setting the number of usable lines in a session window. See the **Set Screen Size** command described in "Changing Configuration after Session Connected" on page 2–9.)
Internet address of this Mac	\i (See also the descriptions of the **Show Network Numbers** command in "Network-Related Commands" on page 3–4 and the **Send IP Number** command in step 3 of "Issue the FTP Command" on page 4–6.)

Reverting to Previous Macro Definitions

While you are working in the **Macro Configuration** dialog box, you can undo changes you made to a macro and also revert the associated command key to its previous setting—just click on the button corresponding to that command key. For example, to undo changes to the definition for ⌘-2, click on the ⌘2 button. To simultaneously abandon all changes you have made, click on the **Cancel** button.

Saving Macros

Currently the only way to save your macro settings is in a saved set. See "Saved Sets" on page 2–13. NCSA plans to extend the macro capability of NCSA Telnet in future versions.

3 *Advanced Features*

This chapter covers more advanced aspects of the working environment of NCSA Telnet for the Macintosh. It describes how to use the mouse to position the session cursor, open multiple connections, implement commands from the **Connections** and **Network** menus, and use authentication and encryption.

Cursor Positioning with the Mouse

You can use the mouse to position the session cursor if you are using a full-screen editor that supports the arrow keys. One such editor is vi. When the mouse cursor is in a session window, holding down the OPTION key changes the mouse cursor into a rectangle. When the mouse cursor is in the session window, holding down the OPTION key and simultaneously pressing the mouse button instructs NCSA Telnet to send a sequence of arrow keys to move to that position on the screen.

 NOTE: If your editor is EMACS rather than vi, you should either set the **EMACS arrow keys** option in the session configuration record or check the **EMACS arrow mapping** command in the **Session** menu

Multiple Connections

NCSA Telnet lets you use multiple connections, either to a single host or to several different hosts.

Opening More Than One Connection

To open another connection, follow either the opening-a-connection procedure presented in "Opening and Closing a Connection" on page 1–2 or the saved-set instructions in "Loading a Saved Set" on page 2–15.

The *active* session is the connection with which you are currently working. The active session's window is generally frontmost on your desktop.

Moving between Connections

To switch between sessions and to make a new session window your active session, bringing it to the front, either click on the session window for the desired connection or select the desired session name from the **Connections** menu.

To activate the session window directly beneath the current session window, select **Next Session** from the **Connections** menu or press ⌘-N (for *next*).

NCSA Telnet opens new session windows on the screen relative to the number of windows currently opened. You can specify that these windows be staggered by just a few pixels or by the whole window title bar. See the description of the **Staggered Windows** option in"Global Preferences" on page 2–1.

Rules for Session Names

When you open multiple connections to a single host, it is useful to specify session names (other than the hostname) for the connections. You may use any of the following for session names:

- the host's full Internet address, such as `192.17.22.20`
- any session configuration record alias (see "Editing Session Configuration Records" on page 2–5)
- any name, such as `sri-nic.arpa`, that can be resolved by the domain-based nameserver

NOTE: Some systems, such as MFENET, do not use the standard telnet port number 23. If you need access via the telnet protocol to a different port number, in the **Open Connection** dialog box enter the port number after the session name; the session name and port number must be separated by one or more spaces. For example, to open a connection to port 23 of `myhost.network.arpa`, in the **Host/Session Name** box of the **Open Connection** dialog box, enter **myhost.network.arpa**. To open a connection to port number 911 of the same host, enter **myhost.network.arpa 911**. You can also specify alternate port numbers in your session configuration records.

The Connections Menu

You can specify titles that are different from the session names for your session windows so that you can easily distinguish between multiple sessions and session windows.

Naming Windows

To specify a window title, enter the desired name in the **Window Name** box of the **Open Connection** dialog box.

NOTE: If the **Window Name** box is blank when you open a connection, NCSA Telnet automatically numbers the session. Each time you open a session, the number increases, no matter how many sessions are currently open.

Checking Session Status

The **Connections** menu contains the window names for current connections and the status of each session. A checkmark (✓) next to a *window* name indicates an active session, and a diamond (◆) or circle (·) next to a *session* name indicates an attempted connection that has not yet successfully opened. More specifically, a diamond indicates that NCSA Telnet is checking the nameserver to find the session name or hostname; a circle means NCSA Telnet is trying to open the session. Once the connection is established, the diamond or circle next to the session name goes away and the session window appears.

NOTE: If you do not remember the meaning of these symbols, select **Marked Connection** from the **Connections** menu. The **Connection Status** dialog box then reports the name and status of the connection. After you read the message, click the **OK** button (or press RETURN) to proceed with opening the connection, or click the **Abort** button to cancel the attempt.

```
┌─────────────────────────────────────────┐
│  janos is currently                       │
│                                           │
│  being opened                             │
│                                           │
│   ┌─────────┐            ┌─────────┐      │
│   │   OK    │            │  Abort  │      │
│   └─────────┘            └─────────┘      │
└─────────────────────────────────────────┘
```
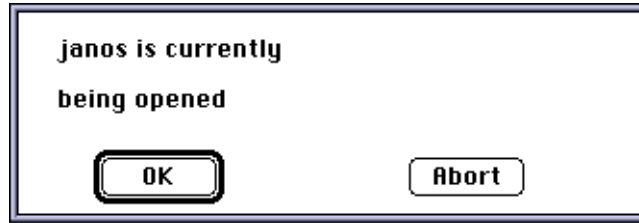
Aborting Connection Attempts

To abort an attempted connection attempt:

1. Select the desired connection from the **Connections** menu. The **Connection Status** dialog box appears, reporting the name and status of the connection.

2. Click the **Abort** button in the **Connection Status** dialog box.

Changing a Window Title

Select **Change Window Title**... from the **Connections** menu to change the window title of the frontmost window.

The Network Menu

NCSA Telnet supports several special commands defined by the Internet standard telnet protocol. Each host telnet implementation treats these commands differently, so they may have no effect on some hosts.

The **Network** menu includes seven telnet commands as well as two network-related commands:

```
┌──────────────────────────────────┐
│ Network                          │
├──────────────────────────────────┤
│ Send FTP Command            ⌘F   │
│ Send IP Number              ⌘I   │
├──────────────────────────────────┤
│ Send "Are You There?"       ⌘/   │
│ Send "Abort Output"         ⌘A   │
│ Send "Interrupt Process"    ⌘Y   │
│ Send "Erase Character"      ⌘H   │
│ Send "Erase Line"           ⌘U   │
├──────────────────────────────────┤
│ Suspend Network                  │
├──────────────────────────────────┤
│ Show Network Numbers...          │
└──────────────────────────────────┘
```

Telnet Commands

Command	Description
Send FTP Command	When you select this command, NCSA Telnet sends an FTP command to the remote machine. Normally the command is `ftp` *w.x.y.z* (where *w.x.y.z* is the IP address of your Macintosh) followed by a return character. However, if the FTP server is in anonymous mode, NCSA Telnet

sends the command `ftp -n` *w.x.y.z* followed by a return character. You can force NCSA Telnet to omit the `-n` option if you hold down the SHIFT key. For more information about FTP commands, see "File Transfer" on page 4–1.

Send IP Number　　　　When you select this command, NCSA Telnet sends the IP address of the Macintosh you are using to the remote machine as if you typed it in manually.

Send "Are You There?"　　　　Use this command whenever you are not sure whether the network and host are up. Every once in a while, especially when the host is bombarded with incoming information or tied up by a large number of users, the host doesn't seem to respond to your commands. When this happens and your terminal appears to have locked up, you can select this command to determine whether you are still connected to the host. The host is supposed to respond, if able, with a readable message. Some machines answer `Yes`; others answer with more informative messages.

Send "Abort Output"　　　　This command is supposed to throw away all output from the current process and then resume when there is a pause. Very few hosts implement this command correctly.

Send "Interrupt Process"　　　　Available on nearly every telnet host, this command stops the current process and throws away all pending data for the connection. It is equivalent to pressing CONTROL-C on most UNIX systems. You can set your Macintosh keyboard so that CONTROL-C sends the **Send "Interrupt Process"** command; select the **Setup Keys**… command in the **Session** menu, as described in "Changing Configuration after Session Connected" on page 2–9.

Send "Erase Character" *and*

Send "Erase Line"　　　　You can erase either the last character or the current line by selecting **Send "Erase Character"** or **Send "Erase Line"**, respectively. Many hosts do not implement these commands but use their own special characters instead.

Network-Related Commands

The **Network** menu includes two of NCSA Telnet's network-related commands:

Command	Description
Suspend Network	Select this command to temporarily suspend all network communications and disable all receive functions. All of your connections are kept alive, but you do not see any incoming text.
	NOTE: Generally you should use the `Suspend` and `Resume` commands rather than the `Suspend Network` command. See the discussion of the `Interrupt`, `Suspend`, and `Resume` commands in "Editing Session Configuration Records" on page 2–5.
Show Network Numbers	Because NCSA Telnet now uses MacTCP for all network communications, this command is largely unnecessary. However, for purposes of continuity, selecting this command displays your Macintosh's IP address in a dialog box but does not transmit the address. Click on the dialog box to remove it.

Authentication and Encryption

NCSA Telnet supports Kerberos Version 4 authentication (from Cornell University) and DES encryption.

Computer users traditionally have entered passwords to log on to their accounts on hosts. While passwords have provided some level of security, a proliferation of methods for snooping passwords off the Internet has greatly reduced the security provided by passwords.

Kerberos provides a system that *authenticates* a user to hosts. After you enter your password once, that password is used to gain a *ticket* from a Kerberos server. You use this ticket to log on to Kerberos-aware hosts without entering your password: the ticket guarantees that the person making the connection is who you say you are (i.e., because you are the authentic person, you are authenticated). The method used to gain the ticket does not require that your password pass over the network in an easily snooped form.

Even with the authentication features of Kerberos, NCSA Telnet connections are still subject to snooping. Data you send and receive can be snatched from the network and viewed by others. However, when NCSA Telnet sets up an *encrypted* connection, data are scrambled before passing between your Macintosh and a remote host. Such data are significantly more protected than unencrypted data. Encryption is not foolproof, but it does stop the majority of attempts to snoop through your data.

NCSA Telnet requires that an authenticated connection be in place before using encryption.

Preparing Your Environment

NCSA Telnet uses Cornell University's Kerberos driver package (Kdriver) for Kerberos and encryption support routines. Kdriver, which supports Kerberos Version 4, requires that each Kerberos server host also run a UDP daytime server. KConfig (an application written by Rick Watson of the University of Texas) is used to configure Kdriver settings.

You can download the `Kerberos Client` extension and the KConfig application from NCSA's anonymous FTP server. (See "Anonymous FTP Server" on page C–1.) If you use a version of the Cornell Kerberos driver obtained from a source other than NCSA, encryption is not supported, some setting changes made by KConfig won't be saved in the `Preferences` file, and the ticket may display garbage for the user realm.

You also need to know pertinent information regarding your site's Kerberos server. If you are an administrator, you need to install a Kerberos server for your site. Installing a Kerberos server is beyond the scope of this manual.

NCSA Telnet for the Macintosh Version 2.6 supports the telnet authentication and encryption options described in the RFC1411/1416 and IETF drafts dated July 1991. Future versions may support the IETF draft AUTH_ENCRYPT option described in the draft dated April 1993.

Installing Software

To implement either authentication or encryption, you must install Kdriver in the `System` folder on your Macintosh. Drag the `Kerberos Client` extension to your closed `System` Folder. If you are running System 7, you are asked to verify that the file is to be placed in your `Extensions` folder.

Reboot your Macintosh and use KConfig to configure settings for your Kerberos environment. All KConfig settings are made in the **Kerberos Configuration** window.

Mapping Kerberos Realms to IP Names

This section assumes you are familiar with Kerberos.

A domain/hostname-to-realm map attempts to match a Kerberos realm with IP domain names. Use KConfig to set up domain/hostname-to-realm maps, which are useful if you support more than one Kerberos realm.

You may (or may not) have to reboot after entering your initial settings in the **Kerberos Configuration** dialog box.
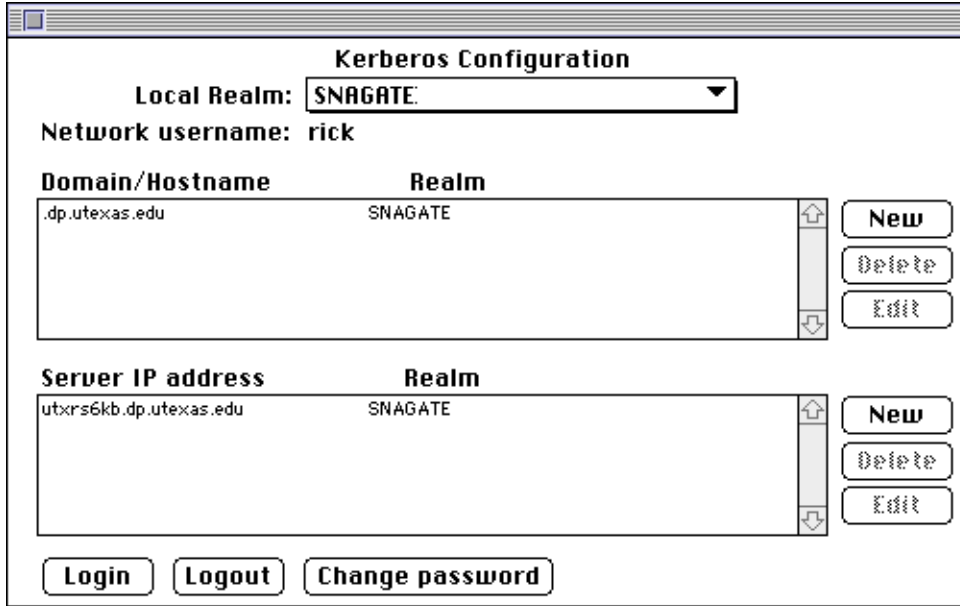
Option	Description
Domain/Hostname . . . Realm	Enter the domain or host name for each Kerberos host you are using.
Server IP address . . . Realm	Enter the Kerberos server's IP address or hostname for each Kerberos realm you are using. After entering your Kerberos servers, you can pick your local realm using the **Local Realm:** popup menu at the top of this dialog box.
Login	Click this button to authenticate to a Kerberos server and obtain an initial ticket-granting ticket for other services. You don't have to log on using KConfig; NCSA Telnet prompts you when a password is needed.
Logout	Click this button to destroy all tickets. Select **Show Credentials** from the **File** menu to display all your Kerberos tickets.
Change Password	Click this button to change your Kerberos password.

Activating Authentication and Encryption in NCSA Telnet

Authentication and/or encryption options appear in two places in NCSA Telnet:

· In the **Open Connection** dialog box. See "Opening a Connection" on page 1–2.

· In the **Session Configuration Record** dialog box. See "Editing Session Configuration Records" on page 2–5.

In the **Open Connection** dialog box, you can select the **Authenticate** and **Encrypt** options when you open a session. These options apply to the default session.

NOTE: The **Authenticate** option is required for encryption. FTP sessions cannot currently be authenticated or encrypted.

In the **Session Configuration Record** dialog box, select the appropriate options for each session that you configure, including the default session.

Indicating Active Encryption

NCSA Telnet displays encryption icons next to the zoom box in the window's title bar. For example, see the padlock icon below:

A padlock icon indicates that a session is two-way encrypted, which means that data are encrypted both going to and coming from the server. If any other icon is displayed, the session is not two-way encrypted. An arrow indicates that the ses-

sion is encrypted in one direction only—either boging to or coming from the server—and is probably evidence of a bug in either the NCSA Telnet code or in your telnet server. The absence of any icon means that no encryption is taking place.

4   *File Transfer*

This chapter discusses File Transfer Protocol (FTP) as well as various features of NCSA Telnet for the Macintosh for transferring Macintosh and other files.

File-Transfer Terminology

The following terms are frequently used in this chapter:

ASCII file	An *ASCII*, or *text*, file is one that you can read. You can use it with standard editors on the Macintosh or host. When text files are transferred, they are translated to a format appropriate for the receiving machine.
Binary file	A *binary*, or *image*, file cannot be read by standard text editors. Unlike ASCII text files, binary files are not changed in any way when transferred.
Client/server	The *client* is the computer system that requests services, and the *server* is the system that provides services. The client is not always your Macintosh, despite appearances. When you use NCSA Telnet to connect to a host, your Macintosh is the telnet client. When you request a file transfer from your Macintosh, the transfer is actually initiated on the host, making the host the FTP client and your Macintosh the FTP server. Your Macintosh can be both a telnet client and an FTP server at the same time.
File transfer	In a *file transfer*, the contents of a file are copied to a file on another computer.
MacBinary file	A *MacBinary file* has been encoded in the MacBinary file format so it can be stored for downloading later to a Macintosh. Because the file contains all the information contained in a normal Macintosh file, a MacBinary file can be used for transferring applications and other Macintosh-specific files. MacBinary files are virtually useless on any other machine.

About FTP and NCSA Telnet

NCSA Telnet has an internal FTP server that permits reliable file transfers between a Macintosh and any FTP host on the network. File transfers are initiated from the FTP host. With the NCSA Telnet implementation of FTP, you can:

- Stream transferring files in either text (ASCII) or binary (image) format
- Change the directory
- Show the name of the current directory
- List files in the current directory (with wildcard specifications)
- Send and receive multiple files with one command (using wildcards)

File transfers are processed in the background. While a file transfer is in progress, you can perform other NCSA Telnet activities such as switching sessions, adding new sessions, or changing parameters. When one FTP connection is active, requests for another are ignored.

Using an FTP Client

NCSA Telnet lets you use an FTP client to connect directly to the FTP port of a host machine, which means you can transfer a file directly between the remote host and your Macintosh.

This is simpler than the normal process, which requires you to log on to a UNIX account, transfer a file from the remote host to your UNIX account, and finally transfer the file from your UNIX account to your Macintosh.

When you use an FTP client to transfer files directly between a UNIX host and your Macintosh, you do not need to log on to a secondary UNIX account for FTP to use as a temporary go-between.

Follow these steps to log on to and use an FTP client:

1. Select **Open Connection** from the **File** menu. The **Open Connection** dialog box appears.

2. In the **Open Connection** dialog box, check the **FTP Session** box. This opens a window displaying an FTP client connection message similar to the one below:
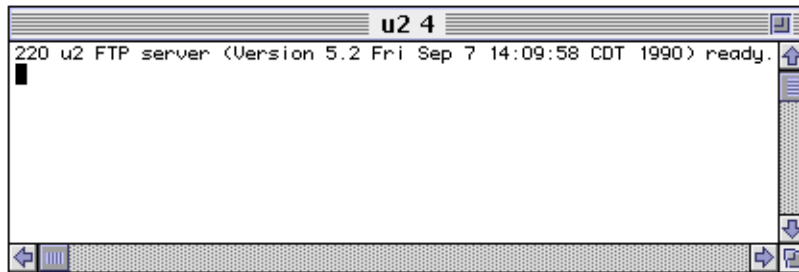
Checking the **FTP Session** box is exactly the same as opening a connection to a UNIX machine on port 21, which is the FTP port. Therefore, if you set up an alias to port 21 of a remost UNIX host, all sessions opened to that alias are FTP clients. For more information about aliases and session configuration records, see the description of the **Alias** option in "Editing Session Configuration Records" on page 2–5.

3. Enter **user** followed by your login name and press RETURN. Example:

    user *loginname* RETURN

4. The host prompts for your password. Enter your password and press RETURN.

5. If you are logged on successfully, the host sends a message that you are connected properly.

Once logged on, use the FTP client just as you would normally use an FTP session.

Configuring an FTP Server

To configure an FTP server, select **Edit ▶ FTP Server** from the **Preferences** menu. The **FTP Server Preferences** dialog box appears:

```
                    FTP Server Prefs

         Server Mode  ○ Off
                      ○ On, No passwords needed
                      ● On, Username & Password required

         ☐ Show FTP log at startup
         ☒ Use Macbinary II
         ☒ Reset Macbinary after each transfer
         ☐ Use ISO Translation
      Binary Filetype [BINA]   Creator [????]  (Example)

              Text Creator [ttxt]  (Select Application)

      (Cancel)                              ( OK )
```

Each option in this dialog box is described below.

Option	Description
Server Mode	NCSA Telnet's FTP server can operate in three modes: off, on with no passwords, and on with passwords. When you select **Off**, NCSA Telnet refuses all FTP connections to your Macintosh. When you choose **On, No passwords needed**, NCSA Telnet allows anyone to connect to your Macintosh through FTP. When you select **On, Username & Password required**, NCSA Telnet requires connecting users to supply a valid username and password before gaining access to your Macintosh through FTP.
	WARNING: Do *not* leave the FTP server in **On, No passwords needed**. This mode allows *anyone* access to your entire filesystem. NCSA Telnet includes this mode merely for quick and simple file transfers. It is not appropriate for a permanent configuration setup.
	For information regarding the configuration of usernames and passwords for FTP, see "Controlling Access" on page 4–4.
Show FTP log at startup	When you check this option, the FTP log is displayed when NCSA Telnet is launched. The FTP log shows current and past transactions:

```
≡≡≡≡≡≡≡≡ FTP Log ≡≡≡≡≡≡≡≡
FTP transferring: mbox
FTP Transfer Concluding
FTP Transfer Concluding
FTP transferring: Connections Menu
FTP Transfer Concluding
FTP Transfer Concluding
```

Option	Description
Use Macbinary II	When you select this option, NCSA Telnet uses MacBinary transfer mode when in binary mode. You can turn MacBinary mode on and off either from this dialog box or by sending `quote macb enable` or `quote macb disable` to the FTP server.

Reset Macbinary after each transfer	When you select this option, the MacBinary transfer mode returns to your preferred default (**enabled** or **disabled**) each time you open a new FTP session, regardless of how you set the mode in a previous session. This saves you the trouble of tracking whether Macbinary transfer mode is enabled each time you want to transfer files. NOTE: Each FTP session corresponds to the opening of each FTP command connection, not to the individual file transfer.
Use ISO Translation	When you select this option, filenames sent in directory listing to the connected FTP user are first translated into the International Standards Organization (ISO) character set.
Binary Filetype and **Creator**	Use the **Binary Filetype** and **Creator** boxes to specify the file type and file creator type for files transferred in binary mode when MacBinary transfer mode is disabled. Clicking on the **Example** button opens the **File** dialog box; use the the dialog box to select a file, then determine that file's file type and file creator type. For more information regarding file types and file creator types, see the discussion of the **Capture File Creator** option in "Global Preferences" on page 2–1.
Text Creator	Use the **Text Creator** box and **Select Application** button to select the four-letter file creator type given to files transferred to your Macintosh through ASCII transfer mode.

Controlling Access

To control who has FTP access to your Macintosh, select **Preferences ▶ FTP Users** from the **Edit** menu. An **FTP Users Preferences** dialog box appears that is similar to the following, which lists three users (jbrowne, melliott, and uldhmi):
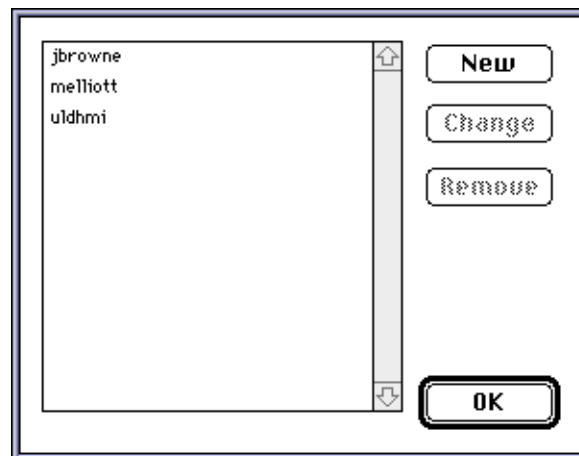
Highlighting a username, then clicking on the **Remove** button cancels that user's access privileges.

Clicking on either the **New** or **Change** button opens a dialog box similar to the one below, which lets you add a new FTP user or change information about an existing FTP user:
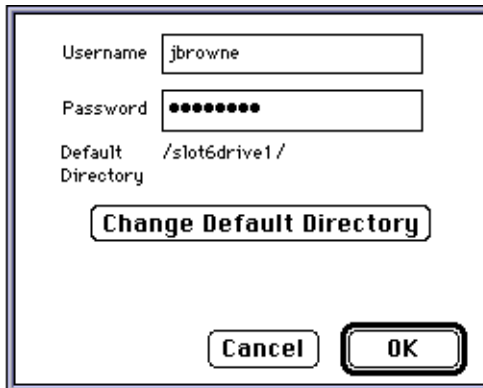
In this sample, the user receiving FTP access is `jbrowne`, whose password is not displayed. When jbrowne logs on, his default directory will be `/slot6drive1/`.

Option	Description
Username	In this box enter the name you want NCSA Telnet to recognize at the username prompt.
Password	Enter the user's password in this box. Newly entered passwords are displayed in normal text. When you change records, this box always displays eight bullets (·) regardless of the length of the actual password. Passwords are stored in an encrypted format in the preferences file.
	NOTE: The encryption method used on passwords is quite simple and prevents casual users from discovering your passwords. But you should never give anyone a copy of your `Preferences` file.
Default Directory	When a user logs on with the correct username and password, NCSA Telnet's FTP server sets the working directory to the default, which is identified here. Clicking on the **Change Default Directory** button lets you change this user's default directory.

Preparing to Transfer Files

Before you attempt to transfer files using FTP, make sure the following conditions are met:

- Your host system supports FTP file transfer. If you do not know whether it does, see your system administrator.
- You have not disabled the file transfer capability of NCSA Telnet. You can check two conditions to determine whether the FTP capability is disabled:
  - » In the **FTP Server Preferences** dialog box, **Server Mode** is set to **Off**. Change this setting to **On**.
  - » When you attempt to start up FTP, your machine does not respond to the FTP command. Check to see if you have configured the FTP server.

Invoke FTP on the Host

Since the remote host initiates FTP transfer, FTP commands vary depending on the host system. For full documentation of FTP and commands within FTP, refer to the manuals for the host computer. On UNIX systems you can read online documentation by entering:

```
% man ftp
```

Issue the FTP Command

On most computer systems, at the prompt you enter the FTP command and the IP name or IP address of the target machine.

You can enter the FTP command in one of three ways. Use whichever method you are comfortable with. In the following examples of the three procedures, the IP name of the Macintosh is `mymachine` and its IP number is `192.17.20.22`:

1. Enter either the machine name or IP address and then press RETURN:

    ```
    % ftp mymachine    or   % ftp 192.17.20.22
    ```

2. Select **Send FTP Command** from the **Network** menu (or press ⌘-F). Either causes NCSA Telnet to enter the FTP command and issue a return character.

3. Enter **ftp**, press the SPACEBAR key, select **Send IP Number** from the **Network** menu (which automatically enters your IP address), and then press RETURN.

Your host computer may not accept FTP commands from any of these procedures, so you may have to test some variations to find the easiest method for your site.

Regardless of how you invoke FTP, most FTP clients respond like this:

```
Connected to 192.17.20.22.
220 Macintosh Resident FTP server, ready
Name (192.17.20.22:uldhmi):
```

Most FTP clients prompt for your username and password. If you have configured the FTP server for passwords (see "Configuring an FTP Server" on page 4–3), then you must enter a password. Otherwise, press RETURN to bypass the prompts. If you are not prompted for a username and password, assume that you are logged on and enter your FTP commands at the FTP prompt.

NOTE: When an FTP connection is active, the cursor changes to a small file icon:

When the FTP connection terminates, this icon changes back to the standard I-beam cursor.

Enter Additional FTP Commands

After FTP is invoked and passwords are checked, most FTP clients prompt you for individual FTP commands. These commands are documented in manuals for the host computer. Most FTP implementations have similar commands because they are modeled after the Berkeley UNIX version of FTP.

Once you are in FTP, you can access online help for a list of available commands. FTP commands that are common to most implementations are listed below:

Command	Action
ascii	Sets mode to ASCII (text) transfer mode, which is the default
binary	Sets mode to binary (image or I) transfer mode
cd	Changes the directory on your Macintosh

`dir`	Shows filenames in the Macintosh's default directory
`get` *filename*	Gets specified file from the Macintosh and sends it to the host
`help`	Shows an online list of FTP commands
`put` *filename*	Sends specified file from the host to the Macintosh
`pwd`	Shows the name of the current Macintosh directory

Set the Transfer Mode

ASCII is the default mode for FTP transfers. To transfer graphic or binary data files, you must change the transfer mode to binary format *before* you enter the `put` or `get` commands that transfer files. To set the transfer mode to binary, enter either **binary** or **bin**.

If you intend to use the file you are transferring with a Macintosh-specific application, you may also need to set MacBinary transfer mode. See "MacBinary Files" on page 4–9.

To set or reset the transfer mode to ASCII format, enter **ascii**.

Examples in "Transferring Files" on page 4–7 demonstrate FTP transactions with an ASCII file and with a binary file.

Change the Current Directory

FTP transfers files to the default directory on your Macintosh. To change the directory, enter **cd** at the FTP prompt (`ftp>`).

The `cd` command (which is one of the common FTP commands) requires you to manually specify a directory by entering a pathname; you do not use a dialog box. In the directory's pathname, the Macintosh requires that you enter a colon (:) or slash (/) to separate folder names.

For example, to change the default directory to a directory named *myfolder* on your local Macintosh named *hd20*, enter one of the following at the FTP prompt:

`ftp>` **cd ":hd20:myfolder"**   or   `ftp>` **cd "/hd20/myfolder"**

To identify your default transfer directory, enter the `pwd` command at the FTP prompt. In our example, entering the `pwd` command after the preceding cd command results in:

```
ftp> pwd
"/hd20/myfolder" is the current directory
```

Transferring Files

Now you are ready to transfer files via FTP.

WARNING: Do not close an NCSA Telnet connection while a file transfer is in progress. Trying to do so causes the file transfer to fail.

To a Macintosh

Even though you seem to be initiating the transfer from the Macintosh, the transaction actually operates from the host. For example, to transfer a file *from the host to your Macintosh*, enter the `put` command:

`ftp>` **put** *filename.ext*

The following example demonstrates how to use the `put` command to transfer an ASCII (text) file named `temp2` from a remote host to a local Macintosh:

```
% ftp -n 192.17.20.124
Connected to 192.17.20.124.
220 Macintosh Resident FTP server, ready
ftp> put temp2
200 This space intentionally left blank <  >
150 Opening connection
226 Transfer complete
262145 bytes sent in 32.61 seconds (7.8 Kbytes/s)
ftp> quit
221 Goodbye
%
```

To a Host

To send a file *from your Macintosh to a remote host*, enter the `get` command:

ftp> **get** *filename.ext*

The following example demonstrates how to use the `get` command to transfer a binary (image) file named `bridge.pic` from a local Macintosh to a remote host. The `cd` command is used to locate the directory, `/HD20/pictures`, in which the file resides.

```
% ftp -n 192.17.20.124
Connected to 192.17.20.124.
220 Macintosh Resident FTP server, ready
ftp> bin
200 Type set to I, binary transfer mode
ftp> cd "/hd20/pictures"
250 Chdir okay
ftp> get bridge.pic
200 This space intentionally left blank < >
150 Opening connection
226 Transfer complete
262144 bytes received in 9.22 seconds (28 Kbytes/s)
ftp> quit
221 Goodbye
%
```

To send a text file after this binary (image) file transfer is complete, you must first enter **ascii** to reset the transfer mode to ASCII (text).

Multiple Files

Some versions of FTP let you enter one command (either `mput` or `mget`) plus wild-card characters to transfer multiple files sequentially.

When you use wildcards in FTP `get` commands, you must enclose the filename in quotation marks. For example, enter **get "*.image"**. Do not use quotation marks with `put` commands.

WARNING: If you transfer multiple binary (image) files using a UNIX host, note that there is a bug in the `mget` command as implemented on some systems (especially 4.2 BSD UNIX systems). When used in binary mode, the `mget` command adds a carriage return to filenames as they are transferred. The files themselves are not affected. Use a UNIX utility to remove the carriage return from the filename. When used to transfer multiple ASCII (text) files, the `mget` command causes no problems.

MacBinary Files

You may occasionally need to transfer Macintosh-only files (such as applications and most data files) to a non-Macintosh host, then download them later without losing any Macintosh-specific data (such as icons and creation dates).

Follow these instructions, and remember that the MacBinary transfer protocol is available only when FTP is in binary mode:

1. Select **MacBinary Enabled** from the **File** menu. When MacBinary is enabled, all `get` and `put` commands transfer Macintosh files in MacBinary format.

   You can alternately enable and disable MacBinary by selecting this option from the **File** menu. A checkmark (✓) appears next to the command when it is enabled.

2. Enter either **binary** or **bin** at the FTP prompt to set the file transfer mode to binary.

NOTE: If you are writing host-based scripts to download from or upload to a Macintosh in MacBinary mode, enter **quote MACB ENABLE** to enable MacBinary mode and **quote MACB DISABLE** to disable MacBinary mode.

5   *Tektronix Graphics*

This chapter describes the Tektronix 4014 and 4105 graphics emulation capabilities of NCSA Telnet for the Macintosh and explains how to use these graphics windows. Tektronix vector graphics use mathematical descriptions to create images primarily as collections of lines.

Tektronix 4014 and 4105 Emulation

NCSA Telnet can emulate a number of graphical capabilities of Tektronix 4014 and 4105 terminals, including text modes, text sizing, zoom, and pan. Using Tektronix graphics with NCSA Telnet depends on host programs that can produce graphical images. When the host programs run and produce Tektronix 4014 or 4105 graphics commands, NCSA Telnet automatically switches to graphics mode, opens a graphics window, and does the drawing.

Starting a Tektronix Emulation

How you set the TEK options in the **Session Configuration Record** dialog box determines the type of Tektronix emulation, if any, for a given session. In the dialog box you can click on one of three TEK options: **Inhibit**, **4014**, or **4105**.

A host program generates the Tektronix clear-screen command sequence (ESC, FF) over an open connection. When NCSA Telnet receives this command, a graphics window opens. All graphical output from the session is redirected into this window until you either close the window or send the TEK `end` command.

Tektronix-Related Commands in the Session Menu

Two Tektronix-related commands appear in NCSA Telnet's **Session** menu:

```
┌─────────────────────────────────────┐
│ Session                              │
├─────────────────────────────────────┤
│   Backspace                          │
│ ✓ Delete                             │
├─────────────────────────────────────┤
│   Local Echo                         │
│ ✓ Wrap Mode                          │
│   EMACS arrow mapping                │
│ ✓ Map PgUp/PgDown/Home/End           │
│   Translation                    ▶   │
│ ✓ Clear Screen Saves Lines           │
│   Reset Terminal                     │
│   Jump Scroll                  ⌘J    │
│   TEK Page...                        │
│   TEK form feed clears screen        │
├─────────────────────────────────────┤
│   Set Screen Size...                 │
├─────────────────────────────────────┤
│   Setup Keys...                ⌘S    │
│   Font                         ▶     │
│   Size                         ▶     │
│   Color...                           │
├─────────────────────────────────────┤
│   Capture Session to File      ⌘K    │
└─────────────────────────────────────┘
```

TEK Page...

This command provides a quick way to create a **Tektronix Emulation** window without intervention from host software. Instead of waiting for NCSA Telnet to receive the clear-screen command sequence from the host, you can create the window immediately by selecting **TEK Page...**.

Just as you would use the PAGE key on a Tektronix keyboard to clear the window for the current session, you can select **TEK Page...** to clear a graphics window. If a Tektronix window is not open, selecting this command creates a cleared graphics window.

TEK form feed clears screen

When you select this command, NCSA Telnet's Tektronix emulation clears the current Tek window any time it receives a Tektronix clear-screen command sequence. If this command is not selected, NCSA Telnet creates a new window for the new Tektronix image. The session's name and time automatically become the name of each new window.

Tektronix Graphics Windows

NCSA Telnet lets you detach, delete, zoom and unzoom, copy, resize, and print graphics windows.

Detaching

Detach a graphics window by clicking on the text window for that graphic's connection. If you hold down the OPTION key, you can click on a window without detaching the corresponding graphics window. The title of a detached window no longer contains the bullet (·) that identifies it as the active output window.

The window can also be detached by host software. When the CAN character (dec 24) is received, the terminal is reset to VT screen emulation.

Deleting

Delete a graphics window by clicking on the close box in the upper-left corner of the window's title bar.

Zooming and Unzooming

To magnify (*zoom* in on) a portion of a drawing in a graphics window, drag a selection rectangle around the area you want to view more closely. When you release the mouse button, the selected section of the drawing expands to fill the entire window. To prevent distortion or stretching of the TEK image, the magnified selection always maintains the same aspect ratio as the TEK window.

To *unzoom* and see the entire drawing, double-click anywhere in the window.

You can copy and print the contents of both zoomed or unzoomed windows. When you copy or print a zoomed window, only the visible portion of the window is copied or printed.

This screen shows a normal-size **Tektronix Emulation** window with zero magnification:
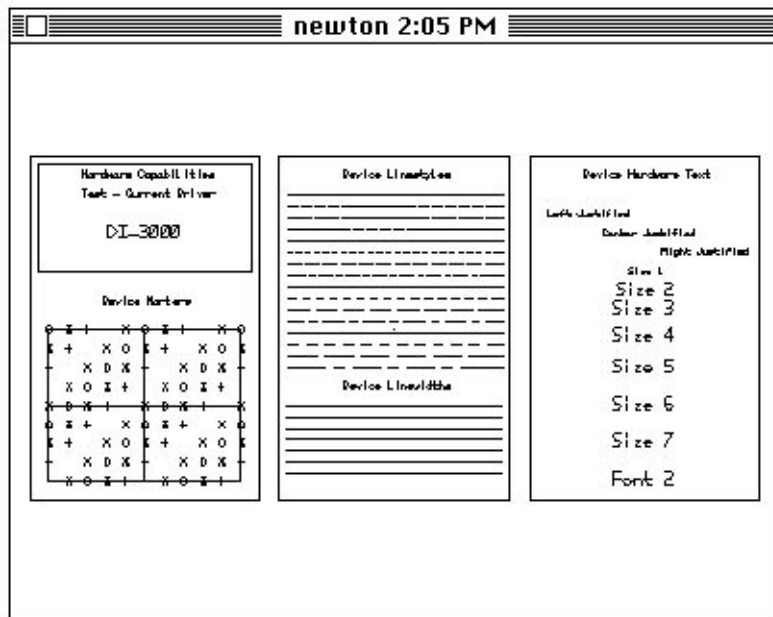
This screen shows a portion of the same drawing in zoomed magnification:
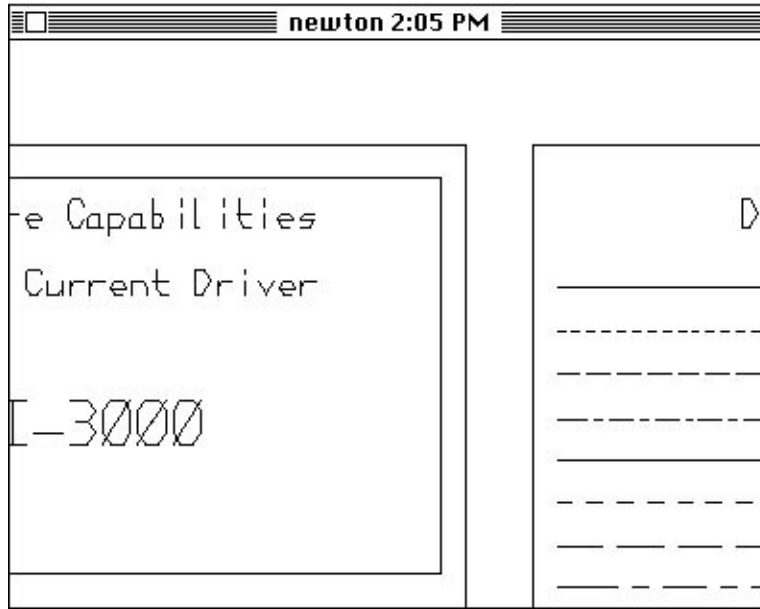
Copying

To copy the contents of a graphics window onto the Macintosh clipboard, activate the window by clicking on it, then choose **Copy** from the **Edit** menu. Now you can paste the graphic into another Macintosh application.

Resizing

To resize a graphics window, click and drag the lower-right corner of the window. The **Tektronix Emulation** window does not have a grow icon.

Printing

To print the contents of a graphics window on a local printer or on a remote printer on the AppleTalk network, first activate the window by clicking on it and then choose **Print Selection** from the **File** menu.

NCSA Telnet centers and scales all graphics to fit the page. To achieve the best possible resolution on a LaserWriter, in the **Page Setup** dialog box enter **25** as the **Reduce or Enlarge** option percentage, as shown in the sample below.
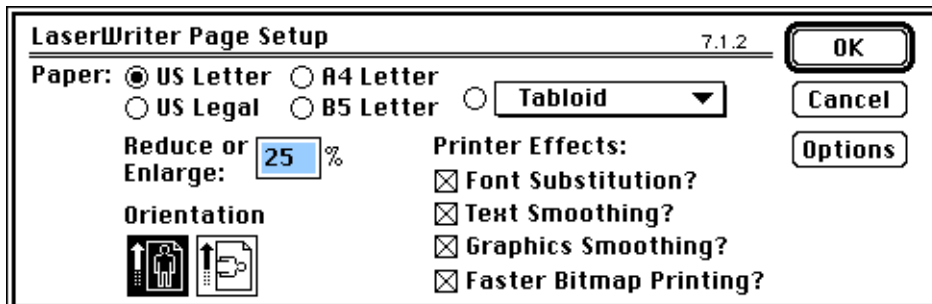
The 25% setting makes the lines thinner but does not change the size of the image.

For more information about the **Page Setup** dialog box, refer to your Macintosh user's guide.

6   *Interactive Color Raster Graphics*

Raster graphics generate color images stored as a collection of pixels (dots) arranged in rows and columns. This chapter introduces the Interactive Color Raster protocol and describes how to use it to write programs that display color graphics with NCSA Telnet for the Macintosh. The chapter concludes with a sample C program you can use as a template for designing programs that use the ICR protocol.

Using the ICR Protocol

Interactive Color Raster (ICR) is a protocol for displaying raster graphics on your workstation screen. The ICR protocol controls its own windows through NCSA Telnet and shares characteristics of the Tektronix graphics terminal emulation protocol. One such shared characteristic is that escape sequences control the display.

To run ICR graphics you must have:

· a 256-color Macintosh computer
· an ICR program that runs on your remote host

You can use ICR to write mainframe programs that display color images (in the full range of 256 colors) in their own windows on your Macintosh screen.

Your ICR program must include all commands needed to emulate ICR graphics. To create an ICR program, work from the protocol description contained later in this chapter ("Creating an ICR Program" on page 6–2) and from the sample program ("Sample ICR Program in C" on page 6–6).

Starting and Quitting ICR Graphics Emulation

When the protocol's command for creating a window arrives from a remote host, NCSA Telnet creates a Macintosh window for it. All human-readable text is sent to the session window, while all graphics commands are sent to the proper graphics window.

The ICR program on the remote computer can also remove the window. If it does not, you can delete a graphics window by clicking in the close box in the upper-left corner of the window's title bar. If you close an NCSA Telnet connection while some windows remain open, the windows close automatically.

Allocating Memory

Raster graphics windows require a lot of memory—one byte for each pixel in each graphics window on the screen. If insufficient memory remains to open a new window, NCSA Telnet displays an alert box and does not create the window.

If you are using MultiFinder, you can increase NCSA Telnet's allocated memory size so that you are less likely to run out of memory. For example, if you need space for two image windows and each is 256 pixels x 256 pixels, increase NCSA Telnet's allocated memory size by 128 K (256 bytes x 256 bytes, or 64K, for each window).

Copying an ICR Graphics Window

You can copy the contents of an ICR window to the Macintosh clipboard, then paste it into a program capable of pasting color images.

To copy the contents of a graphics window:

1. Click in the graphics window to bring it to the front.

2. Choose **Copy** from the **Edit** menu.

Now you can paste the graphic into another Macintosh application.

System Color Problems

Image windows use the display colors that are available on your Macintosh screen. When you close graphics windows, the system does not always restore the color environment to its original state, which causes incorrect colors in other windows. We are working to minimize the effects of NCSA Telnet and ICR graphics on your system's color table.

Pressing CONTROL-C (or using other methods to interrupt ICR commands) can make NCSA Telnet appear to lock up. (See also **Send "Are You There?"** and **Send "Interrupt Process"** under "Telnet Commands" on page 3–3.) When this occurs, either press RETURN several times or enter commands until the session window resumes activity. It may be useful to remember that each time you issue a drawing command NCSA Telnet expects an influx of often hundreds of bytes of image data to finish drawing the current line.

Creating an ICR Program

You must write a program that issues graphics commands to NCSA Telnet. NCSA Telnet follows your programs' directions to receive graphics commands, interpret them, create or destroy windows, set the color environment, and display raster graphics.

Escape Sequence

Begin all ICR graphics sequence commands with the escape sequence ESC^ (escape, caret). This escape sequence ensures that NCSA Telnet can distinguish between regular text and ICR graphics.

ICR Commands

Each ICR command appears in the following form:

ESC^X; *parameters* ^ *data*

where:

- *X* is one of the command characters (W, D, M, R, P, or I) described in "ICR Command Parameters" on page 6–3.
- ^ is the caret character (ASCII 94).
- *Parameters* is one or more of the options of *X* described in "ICR Command Parameters" on page 6–3. Parameters are always printable ASCII characters and are delimited by commas. If your program omits parameters, NCSA Telnet supplies default values.
- The command is terminated with a caret (^).
- Each command can be followed by a data stream (*data*). If a command requires a data stream, the stream follows the command.

ICR Command Parameters

Command characters and their parameters are described below:

Command	Option Parameters	Description
W	left; top; height; width; display; windowname	Creates a window at the specified location on the screen. 0, 0 is the upper-left corner of the screen. • The *left*, *top*, *width*, and *height* integers identify specific locations on the screen:
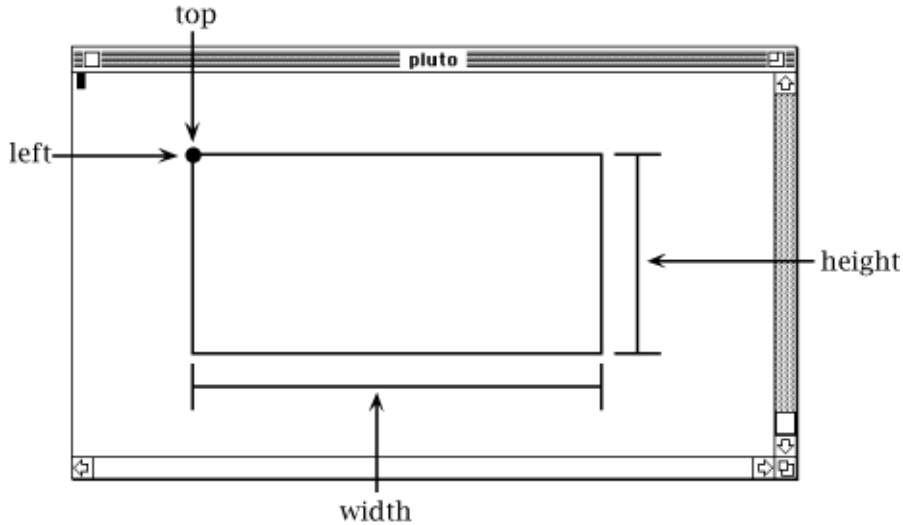
Integer	Definition
left	the pixel value of the *x* (horizontal) location of the upper-left corner of the graphics window
top	the pixel value of the *y* (vertical) location of the upp-erleft corner of the graphics window
height	the number of pixels in the vertical height of the graphics window
width	the number of pixels in the horizontal width of the graphics window

• The *display* integer identifies the hardware screen number (for machines with multiple screens). This parameter is not applicable to Macintosh systems.
• *Windowname* is the unique name assigned to a window by the W command. The assigned windowname distinguishes between multiple windows. It is used by all other commands to specify that window.

Command	Option Parameters	Description
D	windowname	Destroys a window by physically removing it from the screen and memory. • *Windowname* is the unique name assigned to a window by the W command.
M	start; length; count; windowname	Loads into the graphics window a color map palette (of up to 256 colors) or portion of one. NCSA Telnet assumes that each palette entry is 3 bytes in the order R, G, and B.

		The default palette is a straight gray-scale ramp, where 0 = black and 255 = white.(See "Color Maps" on page 6–5.)

- The *start* integer identifies the first entry to change.
- The *length* integer indicates the number of entries to change.
- The *count* integer indicates the total number of bytes in the data portion. Follow the count integer with the command's data stream.
- *Windowname* is the unique name assigned to a window created by the W command.

R	x; y; expand length;	Indicates the data that follow are run-length encoded. (See "Run-Length Encoding" on page 6–5.)

- The *x* and *y* integers identify the point where the raster line starts and data follow for length bytes of encoded data.
- The *expand* integer indicates how many times each dimension is to be expanded on your local screen. For example, an expand value of 2 makes the picture 4 times larger.
- The *length* integer indicates the encoded length (in bytes) of the data.
- *Windowname* is the unique name assigned to a window created by the W command.

P	x; y; expand; length; windowname	Indicates the data that follow are pixel data.

- The *x* and *y* integers identify the point where the raster line starts and data follow for length bytes of pixel data.
- The *expand* integer indicates the number of times each dimension is to be expanded on your local screen. For example, an expand value of 2 makes the picture 4 times larger.
- The *length* integer indicates the encoded length (in bytes) of the data.
- *Windowname* is the unique name assigned to a window created by the W command.

I	x; y; expand; length; windowname	Indicates the data that follow are encoded with the IMCOMP compression scheme (4:1 compression). You *must* use the M command before the picture displayed with the I command appears correctly.

- The *x* integer indicates the number of pixels per line. One I call represents 4 lines of data. Since IMCOMP is a 4 x 4 square compression scheme, each line of data appears as 4 lines of pixels on the screen.
- The *y* integer is required to increment by fours: 0, 4, 8, 12, 16, etc.
- The *length* integer indicates the length (in bytes) of the data. Length should be the same as the number of pixels to be displayed.
- *Windowname* is the unique name assigned to a window created by the W command.

Color Maps

Use the M command to manipulate the color table for your local display. The format for color map data is a series of color-map entries. Each color-map entry is three bytes: one R (red), one G (green), and one B (blue). For example, to set entries 3 through 7 of the color table, you could use the following M command:

```
ESC^M;3;4;12;wind^RGBRGBRGBRGBRGB
```

where RGBRGBRGBRGBRGB is the list of byte values for the new entries. The actual data transmitted over the line must still be ASCII encoded, but the data start out in this form.

NOTE: The count field is always three times the length value. In the example above, the count field is 12 and the length value is 4.

ASCII Encoding

NCSA Telnet assumes that all parameter values (except ESC) are printable ASCII. This means that the parameters require no special encoding, but data values need help. ESC is an allowable exception on most logon data streams.

Your ICR program must encode 8-bit data values into printable ASCII for transmission. When possible, the values that fall in the printable ASCII range are passed untouched, and all values outside that range are encoded as two bytes.

Use the following encoding for all characters 0–255:

Input	realchar
Transmission	specialchar followed by transchar
Encoding	specialchar = realchar div 64 + 123
	transchar = realchar mod 64 + 32
Decoding:	realchar = (specialchar – 123)*64 + (transchar – 32)

These four codes encode data values in printable ASCII character for all characters 0–255, as shown below:

Special	Range
123	0–63
124	64–127
125	128–191
126	192–255

Because all encoded characters are preceded by a character in the 123–126 range, you can send all regular characters that are 32–122 (inclusive) without encoding.

WARNING: Because the CTSS operating system trims trailing spaces, you should avoid the values 0, 32, 128, and 192 because they code to `special space`.

NOTE: In the specifications, all data lengths and counts refer to the protocol data, not to the ASCII-encoded data. The length fields for the R, P, and M commands all reflect the data length on the originating machine before encoding.

Run-Length Encoding

Data for the run-length encoded (RLE) line are first run-length compressed and then ASCII encoded. The deciphering process first decodes ASCII to binary and then decodes the run-length binary data.

Using all 8 bits of the byte stream representing the pixels in a given RLE line, start with the control character. The lower seven bits of the byte are represented by *n*. The high bit represents whether the *n* characters that follow are reproduced exactly (high bit = 0) or whether the single character that follows is reproduced *n* times (high bit = 1).

```
Input      1  1  1  1  23  23  23  234  112  33  44  55  42  42  42  42
Tokenized (128+4)  1  (128+3)  23  (5)  234  112  33  44  55  (128+4)  42
Alternate count, data, count, data
```

After coding in this tokenized form, you know the data length for the R command. (The length is 12 in the example above). Even though ASCII encoding occurs after this step, use the length value from this step.

```
ASCII result   125  36  123  33 125  35  123  55  123  37  126  74  112  33  44  55  125  36  42
```

Sample ICR Program in C

The sample C program shown below is included on the distribution disk. If you are running an active ICR-equipped NCSA Telnet, this program produces a test pattern on your screen. If you do not have ICR, this program produces thousands of encoded characters on your screen.

```c
/*   icrtest
*   Produces a test pattern on an ICR compatible display. Demonstrates and provides
*   example code for writing ICR programs.
*
*   National Center for Supercomputing Applications
*   University of Illinois, Urbana-Champaign
*
*   by Tim Krauskopf
*   This program is in the public domain.
*/
#include <stdio.h>

int
      xdim=0,ydim=0;                               /* size of image on disk */

char
      *malloc(),
      *testimage,
      rgb[768];                                    /* storage for a palette */

main(argc,argv)
      int argc;
      char *argv[];
      {
      register int i,j;
      register char *p;

      puts("Creating test pattern");

      xdim = 150;
      ydim = 100;

      if (NULL == (testimage = malloc(xdim*ydim)))
            exit(1);
```

```
/*
 * Make the test image in a strange pattern.
 */
        p = testimage;

        for (i=0; i<ydim; i++)
                for (j=0; j<xdim; j++) {
                        *p++ = 50 + (((i & 0xfffffff8) * (j & 7))>>2);
                }

        puts("Displaying test pattern with the Interactive Color Raster protocol");

        rimage(0);                              /* display remote image with [palette] */

}

/*****************************************************************************/

/*  rimage
 *  Remote display of the image using the ICR.
 *  Just print the codes to stdout using the protocol.
 */

rimage(usepal)
        int usepal;
        {
        int i,j,newxsize;
        char *space,*thisline,*thischar;
        register unsigned char c;

/*
 *  Open the window with the W command.
 */

(void)printf("\033^W;%d;%d;%d;%d;0;test window^",0,0,xdim,ydim);

/*
 *  If a palette should be used, send it with the M command.
 */
        if (usepal) {
                (void)printf("\033^M;0;256;768;test window^");        /* start map */

                thischar = rgb;
                for (j=0; j<768; j++) {
                        c = *thischar++;
                        if (c > 31 && c < 123) {
                                putchar(c);
                        }
                        else {
                                putchar((c>>6)+123);
                                putchar((c & 0x3f) + 32);
                        }
                }
        }
```

```
/*
 *  Send the data for the image with RLE encoding for efficiency.
 *  Encode each line and send it.
 */
        space = malloc(ydim+100);
        thisline = testimage;

     for (i = 0; i < ydim; i++) {
        newxsize = rleit(thisline,space,xdim);
              thisline += xdim;                    /* increment to next line */

         (void)printf("\033^R;0;%d;%d;%d;test window^",i,1,newxsize);

         thischar = space;
         for (j = 0; j < newxsize; j++) {

/*********************************************************************/

/*  Encoding of bytes:
 *
 *  123 precedes #'s 0-63
 *  124 precedes #'s 64-127
 *  125 precedes #'s 128-191
 *  126 precedes #'s 192-255
 *  overall:  realchar = (specialchar - 123)*64 + (char-32)
 *            specialchar = r div 64 + 123
 *            char = r mod 64 + 32
 */

/*********************************************************************/

                    c = *thischar++;             /* get byte to send */

                    if (c > 31 && c < 123) {
                            putchar(c);
                    }
                    else {
                            putchar((c>>6)+123);
                            putchar((c & 0x3f) + 32);
                    }
             }
        }

        free(space);
}

/*********************************************************************/

/*  rleit
 *
 *  Compress the data to go out with a simple run-length encoded scheme.
 *
 */
```

```
rleit(buf,bufto,len)
        int len;
        char *buf,*bufto;
        {
        register char *p,*q,*cfoll,*clead;
        char *begp;
        int i;

        p = buf;
        cfoll = bufto;                          /* place to copy to */
        clead = cfoll + 1;

        begp = p;
        while (len > 0) {                       /* encode stuff until gone */

                q = p + 1;
                i = len-1;
                while (*p == *q && i+120 > len && i) {
                        q++;
                        i--;
                }

                if (q > p + 2) {                /* three in a row */
                        if (p > begp) {
                                *cfoll = p - begp;
                                cfoll = clead;
                        }
                        *cfoll++ = 128 | (q-p);     /* len of seq */
                        *cfoll++ = *p;              /* char of seq */
                        len -= q-p;                 /* subtract len of seq */
                        p = q;
                         clead = cfoll+1;
                         begp = p;
                }
                else {
                        *clead++ = *p++;            /* copy one char */
                        len--;
                        if (p > begp + 120) {
                                *cfoll = p - begp;
                                cfoll = clead++;
                                begp = p;
                        }
                }

        }
/*
*  fill in last bytecount
*/
        if (p > begp)
                *cfoll = 128 | (p - begp);
        else
                clead--;                        /* don't need count position */

        return((int)(clead - bufto));           /* how many stored as encoded */
}
```

A   *Troubleshooting*

This appendix describes some common error messages reported by NCSA Telnet for the Macintosh. Causes and solutions are also included.

New Error Messages

A new error message system has been implemented in Version 2.6 of NCSA Telnet. The dialog boxes announcing most error conditions are now more verbose. A few error messages still use the former error message system.

Each new-style error box includes two fields: **Internal error #** and **MacOS error #**. When you report a problem or possible bug to NCSA, please include these numbers. They help track down the cause of the problem you are experiencing. If these numbers are zero, NCSA Telnet is unable to provide more detailed information than the message given.

Nonfatal Errors

A *nonfatal error* is a condition that NCSA Telnet can remedy. You see an error box similar to the following:
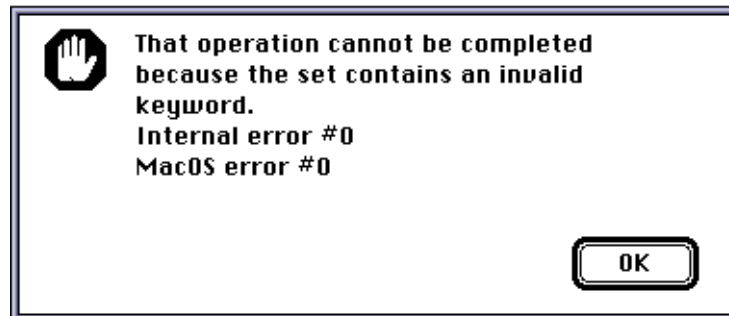
Nonfatal errors most often occur when an action you request fails. The following conditions can currently cause nonfatal errors:

- Insufficient memory
- Corrupted set file
- Inability to open or create a capture file

Semifatal Errors

A *semifatal error* is a condition that NCSA Telnet can attempt to remedy. If the remedy fails, NCSA Telnet must quit. You see an error box similar to the following:

```
┌─────────────────────────────────────────────────┐
│  ✋   The preferences file appears to be          │
│       corrupted.  I can attempt to correct the   │
│       problem.                                    │
│       Internal error #100                         │
│       MacOS error #-192                           │
│                                                   │
│                           ┌──────┐ ┌────────┐     │
│                           │ Quit │ │ Repair │     │
│                           └──────┘ └────────┘     │
└─────────────────────────────────────────────────┘
```
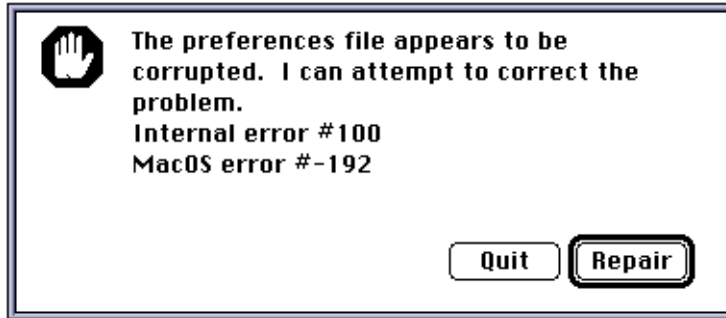
Selecting **Quit** causes NCSA Telnet to quit immediately without attampting any recovery. Selecting **Repair** instructs NCSA Telnet to attempt to repair the damage. However, **Repair** does not always work and may lead to a fatal error condition.

Only one condition—a corrupted **Preferences** file—currently causes semifatal errors.

Fatal Errors

A *fatal error* is a condition from which NCSA Telnet cannot recover. NCSA Telnet must quit immediately. You see an error box similar to the following:

```
┌─────────────────────────────────────────────────┐
│  ✋   Telnet requires at least System version 6.0.│
│       Internal error #0                           │
│       MacOS error #0                              │
│                                                   │
│                                    ┌──────┐       │
│                                    │ Quit │       │
│                                    └──────┘       │
└─────────────────────────────────────────────────┘
```
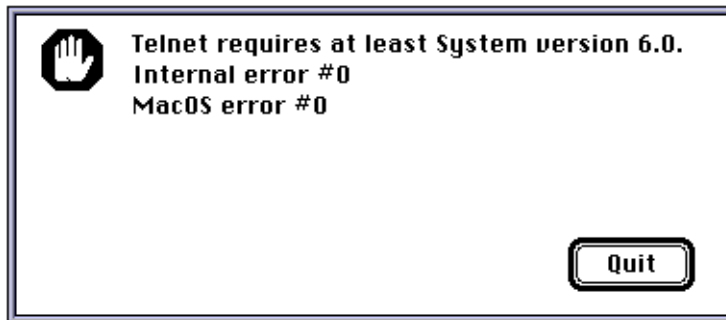
The only available option is **Quit**.

The following conditions can currently cause fatal errors:

- No HFS file system
- System version not 6.0 or higher
- Fewer than 128 K ROMs
- Inability to open MacTCP
- Inability to create preferences file
- Corrupted NCSA Telnet application file (resources missing)
- Inability to repair a corrupted preferences file

Old Error Messages

Not all error messages in NCSA Telnet Version 2.6 have been converted to the new error-reporting system. These are some old-style error messages, what they mean, and what you can do:

Couldn't get translation resource for national character set	A resource is missing from the NCSA Telnet application. Replace your copy of NCSA Telnet from a backup or download a new copy.
Translation resource is corrupted	A resource is missing from the NCSA Telnet application. Replace your copy of NCSA Telnet from a backup or download a new copy.
Error deleting old file	An error occurred during a file transfer when the FTP server attempted to overwrite a file on the local disk.
Error in Sfwrite	An error occurred during a file transfer when the FTP server attempted to write to the local disk.
Disk Full Error	The FTP server ran out of disk space when it tried to transfer a file to the local disk.
Host or gateway not responding	This error used to be a catchall for nearly all errors related to connecting to a host. Now this error message is produced only if the host you are trying to contact does not respond or if a host you are connected to stops responding. Possible causes include: you accidentally unplug your machine from the network, the remote host loses power or its network connection, or your local gateway or Internet connection goes down.

B   *VT Emulation*

This appendix lists features and modes of the VT standard that are not supported by NCSA Telnet for the Macintosh, key mapping to emulate VT keys, and the escape codes sent by NCSA Telnet for certain codes in various emulation modes.

This appendix is intended as a reference to NCSA Telnet's implementation of VT emulation, not as the definitive source for information regarding the VT series of terminals.

VT Compatibility

NCSA Telnet does not support:

· double-height or double-width characters
· the VT52 mode

Key Mapping

NCSA Telnet does not emulate the following VT200 keys: F1, F2, F3, F4, and F5.

NCSA Telnet maps F6 through F20 on the VT200 keyboard to F1 through F15 on the Apple Extended Keyboard.

NCSA Telnet maps PF1 through PF4 on the VT200 keyboard to the top row of keys on the Apple numeric keypad (CLEAR, =, /, *).

Escape Codes

NCAS Telnet always sends the CSI and SS3 control characters using their seven-bit extensions. Therefore, substitute ESC [(1B 5B) for CSI and ESC O (1B 4F) for SS3 in the following tables.

The keycode tables below follow the divisions used in the VT200 manual.

Editing Keys

VT Key Name	VT200 Mode	VT100 Mode
HELP (find)	9B 31 7E CSI 1 ~	
HOME (Insert Here)	9B 32 7E CSI 2 ~	NCSA Telnet sends the VT220 codes for these keys while
PAGEUP (Remove)	9B 33 7E CSI 3 ~	in VT100 mode, even though these keys did not exist
DEL (Select)	9B 34 7E CSI 4 ~	on the VT100.
END (Prev Screen)	9B 35 7E CSI 5 ~	
PAGEDOWN (Next Screen)	9B 36 7E CSI 6 ~	

Cursor Control Keys

Cursor control keys are the same for VT200 and VT100 emulation.

Key	Reset Normal Mode	Set Application Mode <- Cursor Key Mode
UpArrow	9B 41	8F 41
	CSI A	SS3 A
DownArrow	9B 42	8F 42
	CSI B	SS3 B
RightArrow	9B 43	8F 43
	CSI C	SS3 C
LeftArrow	9B 44	8F 44
	CSI D	SS3 D

Auxiliary Keypad Codes

Auxiliary keypad codes are the same for VT200 and VT100 emulation.

Key	Keypad Numeric Mode	Keypad Application Mode
0	30	8F 70
	0	SS3 p
1	31	8F 71
	1	SS3 q
2	32	8F 72
	2	SS3 r
3	33	8F 73
	3	SS3 s
4	34	8F 74
	4	SS3 t
5	35	8F 75
	5	SS3 u
6	36	8F 76
	6	SS3 v
7	37	8F 77
	7	SS3 w
8	38	8F 78
	8	SS3 x
9	39	8F 79
	9	SS3 y
–	2D	8F 6D
	–	SS3 m
+ (,)	2C	8F 6C
	,	SS3 l
.	2E	8F 6E
	.	SS3 n
Enter	**	8F 4D
	**	SS3 M
Clear (PF1)	8F 50	8F 50
	SS3 P	SS3 P
= (PF2)	8F 51	8F 51
	SS3 Q	SS3 Q
/ (PF3)	8F 52	8F 52
	SS3 R	SS3 R
* (PF4)	8F 53	8F 53
	SS3 Q	SS3 Q

Top-Row Function Keys

VT Key Name	VT200 Mode Code	VT100 Mode Code
F1 (F6)	9B 31 37 7E	
	CSI 1 7 ~	
F2 (F7)	9B 31 38 7E	
	CSI 1 8 ~	NCSA Telnet sends the VT220
F3 (F8)	9B 31 39 7E	codes for these keys while
	CSI 1 9 ~	in VT100 mode, even though
F4 (F9)	9B 32 30 7E	these keys did not exist
	CSI 2 0 ~	on the VT100.
F5 (F10)	9B 32 31 7E	
	CSI 2 1 ~	
F6 (F11)	9B 32 33 7E	
	CSI 2 3 ~	
F7 (F12)	9B 32 34 7E	
	CSI 2 4 ~	
F8 (F13)	9B 32 35 7E	
	CSI 2 5 ~	
F9 (F14)	9B 32 36 7E	
	CSI 2 6 ~	
F10 (F15/Help)	9B 32 38 7E	
	CSI 2 8 ~	
F11 (F16/Do)	9B 32 39 7E	
	CSI 2 9 ~	
F12 (F17)	9B 33 31 7E	
	CSI 3 1 ~	
F13 (F18)	9B 33 32 7E	
	CSI 3 2 ~	
F14 (F19)	9B 33 33 7E	
	CSI 3 3 ~	
F15 (F20)	9B 33 34 7E	
	CSI 3 4 ~	

C   *Obtaining NCSA Software*

You can obtain NCSA software and manuals via an anonymous FTP server, an archive server, or U.S. mail.

Anonymous FTP Server

If you are connected to the Internet, you can download NCSA Telnet software and manual at no charge from NCSA's anonymous File Transfer Protocol (FTP) server. Follow the steps enumerated below. If you have any questions regarding the connection or procedure, consult your local system administrator or network expert.

1. Log on to a host at your site that is connected to the Internet and is running software supporting the FTP command.

2. Invoke FTP (on most systems) by entering the Internet address of the server:

   % **ftp ftp.ncsa.uiuc.edu**

3. Log on by entering **anonymous** for the name.

4. Enter your local login name and address (e.g., `smith@ncsa.uiuc.edu`) for the password.

5. Enter **get README.FIRST** to transfer the instructions file (in ASCII) to your local host.

6. Enter **quit** to exit FTP and return to your local host.

7. Review the `README.FIRST` file for complete instructions concerning the organization of the FTP directories and the procedures you should follow to download the `README` files specific to the application you want.

Your logon session should resemble the following sample, where the remote user's name is *smith@ncsa.uiuc.edu* and user entries are indicated in boldface type:

```
%  ftp ftp.ncsa.uiuc.edu
Connected to zaphod.
220 zaphod FTP server (Version 6.23 Thu Apr 8 06:37:40 CDT 1994) ready.
Name (ftp.ncsa.uiuc.edu: smith):  anonymous
331 Guest login ok, send ident as password.
Password:  smith@ncsa.uiuc.edu
230 Guest login ok, access restrictions apply.
ftp>  get README.FIRST
200 PORT command successful.
150 Opening ASCII mode data connection for README.FIRST (10283 bytes).
226 Transfer complete.
local:  README.FIRST  remote:  README.FIRST
11066 bytes received in .34 seconds (32 Kbytes/s)
ftp>  quit
221 Goodbye.
%
```

The `README.FIRST` file instructs you to copy the NCSA Telnet Mac `README` file to your directory and to read it before proceeding. Your FTP session should resemble the following:

```
ftp> cd Mac/Telnet
250 CWD command successful.
ftp> get README
200 PORT command successful.
150 Opening ASCII mode data connection for README (10283 bytes)
226 Transfer complete.
local:  README  remote:  README
2080 bytes received in .14 seconds (15 Kbytes/s)
ftp> quit
221 Goodbye.
%
```

The README file explains how to copy contents of the NCSA Telnet Macintosh direc-
tory to your home directory via remote logon or anonymous FTP. The precise file
transfer procedure depends upon the operating system you use.

Archive Server

1. Email a request to **archive-server@ncsa.uiuc.edu**.

2. Include the word *help* in the subject or message line.

3. Press RETURN.

4. Send another email request to **archive-server@ncsa.uiuc.edu**.

5. Include the word *index* in the subject or message line.

6. Press RETURN.

If you use the UNIX mail system, your logon session should resemble the following:

```
% mail archive-server@ncsa.uiuc.edu
Subject:  help
.
EOT
Null message body; hope that's ok
% mail archive-server@ncsa.uiuc.edu
Subject:  index
.
EOT
Null message body; hope that's ok
```

Information you receive from the `help` and `index` commands gives you further
instructions for obtaining NCSA software. This controlled-access server emails the
distribution to you one segment at a time.

U.S. Mail

NCSA Telnet software and manual are available for purchase through the *NCSA
Technical Resources Catalog.* All orders must be prepaid. To obtain a copy of the
catalog, contact NCSA Orders by electronic mail at orders @ncsa.uiuc.edu, by
phone at (217) 244-4130, or by U.S. mail at:

NCSA Orders
152 Computing Applications Building
605 East Springfield Avenue
Champaign, IL 61820-5518

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