

## Using VT320 Terminal Emulator Escape Sequences

An escape sequences is a series of non-printing characters, beginning with an Escape character, that sends commands to devices. Escape sequences are used for printing, communications, and display management. The command in an escape sequence results in specified actions by devices. Escape sequences are also called control codes or control sequences.

Escape sequences are most often used in scripts, as in the following examples:

```
cursoroff: echo "ESC[?25lcursor is off"
```

```
cursoron: echo "ESC[?25hcursor is on"
```

The NCD Terminal Emulator includes a subset of the VT320 command set, as well as NCD-specific sequences. These escape sequences, their actions, and associated functions are listed in [Table 12-5](#). Some of the sequences are described in more detail following the table.

The table lists sequences that differ depending on whether the environment requires eight-bit or seven-bit mode. The eight-bit mode sequence (for example, CSI. . .) is listed first, followed by the equivalent seven-bit mode sequence (for example, Esc[. . .).

Numerical variables are represented as *pn*. Variables representing a number of rows or columns are represented as *pr* or *pc*, respectively. Variables requiring a parameter setting from a number of specific choices are represented by *ps*. Other variable types are defined in the table as required.

Table 12-5 Escape Sequences

Escape Sequence	Action	Control Function				
CSI <i>pn</i> @  Esc [ <i>pn</i> @	Insert <i>pn</i> blank characters. Default: 1.	ICH				
CSI <i>ps</i> \$ }  Esc [ <i>ps</i> \$ }  See <a href="#">"Configuring the Status Line"</a> for more information.	<div>Select the status line. <i>ps</i> specifies the display to which the terminal sends data. Permissible values:</div> <table><tr><td>0</td><td>Send characters to main display</td></tr><tr><td>1</td><td>Send characters to status line</td></tr></table>	0	Send characters to main display	1	Send characters to status line	
0	Send characters to main display					
1	Send characters to status line					
CSI <i>ps</i> \$ -  Esc [ <i>ps</i> \$ -	<div>Enable the status line. The variable parameter <i>ps</i> indicates the status line to use. Permissible values:</div> <table><tr><td>0</td><td>No status line</td></tr></table>	0	No status line			
0	No status line					

See <a href="#">"Configuring the Status Line"</a> for more information.	1	Indicator status line (no-op)	
	2	Host-writable status line	
CSI ! p Esc [ ! p	Soft reset		
CSI > c Esc [ > c  or CSI > 0 c Esc [ > 0 c	Request secondary device attributes. Response is C S I > <i>id</i> , <i>ver</i> , 0 c, in which <i>id</i> is terminal identification and <i>ver</i> is version.  Default response: CSI>1;1;0c		DA
CSI ? ps J Esc [ ? ps J	Selective erase in display. Permissible values for <i>ps</i> :		DECSED
	0	Cursor to end of screen	
	1	Start to cursor	
	2	Entire screen	
CSI ? ps K Esc [ ps K	Selective erase in line. Permissible values for <i>ps</i> :		DECSEL
	0	Cursor to end of line	
	1	Beginning to cursor	
	2	Entire line	
CSI ? <i>ps</i> ; <i>ps</i> ... h Esc [ ? <i>ps</i> ; <i>ps</i> ... h	Set Digital private mode. Permissible values for <i>ps</i> :		
	1	Cursor keys mode (keypad application)	DECCKM
	3	Column mode (132 column)	DECCOLM
	4	Scrolling mode (smooth scroll)	DECSCLM
	5	Screen mode (reverse video)	DECSCLNM
	6	Origin mode	DECOM
	7	Autowrap mode	DECAWM
	8	Auto-repeat mode	DECARM
	9	Send MIT mouse row and column on button press	
	25	Text cursor enable mode (cursor visible)	DECTCEM
	40	Allow 80-to-132 mode	
	41	<i>curses</i> (1) fix	
	42	National replacement character set mode (enabled)	DECNRCM
	44	Turn on margin bell	
	45	Reverse wraparound mode	
	46	Start logging	
	47	Use alternate screen buffer	

CSI ? <i>ps</i> i	Digital private print control mode. Permissible values for <i>ps</i> are:																																																	
Esc [ ? <i>ps</i> i	<table><tr><td>1</td><td>Print line with cursor</td></tr><tr><td>4</td><td>Exit autoprint mode</td></tr><tr><td>5</td><td>Enter autoprint mode</td></tr><tr><td>10</td><td>Print main display</td></tr><tr><td>11</td><td>Print main display</td></tr></table>	1	Print line with cursor	4	Exit autoprint mode	5	Enter autoprint mode	10	Print main display	11	Print main display																																							
1	Print line with cursor																																																	
4	Exit autoprint mode																																																	
5	Enter autoprint mode																																																	
10	Print main display																																																	
11	Print main display																																																	
CSI ? <i>ps</i> ; <i>ps</i> ... 1	Reset Digital private mode. Permissible values for <i>ps</i> include:																																																	
Esc [ ? <i>ps</i> ; <i>ps</i> ... 1	<table><tr><td>1</td><td>Cursor keys mode (normal cursor keys)</td><td>DECCKM</td></tr><tr><td>3</td><td>Cursor keys mode (normal cursor keys)</td><td>DECCOLM</td></tr><tr><td>4</td><td>Scrolling mode (jump/fast scroll)</td><td>DECSCLM</td></tr><tr><td>5</td><td>Screen mode (normal video)</td><td>DECSCNM</td></tr><tr><td>6</td><td>Origin mode (normal cursor)</td><td>DECOM</td></tr><tr><td>7</td><td>Autowrap mode (wraparound)</td><td>DECAWM</td></tr><tr><td>8</td><td>Auto-repeat mode (disabled)</td><td>DECARM</td></tr><tr><td>9</td><td>Do not send MIT mouse row, column on button press</td><td></td></tr><tr><td>10</td><td>Text cursor enable mode (cursor invisible)</td><td></td></tr><tr><td>40</td><td>Do not allow 80-to-132 mode</td><td>DECTCEM</td></tr><tr><td>41</td><td>No <i>curses</i> (1) fix</td><td></td></tr><tr><td>42</td><td>National replacement character set mode (disabled)</td><td>DECNRCM</td></tr><tr><td>44</td><td>Turn off margin bell</td><td></td></tr><tr><td>45</td><td>No reverse wraparound mode</td><td></td></tr><tr><td>46</td><td>Stop logging</td><td></td></tr><tr><td>47</td><td>Use normal screen buffer</td><td></td></tr></table>	1	Cursor keys mode (normal cursor keys)	DECCKM	3	Cursor keys mode (normal cursor keys)	DECCOLM	4	Scrolling mode (jump/fast scroll)	DECSCLM	5	Screen mode (normal video)	DECSCNM	6	Origin mode (normal cursor)	DECOM	7	Autowrap mode (wraparound)	DECAWM	8	Auto-repeat mode (disabled)	DECARM	9	Do not send MIT mouse row, column on button press		10	Text cursor enable mode (cursor invisible)		40	Do not allow 80-to-132 mode	DECTCEM	41	No <i>curses</i> (1) fix		42	National replacement character set mode (disabled)	DECNRCM	44	Turn off margin bell		45	No reverse wraparound mode		46	Stop logging		47	Use normal screen buffer		
1	Cursor keys mode (normal cursor keys)	DECCKM																																																
3	Cursor keys mode (normal cursor keys)	DECCOLM																																																
4	Scrolling mode (jump/fast scroll)	DECSCLM																																																
5	Screen mode (normal video)	DECSCNM																																																
6	Origin mode (normal cursor)	DECOM																																																
7	Autowrap mode (wraparound)	DECAWM																																																
8	Auto-repeat mode (disabled)	DECARM																																																
9	Do not send MIT mouse row, column on button press																																																	
10	Text cursor enable mode (cursor invisible)																																																	
40	Do not allow 80-to-132 mode	DECTCEM																																																
41	No <i>curses</i> (1) fix																																																	
42	National replacement character set mode (disabled)	DECNRCM																																																
44	Turn off margin bell																																																	
45	No reverse wraparound mode																																																	
46	Stop logging																																																	
47	Use normal screen buffer																																																	
CSI ? <i>ps</i> n	See CSI <i>ps</i> n.																																																	
Esc [ ? <i>ps</i> n																																																		
CSI ? <i>ps</i> ; <i>ps</i> ... r	Store Digital private mode. Permissible values for <i>ps</i> :																																																	
Esc [ ? <i>ps</i> ; <i>ps</i> ... r	<table><tr><td>1</td><td>Cursor keys mode (normal/application keypad)</td><td>DECCKM</td></tr><tr><td>3</td><td>Column mode (80/132 columns)</td><td>DECCOLM</td></tr><tr><td>4</td><td>Scrolling mode (jump (fast)/scroll)</td><td>DECSCLM</td></tr><tr><td>5</td><td>Screen mode (normal/reverse video)</td><td>DECSCNM</td></tr><tr><td>6</td><td>Origin mode (normal/origin)</td><td>DECOM</td></tr><tr><td>7</td><td>Autowrap mode (no wrap/wraparound)</td><td>DECAWM</td></tr><tr><td>8</td><td>Auto-repeat mode (auto-repeat/no-auto-repeat)</td><td>DECARM</td></tr></table>	1	Cursor keys mode (normal/application keypad)	DECCKM	3	Column mode (80/132 columns)	DECCOLM	4	Scrolling mode (jump (fast)/scroll)	DECSCLM	5	Screen mode (normal/reverse video)	DECSCNM	6	Origin mode (normal/origin)	DECOM	7	Autowrap mode (no wrap/wraparound)	DECAWM	8	Auto-repeat mode (auto-repeat/no-auto-repeat)	DECARM																												
1	Cursor keys mode (normal/application keypad)	DECCKM																																																
3	Column mode (80/132 columns)	DECCOLM																																																
4	Scrolling mode (jump (fast)/scroll)	DECSCLM																																																
5	Screen mode (normal/reverse video)	DECSCNM																																																
6	Origin mode (normal/origin)	DECOM																																																
7	Autowrap mode (no wrap/wraparound)	DECAWM																																																
8	Auto-repeat mode (auto-repeat/no-auto-repeat)	DECARM																																																

	9	Do not send/send MIT mouse row and column on button press	
	40	Disallow/allow 80-to-132 mode	
	41	Off/on <i>curses</i> (1) fix	
	42	National replacement character set mode (disabled)	DECNRCM
	44	Off/on margin bell	
	45	No reverse-wraparound/reverse wraparound mode	
	46	Stop/start logging	
	47	Use normal/alternate screen buffer	
CSI ? <i>ps</i> ; <i>ps</i> ... s		Restore Digital private mode. Permissible values for <i>ps</i> :	
	1	Cursor keys mode (normal/application keypad)	DECCKM
	3	Column mode (80/132 columns)	DECCOLM
	4	Scrolling mode (jump (fast)/scroll)	DECSCLM
	5	Screen mode (normal/reverse video)	DECSCNM
	6	Origin mode (normal/origin)	DECOM
	7	Autowrap mode (no wrap/ wraparound)	DECAWM
	8	Auto-repeat/no-auto-repeat keys	DECARM
	9	Do not send/send MIT mouse row and column on button press	
	40	Disallow/allow 80-to-132 mode	
	41	Off/on <i>curses</i> (1) fix	
	42	National replacement character set mode (disabled)	DECNRCM
	44	Off/on margin bell	
	45	No reverse-wraparound/reverse wraparound mode	
	46	Stop/start logging	
	47	Use normal/alternate screen buffer	
CSI <i>ps</i> "q		Select character protection attribute. Permissible values for <i>ps</i> :	DECSCA
Esc [ <i>ps</i> " q	0	Not protected	
	1	Protected	
	2	Not protected	
CSI 0 c		Device attributes/terminal identification.	DA1
CSI <i>pn</i> c		The response is CSI ?62;1;2;6;8c)	DECID
Esc [ <i>pn</i> c			
Esc Z			

CSI <i>pn</i> A Esc [ <i>pn</i> A	Cursor up <i>pn</i> times. Default: 1.	CUU
CSI <i>pn</i> B Esc [ <i>pn</i> B	Cursor down <i>pn</i> times. Default: 1.	CUD
CSI <i>pn</i> C Esc [ <i>pn</i> C	Cursor forward <i>pn</i> times. Default: 1.	CUF
CSI <i>pn</i> D Esc [ <i>pn</i> D	Cursor backward <i>pn</i> times. Default: 1.	CUB
CSI <i>pr</i> ; <i>pc</i> H Esc [ <i>pr</i> ; <i>pc</i> H	Cursor position. Default: [1,1].	CUP
CSI <i>ps</i> J Esc [ <i>ps</i> J	Erase in display. Permissible values for <i>ps</i> :	ED
	0 Cursor to end of screen (default)	
	1 Start to cursor	
	2 Entire screen	
CSI <i>ps</i> K Esc [ <i>ps</i> K	Erase in line. Permissible values for <i>ps</i> :	EL
	0 Cursor to end of line (default)	
	1 Beginning to cursor	
	2 Entire line	
CSI <i>pn</i> L Esc [ <i>pn</i> L	Insert <i>pn</i> lines. Default: 1.	IL
CSI <i>pn</i> M Esc [ <i>pn</i> M	Delete <i>pn</i> lines. Default: 1.	DL
CSI <i>pn</i> P Esc [ <i>pn</i> P	Delete <i>pn</i> characters. Default: 1.	DCH
CSI <i>pn</i> X Esc [ <i>pn</i> X	Erase <i>pn</i> characters.	ECH
CSI <i>pr</i> ; <i>pc</i> f Esc [ <i>pr</i> ; <i>pc</i> f	Horizontal and vertical position.	HVP
CSI <i>ps</i> g Esc [ <i>ps</i> g	Tab clear. Permissible values for <i>ps</i> :	TBC
	0 Clear current tab stop (default)	

	2	Clear all tab stops	
	3	Clear all tab stops	
CSI <i>ps</i> ; <i>ps</i> ; <i>ps</i> ... h	Set Mode. Permissible values for <i>ps</i> :		
Esc [ <i>ps</i> ; <i>ps</i> ; <i>ps</i> ... h	4	Insert mode	IRM
	20	Line feed/new line	LNМ
CSI <i>ps</i> i	Print control mode. Permissible values for <i>ps</i> :		
Esc [ <i>ps</i> i	0	Print page that has cursor	
	4	Exit printer controller mode	
	5	Enter printer controller mode	
CSI <i>ps</i> ; <i>ps</i> ; <i>ps</i> ... l	Reset Mode. Permissible values for <i>ps</i> :		
Esc [ <i>ps</i> ; <i>ps</i> ; <i>ps</i> ... l	4	Replace mode	IRM
	20	No line feed/no new line	LNМ
CSI <i>ps</i> ; <i>ps</i> ; <i>ps</i> ... m	Select graphic rendition (visual attributes). Permissible values for <i>ps</i> :		SGR
Esc [ <i>ps</i> ; <i>ps</i> ; <i>ps</i> ... m (For more information, see <a href="#">"Configuring Color Text"</a> .)	0	Normal; clear all attributes	
	1	Bold	
	4	Underscore	
	5	Blink	
	7	Reverse video	
	22	Normal intensity, not bold	
	24	Not underlined	
	25	Not blinking	
	27	Normal video	
	Foreground text color:		
	30	Black	
	31	Red	
	32	Green	
	33	Yellow	
	34	Blue	
	35	Magenta	
	36	Cyan	
	37	White	
	Background text color:		
	40	Black	
	41	Red	

	42	Green	
	43	Yellow	
	44	Blue	
	45	Magenta	
	46	Cyan	
	47	White	
	Color-pair selection (NCD-specific values):		
	90	Color-pair0	
	91	Color-pair1	
	92	Color-pair2	
	93	Color-pair3	
	94	Color-pair4	
	95	Color-pair5	
	96	Color-pair6	
	97	Color-pair7	
CSI <i>ps</i> n	Device status reports.		DSR
Esc [ <i>ps</i> n	<i>ps</i> , meaning, and response:		
or	5	Status report: CSI 0 n	
CSI ? <i>ps</i> n	6	Cursor position report: CSI r c R	
Esc [ ? <i>ps</i> n	15	Printer ready: CSI ? 10 n	
		No printer: CSI ? 13 n 00	
	25	User-defined key status (unlocked):  CSI ? 20 n	
	26	Keyboard dialect: CSI ? 27 <i>type</i> n	
	Permissible values for <i>type</i> :		
	1	North American	
	2	British	
	3	Flemish	
	4	Canadian French	
	5	Danish	
	6	Finnish	
	7	German	
	8	Dutch	
	9	Italian	

	10	Swiss (French)	
	11	Swiss (German)	
	12	Swedish	
	13	Norwegian	
	14	French/Belgian	
	15	Spanish	
	16	Portuguese	
CSI <i>pt</i> ; <i>pb</i> r  Esc [ <i>pt</i> ; <i>pb</i> r	Set top and bottom margins ( <i>pt</i> =top; <i>bp</i> =bottom). Default: full-size window.		DECSTBM
8-bit mode:  <i>DCS pc</i> ; <i>pl</i>   <i>Ky1</i> / <i>St1</i> ; ... <i>Kyn</i> / <i>Stn</i> <i>ST</i>  or  <i>DCS pc</i> ; <i>pl</i>   <i>Ky1</i> \ <i>St1</i> ; ... <i>Kyn</i> \ <i>Stn</i> <i>ST</i>  7-bit mode:  <i>Esc P pc</i> ; <i>pl</i>   <i>Ky1</i> / <i>St1</i> ; ... <i>Kyn</i> / <i>Stn</i> <i>ST</i>  or  <i>Esc P pc</i> ; <i>pl</i>   <i>Ky1</i> \ <i>St1</i> ; ... <i>Kyn</i> \ <i>Stn</i> <i>ST</i>  (See <a href="#">"Programming Function Keys on N-108LK Keyboards"</a> for more information.)	User-defined keys (F6-F14, Do, Help, F17-F20):  <i>pc</i> Clear parameter. Permissible values: 0 Clear all keys before starting (resetting) 1 Clear one key at a time, as overwritten  <i>pl</i> Lock parameter (no-op). Permissible values: 0 Lock the keys 1 Unlock the keys  <i>Ky1</i> / <i>St1</i> or <i>Ky1</i> \ <i>St1</i> Key definition strings  <i>ST</i> String terminator character or ESC \		DECUDK
Esc G (embedded space required)	Sending 8-bit C1 control characters		S8C1T
Esc F (embedded space required)	Sending 7-bit C1 control characters		S7C1T
Esc }	Select locking shift of G2 character set, right		LS2R
Esc =	Keypad application mode		DECKPAM
Esc >	Keypad numeric mode		DECPNM
Esc # 3	Double-width, single-height line, top		DECDHL
Esc # 4	Double-width, single-height line, bottom		DECDHL
Esc # 5	Single-width, single-height line		DECSWL
Esc # 6	Double-width, single-height line		DECDWL



Esc # 8	Screen alignment pattern	DECALN
	Designate character sets:	SCS
Esc ( <i>ps</i>	Select character set G0.	
Esc ) <i>ps</i>	Select character set G1.	
Esc * <i>ps</i>	Select character set G2.	
Esc + <i>ps</i>	Select character set G3.	
	Permitted values for <i>ps</i> and corresponding character sets:	
	B ASCII	
	%5 Digital supplementary	
	< Digital user supplementary	
	0 Digital graphics	
	A United Kingdom	
	4 Dutch	
	C FINNISH	
	5 FINNISH 2	
	R French	
	Q French Canadian	
	9 French Canadian 2	
	K German	
	Y Italian	
	E Norwegian	
	6 Norwegian 2	
	\ Norwegian 3	
	%6 Portuguese	
	Z Spanish	
	H Swedish	
	7 Swedish 2	
	= Swiss	
Esc	Select locking shift of G3 character set, right	LS3R
Esc ~	Select locking shift of G1 character set, right	LS1R
Esc 7	Save cursor	DECSC
Esc 8	Restore cursor	DECRC
Esc D	Index	IND
Esc E	New line	NEL

Esc H	Horizontal tab set	HTS
Esc M	Reverse index	RI
Esc N	Select single-shift of G2 character set	SS2
Esc O	Select single-shift of G3 character set	SS3
Esc Z	Send device attributes/terminal identification. Response: CSI?62;1;2;6;8c	DECID
Esc [ c		
Esc c	Hard reset	RIS
Esc n	Select locking shift of G2 character set	LS2
Esc o	Select locking shift of G3 character set	LS3
OSC <i>ps ; string NP</i>	OSC Mode-Set icon and window titles. Variables are:	
Esc ] <i>ps ; string NP</i> (For more information, see <a href="#">"Configuring Window and Icon Titles"</a> .)	<i>NP</i> -Any non-printing character (discarded)	
	<i>string</i> -ASCII printable string (maximum 511 characters)	
	<i>ps</i> -	
	0 Use string as new icon name and title	
	1 Use string as new icon name only	
	2 Use string as new title only	
OSC <i>ps ND string NP</i>	Color-pair specification (NCD-specific) Variables are defined as follows:	
Esc ] <i>ps ND string NP</i> (For more information, see <a href="#">"Configuring Color Text"</a> .)	<i>ps</i> -90 to 97	
	<i>ND</i> -Any non-digit character	
	<i>string</i> - <i>foreground/ background</i>	
	<i>NP</i> -Any non-printing character	

## Configuring the Status Line

The status line is referred to in Digital documents as "the 25th line of the display." Because NCD Terminal Emulator windows may have more than 24 lines, the status line must be treated as the hardware status line instead of line 25.

The NCD implementation of the status line allows the programmer to create a new line that appears at the bottom of the window. Normal programmatic editing operations are available for this line, but different character modes (such as blinking or bold) are not supported. To enter characters into the status line, the programmer switches from the main display to the status line display, then uses normal cursor control and text to add characters.

By default, the status line is not visible on the screen.

To use the status line, enable or disable it with the following sequence:

CSI *ps* \$ -

where *ps* indicates which status line to use (or none):

0	No status line available
1	Indicator status line (no-op)
2	Host-writable status line

Hence, the value 2 makes the status line appear, and 0 makes it disappear. Note that content is not retained when the status line is hidden; the line is emptied.

To select the status line, use the following sequence:

CSI *ps* \$ }

where *ps* represents the display area to which the terminal sends data:

0	Send characters to the main display
1	Send characters to the status line

Once the status line is selected, all character input is directed there until the main display is selected.

### Programming Function Keys on N-108LK Keyboards

Fifteen of the twenty function keys on the N-108LK keyboards can be redefined by the user. The definable function keys are:

- F6 through F14
- Do and Help
- F17 through F20

When redefined, the shifted state of these keys takes on the defined values. The unshifted keys still work as usual; you cannot programmatically rebind the unshifted state.

The two permissible formats of the escape sequences follow:

DCS *pc* ; *p1* | *Ky1* / *St1* ; ... *Kyn* / *Stn* *ST*

DCS *pc* ; *p1* | *Ky1* \ *St1* ; ... *Kyn* / *Stn* *ST*

The parts of a function key definition are:

<b>DCS</b>	Device control string	
<b>pc</b>	Clear parameter:	
	0	Clear all keys before starting (reset)
	1	Clear one key at a time, as overwritten
<b>pl</b>	Lock parameter (no-op on NCD terminals):	
0	0	Lock the keys
	1	Unlock the keys
<b>Ky1/St1</b> or <b>Ky1\St1</b>	Key definition string. There can be <i>n</i> of these, separated by semicolons. The format is a key selector number, a slash, then the rebinding. (See <a href="#">Table 12-6</a> ). The <b>Ky1/St1</b> version requires that you supply the hexadecimal values of the letters in the key definition string. NCD has added another option, <b>Ky1\St1</b> , which allows you to supply ASCII characters for the string.	
<b>ST</b>	String terminator character, or ESC \	

**Table 12-6 Key Selector Numbers**

Key	Value
F6	17
F7	18
F8	19
F9	20
F10	21
F11	23
F12	24
F13	25
F14	26
Help	28
Do	29
F17	31
F18	32
F19	33
F20	34

Examples of function key definitions follow (spaces have been inserted for legibility, but must not be included in

the definition):

DCS 0 ; 1   ST	Clears all key rebindings
DCS 1 ; 0   ESC \	Locks keys (no-op on NCD terminals)
DCS 1 ; 1   34\ Print ST	Rebinds F20 to string "Print"
DCS 1 ; 1   34/5052494E54 ST	Rebinds F20 to string "Print"

In the Digital implementation, there is a limitation of 256 characters combined for all programmable function keys. NCD has a limitation of 256 characters per rebound key.

With Digital computers, key locking and unlocking can be set through hardware. Because NCD does not have this hardware, this function does not work. Locking is not enforced.

### Configuring Window and Icon Titles

Icon and window titles can be configured through the following escape sequence:

OSC *ps* ND *string* NP

where:

<b><i>ps</i></b>	Determines how the string is used:
	0-Uses <b><i>string</i></b> as the new icon name and window title
	1-Uses <b><i>string</i></b> as the new icon name only
	2-Uses <b><i>string</i></b> as the new window name only
<b><i>ND</i></b>	Is any non-alphanumeric character (and is discarded)
<b><i>string</i></b>	Becomes the icon name and window title (or icon name only). This is an ASCII printable string that contains a maximum of 511 characters.
<b><i>NP</i></b>	Is any non-printing character (and is also discarded)

### Configuring Color Text

You can specify color text programmatically. This feature is based on the SGR (select graphic rendition) paradigm used to control blinking, bold, inverse, and other text attributes.

There are two methods of setting text color:

- Using a subset of the ISO 6429 standard for selection of basic colors for foreground and background

- The Hewlett-Packard color-pair model in which you can select pairs of any X colors for text (X colors are listed in the file `/usr/lib/X11/ncd/rgb.txt`.)

The color selection code is limited to eight combinations of colors at any given time.

The number of combinations can be effectively doubled by using the inverse graphics rendition, but the number of colors that can be displayed on the screen simultaneously is limited.

#### ISO 6429 Color Usage

The ISO specification defines SGR sequences to change the foreground and the background pens, as listed in [Table 12-7](#).

**Table 12-7 SGR Sequences for Foreground and Background Pens**

Foreground Selection		Background Selection	
30	black	40	black
31	red	41	red
32	green	42	green
33	yellow	43	yellow
34	blue	44	blue
35	magenta	45	magenta
36	cyan	46	cyan
37	white	47	white

For example:

`CSI 31 m` or `ESC[ 31 m`

renders foreground text in red, and

`CSI 44 m` or `ESC[ 31 m`

renders background text in blue.

These selections can be mixed to use combinations of the foreground and background colors when rendering text. However, only eight combinations are permitted simultaneously on the screen. The eight color cells are reused as needed.

Note also that the combination of black text on a white background is always reserved for the first color cell; hence, there are really only seven combinations of these colors that you can select.

If you attempt to use more than seven combinations at one time, the resulting text is displayed using color cell zero (black on white).

Hewlett-Packard Color-Pair Usage

The eight available color cells can be assigned to any combination of foreground and background colors using NCDware-specific functionality.

This functionality builds on the SGR method of text specification with the addition of the range of new selections listed in [Table 12-8](#)

Table 12-8 New Color-Pair Selection

Color Pair Selector	Color Pair
90	color-pair0
91	color-pair1
92	color-pair2
93	color-pair3
94	color-pair4
95	color-pair5
96	color-pair6
97	color-pair7

For example:

```
CSI 91 m or ESC[ 91 m
```

uses color-pair1 for rendering text.

Specify the colors associated with the selections by using an extension of the OSC functions in the following format:

```
OSC ps ND string NP
```

where:

<i>ps</i>	ranges from 90 to 97 for the color-pair selection
<i>ND</i>	is any non-alphanumeric character (and is discarded)
<i>string</i>	is in the format foreground/background
<i>NP</i>	is any non-printing character (and is discarded)

---

For example:

```
OSC 91 ; orange/brown ^G
```

or

```
ESC] 91 ; orange/brown ^G
```

sets color-pair1 to foreground orange, background brown.

The first color, color cell 0 (zero), is special-it is the default used for normal text. In addition, the background of the window is reset to the background specified with this color. In the ISO 6429 model, color cell 0 is always used for text specified as black text on a white background. Note that this may have been changed using the Hewlett-Packard method, which results in black text on a white background being stored in color-pair0.

You can use the two models together, but this is somewhat tricky in terms of cell reuse. The zero cell is never reused, but others are available to be reused if a free cell is needed and there are no matching colors for an existing cell on the screen. (The code scans the screen to determine if a color cell is in use when it needs to allocate a new color selection.) As a rule, you should limit color to eight combinations at any given time, or twice that using inverse text. If you attempt to use more colors, the result is plain color text.

Set up new color cells as early as possible and not within loops.

Reverse video inverts all the colors that are set programmatically. The user can select reverse video from the Options menu or use the **reverseVideo** resource.

---

[\[Top\]](#) [\[Prev\]](#) [\[Next\]](#) [\[Contents\]](#) [\[Index\]](#)

---

*Send comments, suggestions, or questions about this document to the NCD Technical Publications Department by Internet e-mail. Write to us at [techpubs@ncd.com](mailto:techpubs@ncd.com).  
[Copyright © 1997, NCD Inc. All rights reserved.](#)*