Network Computing Devices, Inc.

3270/3179G User Manual

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3270/3179G User

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Revision Status

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Introduction

With the Tek3270 and Tek3179G terminal emulators, you can open fully functional 3270 or 3179G windows on your network computer. You can use these windows to log on to SNA and TCP/IP mainframe operating systems and run the application programs from your network computer. The windows have all the features and functionality you need to run your IBM applications.

The Tek3287 printer emulator provides screen printing from your network computer to a local printer. Information on setting up a print spooler is in Appendix A, *Printing*, of the *Network Computer Reference* manual.

NOTE: You may want to read the Network Computer User manual for information on how to operate your network computer.

Audience

This manual assumes:

- You are familiar with: IBM 3270, 3278, 3279, or 3179G Information Display Station functionality
- You know how to operate your network computer
- You know how to log on to a host on your network
- You know how to run your host applications

Product Features

You can use your network computer to perform standard IBM 3270 text operations (in a 3270 window) or graphical operations (in a 3179G window). There are a number of keyboards available for your network computer. If your network computer does not have a 3270 style keyboard, you can use keystroke sequences to access the 3270 key functions.

NOTE: Tek3179G includes all of the Tek3270 features.

Tek3270 Features

- TN3270 protocol support
- Models 2, 3, 4, and 5 emulation
- Full seven-color support
- Function keys
- Dynamic font resizing
- Keyboard mapping
- Operator information area
- Cursor movement keys
- Extended attributes

Tek3179G Features

- Full Tek3270 product features
- Models 2, 3, 4, and 5 emulation
- GDDM mouse
- Support for a wide variety of IBM host graphics applications
- Support for area fill, markers, patterns, and programmed symbol sets
- Support for image data

NOTE: Tek3179G does not support Underpaint Mix Mode.

Terminology and Conventions

Basic operating information about your network computer, including mouse and keyboard information is included in the *Network Computer User* manual.

This symbol indicates a *Launcher* Menu selection. Depending on how your account is set up, the *Launcher* may already be on your screen. If that is the case, simply use the mouse to select an option. If the *Launcher* is not present, press the Setup key on the keyboard. For 101/102 with Pause key keyboards, press and hold the Shift key and then press Setup to access the *Setup* window. For UNIX keyboards press the key sequence: AltGraph-Setup to access the *Launcher*. For 3270 keyboards use Alt-Setup.

Alt key	Hold Alt while pressing other keys in a sequence
Ctrl key	Hold Ctrl while pressing other keys in a sequence
Esc key	Press and release Esc then press other keys in a sequence
Button (mouse)	The three buttons on the top of the mouse. Table 1 shows the factory configuration of the buttons.

Table 1 Mouse Button Configuration.

Button Name in Manual	3-button Mouse Selection
Select	Left button
Menu	Middle button
Custom	Right button

Clicking	Quickly pressing and releasing the mouse button without moving the pointer.
Dragging	Pressing and holding the mouse button while moving the pointer.
Moving	Changing the location of the pointer on the screen by moving the mouse.
Pointer	An arrow on the screen indicating the current cursor position for selecting or clicking.
Pointing	Positioning the pointer on an object on the display by moving the mouse.

Figure 1 illustrates the typographical conventions used in this manual.

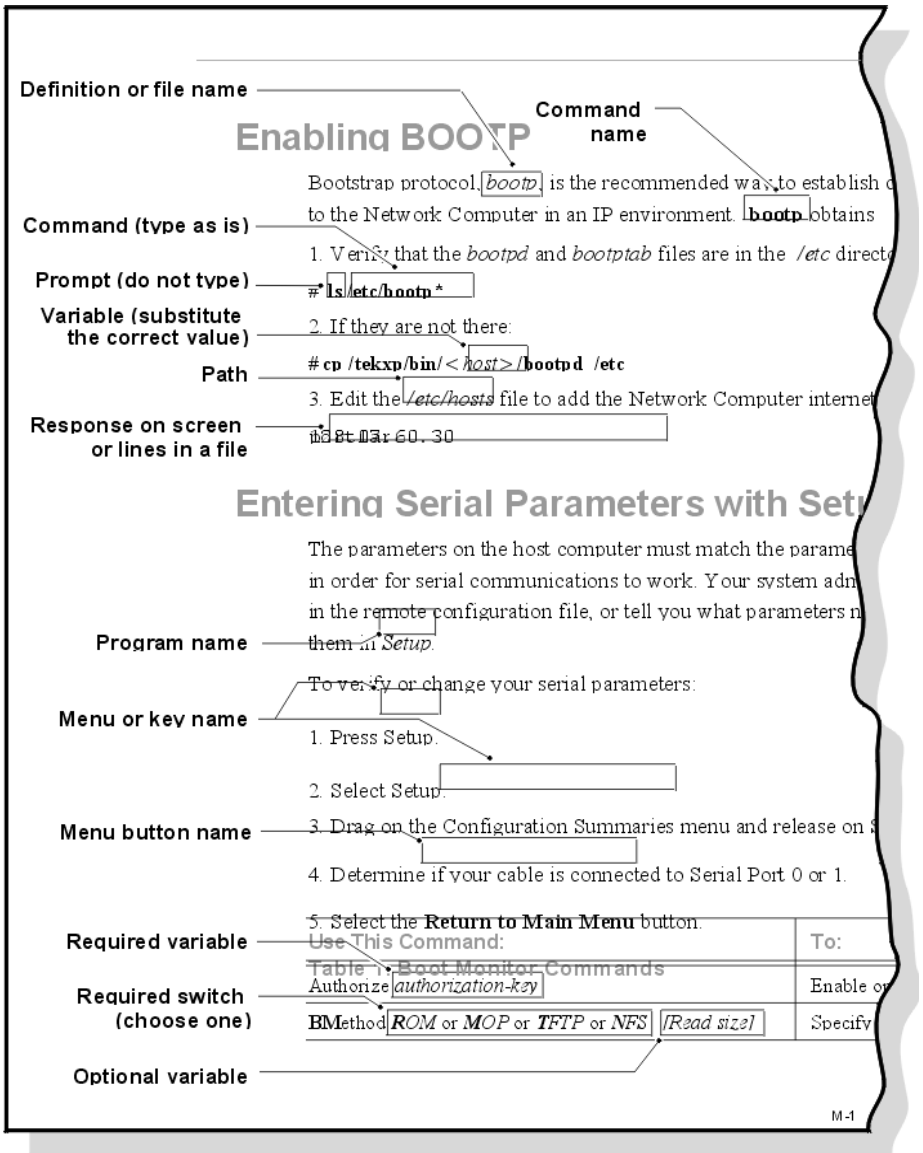

Figure 1 Typographical Conventions.

Related Documentation

The following manuals are available in hard copy:

- *NCBridge Installation for UNIX Environments* — 9300845
  NCBridge Installation for VMS Environments — 9300846
  NCBridge Installation for Windows NT Environments — 9300847

  Explains how to install a network computer in the specified environment.

- *Serial Xpress User* — 9300834

  Provides information about Serial Xpress, where you use a serial cable instead of a network cable to connect your network computer with a remote host.

The following manuals are available on the *Documentation CD-ROM*:

- *Network Computer User*

  Provides basic operating information about your network computer.

- *Network Computer Reference*

  Provides reference information about network computers, including remote configuration, Setup, and the Boot Monitor.

- *3270/3179G User*

  Provides operating information for the 3270/3179G terminal emulator.

- *3270E/5250 User*

  Provides operating information for the 3270/3179G terminal emulator.

If your site uses an OpenConnect Server, you may wish to refer to the OpenConnect documentation for specialized server options.

The following documentation is available in local bookstores:

- *X Window System User's Guide* — O'Reilly & Associates, Inc.
  ISBN 0-937175-29-3

  Presents window system concepts and includes tutorials for many clients.

Preface

Chapter **1**

Getting Started

To get started, you need to open one or more 3270 or 3179G windows to establish connections between your network computer and the IBM host. 3270, 3179G, and 3287 sessions can be started several ways:

- Type the **xpsh** command from your regular UNIX session window.
- Select 3270 from the client launcher, if your System Administrator set it up.
- Add the **xpsh** command line to one of your startup files, either *.login* or *.profile*, or to the system remote configuration file (*xp.cnf*). Consult your System Administrator before modifying any of these files.

If your System Administrator has set up your account to automatically start one or more windows for you, simply log on and start your application.

Manually Starting a Session

To manually start the emulator, you need to know the following information:

- Name (*host_name*) of the IBM host where your application resides.
- Name or address (*term_name*) of your network computer. To find this information:

  - Enter Setup.
  - Drag on Configuration Summaries and release on TCP/IP.
  - The network computer name and network computer IP address are shown on this screen.

- List of command line options (*-options*) you want to use. The available 3270 options are shown in Table 1-1, the 3179G options are in Table 1-2, and the 3287 options are in Table 1-1.

1. From your session window, enter one of the following commands:

   xpsh -display *term_name***:0 tek3270 -h** *host_name* [*-options*]
   xpsh -display *term_name***:0 tek3179g -h** *host_name* [*-options*]
   xpsh -display *term_name***:0 tek3287 -h** *host_name* [*-options*]

2. Type your login name and password if prompted.
3. Start your application as appropriate.

Exiting a Session

To exit the session and close the 3270 or 3179G session window, press:

Esc-x-x

The 3287 session does not have a session window. To exit the 3287 session, you need to know the process identifier (*PID*) of the **xpsh** process used to start the session (use the **ps** command to find the *PID*). Use the **kill** command to exit the 3287 session:

kill *PID*

Command Line Options

Here are the options for the tek3270 command. Refer to Table 1-1 for details.

tek3270 [-t] [-o] [-l *nn*] [-s *string*] [[-h] *host*] [-T *termtype*] [-m *model*] [-c *PUname*] [-keycodes] [-nocolor] [-winid] [-clipboard] [-invert] [-invctl] [-noinvctl] [-subctl *character*] [-nosubctl] [-fn *fontname*[:*boldfontname*]] [-geometry *geometry*] [-title *title*] [[-P] *port*] [-lightpen] [-v | -V] [-?] [-iconify] [-iconic] [-ig *geometry*] [-ib *filename*] [-in *name*] [-blockcursor] [-snap] [-record *dir*] [-nonvt] [-crlf] [-ta | -nota] [-ex3287] [-timeout *n*] [-nlprint] [-blink] [-noblink] [-bindport] [-bindmask] [-luname] [-nolumane] [-fnmerge] [-nofnmerge] [-blockcopy] [-noblockcopy] [-keepalive] [-nokeepalive] [-socketest]

Here are the options for the tek3179G command.This command supports all of the 3270 functionality (Table 1-1) plus the options shown in Table 1-2.

tek3179g [-t] [-o] [-l nn] [-s *string*] [[-h] *host*] [-T *termtype*] [-m *model*] [-c *PUname*] [-keycodes] [-nocolor] [-winid] [-clipboard] [-invert] [-invctl] [-noinvctl] [-subctl *character*] [-nosubctl] [-fn *fontname*[:*boldfontname*]] [-geometry *geometry*] [-title *title*] [[-P] *port*] [-lightpen] [-v | -V] [-?] [-a] [-r] [-iconify] [-iconic] [-ig *geometry*] [-ib *filename*] [-in *name*] [-blockcursor] [-snap] [-record *dir*] [-nonvt] [-crlf] [-ta | -nota] [-nopixmap] [-ex3287] [-timeout *n*] [-3472] [-nlprint] [-blink] [-noblink] [-bindport] [-bindmask] [-luname] [-nolumane] [-fnmerge] [-nofnmerge] [-blockcopy] [-noblockcopy] [-keepalive] [-nokeepalive] [-socketest]

Here are the options for the tek3287 command. Refer to Table 1-1 for details.

tek3287 [-l nn] [-s *string*] [[-h] *host*] [-c *PUname*] [-v | -V] [-?] [-formfeed] [-nlprint]

NOTE: Several of the options are only available if your site has an OpenConnect Server. These options are: -o, -l, -c, and -timeout. In addition, some parameters for the -title and -in options also require the server. Refer to Table 1-1 for option details.

Table 1-1 Tek3270 Command Line Options.

Option	Description Summary
-t	Specifies the Telnet protocol. This is the default. If you have an OpenConnect Server, you can use the **-o** option instead.
-o	Specifies a connection to an OpenConnect Server. ***Note***: Two conditions apply: you must have an OpenConnect Server, and your network computer must have an assigned name.
-l *nn*	Connects to OpenConnect Server LU, where *nn* is the LU number. Requires the **-o** option.
-s *string*	Sends print output to the spooler string specified by string. The string should be in quotes if the print command string includes spaces. For example, to send print output to file *xxx*, enter: -s "cat > *xxx*"
[-h] *host*	Connects to the TCP/IP host whose name or Internet Protocol (IP) address is specified as host. If **-h** is not specified, the first non-switched (no dash) option is interpreted as the host.
-T *termtype*	Specifies *termtype* as the TELNET terminal type negotiation string. 3279 and NVT are valid values for *termtype*. If -T is omitted, the TELNET terminal type negotiation string is IBM-3278-model-E where model is specified with the **-m** option. If -T3279 is specified, the TELNET terminal type negotiation string is IBM-3279-model-E. If an invalid model (4 or 5) is specified, 2 is used. If -TNVT is specified, TELNET terminal type negotiation is refused. If the TELNET server rejects terminal type negotiation, a new negotiation string is constructed and negotiation is attempted again. The new string is the previous string without -E. If negotiation fails for this string, model is decremented by 1, and -E is added. This cycle is repeated until the negotiation string containing model 2 without -E fails.

Table 1-1 Tek3270 Command Line Options. (Continued)

Option	Description Summary
-m *model*	Emulates a Model 2, 3, 4, or 5 display. The values are: 2 Model 2 with 24 rows and 80 columns 3 Model 3 with 32 rows and 80 columns 4 Model 4 with 43 rows and 80 columns 5 Model 5 with 27 rows and 132 columns If **-m** is omitted, the emulator processes the bind information's model data. You do not need this option if you are using the **-o** option. With the -o option, the emulator uses *dynamic binding* to automatically resize windows and fonts during your session.
-c *PUname*	Connects to the OpenConnect Server Physical Unit specified by PUname. The PUname, Physical Unit name, is the fourth parameter of the controller (C) parameter line in the *sna_cfg* file. Requires the **-o** option.
-keycodes	Displays keycodes as you press keys. The keycodes are displayed in the Console window. This option can be used to verify keycodes if you are building a *snatermkey* file or manually recording keystrokes.
-nocolor	Specifies monochrome emulation on a color network computer.
-bg *color*	Specifies the window's background color. The default is black on a color network computer, and while on a monochrome network computer.
-winid	Displays the window ID number in the Console window.
-clipboard	Uses the Clipboard Selection buffer instead of the Primary Selection buffer for copying and pasting text.
-invert	Uses a high contract background color to make it easier to read highlighted text. This option is designed for monochrome network computers, or for use with the **-nocolor** option.
-invctl	Allows undefined control characters in the LU1 data stream and are accepted as valid. The **-subctl** and **-nosubctl** arguments specify how undefined characters are displayed.
-noinvctl	Does not allow undefined control characters in the LU1 data stream. This is the default.

Table 1-1 Tek3270 Command Line Options. (Continued)

Option	Description Summary
-subctl *character*	Substitutes the following character for undefined control characters in the LU1 data stream. Not valid if used with the **-invctl** argument.
-nosubctl	Specifies that a dash (-) is the character substituted for undefined control characters in the LU1 data stream. This is the default.
-fn *fontname* [:*boldfontname*]	Specifies (up to 50) text fonts to use. The first font is the starting font and determines the initial window size. If more than one font is given, the program automatically chooses the font that best fits in a resized window. Fonts can also be specified in the *snatext* file. If a bold version of the font is available then the *intense* field attribute on a monochrome display is available. A bold font can also be explicitly specified after a font name by using a colon (:).
-geometry *geometry*	Specifies the initial placement of the 3270/3179G window. The format for the option is: widthXheight±*xoff*±*yoff* The width and height variable specifications are not used. The variables *xoff* and *yoff* are values in pixels. The symbols for the offsets have these effects: +*xoff* Specifies the distance of the left window edge from the left of the display. +*yoff* Specifies the distance of the top window edge from the top of the display. -*xoff* Specifies the distance of the right window edge from the right side of the display. -*yoff* Specifies the distance of the bottom window edge from the bottom of the display.
-title *title*	Specifies the title for the window. If the title argument includes one or more spaces, the variable must be enclosed within quotation marks. This option overrides the title specification in the snatext file MTK013 entry. There are five predefined arguments: *$1%s* displays the name of the executable program. *$2%s* displays the name of the host. *$3%d* displays the LU number (**-o** option) or the port number. *$4%d* displays the process ID of the tek3270 process. *$5%d* displays the OCS model number (**-o** option).

Table 1-1 Tek3270 Command Line Options. (Continued)

Option	Description Summary
[-P] *port*	Connects to the TELNET port number *port*. If **-P** is not used, the last non-switched (no dash) option is interpreted as *port*. If this option is not used, the port specified in the *snatext* MTK011 entry is used. If there is not a MTK011 entry, the default value in 23.
-lightpen	Enables lightpen emulation using a mouse.
-v or -V	Displays the version string in the Console window.
-?	Displays the usage statement in the Console window.
-iconify or -iconic	Starts the emulator with the window iconified.
-ig *geometry*	Specifies the initial geometry for the icon placement, size requests are ignored. The x offset and y offset coordinates are interpreted relative to the origin of the root window. Refer to **-geometry** option.
-ib *filename*	Specifies the icon bitmap to *filename*.
-in *name*	Overrides the default icon name specification. The default for the name argument consists of four items in the following sequence: - Name of the host for the current connection. - LU number (**-o** option) or the port number. - Process ID for the Tek3270 process. - OCS model number (**-o** option)
-blockcursor	Selects block cursor for default text cursor.
-snap	Window automatically resizes for current font.
-record *dir*	Sets recording file path to directory *dir*.
-nonvt	Operates the emulator in only 3270 mode. NVTs are not supported when this option is used.
-crlf	Sends a carriage return and line feed when Enter is pressed.

Table 1-1 Tek3270 Command Line Options. (Continued)

Option	Description Summary
-ta	Enables typeahead buffering.
-nota	Disables typeahead buffering.
-timeout *n*	Enforces a timeout request (*n* seconds) for the connection if the gateway does not respond (**-o** option). The range is 60 to 2^{32}-1. 60 is the default.
-nlprint	Forces blank lines to print when using the print screen function.
-blink	Specifies true blinking for fields with the blink attribute.
-noblink	Specifies that fields with the blink attribute are displayed with a red underline.
-bindport *n* or *Ox<n>*	Specifies a range of Telnet ports from which the gateway selects the first available port configured in its host configuration table. Enter a decimal or hexadecimal number in the range 0 to 0xFFFF (using numbers 0-9 and characters A-F). Default is -1. This argument can be used with the **-bindmask** argument. If so, the bindport and bindmask numbers are anded. For example, if **-bindport** is 0x000A and **-bindmask** is 0x000F, all ports 0x***A are checked.
-bindmask *n* or *Ox<n>*	Specifies a range of Telnet ports from which the gateway selects the first available port configured in its host configuration table. Enter a decimal or hexadecimal number in the range 0 to 0xFFFF (using numbers 0-9 and characters A-F). Default is OxFFFF. This argument must be used with the **-bindport** argument.
-luname LUname	Connects to the OpenConnect Server Logical Unit specified by LUname. Requires the **-o** option.
-noluname	Disables the LUname connection to the OpenConnect Server. Requires the **-o** option.
-fnmerge	Allows command line fonts to merge with those specified via the snatext file and/or the resource files.
-nofnmerge	Forces command line fonts to override those specified via the snatext file and/or resource files. This is the default.

Table 1-1 Tek3270 Command Line Options. (Continued)

Option	Description Summary
-blockcopy	Sets the text copy-paste mode to block mode.
-noblockcopy	Sets the text copy-paste mode to stream mode. This is the default.
-keepalive	Enables the KEEPALIVE packet for TCP/IP.
-nokeepalive	Disables the KEEPALIVE packet for TCP/IP. This is the default.
-socketest *nn*	Probes the TCP/IP socket every *nn* minutes.

Table 1-2 Tek3179G Command Line Options.

3179G Option	Description Summary
-a	Suppresses APA/vector graphics and initializes programmed symbol sets like an IBM-3278 or IBM-3279 terminal (Tek3179G only). This option should only be used for IBM host graphics applications written specifically for IBM-3279/9 that do not use the IBM GDDM library. Graphics are performed with Programmed Symbols instead of vectors, increasing the burden on the host and the size of the data stream may be increased, and decreasing the precision of the image on the display. The IBM-3270 query/replies are still full-sized SAA-compliant replies, not abbreviated IBM-3279 replies.
-r	If the graphics image is distorted or incorrectly positioned, the application is either not querying the display device or it is not using the screen and character cell dimension information that is in the query/replies; try different font sizes with and without the **-r** option.
-nopixmap	Creates memory buffers for windows that display graphic images.
-3472	Emulates an IBM 3472 terminal.

NOTE: All 3270 command options (Table 1-1) are also available with the 3179G command.

Table 1-3 Tek3287 Command Line Options.

Option	Description Summary
-l *nn*	Connects to OpenConnect Server LU, where *nn* is the LU number. Requires the **-o** option.
-s *string*	Sends print output to the spooler string specified by *string*. The string should be in quotes if the print command string includes spaces. For example, to send print output to file *xxx*, enter: -s "cat > *xxx*"
[-h] *host*	Connects to the TCP/IP host whose name or Internet Protocol (IP) address is specified as *host*. If **-h** is not specified, the first non-switched (no dash) option is interpreted as the host.
-c *PUname*	Connects to the OpenConnect Server Physical Unit specified by PUname. The PUname, Physical Unit name, is the fourth parameter of the controller (C) parameter line in the *sna_cfg* file. Requires the **-o** option.
-v or -V	Displays the version string in the Console window.
-?	Displays the usage statement in the Console window.
-formfeed	Instructs the terminal emulator to send form feed characters to the printer, instead of line feed characters. You should specify this option if the Set Vertical Format command is included in the printer data stream. The printer data stream might include page lengths greater than 66 lines. Line feeds allow the printer to print the additional lines on the proceeding page. However, the beginning printing of the next page is positioned near the middle of the current page (below the previous page's overflow). Specifying the **-formfeed** option allows print lines to break at the end of a page so that pages can be printed correctly.
-nlprint	Forces blank lines to print when using the print screen function

Using the Console Window

The *Console* is a useful tool to see what is happening with the network computer. Messages, such as a confirmation that a file was located or that a command generated an error, are sent to this window. In addition, many of the 3270 and 3179G command line options, such as **-keycodes**, write information to the *Console*. You must explicitly open and close the Console window through the *Client Launcher*.

Opening the Console Window

The Console window is a valuable tool to see messages being generated by the network computer. You can display this window at any time.

To open the Console window:

1. Select Console from the *Client Launcher*. If you need a refresher on the terminology used in these procedures, refer back to the *Terminology and Conventions* section in the Preface.

The Console Window appears on your screen.

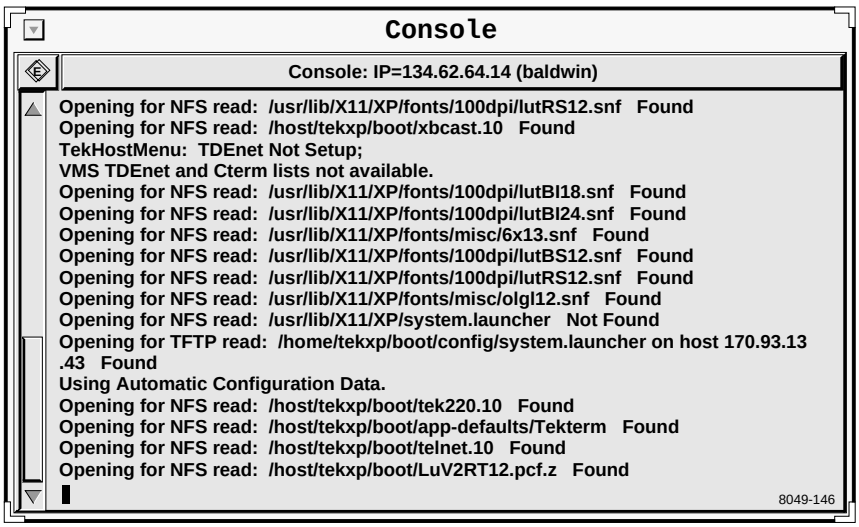

Figure 1-1. Console Window.

The network computer's address and name (if defined) appear on the title bar. You cannot add or delete information from the Console. This window is updated whenever a confirmation or error message is received by the network computer.

Using the Console Window

Often there is more information available than will fit in the Console window. Since the Console window cannot be resized, use the methods listed below to view additional information. You can also copy and paste information from the Console to a command window.

- To display the previous screen of messages:

  Position the mouse pointer in the scroll bar anywhere above the slider box and click the Select (left) button.

- To display the next screen of messages:

  Position the mouse pointer in the scroll bar anywhere below the slider box and click the Select (left) button.

- To scroll through the messages one line at a time:

  Position the mouse pointer on the up or down arrow (on the scroll bar) and click the Select (left) button once for each line.

- To clear the contents of the Console window:

  Click on the Erase icon. The Console scrolls to just below the last line of information. Drag the slider box up to view the Console information.

- To copy information from the Console window and place it in the Console buffer:

  Position the mouse pointer on the first character to copy and click the Select (left) button. Drag the mouse to the last character to copy. The selected text is highlighted.

- To paste information from the Console buffer into a window:

  Position the mouse pointer in the window where you want to paste the information and click the Menu (middle) button. Information can be pasted in Telnet, Cterm, Lat, and xterm windows.

Closing the Console Window

1. Select Console from the *Client Launcher*.

The Console Window disappears from your screen.

Chapter 2

Using the Features

There are numerous 3270/3179G/3287 features. This chapter focuses on features that may differ between your applications and your 3270/3179G/3287 sessions.

- Working with text and graphic Cursors
- Copying and Pasting Text
- Using the Mouse as a Lightpen
- Using the Keyboard
- Using Record and Playback
- Printing

Working with Cursors

There are two types of cursors: *graphic* and *text*. Both are similar to the cursors used on an IBM 3179G terminal.

The *graphic* cursor appears as an arrow until it is activated by a host application. When activated, it appears as a white cross. Use the mouse to move the cursor. When the graphic cursor is activated, use the mouse buttons as specified by the application. Refer to Table 2-1 for other button functions.

You can use the Alternate Cursor key to change the cursor to a green cross. If your keyboard does not have an Alternate Cursor key, refer to Appendix A: *snatermkey OCSid Values* for alternate keystrokes.

The *text* cursor shows the current position within a field. Refer to Table 2-1 for mouse button functions. To move the cursor:

- Position the mouse pointer in the desired field.
- Press and hold Shift-Menu mouse button.
- Release Shift-Menu button.

The text cursor is automatically disabled in these situations:

- The HELP screen is displayed.
- You are prompted for a key function, such as Exit.

You can use the Alternate Cursor key to select an underline or a block cursor. If your keyboard does not have an Alternate Cursor key, refer to Appendix A: *snatermkey OCSid Values* for alternate keystrokes. You can start a session with the **-blockcursor** command described in Chapter 1, *Getting Started*.

Table 2-1 Cursor Types and Mouse Button Functions.

	Normal			Shifted		
Mouse Pointer	**Select**	**Menu**	**Custom**	**Select**	**Menu**	**Custom**
Arrow	Copy	Paste	[a]Select lightpen field		Moves 3270 text cursor to the position you choose	†Identifies lightpen fields with an *
White or Green Cross			Reset			

a. These buttons are only active if lightpen emulation is enabled.

Copying and Pasting Text

There are three methods you can use to copy and paste text:

- *Primary Selection Buffer* (window to window). This method uses the mouse to copy and paste text between the 3270 window and other client windows.
- *Clipboard Selection Buffer* (window to window). This method uses the keyboard to copy and paste information between the 3270 window and other client windows in an OPENLOOK environment, such as Open Windows.
- *tek3270* **-clipboard** *Option* (window to clipboard). This method is used to copy and paste information between the 3270 window and the clipboard buffer.

Primary Selection Buffer

This is the most common method to copy and paste text between the 3270 window and other client windows, such as a *Telnet* or *Cterm* window.

NOTE: The Primary Selection Buffer is designed to copy and paste text. Unpredictable results occur if you try to copy and paste graphics.

To copy text:

1. Position the mouse pointer at the first character you want to select.
2. Drag the mouse pointer across the characters (the text becomes highlighted). Release the mouse button at the end of the last character to be selected. The selected text is copied to the Primary Selection Buffer.
3. To turn off the highlighting, position the mouse pointer in the window and click the mouse button.

To paste text:

1. Position the mouse pointer where you want to paste the text.
2. Click the Menu mouse button to paste the text.

Clipboard Selection Buffer

This method uses the keyboard to copy and paste information between the 3270 window and other client windows in an OPENLOOK environment, such as Open Windows.

> ***NOTE: If the X-Copy and X-Paste key functions are not on your keyboard, refer to*** Appendix A: *snatermkey OCSid Values* ***for alternate keystrokes.***

To copy text:

1. Select the text you want to copy.
2. Press X-Copy to copy the selected text to the Clipboard Selection Buffer.

To paste text:

1. Position the mouse pointer where you want to paste the text.
2. Press X-Paste to paste the text.

Clipboard Command Option

This method uses the mouse to copy and paste information between the 3270 window and other client windows via the Clipboard Selection Buffer. To use the Clipboard Selection Buffer, start your session with the **-clipboard** option:

xpsh -display *term_name***:***0* **tek3270** *hostname* **-clipboard**

To copy text:

1. Position the mouse pointer at the first character you want to select.
2. Drag the mouse pointer across the characters (the text becomes highlighted). Release the mouse button at the end of the last character to be selected. The selected text is copied to the Clipboard Selection Buffer.
3. To turn off the highlighting, position the mouse pointer in the window and click the mouse button.

To paste text:

1. Position the mouse pointer where you want to paste the text.
2. Click the Menu mouse button to paste the text.

Using Lightpen Emulation

This feature uses the mouse in place of a lightpen for mainframe applications that normally require a lightpen. It is started with the **-lightpen** command option. The Lightpen feature supports two types of fields: *selection* and *attention*. Table 2-2 shows the designator characters that appear for the fields.

Table 2-2 Lightpen Emulation Features.

Designator Character	Field Type	Meaning
?	Selection	Not selected
>	Selection	Selected
&	Attention	Enter key AID (X'7D') sent to host
Space or NULL	Attention	Lightpen Attention AID (X'7E') sent to host

Lightpen Fields

When the **-lightpen** option is on, the mouse pointer appears as an arrow when a lightpen field is on the screen. To identify the lightpen fields, press and hold the Shift-Custom mouse button. An asterisk (*) is displayed near each lightpen field. To select a lightpen field:

- Position the mouse pointer in the field (while holding Shift-Custom button). Release Shift-Custom button. Click the Custom button.
- To select additional fields, position the pointer in the field and click the Custom button.

Using the Keyboard

There are many keyboards available for your network computer. You may have a 3270 keyboard, a 101/102 keyboard, or one of several other choices. Regardless of the specific keyboard, the Tek3270 and Tek3179G sessions can emulate all standard IBM 3270 key functions and the following features:

- Cursor Movement Keys (Table 2-3)
- Editing Keys (Table 2-4)
- Special Function Keys (Table 2-5)
- Extended Feature key functions (Table 2-6)

Your key functions might be mapped to keystrokes other than the default keys listed in the tables. If your keystrokes do vary, you can add them to the right column of each table for easy reference. For more information, refer to Chapter 3: *Customizing the Sessions* for keyboard mapping information. As an added reference, Appendix A: *snatermkey OCSid Values* lists the default keystrokes and the OCSids for each 3270 key function.

NOTE: Refer to Terminology and Conventions in the Preface for usage details about the Alt, Ctrl, and Esc keys.

Table 2-3 Cursor Movement Keys.

3270 Key Function	Default Keystrokes	Description	Your Keystrokes
Fast Down	Shift-↓	Move down at double speed	
Fast Left	Shift-←	Move left at double speed	
Fast Right	Shift-→	Move right at double speed	
Fast Up	Shift-↑	Move up at double speed	
Back Tab	Shift-Tab	Move to beginning of previous field	
Down	↓	Move down one line	
Home	Esc-O	Move to first unprotected field	
Left	←	Move left one character	
Right	→	Move right one character	
Tab	Tab	Move to beginning of next field	
Up	↑	Move up one line	

Table 2-4 Editing Keys.

3270 Key Function	Default Keystrokes	Description	Your Keystrokes
Delete	Delete	Deletes the current character (must be an unprotected field).	
Backspace	Backspace	Deletes the previous character. You cannot delete a field attribute.	
Dup	Ctrl-d	Stores a Dup character in the display buffer to indicate the remainder of the field is a duplicate operation. Moves either to the next unprotected field (formatted screen) or to row 1, column 1 (unformatted screen).	
Erase EOF	Esc-e-f	Deletes all the characters from the current position to the end of the field.	
Erase Input	Esc-e-i	Clears all unprotected fields and resets the MDT (Modified Data Tag) bit to zero. Moves to the first unprotected field.	
Field Mark	Ctrl-k	Stores a Field Mark character (;) in the display buffer to indicate where a field (unformatted buffer) or subfield (formatted buffer) ends.	
Insert	Ctrl-u	Toggles insert mode off and on. The Reset key also exits insert mode.	
New Line	Ctrl-j	Move to first unprotected character of next line.	

Table 2-5 Special Function Keys.

3270 Key Function	Default Keystrokes	Description	Your Keystrokes
Alternate Cursor	Esc-t	Selects the cursor type. For a text cursor, the choice is block or underline. For a graphic cursor (**+Cr** displayed at the bottom of the display) Tek3179G users can choose either a white or green cross.	
Attention	Esc-a-Enter	Sends a PA1 key signal to the host (if you used the **-o** command option).	
Clear	Esc-z	Clears the display.	
Cursor Select	Esc-c-Enter	Performs lightpen input from the keyboard (fields must be lightpen detectable).	
Enter	Enter	Sends data to the IBM host.	
Graphic Cursor	Esc-g	Selects the cursor type. For a graphic cursor (**+Cr** displayed at the bottom of the display) Tek3179G users can choose either a white or green cross. For a text cursor, the choice is block or underline.	
PA1 PA2 PA3	Esc-a-1-Enter Esc-a-2-Enter Esc-a-3-Enter	Communicates with application programs (the PA3 key function does not operate on all IBM systems).	

Table 2-5 Special Function Keys. (Continued)

3270 Key Function	Default Keystrokes	Description	Your Keystrokes
PF1 PF2 PF3 PF4 PF5 PF6 PF7 PF8 PF9 PF10 PF11 PF12 PF13 PF14 PF15 PF16 PF17 PF18 PF19 PF20 PF21 PF22 PF23 PF24	F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 Shift-F1 Shift-F2 Shift-F3 Shift-F4 Shift-F5 Shift-F6 Shift-F7 Shift-F8 Shift-F9 Shift-F10 Shift-F11 Shift-F12	Sends function information to an application program. These keys change depending on the application you run.	
Reset	Ctrl-a	Unlocks the keyboard if the keyboard is disabled by an INHIBIT operation.	

Table 2-6 Extended Feature Key Functions.

3270 Key Function	Default Keystrokes	Description	Your Keystrokes
Cancel	Ctrl-x	Cancels an incomplete key sequence.	
Exit	Esc-x-x	Exits the emulator.	
Help	Esc-h	Displays the help screen. Press Space for additional help. Press Help or Enter to exit from help and return to the prompt. Pressing any other key exits you from help and echoes the entered keystroke at the prompt.	
Repaint	Esc-r	Updates the displayed information.	
X-Copy	L6 or F16	Copies highlighted text.	
X-Paste	L8 or F15	Pastes copied text at the cursor position.	
Zoom	Esc-m	Expands the current window to fill the screen.	

Using Record and Playback

Keystrokes can be captured to an ASCII file that can be played back to your display. This is useful for often-repeated keyboard sequences. Each key you press is recorded as follows:

- Alphanumeric keys are echoed. If you press A, an `A` is added to the file.
- Special keys, such as IBM 3270 keys, are recorded as a TERMKEY OCSid (\xx). A backspace keystroke is shown as `\BS` in the recorded file. Refer to Appendix A: *snatermkey OCSid Values* for a list of values.
- A series of keys, such as ABCEnterPauseF appear as `ABC\EN\pUF`.

Carriage returns in the file are not processed during playback. The emulator inserts a carriage return after each 78 characters.

Table 2-7 Record and Playback Feature Keys.

3270 Key Function	Default Keystrokes	Description	Your Keystrokes
Erase Recording	Esc-E	Deletes a keystroke sequence file.	
Pause	Esc-U	Toggles pause. If used during recording, it inserts a Pause in the keystroke sequence file. During play, Pause is used to resume playback.	
Play	Esc-P	Play the recorded file. Press Pause to resume playback if a pause occurs.	
Quit Record/Play	Esc-Q	Abort recording and erase the file. Enter the keystrokes (during play) to stop playing the recorded keystrokes.	
Record	Esc-R	Toggles keystroke recording.	
Repeat Play	Esc-Y	Replay the last file played.	

Recording to a File

This procedure automatically records keystrokes to a file stored locally in the network computer's memory, or on the host using NFS. It is important to understand that local files are erased when the network computer is powered off.

If you do not have a Record key, refer to Table 2-5 for default keystrokes or keystrokes you have mapped for 3270 functions. To record keystrokes:

1. Press the Record key function. The following prompt appears:

   ```
   Record - Enter name: _
   ```

2. Enter the filename you want to use. When specifying a name, you can enter a path and name to create and save the file on the host using NFS. This file can then be played again. If you do not specify a path with the name, the file is saved in the network computer's memory and is erased when the network computer is powered down. If you do not enter an extension, *.rec* is used as the default.

   An **R** appears at the bottom of the display to indicate you are recording.

3. Enter your keystrokes. In addition to your keystrokes, there are two instances where you must use the Pause function:

   - If you need to input data, such as a filename, press Pause to temporarily halt the recording. Enter the data, and press Pause to continue recording.
   - If you use an AID key, press Pause to allow the host to display a response. After the response, press Pause to continue recording. If you do not use a Pause, the Playback function exits after the AID key is played back.

   When Pause is toggled on, a **P** appears at the bottom of the display.

4. Press the Record key function. The **R** indication disappears.

To stop the recording and delete the file, press the Quit Record/Play function.

Playing a File

You can play local files or host files with the Playback function. If you do not have a Play key, refer to Table 2-5 for default keystrokes or keystrokes you have mapped for 3270 functions. To play a file:

1. Press the Play function. The following prompt appears:

   ```
   Play - Enter name:_
   ```

2. Enter the file name that contains the recorded keystrokes. If you do not enter an extension, *.rec* is used. To play a local file stored in the network computer's memory, enter the filename. To play a file located on the host, enter the path and file name, or place the file in one of the directories used in the search path. The emulator attempts to resolve the path name in the following order, executing the first file it finds:

   - Searches the host for the optional path name specified with the file name.
   - Searches the recording directory specified by the **-record** command line option, if it was used when the emulator was started.
   - Searches the recording directory specified by the environment variable TEK3270RECORD_DIR.
   - Searches the recording directory specified by the REC006 entry in the *snatext* file.
   - Searches the network computer local memory.

   A **P** appears at the bottom of the display to indicate Playback.

3. If you encounter a pause during playback, another P appears at the bottom of the display to indicate a pause. If this occurs:

   - Type the required information and wait for the host response or for any inhibit messages to disappear from the bottom of the display.
   - Press the Pause function to resume playback.

To stop the playback, press the Quit Record/Play function.

Printing

Two types of printing are supported:

- DSC (3270 Data Stream Compatible)
- SCS (SNA Character String)

DSC Printing (LU type 3)

DSC printing can be formatted or unformatted. For example, the DSC printer can be used with IBM CICS or TSO application subsystems.

Formatted printing suppresses lines that consist only of null characters, attribute characters, and characters in nondisplay fields. The printed image is reduced because of null line suppression (i.e., all null characters are bypassed); the printout may not look exactly like the screen. In formatted printing, the EBCDIC characters CR (hexadecimal 0D), NL (hexadecimal 15), and EM (hexadecimal 19) are ignored and printed as spaces.

In *unformatted* printing, CR and NL characters in the stream control when a line ends. These are not processed if they are in nonprint fields. An EM character terminates the printing and is followed by a new line in preparation to start the next print job. Unformatted printing on a 3287 has an automatic new line at the end of the physical line, position 132. Unformatted printing does not suppress null lines.

The FF (form feed) character is printed as a space. When the FF character is received in a print stream, it is ignored and printed as a < character, unless the FF character is found in the first position of a line and is in a displayable field. A valid FF also results in one space being printed on the first line of the new form. FF characters may occur in either formatted or unformatted printing. The software emulates the FF by sending a \f (hexadecimal 0C) ASCII character to the printer. This assumes that the printer itself or the spooling program performs the appropriate page eject.

SCS Printing (LU Type 1)

An SCS printer can be used by application subsystems (IBM IMS or CICS). The terminal emulator translates 3270 datastreams to ASCII print jobs that are sent to the ASCII printer.

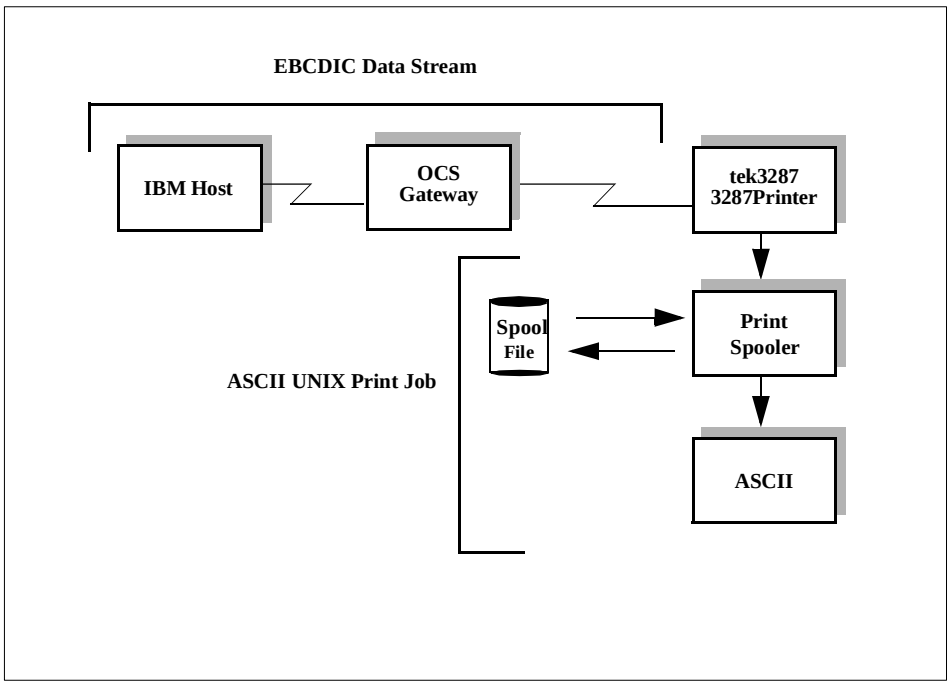

Figure 2-1 SCS Printing.

SCS datastreams are sent from the host to the emulator in EBCDIC character format. The terminal emulator accepts the SCS datastream by performing two operations: emulating a 3287 printer (for CSC printing) and translating the SCS datastream to ASCII character format. Table 2-8 provides the SCS control codes that are emulated when the terminal emulator receives a datastream.

An SCS datastream includes page formatting information, such as margins, page length, and tab stops. The terminal emulator uses only the printer's basic formatting features for reproducing the SCS datastream formatting. For example, the terminal emulator uses spaces in the associated ASCII print job to emulate a datastream's SCS tab stop.

> ***NOTE: Normally, line density and page length setting emulation for most of your printing should not cause printing problems. However, some datastreams might include these settings for printing with preprinted forms. If this occurs, be sure that the appropriate forms are correctly loaded and aligned in the printer.***

Because many UNIX print spoolers can issue an appropriate prompt for printing form changes, you might have to specify a separate print command string.

Table 2-8 SCS Printer Control Codes.

Code	EBCDIC Value	Function	Comments
BS	16	Backspace	Sends \b
BEL	2F	Bell	Sends hexadecimal 07
CR	0D	Carriage Return	Sends \f and spaces to the left margin
ENP	14	Enable Presentation	No operation
FF	0C	Form Feed	Sends appropriate number of \n and spaces to the left margin
HT	05	Horizontal Tab	Sends appropriate number of spaces
INP	24	Inhibit Presentation	No operation
IRS	1E	Interchange Record Separator	Sends \n and spaces to the left margin
LF	25	Line Feed	Sends \n and spaces to the current column
NL	15	New Line	Sends \n and spaces to the left margin
SHF	2BC1	Set Horizontal Format	
SLD	2BC6	Set Line Density	Ignored
SVF	2BC2	Set Vertical Format	
TRN	35	Transparent	
VCS	04XX	Vertical Column Select	Sends appropriate number of \n and spaces to the current column
VT	0B	Vertical Tab	Sends appropriate number of \n and spaces to the current column
GE	08	Graphic Escape	Unsupported, causes error report to the host
SA	28	Set Attribute	Unsupported, causes error report to the host

Using Separate Printing Translation

During printer emulation, the printcap file is used to override the default EBCDIC-to-ASCII translation for data sent to the printer. The printcap file is an ASCII file that you can modify by using a text editor.

Printcap File

The default printcap file is specified by the DEV002 entry in the *snatext* file. The default is */tekxp/boot/usascii/printcap*. You must create a printcap file in this directory, or change the value of the *sntext* DEV002 entry.

The format for entering a printcap file entry is shown in the following example.

```
# Comments
printer:\
values:
```

- Lines beginning with a pound sign are comments. You can position comments before and after printcap entries—not within them. A backslash (\) at the end of a line indicates that the entry continues on the next line. In addition, each printcap entry corresponds to a specific printer (printer:\).

- The *values* parameter describes how to override the default EBCDIC-to-ASCII table. The format for the values parameter is as follows:

  ```
  ebcdic=ascii
  ```

  The EBCDIC string is two hexadecimal digits (A through F must be upper case) that specifies the EBCDIC character to be translated. The ASCII string is text that describes the string to be sent to the printer. Non-printable characters must be specified as a backslash, followed by three octal digits. For example, the following printcap file entry maps the 0xC9 EBCDIC value to the 0x7C ASCII value for a printer labeled lp1:

  ```
  # printcap entry for lp1
  lp1:\
  C9=\174:
  ```

Specifying the Print Spooler

Printing data streams can be directed (through the terminal emulator) to the printer location of your choice. The default print spooler is *lp*. This value is controlled by the PRT001 entry in the *snatext* file, the SPOOLER environment variable, the spooler X resource or the -s command line option.

Print Security

Several security considerations are inherent in spooled printing. In many implementations of print spooling, the temporary files used by the print command string can be accessed by other users for only an instant. Unauthorized users can view or modify the data that is to be printed. This is a general problem with most multi-user computer systems; similar security vulnerabilities exist both on the host side and with other local applications. You should consider data accessibility in your system's security.

Chapter 3

Customizing the Sessions

Customization is done by changing the values of various parameters used in a session. In Chapter 1, command line options were used to customize a single session. This chapter details how to set up your environment so every session you start is exactly as you want it.

The following topics are described in this chapter:

- Specifying session parameters
  - Default values
  - File settings (*snatermkey* and *snatext* files)
  - Environment variables
  - X resources
- Specifying keyboard settings
  - Mapping the keyboard
  - Linking *snatermkey* entries
  - Specifying typeahead buffering
- Specifying monitor settings
  - Terminal color
  - Extended highlighting
  - International characters
  - Decimal character
- Specifying fonts
  - In the X resource file
  - On the command line
  - In the snatext file

Specifying Session Parameters

Parameters can be specified by one or more methods. If duplication occurs, the last assigned value is the value that is used. For example, if a value is set in both the *snatermkey* file and X resource file, the value in the X resource file is used. This list shows the methods and order used to set parameters:

- *Default Values* are the values preset at the factory. No customization.
- *File Settings* are stored and retrieved from the *snatext* and *snatermkey* files. These are system files that are read for all sessions on all network computers.
- *Environment Variables* are variables set up and used for your sessions. They are typically set in an individual startup file, such as your *.login* file. They affect all sessions you start on your network computer.
- *X Resources* are variables set up and used for all network computer sessions. They can be set at both the system level to affect all user sessions and at the individual user level to affect only your sessions.
- *Command Line Options* are specified on the command line when you start a session. They only affect the single session you are starting.

All of the methods change the parameter values, it is mainly the *scope* of the method that changes. For example, file settings affect everyone's 3270/3179G sessions, whereas X resources in your *.Xdefaults* file only affect your sessions.

File Settings

There are two system files used to control 3270/3179G/3287 sessions:

- *snatermkey* file contains parameters for keyboard mappings, color, highlighting, international character definitions and other terminal settings.
- *snatext* file specifies message text and session initialization.

Using the *snatermkey* File

Keyboard mapping, color, highlighting, international character definitions and other terminal settings are stored in the *snatermkey* file. A sample file is in the default *snatermkey* directory: */tekxp/boot/<language>/snatermkey*. If you have your own *snatermkey* file in a different location, us the TERMKEY environment variable or an X resource setting to specify the path. For example:

```
setenv TERMKEY = /usr/mydir/snatermkey
```

or, in an X resource setting:

```
tek3270.termkey:/usr/mydir/snatermkey
```

NOTE: The snatermkey and snatext files may only be accessible to your system administrator.

Comment lines begin with a pound sign (#) can be inserted before or after file entries but not within entries.

The TERMX environment variable sets the terminal type each time you log on to a system. Your terminal type is determined by your keyboard. For example, if you have a network computer with a 3270 keyboard, the type is *tekxp-3270*. Likewise, *tekxp-101* refers to a network computer with a 101 keyboard.

Each terminal type must have a corresponding definition in the *snatermkey* file. For example, if the terminal type is *tekxp*-3270 (`TERMX=tekxp-3270`), an entry labeled *tekxp-3270* is referenced in the *snatermkey* file.

```
#tekxp-3270 Entry
tekxp-3270:\
ku=\013=Cursor Up:\
kd=\012=Cursor Down:\
kl=\010-Cursor Left:\
kr=\014=Cursor Right:\
BS=\377=Use left arrow:\
DL=\033W=Delete:\
FM=\006=Control F:\
EN=\034<0><Control_R>=Enter/Ctrl:\
NL=\012=\^j:\
NL=\015=Carriage Return:\
```

If an undefined TERMX variable is specified, a warning message is displayed and the session uses the default values.

NOTE: Refer to** Mapping the Keyboard **in this chapter for information on adding snatermkey entries.

Using the *snatext* File

The *snatext* file specifies the message text and session initialization used by the emulator. This file can be customized for your environment, however do not change the number or the order of the entries. A sample file is provided in the default *snatext* directory: */tekxp/boot/<language>/snatext*. If your *snatext* file is in a different location, use the SNATEXT environment variable in an X resource to specify the new path. For example:

```
setenv SNATEXT = /usr/mydir/snatext
```

or, in an X resource setting:

```
tek3270.snatext:/usr/mydir/snatext
```

NOTE: The snatermkey and snatext files may only be accessible to your system administrator.

The format for *snatext* file entries is:

```
#ID
length,message
```

- *#ID* is a comment line identifying the entry
- *length* is for internal use only. Do not change the length value.
- *message* is either the text to be displayed or an initialization string

To change the message text for an entry, edit the *snatext* file and change the appropriate message. The following example illustrates changing the message for the CRT011 entry:

Before editing:

```
# CRT011
77,Are you sure you want to exit? (y/n):
```

After editing:

```
# CRT011
77,Enter y(es) or n(o) to exit this session. (y/n):
```

NOTE: The number of lines in the snatext file and the order of the entries should not be changed.

Environment Variables

Environment variables are used to set values for specific parameters. Environment variables can be entered at a prompt or placed in a start up file, such as your *.login* file in your login directory. They are effective until you end your session. Table 3-1 lists the available environment variables

Table 3-1 Environment Variables.

Environment Variable	Usage
DISPLAY	Specifies the X Window System display server
TEK3270RECORD_DIR	Specifies path for keystroke recording files
PRINTCAP	Specifies full path name or string for *printcap* information
PRINTER	Specifies name of the *printcap* entry to use during printer emulation
TERMX	Specifies type of keyboard in use. Use a TERMX entry in the *snatermkey* file only if using a custom keymapping file.
TERMKEY	Specifies full path name for the *snatermkey* file
SNATEXT	Specifies full path name for the *snatext* file
SPOOLER	Specifies command string for spooling print output during printer emulation
XAPPLRESDIR	Specifies the X application resource directory
XENVIRONMENT	Specifies the file name for X resource definitions

NOTE: The TERMX variable must be used to set your 3270/3179G session terminal type. The TERM variable probably appears in your startup file to control your normal UNIX sessions, but does not affect your 3270/3179G sessions.

X Resource Definitions

Your network computer uses the X Window System environment. This means that the standard *X resources* are available to customize and configure your session.

X resources can be defined in one or more resource files. The files are read in the order listed:

- *Tek3270* — This file is in the */tekxp/boot/<language>/app-defaults* directory. To locate it in a different directory, move the file and set the XAPPLRESDIR environment variable to point to the new location.
- *Resource Manager String* property or *.Xdefaults* — X resources can be defined in the X server by using the **xrdb** command. If no *Resource Manager String* is found, the *.Xdefaults* file (contained in your home directory) is used.
- A file specified by the XENVIRONMENT environment variable — XENVIRONMENT can be used to specify a file of X resource definitions. If XENVIRONMENT is not set, the *.Xdefaults-<terminal_name>* file in your home directory is used.

If a resource is defined in multiple files, the last definition is the one that is used. For example, if an X resource is defined in both the *Tek3270* file and the *.Xdefaults* file, the definition from the *.Xdefaults* file is used, as it was the last one read.

Specifying an X Resource

An X resource definition is generally composed of three parts:

- application name (*tek3270*) followed by a period (.)
- the resource (such as *background*) followed by a colon (:)
- the assigned value (such as *light grey*)

For example, the following X resource sets the background color to light grey:

```
tek3270.background:light grey
```

Each X resource is specified on a separate line. The following tables show the available X resources. For in-depth information about X resources, refer to the X Window System documentation.

Resource Listings

The following tables list X Resources that can be used in your sessions:

- Visual attributes (Table 3-2)
- Session configuration (Table 3-3)
- Input and cursor options (Table 3-4)
- File and directory specifications (Table 3-5)

NOTE: In the following tables, description items enclosed in parentheses () indicate other places where the parameter can be set, such as the snatermkey file, or as a command line option.

Table 3-2 Visual Attribute Resources.

Resource Name	Class	Value	Description
background	Background	X color name	Uses X color name for background
3270black 3270red 3270green 3270yellow 3270blue 3270pink 3270turquoise 3270white	3270Black 3270Red 3270Green 3270Yellow 3270Blue 3270Pink 3270Turquoise 3270White	X color name	Uses X color names for 3270 logical colors; operable only on color X displays. (*snatermkey* file)
nocolor	Nocolor	True or False	Uses black and white, regardless of type of display detected.
font0 font1 font2 font3 font4 font5 font6 font7 font8 font9	Font0 Font1 Font2 Font3 Font4 Font5 Font6 Font7 Font8 Font9	X fontname	Specifies fonts for window scaling. (**-fn** command option or MTK012 *snatext* file entry)

Table 3-2 Visual Attribute Resources. (Continued)

Resource Name	Class	Value	Description
fnmerge	Fontmerge	True or False	Allows command line fonts to merge with those specified via the snatext file and/or the resource files.
snaptofont	Snaptofont	True or False	Resizes window automatically for new font sizes. (**-snap** command option)
clipboard	Clipboard	True or False	Uses clipboard buffer in place of Primary Selection Buffer for copying and pasting text. Used for compatibility with some X clients. (**-clipboard** command option)
invertselect	Invertselect	True or False	Uses a high contract background color to make it easier to read highlighted text. This option is designed for monochrome network computers, or for use with the nocolor resource. (**-invert** command option)
geometry	Geometry	X geometry string	Sets initial window geometry (**-geometry** command option)
title	Title	string	Sets initial window state (**-title** command option, MTK013 *snatext* file entry)
iconify	Iconify	True or False	Sets initial window state (**-iconify** command option)
iconic	Iconic	True or False	Sets initial window state (**-iconic** command option)

Table 3-2 Visual Attribute Resources. (Continued)

Resource Name	Class	Value	Description
ig	Ig	X geometry string	Sets initial icon geometry (**-ig** command option)
ib	Ib	bitmap filename	Sets icon bitmap file (**-ib** command option)
in	In	string	Sets icon label text (**-in** command option)

Table 3-3 Session Configuration Resources.

Resource Name	Class	Value	Description
host	Host	string	Host name for the session connection. (**-h** command option)
protocol	Protocol	T or O	Protocol used for the host connection, T=TN, O=SNA. (**-o**, **-t** command options, MTK011 *snatext* file entry)
port	Port	Port number	Port number used for session connection to the TELNET service for TN protocol. (**-P** command option, MTK011 *snatext* file entry)
termtype	Termtype	string	TN terminal type negotiation string. (**-T** command option)
nvt	Nvt	True or False	NVT emulation; True turns on NVT emulation; False turns off NVT emulation. (**-nvt** command option)
puname	Puname	string	PU name used for connection to the OpenConnect Server Gateway for SNA protocol. (**-c** command option)

Table 3-3 Session Configuration Resources.

Resource Name	Class	Value	Description
luname	Luname	string	Connects to OpenConnect Server Logical Unit specified by LUname
lunumber	Lunumber	LU number	LU number used for connection to the OpenConnect Server Gateway for SNA protocol. (**-l** command option)
model	Model	2, 3, 4, or 5	Sets 3270 model emulation. (**-m** command option)
termx	Termx	string	Specifies terminal/keyboard type. (TERMX environment variable)
enable3472	Enable3472	True or False	Enables IBM 3472 terminal emulation. (**-3472** command option)

Table 3-4 Input and Cursor Option Resources.

Resource Name	Class	Value	Description
lightpen	Lightpen	True or False	Enables lightpen emulation. (**-lightpen** command option)
blockcursor	Blockcursor	True or False	Displays text cursor as a block cursor; default is an underline. (**-blockcursor** command option)
spooler	Spooler	string	UNIX print command for print output (-s command line option, SPOOLER environment variable)
typeahead	Typeahead	True or False	Enables typeahead buffering (**-ta** | **-nota** command option, MTK022 *snatext* file entry)

Table 3-4 Input and Cursor Option Resources.

Resource Name	Class	Value	Description
tek3270	ex3287	True or False	Printed lines to include more than 132 characters during 3287 printer emulation. Tab stops can be set beyond column number 132.
nlprint	nlprint	True or False	Prints blank lines when doing a Print Screen. (**-nlprint** command option)
3270blink	3270Blink	True or False	Specifies whether true blinking is used for fields with the blinking attribute, or whether fields are underlined in Red.
blockcopy	Blockcopy	True or False	Sets the text copy-paste mode to block mode.

Table 3-5 File and Directory Specification Resources.

Resource Name	Class	Value	Description
snatext	Snatext	string	Specifies path and file name of *snatext* file. (SNATEXT environment variable)
termkey	Termkey	string	Specifies path and file name of *snatermkey* file. (TERMKEY environment variable, DEV001 *snatext* file entry)
printcap	Printcap	string	Specifies path and filename of *printcap* file (DEV002 snatext file entry)
recorddir	Recorddir	string	Specifies path name of recording file directory. (**-record** command line option, REC006 *snatext* file entry)

Specifying Keyboard Settings

This section describes the following keyboard setting information:

- Mapping the keyboard is used to map key sequences to 3270 functions
- Linking *snatermkey* entries sets up common information for all keyboards
- Specifying typeahead buffering enables typeahead during a Wait state

Mapping the Keyboard

Key mappings are already included with your network computer so most keyboards can be used without modification. To map keys, edit the *snatermkey* file and define new mappings for your keyboard type. Map the keysym or ASCII keystrokes to specific 3270 functions used by your applications. Here are some lines from the tekxp-101(network computer with 101-key keyboard) *snatermkey* entry:

```
tekxp|tekxp-101:\
CL=\034<0><KP_Enter>=Keypad Enter:\
NL=\034<0><Linefeed>=Line Feed:\
K1=\034<0><Prior>=Page Up/Prev Scrn:\
```

For non-ASCII keystrokes: the \034 indicates it is an X keysym; the <0> indicates *normal* state (<1> = *Shift*, <2> = *Caps Lock*, <4 > = *Ctrl*, < 8> = *Alt*); and <*xxx*> is the keysym name (for example: <Linefeed>).

The format for the entries is:

OCSid=keystrokes[=helptext]

OCSid	Identifies the 3270 key function to perform. For example, the **CL** OCSid represents the Clear key. Refer to Appendix A: *snatermkey OCSid Values* for a listing of OCSid values.
keystrokes	Identifies the octal value of the keysym or the ASCII keystrokes generated when keys are pressed. For example, Esc-!-E is listed as \033\041\105. You must use the backslash (\) as part of the octal value. Details on finding the octal values is on page 3-14.
helptext	Describes the key mapping. This information is used for the keystroke description on the help screen. For DL, *Delete* would be displayed on the help screen.

There are several methods you can use to obtain the octal values:

- Use the chart in Appendix C to find the value based on the ASCII key.
- Use the **-keycodes** command option when you start a session. This option displays the octal value in the Console window for each key you press. Refer to Table 1-1 in Chapter 1: *Getting Started,* for further information.
- Use the shorthand notation (Table 3-6) for common ASCII characters. For example, with shorthand notation, the sequence Esc-!-E is DL=\E!E.

Table 3-6 Shorthand Notations for snatermkey Entries.

Shorthand Notation	Description (equivalent octal value)
\E	Escape (\033)
\^	Caret (\136)
\\	Back slash (\134)
\n	New line (\012)
\r	Enter (\015)
\t	Tab (\011)
\b	Back space (\010)
\f	Form feed (\014)

You can map multiple key sequences to a single 3270 key function. In this example, pressing any of the key sequences (Esc-?-E, Esc-!-E, Esc-@-E, Esc-#-E, Esc-*-E) would bring up the Help function:

```
# Example entry tekxp-101:\
hK=\E?E=ESC?E:\
hK=\E!E=ESC!E:\
hK=\E@E=ESC@E:\
hK=\E#E=ESC#E:\
hK=\E*E=ESC*E:
```

Linking snatermkey Entries

The *snatermkey* entries are used depending on the TERMX environment variable representing your network computer type and keyboard. Many keyboard settings may be common to all the entries. To simplify the keyboard mapping task, these common settings are set in a single entry, and linked to other entries. This builds a *snatermkey* file for families of terminals.

For example, common information is in the *tekxp-common* entry. This entry is linked to the keyboard specific (*tekxp-101* for this example) entries with the **tc=term** command:

```
tekxp|tekxp-101:\
CL=\034<0><KP_Enter>=Keypad Enter:\
eF=\034<0><End>=End:\
NL=\012=\^j:\
NL=\034<0><Linefeed>=Line Feed:\
K1=\034<0><Prior>=Page Up/Prev Scrn:\
K2=\034<0><Next>=Page Down/Next Scrn:\
tc=tekxp-common:
```

When the *tekxp-101* values are linked to the *tekxp-common* values, the *tekxp-101*entry becomes a superset of the *tekxp-common* entry. The network computer uses both the *tekxp-common* and the *tekxp-101* entry values.

Specifying Typeahead Buffering

Typeahead buffering means that you can enter information even if the WAIT indicator is showing on the display. Keystrokes you enter are not immediately displayed, but they are captured into a buffer. When the WAIT indicator disappears, the keystrokes in the typeahead buffer are displayed.

The typeahead buffer is controlled through the command line options when the window is started or with the MTK022 entry in the *snatext* file.

To specify typeahead buffering on the command line, use the **-ta** option to enable the buffer or the **-nota** option to disable the buffer.

To specify typeahead buffering in the *snatext* file, the MTK022 entry is set to *T* (true) to enable the buffer, or *F* (false) to disable the buffer. The following example enables buffering:

```
#MTK022
#T (true) or F (false) as to whether typeahead is enabled.
1,T
```

Monitor Settings

You can change settings to customize how your monitor displays information:

- Terminal color
- International characters
- Decimal character

Assigning Terminal Colors

If you have a color monitor, you can use OCSids in the *snatermkey* file to assign colors. The format in the *snatermkey* file is:

```
OCSid=color_value[=helptext]
```

OCSid	Specifies the color to use. Refer to Table A-3 in Appendix A: *snatermkey OCSid Values* for the color OCSids.
color_value	Specifies an X color name. For example, to change *orange* to *white*: `cW=orange=X orange mapped to 3270 white`
helptext	Describes the color name. This is used as the color description on the help screen.

Specifying International Character Values

You can display international characters during a session by overriding the default ASCII-to-EBCDIC and EBCDIC-to-ASCII translations with an entry in the *snatermkey* file for your terminal type. Up to 512 international values can be specified. The format for international characters is:

```
char=\[keystrokes]=[helptext]=\bytes
```

char	Specifies the two hexadecimal digits (A through F must be uppercase) for the EBCDIC character to be translated. For example, the hexadecimal value for the ñ character is 49.
keystrokes	Identifies the keystrokes you press on your keyboard to generate *char*. For example, \033N is the *keystrokes* value for the key sequence Esc-N.
helptext	Describes the keystrokes. This information is displayed on the help screen.
bytes	Identifies the bytes sent to your terminal for generating the desired character when the terminal emulator receives the *char* parameter. *bytes* is specified by a backslash followed by three octal digits. If *bytes* specifies a printable character, the character is used.

Here is a sample entry line to map the EBCDIC ñ character to the key sequence Esc-N (361 is the octal value for the ASCII ñ character):

```
49=\033N=Esc N for the ñ character=\361
```

Specifying the Decimal Point Character

In the *snatermkey* file, you can specify an alternate character (instead of the default period) as the decimal point in numeric fields. The format is:

```
DP=char
```

DP	Indicates the decimal point function.
char	Specifies the character to be displayed.

This sample entry line specifies a comma character as the decimal point:

```
DP=,:
```

Fonts

Fonts can be specified in three places: The X resource file, the command line, and in the snatext file.

- In the X resource file, assign font0 through font9 to the fonts you want to use. Font0 is always read first, followed by 1through 9. Assign the font you want to use by default to font0.
- In the command line, use the **-fn** command followed by the font name, for example, -fn *fontname*
- In the snatext file, add fonts to the line following the text:

  `#Default list of X fonts separated by spaces`.

  Enter the font names.

If font0 through font9 are not assigned to fonts in the X resource file, then the emulator uses the font specified in the command line. If no font is specified in the command line, then the emulator uses the fonts specified in the snatext file.

For information about the X resource file, refer to the topic *X Resource Definitions* earlier in this chapter. For information about command line options, refer to Chapter 1. For information about the snatext file, refer to the topic *Using the snatext File* earlier in this chapter.

Appendix **A**

snatermkey OCSid Values

This appendix contains OCSid values for the *snatermkey* file.

- Table A-1—OCSid values for 3270 key functions
- Table A-2—OCSids for extended feature key functions
- Table A-3—OCSid values for color

Table A-1 OCSid Values for 3270 Keys.

3270 Key Function	Default Keystrokes	OCSid
Alternate Cursor	Esc-t	aC
Attention	Esc-a-Enter	AT
Back Tab	Shift-Tab	BT
Clear	Esc-z	CL
Cursor Select	Esc-c-Enter	cS
Delete	Delete	DL
Down	↓	kd
Dup	Ctrl-d	DU
Enter	Enter	EN
Erase EOF	Esc-e-f	eF
Erase Input	Esc-e-i	EI
Field Mark	Ctrl-k	FM
Graphic Cursor	Esc-g	GC
Home	Esc-O	kh
Insert	Ctrl-u	IN

Table A-1 OCSid Values for 3270 Keys. (Continued)

3270 Key Function	Default Keystrokes	OCSid
Left	←	kl
New Line	Ctrl-j	NL
PA1	Esc-a-1-Enter	K1
PA2	Esc-a-2-Enter	K2
PA3	Esc-a-3-Enter	K3
PF1	F1	P1
PF2	F2	P2
PF3	F3	P3
PF4	F4	P4
PF5	F5	P5
PF6	F6	P6
PF7	F7	P7
PF8	F8	P8
PF9	F9	P9
PF10	F10	PA
PF11	F11	PB
PF12	F12	PC
PF13	Shift-F1	PM
PF14	Shift-F2	PN
PF15	Shift-F3	PO
PF16	Shift-F4	PP
PF17	Shift-F5	PQ
PF18	Shift-F6	PR

Table A-1 OCSid Values for 3270 Keys. (Continued)

3270 Key Function	Default Keystrokes	OCSid
PF19	Shift-F7	PS
PF20	Shift-F8	PT
PF21	Shift-F9	PU
PF22	Shift-F10	PV
PF23	Shift-F11	PW
PF24	Shift-F12	PX
Reset	Ctrl-a	RE
Right	→	kr
System Request	Esc-q	SY
Tab	Tab	TB
Up	↑	ku

Table A-2 OCSid Values for Extended Feature Key Functions.

Extended Feature Key Functions	Default Keystrokes	OCSid
Back space	Backspace	BS
Cancel	Ctrl-x	CN
Erase Recording	Esc-E	dE
Exit	Esc-x-x	Ex
Fast Down	Shift-↓	fd
Fast Left	Shift-←	fl
Fast Right	Shift-→	fr
Fast Up	Shift-↑	fu
Help	Esc-h	hK

Table A-2 OCSid Values for Extended Feature Key Functions. (Continued)

Extended Feature Key Functions	Default Keystrokes	OCSid
Pause	Esc-U	pU
Play	Esc-P	PY
Print Screen	Esc-p	pR
Quit Record/Play	Esc-Q	QU
Record	Esc-R	RC
Repaint	Esc-r	rP
Repeat Play	Esc-Y	RP
X-Copy[a]	L6 or F16	XC
X-Paste[*]	L8 or F18	XP
Zoom	Esc-m	mW

a. The X-Copy and X-Paste mappings are defaults for the UNIX and Sun V keyboards. No default mapping is provided on other keyboards.

Table A-3 OCSid Values for Color.

OCSid	Meaning
cR	Red
cG	Green
cY	Yellow
cB	Blue
cP	Pink
cT	Turquoise
cW	White

Appendix **B**

Window Format

When you start an application in a 3270 or 3179G session window, most of the window is used as the *application program area*. At the bottom of the screen, status information is displayed in the *operator information area*. Messages and codes that appear in this area correspond to the various icons and symbols used on an actual IBM terminal. This appendix describes the differences.

Messages and codes appear within designated fields. The field numbers are illustrated in Figure B-1. The codes are grouped by field number, and described in Table B-1.

IBM equivalents and meanings of these messages are included in the tables. Entries marked with an asterisk (*) indicate messages that only appear if you used the **-o** command option.

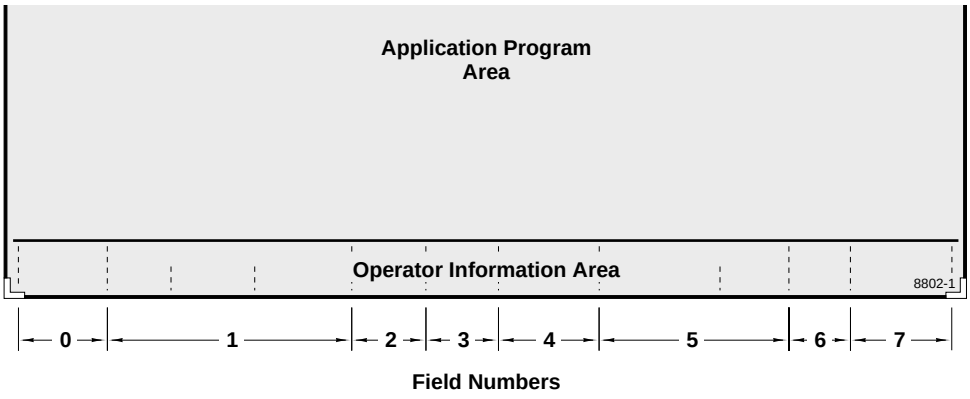

Figure B-1 Operator Information Area Message Fields.

Appendix B

Table B-1 Operator Information Area Messages (by Field Number).

Message	Corresponding IBM Symbol	Description
Field 0		
UNOWNED	?	The UNIX workstation is connected to the emulator process, but not to an IBM SNA or TCP/IP host application subsystem or System Services Control Point (SSCP).
INACTIVE	None	The emulator is both ready for operation and in emulation mode, and is waiting for an IBM host connection.
CMD	None	PC File Transfer commands are entered.
PLU*		The UNIX workstation is communicating with an IBM host application subsystem.
SSCP*	Stick Figure	The UNIX workstation is communicating with the SSCP.
TEST	TEST	The IBM host is in the test mode.
Field 1		
WAIT	X and Clock	The keyboard is locked. The host is busy processing the last command typed in from the keyboard. Time is required by the IBM host to perform this function or task.
INHIBIT	X	The keyboard is locked.
SYSTEM	X SYSTEM	The keyboard is disabled by the IBM host. Wait for the IBM host to re-enable; otherwise, enter the Reset key function.
WHAT?	X ? +	The IBM host does not accept the operation. Enter the Reset key function and try the operation again.
NOT HERE	X <– Stick Figure–>	Operator action was attempted that was invalid for the screen location. Enter the Reset key function.

Table B-1 Operator Information Area Messages (by Field Number). (Continued)

Message	Corresponding IBM Symbol	Description
TOO MUCH	X Stick Figure–>	Operator entry exceeded field length. Enter the Reset key function.
NUMERIC	X Stick Figure NUM	Non-numeric data is entered in a numeric field. Enter the Reset key function.
BAD KEY TRANSLATION	X – S	This entry is not recognized. Enter the Reset key function.
UNAUTH	X symbol for Printer Not Working	A printer is not assigned to the UNIX workstation. Enter the Reset key function.
PRT FAIL*	X symbol for Printer Not Working	The printer assigned to the UNIX workstation is not working or is powered down. Enter the Reset key function.
PRT BUSY*	X symbol for Printer and single Clock	The printer assigned to the UNIX workstation is busy. A copy of the screen is being sent to the printer spooler.
PRT VBUSY*	X symbol for Printer and two Clocks	The printer assigned to the UNIX workstation is in another session with the IBM SNA or TCP/IP host. Additional time is needed for the print request to be accepted.
Field 2		
SCRD	None	The emulator is in the Continuous-Screen-Copy-to-Disk feature mode. The Continuous- Screen-Copy-to-Disk feature is activated and can be used until it is disabled.
PRTD*	None	The emulator is in the Printer to Disk mode. Data coming from the IBM host, intended for the printer, is rerouted to a disk file.
Field 3		
R	R	Keystroke recording is active.

Table B-1 Operator Information Area Messages (by Field Number). (Continued)

Message	Corresponding IBM Symbol	Description
R p	R P	Keystroke recording is active but currently paused.
P	P	Keystroke playback is active.
P p	P P	Keystroke playback is paused. Enter the Pause key function to resume playback.

Table B-1 Operator Information Area Messages (by Field Number). (Continued)

Message	Corresponding IBM Symbol	Description
Field 4		
CAP	Large Up Arrow	Caps lock is on.
UPLD	None	The emulator is in the Upload to Host mode and is ready to upload a file to the host.
UPLDN	None	The emulator is in the Upload Toggle mode (a file is being uploaded to the host).
Field 5		
>4*nn*<	X PROG4*nn*	A programming error was detected in the IBM host data. Enter the Reset key function. If the problem occurs again, exit and start a session; contact the System Administrator.
MCHK *nnn*	X symbol for Machine *nnn*	The UNIX workstation is not working properly. The *nnn* variable defines the probable cause of the Machine Check. Enter the Reset key function.
SENDING	None	PC File Transfer send operation is in progress. This message clears when the operation completes or if the command has been aborted (by entering the Attention key function). See “ATTN STRUCK” in this table.
RECEIVING	None	PC File Transfer receive operation is in progress. This message clears when the operation completes normally or if the command has been aborted (by entering the Attention key function. See “ATTN STRUCK” in this table.
ATTN STRUCK	None	During PC File Transfer, the Attention key function has been pressed and the Send (or Receive) operation is in the abort process. This message clears when the IBM host successfully terminates the abort operation.

Table B-1 Operator Information Area Messages (by Field Number). (Continued)

Message	Corresponding IBM Symbol	Description
NO COMM	None	There is a communication problem between the IBM host and the OpenConnect Server. Enter the Reset key function.
END OF FILE	None	During the Upload-to-Host operation, the file being uploaded to the host has been processed completely.
>5*nn*<	X symbol for Bad Communication	The communication link with the IBM host is bad. Enter the Reset key function. If the problem occurs again, exit and start a new session; contact the System Administrator.
Field 6		
INS	^	The keyboard is in insert mode. A character can be inserted at the cursor location.
+Cr	+Cr	The Alternate Cursor key function changes the appearance of the graphic cursor. Enter the Graphic Cursor key function to change the shape of the alphanumeric cursor.
Field 7		
*aaaaaaa**	None	A print operation is in progress; the *aaaaaaa* variable represents the spooler. This message displays concurrently with the PRT BUSY message in Field 1.
PRT *nnn**	Symbol for Printer *nnn*	The UNIX workstation is authorized to use the printer identified by LU *nnn*.
PFAIL *nnn**	Symbol for Printer Failure *nnn*	The printer (identified by LU *nnn*) stopped printing information from the UNIX workstation.

Appendix **C**

ASCII Character Equivalence Chart

B7 B6 B5 / Bits B4 B3 B2 B1	0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
	Control		Numbers Symbols		Uppercase Symbols		Lowercase Symbols	
0 0 0 0	0 NU NUL 0 0	20 DL DLE 16 10	40 SP 32 20	60 0 48 30	100 @ 64 40	120 P 80 50	140 ` 96 60	160 p 112 70
0 0 0 1	1 SH SOH 1 1	21 D1 DC1 17 11	41 ! 33 21	61 1 49 31	101 A 65 41	121 Q 81 51	141 a 97 61	161 q 113 71
0 0 1 0	2 SX STX 2 2	22 D2 DC2 18 12	42 " 34 22	62 2 50 32	102 B 66 42	122 R 82 52	142 b 98 62	162 r 114 72
0 0 1 1	3 EX ETX 3 3	23 D3 DC3 19 13	43 # 35 23	63 3 51 33	103 C 67 43	123 S 83 53	143 c 99 63	163 s 115 73
0 1 0 0	4 ET EOT 4 4	24 D4 DC4 20 14	44 $ 36 24	64 4 52 34	104 D 68 44	124 T 84 54	144 d 100 64	164 t 116 74
0 1 0 1	5 EQ ENQ 5 5	25 NK NAK 21 15	45 % 37 25	65 5 53 35	105 E 69 45	125 U 85 55	145 e 101 65	165 u 117 75
0 1 1 0	6 AK ACK 6 6	26 SY SYN 22 16	46 & 38 26	66 6 54 36	106 F 70 46	126 V 86 56	146 f 102 66	166 v 118 76
0 1 1 1	7 BL BEL 7 7	27 EB ETB 23 17	47 ´ 39 27	67 7 55 37	107 G 71 47	127 W 87 57	147 g 103 67	167 w 119 77
1 0 0 0	10 BS 8 8	30 CN CAN 24 18	50 (40 28	70 8 56 38	110 H 72 48	130 X 88 58	150 h 104 68	170 x 120 78
1 0 0 1	11 HT 9 9	31 EM 25 19	51) 41 29	71 9 57 39	111 I 73 49	131 Y 89 59	151 i 105 69	171 y 121 79
1 0 1 0	12 LF A 10	32 SB SUB 26 1A	52 * 42 2A	72 : 58 3A	112 J 74 4A	132 Z 90 5A	152 j 106 6A	172 z 122 7A
1 0 1 1	13 VT B 11	33 EC ESC 27 1B	53 + 43 2B	73 ; 59 3B	113 K 75 4B	133 [91 5B	153 k 107 6B	173 { 123 7B
1 1 0 0	14 FF C 12	34 FS 28 1C	54 , 44 2C	74 < 60 3C	114 L 76 4C	134 \ 92 5C	154 l 108 6C	174 | * 124 7C
1 1 0 1	15 CR D 13	35 GS 29 1D	55 - 45 2D	75 = 61 3D	115 M 77 4D	135] 93 5D	155 m 109 6D	175 } 125 7D
1 1 1 0	16 SO E 14	36 RS 30 1E	56 . 46 2E	76 > 62 3E	116 N 78 4E	136 ^ 94 5E	156 n 110 6E	176 ~ 126 7E
1 1 1 1	17 SI F 15	37 US 31 1F	57 / 47 2F	77 ? 63 3F	117 O 79 4F	137 _ 95 5F	157 o 111 6F	177 DT DEL RUBOUT 127 7F
	Addressed Commands	Universal Commands	Listen Addresses		Talk Addresses		Secondary Addresses or Commands	

KEY octal 20 / DL DLE / 10 16 hex — graphic representation, mnemonic, decimal

* ¦ on some keyboards or systems

8618-1

Appendix C

Appendix **D**

EBCDIC Translation

The 3270/3179G software includes features that convert data format conversion (ASCII-to-EBCDIC or EBCDIC-to-ASCII). Data conversion allows your network computer's components and the network to communicate properly. The terminal emulator converts data formats, depending on the data source or destination.

- Table D-1 lists data conversion values for character sent to your monitor. The data is converted from EBCDIC to display codes (usually ASCII).
- Table D-2 lists data conversion values for characters sent from the keyboard. The data is converted from ASCII to EBCDIC
- Table D-3 lists data conversion values for characters sent to the printer. The data is converted from EBCDIC to ASCII.

NOTE: You can substitute values for the default character values in the tables. For example, you can substitute international character values for the values shown. (For additional information about international characters, see Specifying International Character Values in this guide.)

Appendix D

Table D-1 Terminal Emulation Default EBCDIC-to-Display Code Conversion.

hexa-decimal EBCDIC code	hexadecimal display (ASCII code)															
00 to 0F	20	20	20	20	20	09	20	20	20	20	20	20	0c	0d	20	20
10 to 1F	20	20	20	20	20	0a	20	20	20	19	20	20	2a	20	3b	20
20 to 2F	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
30 to 3F	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
40 to 4F	20	20	20	20	20	20	20	20	20	20	5b	2e	3c	28	2b	7c
50 to 5F	26	20	20	20	20	20	20	20	20	20	21	24	2a	29	3b	5e
60 to 6F	2d	2f	20	20	20	20	20	20	20	20	7c	2c	25	5f	3e	3f
70 to 7F	20	20	20	20	20	20	20	20	20	60	3a	23	40	27	3d	22
80 to 8F	20	61	62	63	64	65	66	67	68	69	20	20	20	20	20	20
90 to 9F	20	6a	6b	6c	6d	6e	6f	70	71	72	20	20	20	20	20	20
A0 to AF	20	7e	73	74	75	76	77	78	79	7a	20	20	20	5b	20	20
B0 to BF	20	20	20	20	20	20	20	20	20	20	20	20	20	5d	20	20
C0 to CF	7b	41	42	43	44	45	46	47	48	49	20	20	20	20	20	20
D0 to DF	7d	4a	4b	4c	4d	4e	4f	50	51	52	20	20	20	20	20	20
E0 to EF	5c	20	53	54	55	56	57	58	59	5a	20	20	20	20	20	20
F0 to FF	30	31	32	33	34	35	36	37	38	39	20	20	20	20	20	20

Table D-2 Terminal Emulation ASCII to EBCDIC Conversion.

hexa-decimal ASCII keyboard code	hexadecimal EBCDIC buffer															
00 to 0F	00	00	00	00	00	00	00	00	00	05	15	00	0c	0d	00	00
10 to 1F	00	00	00	00	00	0a	00	00	00	19	00	00	1c	00	1e	00
20 to 2F	40	5a	7f	7b	5b	6c	50	7d	4d	5d	5c	4e	6b	60	4b	61
30 to 3F	f0	f1	f2	f3	f4	f5	f6	f7	f8	f9	7a	7b	7c	7e	6e	6f
40 to 4F	7c	cl	c2	c3	c4	5	c6	c7	c8	c9	d1	d2	d3	d4	d5	d6
50 to 5F	d7	d8	d9	e2	e3	e4	e5	e6	e7	e8	e9	ad	e0	bd	5f	6d
60 to 6F	79	81	82	83	84	85	86	87	88	89	91	92	93	94	95	96
70 to 7F	97	98	99	a2	a3	a4	a5	a6	a7	a8	a9	c0	4f	d0	a1	00
80 to 8F	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
90 to 9F	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
A0 to AF	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
B0 to BF	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
C0 to CF	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
D0 to DF	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
E0 to EF	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
F0 to FF	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00

Appendix D

Table D-3 Terminal Emulation EBCDIC to ASCII Conversion.

hexa-decimal EBCDIC code	hexadecimal ASCII printer code															
00 to 0F	00	00	00	00	00	09	00	00	00	00	00	00	0c	0d	00	00
10 to 1F	00	00	00	00	00	0a	00	00	00	19	00	00	2a	00	3b	00
20 to 2F	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
30 to 3F	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
40 to 4F	20	00	00	00	00	00	00	00	00	00	5b	2e	3c	28	2b	7c
50 to 5F	26	00	00	00	00	00	00	00	00	00	21	24	2a	29	3b	5e
60 to 6F	2d	2f	00	00	00	00	00	00	00	00	7c	2c	25	5f	3e	3f
70 to 7F	00	00	00	00	00	00	00	00	00	60	3a	23	40	27	3d	22
80 to 8F	00	61	62	63	64	65	66	67	68	69	00	00	00	00	00	00
90 to 9F	00	6a	6b	6d	6e	6f	70	71	72	00	00	00	00	00	00	00
A0 to AF	00	7e	73	74	75	76	77	78	79	7a	00	00	00	5b	00	00
B0 to BF	00	00	00	00	00	00	00	00	00	00	00	00	00	5d	00	00
C0 to CF	7b	41	42	43	44	45	46	47	48	49	00	00	00	00	00	00
D0 to DF	7d	4a	4b	4c	4d	4e	4f	50	51	52	00	00	00	00	00	00
E0 to EF	5c	00	53	54	55	56	57	58	59	5a	00	00	00	00	00	00
F0 to FF	30	31	32	33	34	35	36	37	38	39	00	00	00	00	00	00

Appendix **E**

Troubleshooting

If you have trouble with your terminal emulator, check the settings to make sure the terminal emulation is operating properly:

- Make sure the 3270/3179G option is enabled for your X terminal. The *Console* message *tek3270: Tek3270 Option not installed* means the correct authorization key has not been entered. Option authorization keys are sent separately from the X terminal. Instructions for entering the authorization key are include in the option letter.
- Make sure the TERMX environment variable's value is set to the *snatermkey* file's entry for your keyboard type. Refer to the *Environment Variables* section in Chapter 3.
- Make sure you are using the correct *snatermkey* file pathname. Refer to the *Using the snatext file* section in Chapter 3.
- Check the keyboard mapping values for your terminal type. Refer to the *Mapping the Keyboard* section in Chapter 3.
- If you do not get any response when you press the Enter key, try starting your session with the **-crlf** option.

The following sections describe status and error messages and their codes:

- Communication Check Codes

  Communication check codes and their messages for the tek3270 commands
- Tek3270 or Tek3179G Error Messages

  Common error messages that might appear when you use either the tek3270 or tek3179g command
- Machine Check Error Codes

  Machine check codes that might appear when you use the tek3270 or tek3179g command

Appendix E

Communication Check Codes

The following lists the communication check codes and their corresponding messages for the tek3270 or tek3179g commands.

Table E-1 Communication Check Codes.

Code Number	Message
504	The communication link between the host and the OpenConnect Server is disrupted (e.g., the channel is down, the LU is varied inactive, the LU is not defined to the PU). The 504 code automatically resets when the communication link is established.
520	No valid SDLC frames have been received in the past 30 seconds. Verify the operational status of the communication network. Enter the Reset key function. The 520 code automatically resets upon receipt of any valid frame or poll address to the OpenConnect Server.

Tek3270 or Tek3179G Error Messages

These error messages can appear during a 3270 or 3179G session. Message segments labeled *Workstation error message* are generated by the TCP/IP host, not the emulator. See your host documentation for additional information.

tek3270 | tek3179g *— LU request process timeout (aaaaaa)*

An error occurred when the tek3270 or tek3179g command was entered. The *aaaaaa* variable represents one of the following error conditions:

- FATAL — The OpenConnect Server software has timed out while it attempts to issue an LU request that is unrecognizable. The error indicates a OpenConnect Server software problem.

  Action: Reenter the tek3270 or tek3179g command and contact OpenConnect Systems Customer Support if the problem continues.

- CLOSE — The OpenConnect Server software is unresponsive to a request for stopping an LU from the Terminal Emulator process in the allotted time. After displaying this message, the tek3270 or tek3179g command process continues with the shutdown procedures.

  Action: Terminate the LU session from the OpenConnect Server. Then, check the status of the OpenConnect Server with the use of *sna_status*.

- LUOPEN — The OpenConnect Server software is unresponsive to a request for starting an LU from a Terminal Emulator process in the allotted time. After displaying this message, the tek3270 or tek3179g process continues with the shutdown procedures.

  Action: Reenter the tek3270 or tek3179g command. If the error continues, contact your System Administrator.

tek3270 | tek3179g *— No available LUs of proper type*

There are unavailable LUs of the requested type.

Action: Wait until an LU of the proper type is available, then reenter the command. If the error persists, ask your System Administrator to verify that all 3270 or 3179G LUs are active. In addition, the OpenConnect Server configuration should match the configuration of the IBM host.

tek3270 | tek3179g *— Requested hostname (host) not found in internet host table*

The emulator is unable to find the specified host in the internet host table.

Action: Enter the host in the internet host table, or use the ip address.

tek3270 | tek3179g *— Requested LU unavailable*

The requested LU is unavailable for use.

Action: Reenter the tek3270 or tek3179g command with another LU number (without an LU number), or wait until the desired LU is available.

tek3270 | tek3179g *— Requested LU type is inconsistent with configuration*

The error indicates you are attempting to start an LU process (under an LU number) that is incorrectly configured.

Action: Use another LU number; otherwise, you can allow the system to assign the next available LU. If the LU number is configured improperly, your System Administrator can change the configuration file as desired. Then, you can restart the Terminal Emulator process by reentering the tek3270 or tek3179g command.

tek3270 | tek3179g *— Signal received (So*cket *connection lost)*

Interrupted connection between the TCP/IP host and the OpenConnect Server.

Action: Reenter the tek3270 or tek3179g command. If the problem persists, check the TCP/IP processes for problems.

tek3270 | tek3179g *— System error (aaaaaa on socket failed): [Workstation error message]*

The error can occur when the emulator is attempting to send or receive a packet (*aaaaaa*) through the connection between the TCP/IP host and the OpenConnect Server. An error indication is returned by the TCP/IP interface that has additional information about the reason for the error. The most common cause for the error is that the connection between the TCP/IP host and the OpenConnect Server has been lost.

Action: Reenter the tek3270 or tek3179g command. If the problem persists, check the TCP/IP processes and the OpenConnect Server status.

tek3270 | tek3179g *— System error (Connect on socket failed): [Workstation error message]*

The TCP/IP host is failing to connect with the OpenConnect Server through the TCP/IP interface. The UNIX error message contains additional information about the cause of the failed connection. The most common error is "Connection timed out" error indicating that the OpenConnect Server is down, the internet address is wrong, or that the physical connection between the TCP/IP host and the OpenConnect Server is bad.

Action: After you correct the error, reenter the tek3270 or tek3179g command.

tek3270 | tek3179g *— System error (Select on input fds failed): [Workstation error message]*

The tek3270 or tek3179g process has issued a poll of the connection between the TCP/IP host and the OpenConnect Server. The poll request has returned an invalid file descriptor (the file is nonexistent or cannot be opened).

Action: Reenter the tek3270 or tek3179g command

tek3270 | tek3179g *— System error (Socket creation failed): [Workstation error message]*

The emulator is attempting to create a communication endpoint (i.e., socket) on the TCP/IP host. The request has failed and the error indication appears. The most common cause is that the version and release of the product is not compatible with the TCP/IP version and release.

Action: Check the product versions and releases and reenter the command.

tek3270 *— Bad error value from tgetent, rc=n*

The emulator attempted to find the terminal name in the *snatermkey* file, based on the TERMX environment variable. The *rc* variable represents the return code; *n* represents the value returned. If *n* is -1, the *snatermkey* file is unopenable. If n is equal to 0, the terminal name does not have an entry in the *snatermkey* file. (The message is stored in the *snatext* file.)

Action: Check read permissions on the snatermkey file (*n* = -1); add an entry for the X terminal in the snatermkey file (*n* = 0).

Appendix E

Machine Check Error Codes

Most machine check error messages are produced by internal OpenConnect processing errors. If errors persist, make the following information available for the OpenConnect Support Representative:

- Record procedures to recreate the problem.
- Record the machine check number, filename, and line number next to the error message.
- Record the version and release information of the product in question.
- Supply any further pertinent information such as files, screen prints, JCL, etcetera.

The following machine check error codes take place between the OpenConnect Server and the TCP/IP host.

Table E-2 Machine Check Codes and Messages.

Code Number	Message
8	An invalid LU session type was returned in the Information Message (IFMSG) unit, from the Control Unit
68	In validating the Information Message (IFMSG) unit from the Control Unit, a status line update request was found formatted incorrectly.
70	In validating the Information Message (IFMSG) unit from the Control Unit, the request code from the Control Unit was found invalid.
76	In validating the Information Message (IFMSG) unit from the Control Unit, a Function Management Data (FMD) request was found formatted incorrectly.
79	In validating the Information Message (IFMSG) unit from the Control Unit, the response code from the Control Unit was found invalid.
201	The Control Unit returned an invalid response to an LU open (LU session start-up request).
203	The Control Unit returned a negative response to an LU close (LU session shutdown request). Enter sna_status to determine if the LU session was actually closed by the Control Unit. *The 203 machine check* error code is a non-internal error.
204	The Control Unit returned a negative response to an system request (SYSREQ).

Table E-2 Machine Check Codes and Messages. (Continued)

Code Number	Message
205	The Control Unit returned an invalid response to a request for a process state change. This usually occurs when a keystroke has been detected, a reset, or an attention is attempted.
207	The Control Unit returned a negative response to a previous Control Unit request.
208	The Control Unit returned a negative response to a request for a process state change. This usually occurs when a keystroke has been detected, a reset, or an attention is attempted.
220	While sending an LU response to the Control Unit, the response subprocessor was passed an invalid response format.
256	An invalid LU number was received in the Information Message (IFMSG) unit from the Control Unit.
260	While queuing or dequeuing the Information Message (IFMSG) unit, the LU session state was found invalid for this operation.
261	The 261 machine check error can appear under the following conditions: 1) An invalid request code was received from the Control Unit; and 2) While sending an LU write request to the Control Unit, the LU write request subprocessor encountered an invalid chain code.
267	An invalid response code was returned by the Control Unit.
777	While updating the command screen during a PC File Transfer operation, the transfer report subprocessor was passed an invalid process code.
830	While processing a Write Structured Field (WSF) request and sending a positive or negative response, an error occurred while sending an Information Message (IFMSG) unit to the Control Unit.
831	While processing a Write Structured Field (WSF) request and sending a response, the WSF response subprocessor was passed an invalid response code.
836	While processing a Write Structured Field (WSF) request and sending a queried response to a Read Partition Query structured field request, an error occurred while sending an Information Message (IFMSG) unit to the Control Unit.
838	While processing a Write Structured Field (WSF) request, the 3270 Data Stream structured field subprocessor dispatched a non-3270 Data Stream structured field.
839	While processing a Write Structured Field (WSF) request, the Read Partition Query structured field subprocessor was dispatched a non-Read Partition Query structured field.

Table E-2 Machine Check Codes and Messages. (Continued)

Code Number	Message
840	While processing a Write Structured Field (WSF) request, an error occurred while processing the request message during Write Structured Field (WSF) initialization.
841	While processing a Write Structured Field (WSF) request, an invalid return code was returned from the WSF subprocess handler.
845	While processing a Write Structured Field (WSF) request, an error was encountered.
900	The process has run out of internal buffers.
901	In validating the Information Message (IFMSG) unit, the size of the message unit was found invalid.
902	There was an internal processing assertion failure.
903	While processing a WRITE command 3270 data stream, the write command subprocessor found an invalid device type in the Information Message (IFMSG) unit.
950	An invalid hostlock (indicating terminal state) value was encountered.
951	An invalid iiplock (indicating printer state) value was encountered.
960	The retries were exhausted processing an Information Message (IFMSG) unit from the Control Unit.
980	While formatting an Information Message (IFMSG) unit and associated Message Units (MUs), the message formatter subprocessor failed to establish a buffer from the IFMSG or the buffer manager.
995	While receiving an Information Message (IFMSG) unit, the message receive subprocessor failed to establish a buffer from the buffer manager.
996	While unformatting an Information Message (IFMSG) unit and associated Message Units (MUs), the message unformatter subprocessor failed to establish a temporary IFMSG from the temporary buffer queue.