

G3270 Terminal Emulation

User Guide

Document Version 1.1
December 2000

Copyright © GCOM, Inc.
All rights reserved.

© 1995-1998 GCOM, Inc. All rights reserved.

Non-proprietary—Provided that this notice of copyright is included, this document may be copied in its entirety without alteration. Permission to publish excerpts should be obtained from GCOM, Inc.

GCOM reserves the right to revise this publication and to make changes in content without obligation on the part of GCOM to provide notification of such revision or change. The information in this document is believed to be accurate and complete on the date printed on the title page. No responsibility is assumed for errors that may exist in this document.

Rsystem is a registered trademark of GCOM, Inc. Macintosh is a registered trademark of Apple Computer, Inc. FrameMaker is a trademark and registered trademark of Frame Technology Corporation. UNIX is a registered trademark of UNIX Systems Laboratories, Inc. in the U.S. and other countries. SCO is a trademark of the Santa Cruz Operation, Inc. IBM PC, IBM PC/AT and PC DOS are registered trademarks of International Business Machines Corporation. All other brand product names mentioned herein are the trademarks or registered trademarks of their respective owners.

Any provision of this product and its manual to the U.S. Government is with "Restricted Rights": Use, duplication or disclosure by the U.S. Government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at 252.227-7013 of the DoD FAR Supplement.

This manual was written, formatted, illustrated, indexed, and produced by Senior Technical Writer Scott D. Smith using Microsoft Word 5.1 and FrameMaker 4.04 and 5.0 on an Apple Macintosh platform. The source material was gathered by interviewing subject matter specialist Bob Crownover. Additional art work including the binder was produced by publication specialist Charles Lipp using Adobe Illustrator and Aldus PageMaker.

This manual was printed in the U.S.A.

FOR FURTHER INFORMATION

If you want more information about GCOM products, contact us at:

GCOM, Inc.
1800 Woodfield
Savoy, IL 61874
(217) 351-4241
FAX: (217) 351-4240
e-mail: support@gcom.com
homepage: <http://gcom.com>



GCOM is committed to the conservation of America's natural resources.

C *ontents*

Preface

PREFACE	vii	<i>About This Guide</i>
	vii	Purpose
	vii	Organization of This Guide
	viii	Conventions Used in This Guide
	viii	Special Notices
	viii	Text Conventions
	ix	Control vs. Escape Key Sequences

Chapter 1	11	<i>Getting Started</i>
	11	Understanding This Product
	12	Technical Requirements
	12	Operator Messages Support
	13	Starting a Session
	14	Ending a Session
	14	EBCDIC Character Representation

Chapter 2	15	<i>Keyboard Mapping</i>
	15	Special Key Combinations
	16	3270-to-ASCII Keyboard Mapping

Appendix A	21	<i>Messages</i>
	22	Termination Messages
	24	Operator Information Area (OIA) Messages
	24	WAIT Messages
	26	RESET Messages



About This Guide

Purpose

This document describes how to use the G3270 Terminal Emulator product in GCOM's NPI/SNA product line.

Organization of This Guide

The following table shows the organization of this manual and tells you where to find specific information.

<i>For information about:</i>	<i>Look at:</i>
Getting started using G3270, which includes: Overview of G3270 Terminal Emulator software Technical requirements Operator messages support Starting and ending a session	Section 1
3270-to-ASCII keyboard mapping	Section 2
Termination messages Operator Information Area (OIA) messages (WAIT and RESET)	Appendix A

Conventions Used in This Guide

This section discusses conventions used throughout this guide.

Special Notices

A special format indicates notes, cautions and warnings. The purpose of these notices is defined as follows:



Note: *Notes call attention to important features or instructions.*



Caution: *Cautions contain directions that you must follow to avoid immediate system damage or loss of data.*



Warning! *Warnings contain directions that you must follow for your personal safety. Follow these instructions carefully.*

Text Conventions

The use of italics, boldface and other text conventions are explained as follows:

- | | |
|-----------------------|--|
| Boldface terms | Directories and file names appear in boldface typeface, such as the <i>hstpar.h</i> include file. Highlighted terms inside angle brackets refer to the global copy of the file. For instance, <intsx25.h> refers to <i>/rsys/include/intsx25.h</i> . |
| <i>Italic</i> terms | The following terms appear in <i>italics</i> : variables, arguments, parameters, fields, structures, glossary terms, routines, functions, programs, utilities, applications, flags, commands, and scripts. Examples include the <i>count</i> variable, <i>Command Type</i> field, <i>rteparam</i> structure, <i>Rsystem</i> defined term, <i>rsys_read()</i> routine, <i>avail</i> flag, <i>Add Route</i> command, and <i>gcomunld</i> script. |
| “Enter” vs. “Type” | When the word “enter” is used in this guide, it means type something and then press the Return key. Do not press Return when an instruction simply says “type.” |

Screen Display

This `typeface` is used to represent displays that appear on a terminal screen and in-line programming language statements such as `#ifdef`. Commands entered at the prompt use the same typeface only in boldface. For example:

```
C:> cd gcom
% cd gcom
# cd gcom
```

Each of these commands instructs you to enter “cd gcom” at the system prompt and press Return or Enter.

Control vs. Escape Key Sequences

Control key sequences are considered one keystroke (indicated by a dash between the keys) because you hold Control down while pressing the related key, such as Control-H. *Escape key sequences* are considered two or more keystrokes (indicated by a comma between the keys), because you must press and release Escape before pressing the next key, such as Esc, &.

Examples

Control-H	Press and hold down the Control key while pressing “H”.
Esc, &	Press and release the Escape key and then press and release the “&” key.

1

Getting Started

Understanding This Product

GCOM's G3270 Terminal Emulator software product, shown in Figure 1, emulates an IBM 3278-2 type terminal. It uses the NPI/SNA driver to communicate with a remote SNA host.

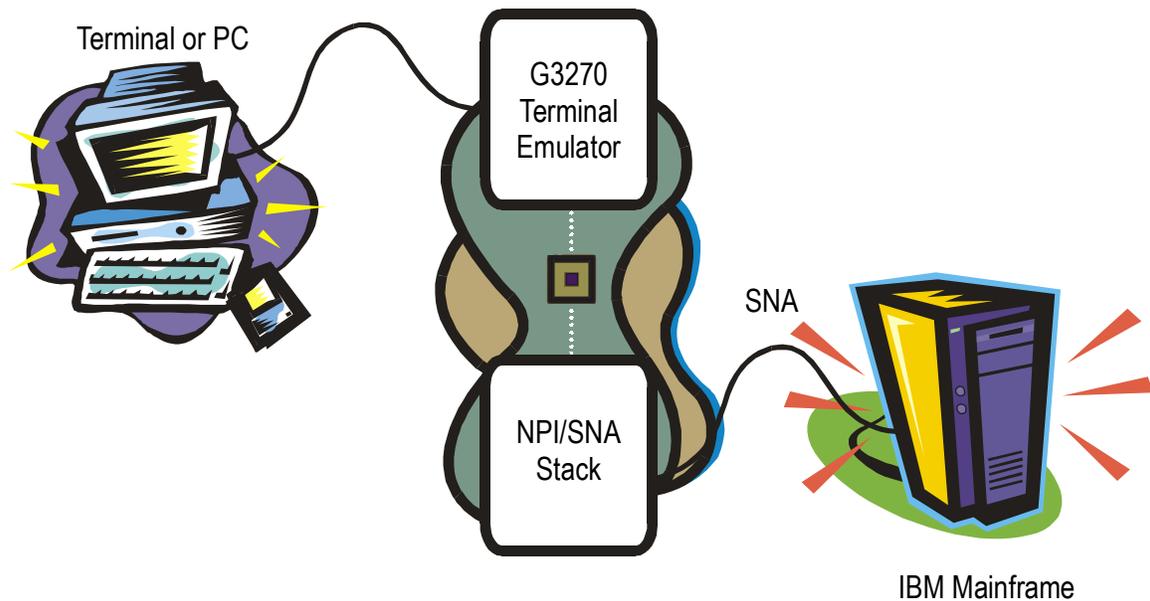


Figure 1 Typical G3270 Terminal Emulation Environment

Technical Requirements

To use the G3270 terminal emulator software, you must fulfill the following requirements:

- You must be using an ASCII terminal or a workstation connected to the UNIX system as shown on page one.

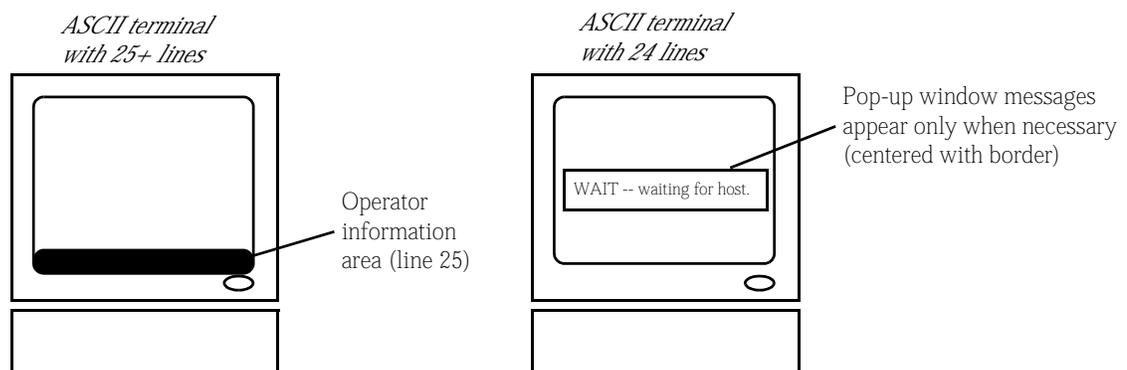


Note: *The terminal screen must support at least 24 lines of text with 80 characters per line.*

- The GCOM NPI/SNA software package must be installed onto the UNIX system in a directory in your path as described in the GCOM Installation Guide shipped with this user's guide.
- The network administrator must configure NPI/SNA and start the *Gcom_monitor* utility as documented in the *UNIX STREAMS Administrator's Guide*.

Operator Messages Support

All 3270 session data from the SNA host is displayed on the first 24 lines of the ASCII terminal screen. Special SNA events, connection status and other conditions are reported to the terminal operator in the Operator Information Area (OIA). The following diagram shows how 24-line terminals display OIA messages in the middle of the screen. Terminals with 25 or more lines dedicate the 25th line to OIA messages.



Starting a Session

Follow these steps to start a session on your ASCII terminal:

1. **Make sure you have fulfilled the requirements listed in “Technical Requirements” on page 12 before continuing to step 2.**

If you do not understand all of these requirements, check with your network administrator before continuing.

2. **Enter the `g3270` command at the prompt using the following syntax:**

```
g3270 [ -lu_number ] [ -pu_number ]
```

The `-l` and `-p` options have the following meaning:

`-l` G3270 attempts to connect to local Logical Unit (LU)
lu_number. If `-l` is not specified, G3270 attempts to connect to the first available local LU. For a list of valid LU numbers, ask your network administrator.

`-p` G3270 attempts to connect to local Physical Unit (PU)
pu_number. If `-p` is not specified, G3270 attempts to connect to PU 1. For a list of valid PU numbers, ask your network administrator.



Note: *If you encounter any unexpected error messages while trying to connect, refer to Table 4 on page 22 for assistance. If problems persist, contact your network administrator.*

Several operator messages are displayed on the terminal screen as G3270 opens an NPI/SNA stream, establishes an LU connection and exchanges a series of messages with the SNA host. Finally, the initial 3270 screen appears. It is typically a login prompt:

```
login:
```

3. **Begin your session as you normally would.**

See Chapter 2 starting on page 15 for a list of valid 3270 keys available from your ASCII terminal.

Ending a Session

To end a session, first sign off of your host session and then press Esc, Q (or Esc, q) to terminate G3270.

EBCDIC Character Representation

Most EBCDIC characters have direct ASCII equivalents (see Chapter 2 starting on page 15), so they appear on an ASCII terminal just as they would on a 3270 terminal. Table 1 lists a few exceptions and shows how G3270 displays them.

Table 1 EBCDIC Character Representation—Exceptions

<i>EBCDIC Character</i>	<i>5251 Terminal</i>	<i>G3270</i>
Not	¬	[
Solid Vertical Bar]
DUP (Duplicate)	⌘	*
FM (Field Mark)	;	;
Cent Sign	¢	^

2

Keyboard Mapping

The keyboard layout of the 3270 and ASCII terminals are fairly similar. Both terminals have keys that correspond to the digits 0 through 9 and the 26 letters of the alphabet in similar locations on the board itself. However, some 3270 keys are not found on an ASCII keyboard.

This chapter lists 3270-to-ASCII keyboard mapping plus other special key combinations.

Special Key Combinations

Table 2 lists additional key combinations to which G3270 assigns special meaning.

Table 2 Special Key Combinations

<i>Description</i>	<i>Key Combination</i>
<i>Escape.</i> Same as pressing the  key.	 - [
<i>Override numeric lock.</i> Use this to enter non-numeric characters in a numeric field.	 - O

Table 2 Special Key Combinations

<i>Description</i>	<i>Key Combination</i>
<i>Quit.</i>	 , Q

3270-to-ASCII Keyboard Mapping

Table 3 lists the 3270 keys that are not usually found on ASCII keyboards along with the ASCII keyboard equivalent. Any special 3270 keys not mentioned in the “3270 Key” column are unsupported at this time.

Table 3 3270 to ASCII Keyboard Mapping (1 of 4)

3270 Key	3270 Key Functionality	ASCII Key Equivalent
	<p><i>Back tab.</i> Moves the cursor to the first character position of the previous unprotected data field except in the following cases:</p> <ul style="list-style-type: none"> • When the cursor is in a protected field, the cursor is moved to the first character position of the previous unprotected data field. • When the cursor is on any position (except the first character) within an unprotected data field, this key moves the cursor to the first character position of the current field. • In a display with no unprotected fields or no fields, the cursor is repositioned to the home position. 	<p> ,  or</p> <p> ,  - I</p>
	<p><i>Backspace.</i> Removes the character to the left of the cursor and moves the cursor one position to the left. All characters to the right of the deleted character in the current field are shifted one space to the left if they are on the same line. Characters are not shifted if they are in a different field or different line.</p> <p>Note: For non-destructive backspace, use Cursor left.</p>	<p> or</p> <p> - H</p>
	<p><i>Clear.</i> Erases the display, moves the cursor to the home position and notifies the SNA host of the Clear operation.</p>	<p> , C or</p> <p> , c</p>
	<p><i>Cursor down.</i> Move cursor one line down.</p>	<p> or  - X</p>
	<p><i>Cursor left.</i> Move cursor one character left.</p>	<p> or  - Z</p>
	<p><i>Cursor right.</i> Move cursor one character right.</p>	<p> or  - V</p>
	<p><i>Cursor up.</i> Move cursor one line up.</p>	<p> or  - C</p>
	<p><i>Delete character.</i> Removes the character at the cursor. All characters to the right of the deleted character in the current field are shifted one space to the left if they are on the same line. The cursor itself does not move.</p>	<p></p>

Table 3 3270 to ASCII Keyboard Mapping (1 of 4)

3270 Key	3270 Key Functionality	ASCII Key Equivalent
	<p><i>Duplicate.</i> Enters a duplicate character code into the display buffer and performs a Tab key operation. The duplicate character tells the application program that a duplicate operation is indicated for the rest of the field. The application program determines the use of the Dup key.</p> <p>Note: The Dup character is shown as an asterisk (*), on your terminal screen.</p>	 - D
	<p><i>Enter.</i> Sends the host the contents of all fields that have been modified.</p>	 or  - M
	<p><i>Erase input.</i> Clears all unprotected characters and moves the cursor to the first unprotected character location on the display.</p> <p>In a buffer with only protected data fields, nothing is cleared and the cursor is moved home. If the display contains no field, the entire buffer is cleared to nulls and the cursor is moved home.</p>	 ,  - E
	<p><i>Erase to end-of-field.</i> Clears characters from the cursor to the right end of the field if the cursor is at an alphanumeric character in an unprotected data field. If the display contains no fields, all character locations from the cursor to the last character location on the bottom line are erased.</p>	 - E
	<p><i>Field mark.</i> Enters a field mark character code into the display buffer. This character code informs the application of the end of a field in an unformatted buffer or of a subfield in a formatted buffer.</p> <p>Note: The Field Mark is displayed as a semicolon (;).</p>	 - F
	<p><i>Insert mode.</i> Puts the terminal in insert mode. Entered characters are inserted at the cursor and characters at and to the right of the cursor in the same field are shifted to the right (rather than being overwritten).</p> <p>Note: To disable insert mode, press Reset (Ctrl-R) or any key that sends data to the host, such as the Enter key.</p>	 - N or 
	<p><i>New line.</i> Moves the cursor to the first unprotected character location of the line below the current line. If the display has no unprotected data fields, the cursor is repositioned to home. If the display contains no fields, the cursor is repositioned to the first character position of the next line.</p>	 - J
 to 	<p><i>Program Functions 1-9.</i> PF keys send a message to the host and perform the functions assigned to them by the application that is currently running.</p> <p>Note: The PF keys perform different functions for different applications. For example, PF1 might get help while PF3 might exit the application.</p>	 , 1 to  , 9
	<p><i>Program Function 10.</i></p>	 , 0

Table 3 3270 to ASCII Keyboard Mapping (1 of 4)

<i>3270 Key</i>	<i>3270 Key Functionality</i>	<i>ASCII Key Equivalent</i>
	<i>Program Function 11.</i>	 , -
	<i>Program Function 12.</i>	 , =
	<i>Program Function 13.</i>	 , !
	<i>Program Function 14.</i>	 , @
	<i>Program Function 15.</i>	 , #
	<i>Program Function 16.</i>	 , \$
	<i>Program Function 17.</i>	 , %
	<i>Program Function 18.</i>	 , ^
	<i>Program Function 19.</i>	 , &
	<i>Program Function 20.</i>	 , *
	<i>Program Function 21.</i>	 , (
	<i>Program Function 22.</i>	 ,)
	<i>Program Function 23.</i>	 , _ (underscore)
	<i>Program Function 24.</i>	 , +

Table 3 3270 to ASCII Keyboard Mapping (1 of 4)

3270 Key	3270 Key Functionality	ASCII Key Equivalent
	<p><i>Program Access 1.</i> Like PF keys, PA keys send a message to the host and perform the functions assigned to them by the application that is currently running.</p> <p>Note: The PA keys perform different functions for different applications. For example, PA1 might calculate a sum while PA3 might sort a group of objects.</p>	 
	<p><i>Program Access 2.</i></p>	 
	<p><i>Program Access 3.</i></p>	 
	<p><i>Reset.</i> Removes any displayed RESET message and unlocks the keyboard (See “RESET Messages” on page 26 for details). The Reset key also disables insert mode. For example, if you press a key in an protected field, you must press Reset to reset the keyboard.</p>	 - R
	<p><i>Tab.</i> Moves the cursor to the first character position in the next unprotected field. If there are no unprotected fields or no fields at all, the cursor is moved home.</p>	 or  - I

Appendix A - Messages

G3270 uses two types of messages to communicate with the operator:

- *Termination messages.* These are displayed when an unusual condition causes G3270 to terminate abnormally.
- *Operator Information Area (OIA) messages.* These appear during normal operation and are displayed either on the 25th line or in a popup window near the middle of the screen. See “Operator Messages Support” on page 12 for details. There are two kinds of OIA messages:
 - WAIT messages disable the keyboard for as long as the message is visible.
 - RESET messages disable the keyboard until it is cleared by the host or at the keyboard by pressing Ctrl-R (Reset).

Termination Messages

Termination messages are diagnostics that are displayed when some unusual condition forces G3270 to terminate prematurely. These messages all have the following form:

G3270 terminating: *message*

Table 4 lists and explains the termination messages and provides corrective action.

Table 4 Termination Messages (1 of 2)

<i>If this message appears:</i>	<i>This is what it means:</i>	<i>This is what you should do:</i>
all options must begin with a <code>ẽ-ĩ</code>	An option was specified without the required leading dash (-). For example, instead of <i>g3270 -l2</i> , you entered <i>g3270 l2</i> .	Reenter the <i>g3270</i> command with a leading dash in front of any desired options. See “Starting a Session” on page 13 for a list of legal options.
option <code>-n</code> not recognized	An illegal command line option, <code>-n</code> , was specified.	Reenter the <i>g3270</i> command with a legal option. See “Starting a Session” on page 13 for a list legal options.
<code>n</code> is an invalid LU	An invalid local LU, <code>n</code> , was specified at the command line.	Reenter the <i>g3270</i> command with a proper local LU reference. See “Starting a Session” on page 13 for details.
terminal does not support at least 24 lines	As stated on page 1, you cannot use the G3270 terminal emulation software with an ASCII terminal that supports less than 24 lines.	Replace terminal with one that supports at least 24 lines. See “Operator Messages Support” on page 12 for details.
couldn't create admin window	An attempt to dynamically allocate memory for use with a screen window (such as the main menu) failed.	Contact your network administrator.
initialization failed	G3270 could not initialize internal data structures, probably because of a failed attempt to dynamically allocate memory.	Contact your network administrator.

Table 4 Termination Messages *(1 of 2)*

<i>If this message appears:</i>	<i>This is what it means:</i>	<i>This is what you should do:</i>
<code>poll() returned < 0</code>	Indicates that the UNIX <i>poll()</i> system call encountered an I/O error. G3270 uses <i>poll()</i> to receive notification about events on the NPI/SNA stream and keystrokes entered by the operator.	Contact your network administrator.
<code>keyboard unreadable</code>	G3270 encountered an error from which it could not recover while attempting to read the terminal's keyboard.	Check the connections to the keyboard or try another keyboard. If the problem persists, contact your network administrator, because this can also be caused by a software error.

Operator Information Area (OIA) Messages

There are two kinds of OIA messages: WAIT and RESET.

WAIT Messages

WAIT messages disable the keyboard until some action completes or until explicitly cleared by the host. These messages all have the following form:

WAIT - - *message*

Table 5 lists and explains the WAIT messages.



Note: *If these messages persist on the screen, contact your network administrator.*

Table 5 WAIT Messages (1 of 2)

<i>If this message appears:</i>	<i>This is what it means:</i>
[blank]	WAIT is displayed with no message whenever data is sent to the host.
closing SNA stream	UNIX stream to NPI/SNA driver is being closed.
connected to LU <i>n</i> , waiting for host	G3270 has established a connection to a local LU and is waiting for data to arrive from the SNA host.
connected, waiting for host	
connection attempt failed	An attempt by G3270 to connect to a local LU failed.
connection terminated	Connection between G3270 and a local LU has been terminated. G3270 attempts to reconnect.
granted host's request to send	G3270 receive an SNA SIG request from the host.
host initiated a bracket	The SNA host sent a chain with BB (Begin Bracket) set or a BID command.
host initiated shutdown	The SNA host initiated a shutdown of the connection.
NPI/SNA error: invalid event code	G3270 received an invalid message from the NPI/SNA driver. If the message is not cleared within a few seconds, contact your network administrator.
received BIND	The SNA host sent a BIND command.
received CLEAR	The SNA host sent a CLEAR command.

Table 5 WAIT Messages *(1 of 2)*

<i>If this message appears:</i>	<i>This is what it means:</i>
received negative response from host	The host has rejected data sent by G3270.
received UNBIND	The SNA host sent an UNBIND command.
trying to connect - <i>n</i>	G3270 has made <i>n</i> attempts to connect to a local LU.
trying to open SNA stream - <i>n</i>	G3270 has made <i>n</i> attempts to open a UNIX SNA stream.
waiting for host	The SNA host has the right to transmit.

RESET Messages

RESET messages appear when an operator error occurs, such as an attempt to enter data into a protected field, or when G3270 wants to notify the operator of some event. Clear the RESET message and reset the keyboard by entering Ctrl-R (Reset). These messages all have the following form:

RESET -- *message*

Table 6 lists and explains the RESET messages.

Table 6 RESET Messages

<i>If this message appears:</i>	<i>This is what it means:</i>	<i>This is what you should do:</i>
bracket aborted	A transmission from the host (either an SNA BID command or a chain containing a begin bracket [BB]) was subsequently aborted by the host itself or else as a result of a protocol error detected by NPI/SNA.	If the message is not cleared within a few seconds, press Ctrl-R to reset the keyboard.
cannot transmit	You tried to send data to the host, but the SNA connection was not in the proper state to allow G3270 to transmit.	Wait until the message is cleared by the host or press Ctrl-R to continue to enter data into the display.
field full	While in insert mode, you tried to insert more characters into a field where all character positions to the right of the cursor are already occupied.	Press Ctrl-R to reset the keyboard. This terminates insert mode.
NPI/SNA error: invalid event code	G3270 received an invalid message from the NPI/SNA driver.	If the message is not cleared within a few seconds, press Ctrl-R to reset the keyboard.
numeric	You have attempted to enter a non-numeric character in a numeric field. Numeric characters include 0–9, minus (-), decimal point (.) and DUP.	Press Ctrl-R to reset the keyboard. Then either enter a numeric character, move to another field, or enter Ctrl-0 to disable numeric lock.
protected	You have attempted to enter data in a protected field or a field attribute byte.	Press Ctrl-R to reset the keyboard and move the cursor and try again.

Table 6 RESET Messages

<i>If this message appears:</i>	<i>This is what it means:</i>	<i>This is what you should do:</i>
received negative response from host	The host has rejected data sent by G3270.	If the message is not cleared within a few seconds, press Ctrl-R to reset the keyboard.



Index

Numerics

3270 to ASCII Keyboard Mapping 16

a

angle bracket conventions viii

ASCII

 keyboard equivalents 16

 to 3270 Keyboard Mapping 16

ASCII terminal requirements 12

b

Back tab key, 3270 to ASCII 16

Backspace key, 3270 to ASCII 16

boldface conventions viii

c

cautions, purpose of viii

Cent Sign EBCDIC character equivalents 14

Clear key, 3270 to ASCII 16

configuration requirements 12

Control key

 3270-to-ASCII mapping 16–19

 sequences, defined ix

 special key combinations 15

conventions

 notes, cautions and warnings viii

 text viii

Cursor down key, 3270 to ASCII 16

Cursor left key, 3270 to ASCII 16

Cursor right key, 3270 to ASCII 16

Cursor up key, 3270 to ASCII 16

d

Delete character key, 3270 to ASCII 16

down key 16

Duplicate key

 3270 to ASCII 17

 EBCDIC character equivalents 14

e

EBCDIC character representation, exceptions 14

Enter key, 3270 to ASCII 17

enter vs. type viii

Erase input key, 3270 to ASCII 17

Erase key (clear key) 16

Erase to EOF key, 3270 to ASCII 17

Escape key

 3270-to-ASCII mapping 16–19

 sequences, defined ix

 special keys 15

escape key

 defined 15

f

Field mark key
 3270 to ASCII 17
 EBCDIC character equivalents 14
Function keys 17–18
Function keys, defined 17–??

g

g3270 command syntax 13
G3270 Terminal Emulator product, described 11

h

highlighted term conventions viii

i

input erase key 17
Insert mode key, 3270 to ASCII 17
italic text conventions viii

k

key combinations, special 15
keyboard mapping 15

l

-l option 13
left key 16
login prompt 13
LU, connect to 13
lu_number, defined 13

n

New line key, 3270 to ASCII 17
Not EBCDIC character equivalents 14
notes, purpose of viii
NPI/SNA driver 11

o

Operator Information Area
 support of 12
Operator Information Area messages, defined 21
override numeric lock key 15

p

-p option 13
PA keys 1-3, 3270 to ASCII 19
PF keys 17–18
PU, connect to 13
pu_number, defined 13

r

remote SNA host 11
requirements, technical 12
Reset key, 3270 to ASCII 19
RESET messages
 defined 21
 listed 26
right key 16

s

screen display ix

screen requirements 12

session

 ending 14

 starting 13

SNA

 events, reported 12

 host, remote 11

software requirements 12

Solid Vertical Bar EBCDIC character equivalents

 14

t

Tab

 backwards key 16

 key, 3270 to ASCII 19

terminal requirements 12

Termination messages

 defined 21

 listed 22

terminology conventions viii

text conventions viii

type vs. enter viii

u

up key 16

w

WAIT messages

 defined 21

 listed 24

warnings, purpose of viii