

tn3270 for the Macintosh

User's Guide

for version 2.3d25 of tn3270

James Mathiesen

(based on Peter DiCamillo's Documentation)

April 25, 1991

Copyright © 1988, 1989, 1990 by Brown University and by Peter John DiCamillo.

All copyrights are reserved, except specifically that you are allowed to make binary copies of the unmodified program and documentation as long as the copyright and other notices written in the program are preserved. There is no license fee for these copies. Neither Brown University nor Peter John DiCamillo make representations about the suitability of this software for any purpose. It is provided "as is"

tn3270 2.3d25

- 2 -

April 25, 1991

without express or implied warranty.

Credits:

tn3270 for the Macintosh was written by Peter DiCamillo, and developed by Computing and Information Services at Brown University. It includes the NCSA TCP/IP Kernel for the Macintosh, written by Tim Krauskopf and Gaige B. Paulsen, Copyright © 1987-1988 by the Board of Trustees of the University of Illinois. Also included is code written by Greg Minshall to support the tn3270 Telnet protocol, Copyright © 1984-1988 by the Regents of the University of California and by Gregory Glenn Minshall.

Version 2.0 July 14, 1988

Trademark Acknowledgements

AppleTalk, LocalTalk, Macintosh, Macintosh Plus, Macintosh SE, and Macintosh II are registered trademarks of Apple Computer, Inc.

Ethernet is a trademark of Xerox Corporation.

FastPath, EtherSC, and EtherPort SE are trademarks of Kinetics Inc., a division of Excelan, Inc.

Finder, MacWrite, MultiFinder, Switcher, and AppleShare are copyrighted programs of Apple Computer, Inc.

DEC and VT52 are registered trademarks of Digital Equipment Corporation.

IBM is a registered trademark of International Business Machines Corporation.

SAS and SAS/GRAPH are registered trademarks of SAS Institute Inc., Cary, NC, USA.

Other Documents Referenced in This Guide

Because tn3270 uses the NCSA TCP/IP Kernel, technical information about the Kernel applies to tn3270, as well as NCSA Telnet. Rather than duplicate information, this guide refers the reader to the *NCSA Telnet for the Macintosh Reference Guide* for certain technical information. For the current version of tn3270, these references are to Version 2.0 of the guide (October, 1987).

Introduction

tn3270 allows a Macintosh computer with a TCP/IP network connection to negotiate a Telnet session emulating an IBM 3270 terminal. Features of the emulation include color, extended highlighting, APL and 3179-compatible graphics. When a Macintosh II or other Macintosh with a large screen is used, different screen formats are supported. tn3270 will act as an FTP server for file transfer, and also supports file transfer as part of a terminal session when IBM VM/CMS is being used on the host computer.

Although primarily a 3270 emulation program, tn3270 also supports line mode Telnet connections. This support allows tn3270 to operate with hosts which establish a line mode connection before entering 3270 mode, as well as with line mode only hosts. When operating in line mode, tn3270 emulates a DEC VT52 terminal.

Hardware Requirements

One of the following hardware configurations is required to run tn3270:

- A Macintosh 512K, 512Ke, Plus, SE or II family computer connected to LocalTalk, and a Kinetics FastPath which bridges LocalTalk to EtherTalk or a Cactus box to bridge LocalTalk to BroadTalk.
- A Macintosh II family, Plus, or SE with EtherSC connected to Ethernet.
- A Macintosh II family with EtherTalk connected to Ethernet.
- A Macintosh SE with EtherPort SE connected to Ethernet.

Software Requirements

tn3270 requires that MacTCP be installed in the System Folder of the Macintosh running it. tn3270 itself may be installed on a local drive or on an AppleShare/Novell server. As distributed, tn3270 is configured so that multiple AppleShare users may run it at the same time. tn3270 requires about 300K of disk space (including the MacTCP drivers). tn3270 requires about 395K of RAM on a Mac without a large screen or color, more otherwise.

Configuration Files

Unlike most Macintosh programs, tn3270 must be configured before it can be used. Configuration consists of installing MacTCP and customizing several files tn3270 reads when started in order to obtain network information and user preferences.

Configuration Steps

Since tn3270 must be configured for each departmental subnet separately, you should obtain a properly configured version of tn3270 from your Departmental Network Administrator. This may be provided to you either through a fileserver, or it may be installed on your hard disk, or you may be given a special floppy disk to start up your Mac with to run tn3270.

MacTCP

MacTCP is Apple's TCP/IP driver for the Macintosh. tn3270 calls it whenever it is sending or receiving information from outside of your Macintosh.

The file `MacTCP` must be in your system folder. `MacTCP` has been configured by your Departmental Network Administrator (DNA). You may view the `MacTCP` configuration through the Control Panel, but you can not alter it. Your system must be booted with the `MacTCP` driver in the System Folder before tn3270 can run.

NCSA

The NCSA TCP/IP kernel is a function library that is called by tn3270, it then calls the `MacTCP` interface itself. The NCSA code must be configured in two ways.

The file `config.tel` is a plain text file required by tn3270 (and shared with NCSA Telnet). A `config.tel` file has been provided by your DNA, and should need no further configuration. The file contains information used by the NCSA package to set various defaults. The file must be in the same folder as the tn3270 application, the settings file used to start up, or else in the `System Folder`.

The file `NCSA Telnet Settings` in your System Folder contains the name of a default host (used only by the Host Name... dialogue in tn3270). This file is not required.

tn3270 settings files

tn3270 settings files are optional, and may be used to provide the user with default settings in tn3270 (for instance a host to connect to on startup, color and highlighting

tn3270 2.3d25

- 7 -

April 25, 1991

defaults, and other customization to the user interface which may be done within tn3270).


tn3270 and MultiFinder

tn3270 may be run in the foreground or in the background under MultiFinder. When running in the background, tn3270 indicates a bell (if a message is received, for example) with a double beep instead of a single beep. It is possible to run more than one copy of tn3270 under MultiFinder, but it requires that additional copies of the tn3270 application exist.

MultiFinder and Memory Requirements

Unlike many other applications, tn3270's memory requirements change depending on the configuration of the Mac it is running on. On a standard MacPlus or SE it needs about 400K to run. On machines with large monitors (which allows tn3270 to support 32 line sessions) or machines with more than two colors the memory requirements can increase significantly. If there is not enough memory available then tn3270 may not support IBM 3179 graphics and may not allocate an off-screen bitmap for text (which will result in much screen flicker).

If you are using a machine with a large screen and/or wish tn3270 to run when more than two colors are available you will have to increase its memory allocation under MultiFinder. This may be done with a few simple steps:

1. If you are using a copy of tn3270 off of a server and its memory allocation under MultiFinder is too small you will have to copy the `tn3270`, `config.tel` and any setting files you plan to use into a folder on your own harddisk. (Please do not copy the application into a personal folder on the server without first checking with your DNA; doing so may cause conflicts for other people using the server).
2. Use Get Info... in the Finder to change the memory allocation of the tn3270 program to a large number (1024K might be a good starting point).
3. Make sure your Mac is configured the way you expect it to be when you run tn3270 (monitor in use, number of colors etc...)
4. Start up tn3270, configure the Screen Format... dialogue appropriately (the amount of memory tn3270 needs depends on the size of the session window). Open a Connection. The amount of memory required by tn3270 cannot be calculated until a session is open and a window of the correct size and number of colors has been allocated.
5. Select About tn3270... from the  menu, and click on Storage Info. In the dialogue that comes up you will see information about the amount of memory

allocated for the various bitmaps tn3270 uses. If there are items in the dialogue saying something like "37K more needed" then tn3270 didn't have enough memory, go back to step 2 and further increase the amount of storage allocated under MultiFinder. Once all the bitmaps have been allocated, you may further adjust the memory allocation (as in step 2) so that the amount of free memory is in the 60K to 100K range.

Now try starting up tn3270 again and re-check the Storage Info. All should be allocated and there should be 60K to 100K of free memory.

Starting tn3270

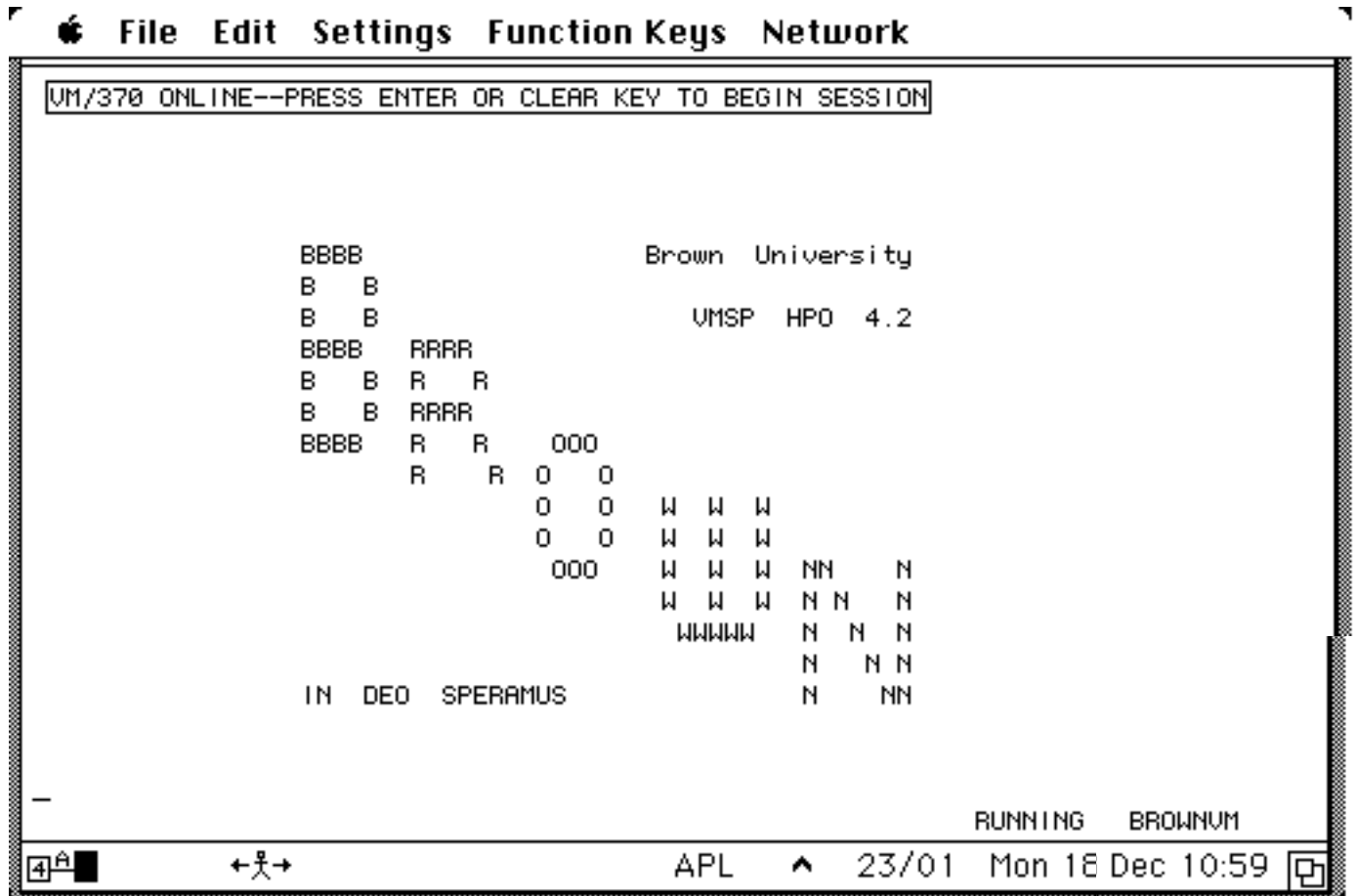
To start tn3270, double-click on the program or on one of its settings files (settings files have a document icon similar to the program's icon). If no settings file is selected, tn3270 will allow you to select one using a standard file dialog (Cancel at this point gets tn3270's default settings). After that, there will be a brief pause while tn3270 performs network initialization. When network initialization is complete, a session will be established automatically if a settings file was selected. Otherwise, choose Host Name... from the Settings menu, and set the name to one of the following.

1. A name which can be resolved by a domain name server (e.g. brownvm.brown.edu).
2. A full internet number (e.g. 128.148.128.40).
3. A pound sign (#) followed by the host number, if the host is on the same Ethernet as the Macintosh. For example, if the IP number of the Macintosh is 128.148.0.18, entering #16 will connect to the host at 128.148.0.16.

After the host name has been defined, open a new session by choosing Open Connection from the File menu, or by pressing the `return` or `clear` key. Within a minute or two, a 3270 session should be established, or an error message displayed. If the connection is taking a long time to complete, you can check on its status using the Connection Status item in the Network menu.

The tn3270 Screen

Below is an example of a tn3270 session on a MacPlus or SE with a standard screen size. A window is present only if a tn3270 session has been established. To establish a session set the Host Name... from the Settings menu, and then choose Open Connection from the File menu (see previous section for details).



This is a sample tn3270 screen. The display/entry area takes up most of the screen. The bottom most section of the screen is used to display certain status information, which is explained below.

4^A The '4' indicates that a 3270 connection has been established successfully (The 4 indicates a session with a 3274 controller, a bit of arcana). The A represents the connection between your terminal and the remote system, if one is

tn3270 2.3d25

- 12 -

April 25, 1991

established. The ■ represents your terminal.

The next section on the status line contains information when the keyboard is locked.

X System

The host (mainframe) has not unlocked the keyboard. It may be unlocked manually

using Command-R. Command-G resets the entire system, it should be avoided if Command-R is sufficient.

X (clock face)

A transaction with the host is in progress. Wait. The keyboard may not be unlocked manually.

(little person w/ arrows)

You are trying to enter information into a protected field. Move the cursor over a field you may type in. Pressing Tab will locate a field you may enter into (if there is one).

(little person) >

You are trying to enter more information into a field than will fit (using insert mode).

APL

The keyboard is in APL mode (normally used only for APL programming). APL may be toggled on and off using Command-a.

^

The keyboard is in insert mode (as opposed to overstrike). Insert mode may be toggled on and off using Command-i or the Function Keys menu.

23/01

This is the current cursor position (row 23, column 1). This display may be toggled on or off with Command-p. If a file transfer is in progress (FTP, RMAC or WMAC) this area of the screen will be used to display the file transfer icon.

Mon 18 Dec 09:17

This is the current date and time. The display of this information may be controlled from the Miscellaneous... dialogue of the Settings menu.

Using the Keyboard

Due to the differences between Macintosh and 3270 keyboards, mappings must be defined for some characters and functions. These mappings are described in the following sections.

If some keys do not appear to be working correctly please make sure that Key Mapping is set to 'default' or 'numeric' and that National Language is set to 'English (US)'.

In the notation below two keys separated by a hyphen represents pressing the first key, holding it down, pressing the second key and then releasing them both (like a shift key). The 'Command' key is generally marked as an apple or clover (propeller).

Character Keys

The characters on the Macintosh keyboard map directly to 3270 characters, with one exception: the circumflex (^) maps to "¬", hex 5F. In addition, option-[generates a "ç", hex 4A, and option-` generates a broken verticle line, hex 6A.

Attention Keys

Attention keys and some other keyboard functions may also be generated using the Function Keys menu of tn3270.

<u>3270 Function</u>	<u>Macintosh Equivalent</u>
Enter	Return
PA1	Command-,
PA2	Command-.
PA3	Command-Enter or Command-\
SYS REQ	Command-/
CLEAR	Command-c
CURSEL	Command-|
PF1 through PF12	Command-1 through Command-=
PF13 through PF24 (*)	Command-Shift-1 through Command-Shift-=

(*) not available with an extended keyboard. Use Shift-F1 through Shift-F12 instead.

Cursor Movement

A single mouse click moves the terminal's cursor to the character position closest to the Mac's cursor. Cursor movement from the keyboard is also possible.

<u>3270 Function</u>	<u>Macintosh Equivalent</u>
cursor left	Backspace or Command-h
cursor right	Command-j or Command-k
cursor up	Command-u
cursor down	Command-m or Command-n

tn3270 2.3d25

- 15 -

April 25, 1991

Press shift with the above keys for double speed cursor movement.

Field Movement

<u>3270 Function</u>	<u>Macintosh Equivalent</u>
tab	Tab
backtab	Shift-Tab
newline	Enter or Shift-Return
home	Command-Return

Editing Keys

<u>3270 Function</u>	<u>Macintosh Equivalent</u>
erase to end-of-field	Command-e
erase input	Command-Shift-e
toggle insert mode	Command-i
delete character	Shift-Backspace
insert character(*)	Option-Backspace
rubout(*)	Command-Backspace

(*) not a standard 3270 function.

Special Keys

<u>3270 Function</u>	<u>Macintosh Equivalent</u>
dup	Command-d
field mark	Command-f
keyboard reset	Command-r
complete program reset	Command-g
toggle APL mode (*)	Command-a
toggle cursor position (**)	Command-p

(*) The APL keyboard mapping is described below. When APL mode is active lowercase characters are not available, and the letters APL appear in the status line of the tn3270 window.

(**) The cursor position is displayed in the status line of the tn3270 window.

The Numeric Keypad

The section below gives additional key mappings for Macintoshes which have numeric keypads. The stand-alone numeric keypad may still be in use with some 512K Macs.

<u>3270 Function</u>	<u>Macintosh Equivalent</u>
PF1-PF9	1-9 (*)
PF10	0 (*)
PF11	. (*)
PF12	Enter (*)

(*) The Shift key adds 12 to the PF key value (so Shift-1 is PF13 etc...).

Numeric Keypad (continued)

<u>3270 Function</u>	<u>Macintosh Equivalent</u>
cursor left	left arrow
cursor right	right arrow
cursor up	up arrow
cursor down	down arrow
CLEAR	Clear
PA1	= (or , on a separate keypad)
PA2	/
SYS REQ	*
Erase EOF -	-
Erase Input	Shift--
Toggle Insert Mode	+

tn3270 supports several different keyboard layouts. If the numeric keypad is behaving as labeled then the numeric keypad mapping has probably been selected. You may use the Key Mapping function of the Settings menu to select the default action.

Macintosh SE and Macintosh II Extended Keyboards

The extended keyboard has yet more keys, some of which are taken advantage of by tn3270.

<u>3270 Function</u>	<u>Macintosh Equivalent</u>
PF1 through PF15	F1 through F15
PF13 through PF24	Shift-F1 through Shift-F12
home	home
delete character	X Del
PF3	end
PF7	page up
PF8	page down

APL Mode

APL input mode, indicated by "APL" appearing in the status line, changes the characters generated by the keyboard. It has no effect on the characters tn3270 is able to display, which always include the APL/Text character set. To toggle APL mode on or off use Command-a.

Note that APL mode is only available with some keymappings. In particular, the ALA key mapping does not support an APL input mode.

In APL mode the unshifted letters become uppercase. Digits are unchanged. The shifted letters and digits, and the punctuation mark keys generate non-overstruck APL symbols according to the standard APL keyboards. The overstruck APL symbols are generated using the Option key. Option with a letter generates the underscored letter. The other symbols are:

I-beam	Option-1
Del-tilde	Option-2
Grade-down	Option-3
Grade-Up	Option-4
Rotate-Vertical	Option-5
Transpose	Option-6
Rotate-horizontal	Option-7
Logarithm	Option-8
Nor	Option-9
Nand	Option-0
Exclamation Mark	Option--
Domino	Option-=
Quote-quad	Option-]
Delta-underscore	Option-\
Format	Option-;
Execute	Option-'
Lamp	Option-,
Expand	Option-.
Compress	Option-/

tn3270 Graphics Support

tn3270 emulates the commonly-used features on an IBM 3179G graphics terminal, and has been tested successfully with SAS/Graph and with IBM's Graphical Data Display Manager (GDDM). The graphics data stream accepted by tn3270 is also compatible with the IBM PC/GX.

In order for graphics to be supported, there must be sufficient memory available for tn3270 to allocate a graphics bitmap (see the section on MultiFinder earlier in this document). In addition 3270 extended data stream support must be available (see the documentation on the Features... dialogue later in this document).

Graphics sent to the Macintosh may be saved in PICT format. See the description of the Save Graphics menu selection below.

File Transfer Support

tn3270 currently supports to file transfer methods: FTP (a general TCP/IP utility) and RMAC/WMAC (which support file transfer through a VM/CMS terminal session).

FTP

tn3270 contains the same FTP (File Transfer Protocol) server as is in NCSA Telnet. For additional information see Chapter 4 of the *NCSA Telnet for the Macintosh Reference Guide*. The information in that chapter applies to tn3270, with the following exceptions:

- tn3270 does not include a Set Transfer Directory Option.
- tn3270 indicates that an FTP connection is active by displaying a file transfer icon in the status line.
- tn3270 does not include an FTP log.

For FTP compatibility information, see section 6.13 of the *NCSA Telnet for the Macintosh Reference Guide*.

In order for FTP transfers to be supported the FTP Enable item of the Network menu must be checkmarked. By default FTP is disabled. If you are planning to use FTP with your Macintosh, you may find out your Mac's IP address by selecting Show Configuration... from the Network menu. If you are using AppleTalk your Mac's IP number may change between invocations of tn3270.

The `telpass` program (obtainable from your DNA) comes with tn3270 and may be used to define passwords for the FTP server in tn3270.

RMAC/WMAC

tn3270 also supports file transfer as part of a VM/CMS terminal session. This is accomplished using the CMS RMAC and WMAC commands:

```
RMAC fn ft <fm> (options
```

to read a Macintosh file and upload it to CMS, and

```
WMAC fn ft <fm> (options
```

to write a Macintosh file, downloading it from CMS. The files are assumed to be text files unless the BINARY option is used. In either case, only the data fork of the file is

read or written. Standard MacBinary format file transfer is supported when the `MACBIN` option is specified. Currently, `MACBIN` is only supported for downloading via the `WMAC` command. To use these commands, 3270 extended data stream support must be available (see the section on the Features... dialogue below). See the CMS HELP facility for more information on `RMAC` and `WMAC`.

A Guide to the Menus

This next section is a reference manual to the features of tn3270. It is organized by menu, and explains the usage of each dialogue and menu item.

File

Open Connection...

Close Connection...

Selecting this item causes tn3270 to try and open a connection with the host (as determined by Host Name... in the Settings menu). A connection is automatically attempted when tn3270 is started up by opening a settings file. If no connection is currently active then pressing `Enter` or `Clear` is equivalent to selecting Open Connection... Currently tn3270 does not support multiple sessions.

Selecting Close Connection... terminates an existing connection. Note that this is generally not equivalent to logging out.

Zoom In/Zoom Out

Selecting this item is equivalent to clicking on the Zoom Box of the tn3270 window. It is useful primarily on small screen Macs running MultiFinder where the Zoom Box is not easily accessible.

Load Settings...

Save Settings...

Settings files let you save your current tn3270 settings in a document. You may later use the settings file either by opening (double-clicking) it from the Finder, or by using Get Settings... A settings file remembers all your customization except for items under the Network menu. Stuff like the host name, cursor shape, colors, highlighting, settings, which keyboard mapping to use, etc...

Set Creator...

Let's you select the application used to open text documents created by tn3270 (for example by downloading from CMS through the WMAC command). If you know the 4-character signature for the application, you may type it in directly.

Save Graphics (checkmarked)

If this item is selected then any graphics sent to tn3270 are saved in PICT file

format. At the start of each new graphic tn3270 will put up a standard file dialogue, allowing the user to specify a file for saving the graphic. The graphic will not be saved if Cancel is selected.

Page Setup...
Print Screen...

Page Setup... invokes the printer configuration for your selected printer. Print Screen... sends a copy of the current tn3270 screen to the printer.

Interrupt Transfer...
Show Transfer Status

Are enabled only if an RMAC or WMAC transfer is in progress. Interrupt Transfer... gives you the option of terminating a transfer in progress. Show Transfer Status will show the status window for the transfer if it was hidden for some reason.

Quit

This terminates tn3270 (giving you the option of canceling if a connection is currently open, and of saving your settings if they have been changed).

Edit

Undo

Undo is used only by desk accessories.

Cut

Copy

Paste

Clear

Copy Table

Copy Text

By selecting with your mouse and dragging, you may select portion(s) of your tn3270 screen. These selected regions may then be operated on in a mac-like fashion using these items (Paste is not yet implemented however). In no case is it possible to modify a part of the 3270 screen that cannot be typed in.

To select a region of the screen click on a beginning, hold the mouse button down and drag. tn3270 normally selects in a flow of text fashion, to select a rectangular area hold down the option button when you click and drag. An existing selection may be modified by holding down the shift key. The command key allows non-contiguous text selections. Shift-option allows multiple rectangular selections.

Copy will place lines in the clipboard, one line for each line selected on the screen. Copy Text copies text to the clipboard in paragraphs appropriate for word processors. Paragraph breaks occur at blank lines. Copy Table places one line in

the clipboard for each line on the screen, replacing strings of blanks with tabs, appropriate for importing into spreadsheets etc...

Cut is equivalent to repeated use of the delete key. Clear replaces characters with nulls (which may be translated to blanks if embedded-nulls-to-blanks is turned on).

To clear all selections, click in any highlighted area of the screen.

Settings

Features...

This item brings up a dialogue allowing you to control some aspects of the 3270 emulation performed by tn3270. The default for each setting is **Yes**.

Reset insert mode after attention keys: if this is set to yes then insert mode is reset after an attention key (PA Key, PF Key, Enter etc...) is pressed. If this is set off then insert mode will never be reset unless you do so explicitly.

Discard trailing blanks in insert mode: on a real 3270 blanks at the end of a line cannot spill off, only the special character Null can. If this option is enabled trailing blanks are also allowed to spill off when in insert mode.

Change embedded nulls to blanks: enabling this option makes several changes from the way that a real 3270 handles nulls and blanks.

- The "delete character" function deletes from the cursor position to the end of the field, instead of to the end of the line.
- When insert mode is in effect, nulls are shifted as well as blanks.
- Within a modified field, embedded nulls (nulls followed by characters) are translated to blanks when they are sent to the host.
- Nulls in text that is copied to the clipboard will be translated to blanks instead of being skipped.

Use Command-Shift-<digit> for PF keys: If this option is on then PF13-PF22 are available as Command-Shift-1 through Command-Shift-9. Normally these keys are used by the Macintosh operating system, not the application. On anything higher than a MacPlus the Command-Shift-<digit> sequence cannot be used for PF keys and if this option is enabled it will be ignored.

Support 3270 extended data stream: After successfully opening a Telnet connection, tn3270 attempts to use a terminal type which indicates it will support 3270 extended data streams. If this attempt fails, it reverts to using an ordinary 3270 terminal type. The negotiation for extended data stream support must succeed in order to use tn3270's support of extended highlighting, color, graphics, and RMAC/WMAC file transfer. This option may be used to disable tn3270's attempt to negotiate extended datastream support if these features are not needed, and may

result in shorter data streams being sent to the mac. Changes to this setting do not take effect until a new connection is opened.

Treat "[" and "]" as standard characters: on a standard 3270 the square brackets do not exist except as part of APL support. Enabling this option allows you to enter and display the square brackets correctly anyway.

Double Click...

Under tn3270 clicking once moves the cursor to the position under the mouse. A double click moves the mouse and then executes an attention key (such as a PF key). This dialogue allows you to select the function you wish to have associated with a double click. The default value, PF23, is useful in several environments. For example it allows you to XEDIT a file from FILELIST by double-clicking on it.

Highlighting...

The highlighting dialogue lets you control how 3270 highlighting (such as high intensity, blinking or reverse video) is handled on your Mac. There are six types of fields: default, high-intensity, non-display (used for passwords), reverse, blink, underline and attributes (special characters that mark the start of a field on the screen, normally hidden).

For each field you may select any combination of attributes to make it stand out. Non-display, frame (draw a box around the field), reverse, underline and bold. If both non-display and bold are selected, then non-display takes precedence. As distributed tn3270 uses framing rather than bold for highlighted fields because the bold font can be difficult to read in 9 point size.

Colors...

Is only enabled on Macintoshes that have color quickdraw installed. Using this dialogue you may choose the colors used by tn3270 to represent the eight standard colors used by a color 3270 (Blue, Red, Pink, Green, Turquoise, Yellow, White and Black) as well as the background color and the color used for the status line. To adjust a color click on it, and the standard Color Wheel dialogue will appear to let you adjust the color.

Exact Colors: if this box is checked then tn3270 will use exactly the colors you select, if not it will use the closest match available in the current color palette. If you use Exact Colors you may see incorrect colors on other parts of the screen, they will be restored when tn3270 is no longer the active application.

Base Color Mode: This controls the use of color when no color fields are defined on the screen. If Base Color Mode is selected then either green or white will be used, based on the highlighting of the field, otherwise 3179 four-color mode will be used.

	Protected	Unprotected	Base Color
Hilighted	White	Red	White
Unhilighted	Blue	Green	Green

Invert Black and White: If this is checked off then tn3270 will use the color selected for black as white and the color selected for white as black. This setting effects the 3270 and Mac cursors, as well as the graphics display.

Prog. Symbols...

tn3270 does not currently support downloadable programmed symbol sets. However certain applications, such as some releases of CMS Windows, incorrectly determine that availability of APL based on the availability of downloadable programmed symbol sets. For these applications tn3270 can be told to pretend it supports programmed symbol sets, even though it does not. This setting should generally not be used unless actually needed, and may prevent some applications (especially graphics applications) from working.

Screen Format...

All 3270 terminals provide a 24 by 80 screen, in addition some also provide an 'alternate', larger screen for use by host programs which can check for and support it. Through this dialogue you can control the size of the alternate screen, and also certain convenience settings that affect how the 3270 screen is presented to you (for example the size of the font used).

24-by-80 Screen Format: If your Macintosh screen is large enough you may have tn3270 use a 12 point font when running in 24x80 mode.

Larger Screen Format: This part of the dialogue allows you to control the alternate screen characteristics. If your screen is large enough a 12 point font may be selected, however tn3270 will not let you create a session larger than will fit on the Mac screen, so this will decrease the maximum size of the screen. You may either select a 'standard' screen size (24x80, 32x80, 43x80 or 27x132) or create a custom alternate screen size. tn3270 will not allow a screen size larger than will fit on your screen or smaller than 24x80. Not all programs support all screen sizes

and some programs are more likely to support one of the 'standard' sizes rather than a custom size. In general programs which do not support the larger screen size will use the 24x80 screen.

Use One Window Size: Normally tn3270 resizes its window when the application switches between the 24x80 and alternate screens. Selecting this item causes tn3270 to make a window that can hold both screens and not to resize it.

Save Window Position: When this item is turned on Save Settings... will save information on the current window location in the settings file. This will most likely be useful only on machines with large monitors.

Miscellaneous...

This section allows you to adjust a few comfort settings that don't directly affect your interactions with the host.

Time: controls the optional clock in the lower right of the status line. It may be displayed in 12-hour form, 24-hour form or may be removed completely.

Cursor: selects between a block cursor and a line cursor.

Cursor Position: controls the display of the current location of the cursor in the status line. The keyboard sequence Command-p may also be used to toggle this setting on and off.

Beep Sound: allows you to control the 3270 bell sound (if your System software is old this option will not be available). Selecting 'System Alert Sound' will cause tn3270 to play the sound defined in the control panel. Or you may select a specific sound. All sounds except the 'System Alert Sound' will be played asynchronously. If tn3270 cannot open a sound channel or is not the foreground application it will revert to using the System Alert Sound. This feature is not available under older versions of the System software (those that don't have the list manager).

Host Name...

The hostname dialogue may be used to select the host that is to be connected to with the next Open Connection... The hostname may be expressed as either a domain name (brownvm.brown.edu) or as an internet address (128.148.128.40).

Make Default: may be used to set the default hostname (it is stored in the file NCSA Telnet Settings in the system folder).

Set Default: may be used to revert back to the default hostname.

Connect to host when settings are loaded: when this option is selected (the default) a new connection to the selected host will be started automatically when

the settings file loaded (either by double clicking in the Finder or by using Load Settings... from the menus).

When establishing a connection, tn3270 negotiates the best terminal type to use, and connects to the standard Telnet port number. However, in order to handle unusual

situations, tn3270 allows the terminal type and port number to be set explicitly as extensions of the host name. The format of the host name in this case is:

```
host name:terminal type:port number
```

i.e. the host name is followed by the terminal type and port number, with colons used as delimiters. Extra blanks should not be included, since they are significant. The port number and its delimiting colon are optional. Also, the terminal type may be omitted by not including any character between the two colons. **Warning:** these options should only rarely be needed, and must be used carefully. In particular, a terminal type must not be specified which conflicts with the capabilities of the Macintosh, since tn3270 does not check for this. For example, using IBM-3278-3 to specify a 32 line terminal when using a Mac Plus may cause unpredictable results.

Internet Servers: tn3270 has an experimental 'server-line-mode' to make it more convenient when connecting to line-oriented servers (ie SMTP, NNTP, IRC &co). When this mode is in use tn3270 will allow local editing of commands entered and makes some simple use of color to separate local commands from server responses. To enter this mode prefix the port number with 'server='. For example:

```
brownvm.brown.edu::server=25
```

to connect to Brownvm's SMTP server. There are two further special cases. The port number may also be specified as "SMTP" or "IRC" (to use the well-known port numbers). In the case of specifying IRC tn3270 has some additional special support:

```
someirc.somewhere.edu:James:IRC
```

When the port number is specified as IRC, then tn3270 will use the 'terminal type' (ie your IRC nickname) to generate PONG commands in response to the PING commands that IRC sends out.

Key Mapping

May be used to select among keyboard mappings. Note that this setting affects only the keyboard, correct usage of a mapping may require changing the National Language setting as well. Three key mappings are currently provided with tn3270. 'default' is the layout described in this document. 'numeric' is identical to default except the numeric keypad is set up for data-entry. 'ala' provides support for ALA data-entry. It is possible to create your own keyboard mappings using the KeyMap

program, available from your Departmental Network Administrator.

APL support is part of the individual keymappings. The 'default' and 'numeric' key mappings include APL support, however the ALA keymapping does not.

National Language

Selects what characters (glyphs) are associated with various binary values. Most of the languages (Spanish, U. S. English, German etc...) have been defined by IBM, and are alternate interpretations of the "international characters", 'ç|!\$#@"~}{\~' plus the broken vertical bar, (shown here as they are defined for U.S. English). Using a different national language will change the way some or all of these characters are interpreted on the screen and from the keyboard. The 'default' and 'numeric' keymappings provide access to all these characters, however the KeyMap program could be used to create and install a mapping more appropriate for the language.

The ALA language provides support for the ALA font, including diacritics. When the 'Library catalog' version is selected then within protected fields diacritics are placed directly over the characters they refer to. When the 'adjacent characters' version is selected diacritics are always placed before the character they go over. The KeyMap program supports the ALA character names, the mapping provided corresponds to that used by an IBM 3163/3164 terminal with the ALA cartridge. See the example files with the KeyMap program for details.

Function Keys

This menu may be used to simulate most of the attention keys of a 3270. These keys are also available from the keyboard (see earlier in this document).

Network

This menu contains items relating to the Macintosh as part of the network, and settings that are intrinsic to tn3270.

Show Configuration...

Will bring up a dialogue telling you the Macintoshes current IP address. If you are connected over AppleTalk this number may change between invocations of tn3270. It is useful primarily when trying to reach the Macintosh (say for FTP) from another host.

Connection Status...

This dialogue will display information about the current connection (if any) including the name of the host being connected to and its internet address. It will also tell you if you have connected as a 3270 or if you are emulating a VT52.

FTP Enabled (checkmarked)

This must be selected to enable the built in FTP server. By default the FTP server is disabled. The default setting is contained in the `config.tel` file.

MacBinary (checkmarked)

If this item is checkmarked then binary retrievals done with FTP will be in MacBinary format, a special form for mac files that preserves all attributes of the file (including both the resource and data forks).

Send "Are you there?"

May be useful to verify if the connection to the host is working properly. Selecting this item will result in a terminal beep if the connection is functioning.

Send "Break"

Send "Interrupt Process"

Send "Abort Output"

Send "Erase Character"

Send "Erase Line"

These items implement portions of the telnet protocol. They are not normally very useful.

National Language Support

The table below shows how national language selection affects the 14 'international characters'. This feature lets tn3270 to emulate 3270 terminals sold outside of the United States. Changing the National Language in use does not affect how information is stored on the host computer. For example at Brown even though using German mode causes '!' to be displayed as 'Ü', it is still character 5A and is still treated as an exclamation point by the mainframe. German mode might be useful however, if one opened a tn3270 session to a mainframe which was using the German set of international characters.

Language/Hexcode	4A	4F	5A	5B	5F	6A	79	7B	7C	7F	A1	C0	D0	E0
English (U.S.)	¢	|	!	\$	¬	**	`	#	@	"	~	{	}	\
Austrian/German	Ä	!	Ü	\$	^	ö	`	#	§	"	ß	ä	ü	Ö
Austrian/German (alt)	ö	|	ü	Ü	¬	ß		Ä	Ö	ä				
Danish/Norwegian	#	!	€	Å	^	ø	`	Æ	Ø	"	ü	æ	å	\
Danish/Norwegian(alt)	ø	|	å	Å	¬	**		Æ	Ø	æ				
Finnish/Swedish	§	!	€	Å	^	ö	é	Ä	Ö	"	ü	ä	å	É
Finnish/Swedish (alt)	ö	|	å	Å	¬	**		Ä	Ö	ä				
French	°	!	§	\$	^	ù	`	£	à	"	¨	é	è	ç
Italian	°	!	é	\$	^	ò	ù	£	§	"	i	à	è	ç
Portuguese	[	!	]	\$	^	õ	`	Ã	Õ	"	ç	ã	´	Ç
Spanish	[	|	]	Pₜ	¬	ñ	`	Ñ	@	"	¨	{	}	\
Spanish (alternate)	¢	|	!	Pₜ	¬	**		Ñ	@	ñ				
English (UK)	\$	|	!	£	¬	**	`	#	@	"	—	{	}	\
Belgian	[	!	]	\$	^	ù	`	#	à	"	¨	é	è	ç
Brazilian/Portuguese	É	!	\$	Ç	^	ç	ã	Õ	Ã	"	~	õ	é	\
Japanese (English)	£	|	!	¥	¬	**	`	#	@	"	—	{	}	\$
Spanish Speaking	[	|	]	\$	¬	ñ	`	Ñ	@	"	¨	{	}	\
Canadian (French)	à	!	´	\$	^	ù	`	#	@	"	¨	é	è	ç
International	[!]	\$	^	**	`	#	@	"	~	{	}	\

** represents the broken vertical bar.

Trouble Shooting

Symptom	Possible Solutions
tn3270 quits immediately without a message or gives a MacTCP error.	<ul style="list-style-type: none">• Make sure MacTCP was installed on the System you booted off of.• Make sure AppleTalk is active (use the Chooser).• Make sure that zones appear in the Chooser (if they don't then your gateway or local network is probably down).• Make sure you aren't running any inits which make the screen too small for a 24x80 tn3270 session.
tn3270 is not able to establish a session.	<ul style="list-style-type: none">• Check the Host Name... dialogue of the Settings menu and make sure it is set correctly. The name of the Brown University mainframe is brownvm.brown.edu. Use the File menu to close any existing connection and open a new one.
"Cannot find or open configuration file."	<ul style="list-style-type: none">• The file <code>config.tel</code> is not in the folder with the tn3270 settings file you used, or the application's folder or your system folder. Obtain a copy of the file from your DNA and place it in the same folder as the settings file or tn3270 application.

Restrictions

The following restrictions apply to tn3270's 3270 emulation:

- Programming errors in a 3270 data stream will not cause error codes to be displayed on the status line, and will not necessarily have the same effect as on a real 3270. In general, tn3270 ignores errors.
- tn3270 does not verify that the Write Control Character (WCC) is a valid EBCDIC-translatable character.
- A Write Structured Field command sent to tn3270 cannot be longer than 8K bytes. Any data after the first 8K bytes will be ignored. This restriction is particularly significant for graphics applications.
- tn3270 does not support the numeric attribute of fields.
- tn3270 does not support all the features of the 3179G terminal. Most significant is that tn3270 does not support graphics commands for which there is no corresponding QuickDraw call, and does not support programmed symbols. tn3270's response to a Write Structured Field Query Reply command includes some features it does not support in order to appear compatible with a 3179G to host applications.

VT52 Emulation Restrictions

The following restrictions apply to tn3270's line mode VT52 emulation:

- Alternate keypad mode is not supported.
- The graphics character set is not supported.
- There is no support for printing or print mode control.

Known Bugs

- Due to a restriction of the Macintosh operating system, key-mappings that correspond to floating accents under the system fonts do not operate ideally. The broken vertical bar (Option-`) is one such case, certain APL characters are also affected. It may be necessary to press these keys twice to receive the desired character.