APPENDIX E

cmdtool and xterm Control Sequences

This appendix lists the escape sequences that can be used to control features of a *cmdtool* or *xterm* terminal emulator window.

A standard terminal performs many operations in response to escape sequences sent out by a program. In emulating a terminal, *cmdtool* or *xterm* responds to those same terminal escape sequences. Under UNIX, programs use the *termcap* or *terminfo* database to determine which escape sequences to send out. For more information, see the standard UNIX man pages *termcap* (5) or *terminfo* (5), or the Nutshell Handbook *Termcap and Terminfo*, available from O'Reilly & Associates, Inc.

E.1 cmdtool/shelltool Control Sequences

Since *cmdtool* was written as a window terminal, not as an emulator of a real terminal, it has little "baggage" to carry around; accordingly, the commands interpreted by *cmdtool/shelltool* are few in number, but more than adequate for most purposes. Table E-1 lists them. Part of this table is adapted from the *shelltool* manual page.

Table E-1. Cmdtool/shelltool escape sequences

Sequence	Function
BEL (Ctrl-G)	Make beeping sound
BS (Ctrl-H)	Erase char to left of cursor
TAB (Ctrl-I)	Horizontal tab
LF (Ctrl-J)	Newline; UNIX maps to "Return"
CR (Ctrl-M; Return)	Normal end-of-line character.

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Table E-1. Cmdtool/shelltool escape sequences

Sequence	Function
ESC [1 t	open (de-iconify)
ESC [2 t	close (iconify)
ESC [3 t	move, with interactive feedback
ESC [3 ; TOP ; LEFT t	move window to TOP LEFT (pixel coordi- nates)
ESC [4 t	stretch, with interactive feed- back
ESC [4 ; HT ; WIDTH t	resize window, to HT WIDTH size (in pixels)
ESC [5 t	move window to front of window stack
ESC [6 t	move window to back of screen
ESC [7 t	refresh
ESC [8 ; ROWS ; COLS t	resize window, to ROWS COLS size (in characters)
ESC [11 t	report if window is open or iconic by sending ESC [1 t or ESC [2 t
ESC [13 t	report position by sending ESC [3 ; TOP ; LEFT t
ESC [14 t	report size in pixels by sending ESC [4 ; HT ; WIDTH t
ESC [18 t	report size in characters by sending ESC [8 ; ROWS ; COLS t
ESC [20 t	report icon label by sending ESC] L label ESC \
ESC [21 t	report tool header by sending ESC] l label ESC \
ESC] l text ESC \	set tool header to text
ESC] I file ESC \	set icon to the icon contained in file; file must be in iconedit output format
ESC] L label ESC \	set icon label to label

Table E-1. Cmdtool/shelltool escape sequences

Sequence	Function
ESC [> OPT ; ... h	turn SB OPT on (OPT = 1 => page-mode), for example, ESC [> 1 ; 3 ; 4h
ESC [> OPT ; ... k	report option OPT; sends ESC [> OPT l or ESC [> OPT h for each OPT
ESC [> OPT ;... l	turn option OPT off (OPT = 1 => pagemode), for ESC [> 1 ; 3 ;

E.2 xterm Control Sequences

Since *xterm* has to retain compatiibility with not one but two different terminal types, it has a vast array of escape sequences. This appendix purports to contain a complete list.

This appendix is based on two sources: the “Xterm Control Sequences” document, written by Edward Moy, University of California, Berkeley, for the X10 *xterm* ; and X11 updates provided to the X Consortium by Skip Montanaro, GE Corporate Research & Development.

E.2.1 Definitions

Most of these control sequences are standard VT102 control sequences. There are, however, additional ones to provide control of *xterm* -dependent functions, like the scrollbar or window size.

C A single (required) character.

Ps A single (usually optional) numeric parameter, composed of one of more digits.

Pm A multiple numeric parameter composed of any number of single numeric parameters, separated by ; character(s).

Pt A text parameter composed of printable characters.

E.2.2 VT102 Mode

Most of these control sequences are standard VT102 control sequences. There are, however, additional ones to provide control of xterm-dependent functions, like the scrollbar or window size.

BEL Bell (Ctrl-G)

BS Backspace (Ctrl-H)

TAB Horizontal Tab (Ctrl-I)

LF Line Feed or New Line (Ctrl-J)

VT Vertical Tab (Ctrl-K)

FF Form Feed or New Page (Ctrl-L)

CR Carriage Return (Ctrl-M)

SO Shift Out (Ctrl-N) -> Switch to Alternate Character Set

SI Shift In (Ctrl-O) -> Switch to Standard Character Set

ESC BEL Same as non-escaped BEL

ESC BS Same as non-escaped BS

ESC HT Same as non-escaped HT

ESC NL Same as non-escaped NL

ESC VT Same as non-escaped VT

ESC NP Same as non-escaped NP

ESC CR Same as non-escaped CR

ESC SO Same as non-escaped SO

ESC SI Same as non-escaped SI

ESC #BEL Same as non-escaped BEL

ESC #BS Same as non-escaped BS

ESC #HT Same as non-escaped HT

ESC #NL Same as non-escaped NL

ESC #VT Same as non-escaped VT

ESC #NP Same as non-escaped NP

ESC #CR Same as non-escaped CR

ESC #SO Same as non-escaped SO

ESC #SI Same as non-escaped SI

ESC #8 DEC Screen Alignment Test (DECALN)

ESC (BEL Same as non-escaped BEL

ESC (BS Same as non-escaped BS

ESC (HT Same as non-escaped HT

ESC (NL Same as non-escaped NL

ESC (VT Same as non-escaped VT

ESC (NP Same as non-escaped NP

ESC (CR Same as non-escaped CR

ESC (SO Same as non-escaped SO

ESC (SI Same as non-escaped SI

ESC (C Select G0 Character Set (SCS)

C = 0 -> Special Character and Line Drawing Set

C = 1 -> Alternate Character ROM Standard Set

C = 2 -> Alternate Character ROM Special Set

C = A -> United Kingdom (UK)

C = B -> United States (USASCII)

ESC)C Select G1 Character Set (SCS)

C = 0 -> Special Character and Line Drawing Set

C = 1 -> Alternate Character ROM Standard Set

C = 2 -> Alternate Character ROM Special Set

C = A -> United Kingdom (UK)

C = B -> United States (USASCII)

ESC *C Select G2 Character Set (SCS)

C = 0 -> Special Character and Line Drawing Set

C = 1 -> Alternate Character ROM Standard Set

C = 2 -> Alternate Character ROM Special Set

C = A -> United Kingdom (UK)

C = B -> United States (USASCII)

ESC +C Select G3 Character Set (SCS)

C = 0 -> Special Character and Line Drawing Set

C = 1 -> Alternate Character ROM Standard Set

C = 2 -> Alternate Character ROM Special Set

C = A -> United Kingdom (UK)

C = B -> United States (USASCII)

ESC 7 Save Cursor (DECSC)

ESC 8 Restore Cursor (DECRC)

ESC = Application Keypad (DECPAM)

ESC > Normal Keypad (DECPNM)

ESC D Index (IND)

ESC E Next Line (NEL)

ESC H Tab Set (HTS)

ESC M Reverse Index (RI)

ESC N Single Shift Select of G2 Character Set (SS2)

ESC O Single Shift Select of G3 Character Set (SS3)

ESC Return Terminal ID (DECID)

ESC [BEL Same as non-escaped BEL

ESC [BS Same as non-escaped BS

ESC [HT Same as non-escaped HT

ESC [NL Same as non-escaped NL

ESC [VT Same as non-escaped VT

ESC [NP Same as non-escaped NP

ESC [CR Same as non-escaped CR

ESC [SO Same as non-escaped SO

ESC[SI Same as non-escaped SI

ESC [?BEL Same as non-escaped BEL

ESC [?BS Same as non-escaped BS

ESC [?HT Same as non-escaped HT

ESC [?NL Same as non-escaped NL

ESC [?VT Same as non-escaped VT

ESC [?NP Same as non-escaped NP

ESC [?CR Same as non-escaped CR

ESC [?SO Same as non-escaped SO

ESC [?SI Same as non-escaped SI

ESC [Ps@ Insert Ps (Blank) Character(s) (default = 1) (ICH)

ESC [PsA Cursor Up Ps Times (default = 1) (CUU)

ESC [PsB Cursor Down Ps Times (default = 1) (CUD)

ESC [PsC Cursor Forward Ps Times (default = 1) (CUF)

ESC [PsD Cursor Backward Ps Times (default = 1) (CUB)

ESC [Ps;PsH Cursor Position [row;column] (default = [1,1]) (CUP)

ESC [PsJ Erase in Display (ED)

Ps = 0 -> Clear Below (default)

Ps = 1 -> Clear Above

Ps = 2 -> Clear All

ESC [PsK Erase in Line (EL)

Ps = 0 -> Clear to Right (default)

Ps = 1 -> Clear to Left

Ps = 2 -> Clear All

ESC [PsL Insert Ps Line(s) (default = 1) (IL)

ESC [PsM Delete Ps Line(s) (default = 1) (DL)

ESC [PsP Delete Ps Character(s) (default = 1) (DCH)

ESC [T Track mouse

ESC [Psc Device Attributes (DA1)

ESC [Ps;Psf Cursor Position [row;column] (default = [1,1]) (HVP)

ESC [Psg Tab Clear

Ps = 0 -> Clear Current Column (default)

Ps = 3 -> Clear All

ESC[Psh Mode Set (SET)

Ps = 4 -> Insert Mode (IRM)

Ps = 20 -> Automatic Linefeed (LNM)

ESC [Psl Mode Reset (RST)

Ps = 4 -> Insert Mode (IRM)

Ps = 20 -> Automatic Linefeed (LNM)

ESC [Pmm Character Attributes (SGR)

Pm = 0 -> Normal (default)

Pm = 1 -> Blink (appears as Bold)

Pm = 4 -> Underscore

Pm = 5 -> Bold

Pm = 7 -> Inverse

ESC [Psn Device Status Report (DSR)

Ps = 5 -> Status Report ESC[0n -> OK

Ps = 6 -> Report Cursor Position (CPR) [row;column] as ESC[r;cR

ESC [Ps;Psr Set Scrolling Region [top;bottom] (default = full size of window) (DECSTBM)

ESC [Psx Request Terminal Parameters (DECREQTPARM)

ESC [Ps ND string NP

OSC Mode

ND can be any non-digit Character (it's discarded)

NP can be any non-printing Character (it's discarded)

string can be any ASCII printable string (max 511 characters)

Ps = 0 -> use string as a new icon name and title

Ps = 1 -> use string as a new icon name only

Ps = 2 -> use string as a new title only

Ps = 46 -> use string as a new log file name

ESC [?Psh DEC Private Mode Set (DECSET)

Ps = 1 -> Application Cursor Keys (DECCKM)

Ps = 2 -> Set VT52 Mode

Ps = 3 -> 132 Column Mode (DECCOLM)

Ps = 4 -> Smooth (Slow) Scroll (DECSCLM)

Ps = 5 -> Reverse Video (DECSCNM)

Ps = 6 -> Origin Mode (DECOM)

Ps = 7 -> Wraparound Mode (DECAWM)

Ps = 8 -> Auto-repeat Keys (DECARM)

Ps = 9 -> Send MIT Mouse Row & Column on Button Press

Ps = 38 -> Enter TekTronix Mode (DECTEK)

Ps = 40 -> Allow 80 <--> 132 Mode

Ps = 41 -> curses(5) fix

Ps = 44 -> Turn On Margin Bell

Ps = 45 -> Reverse-wraparound Mode

Ps = 46 -> Start Logging

Ps = 47 -> Use Alternate Screen Buffer

Ps = 1000 -> send VT200 Mouse Row & Column on Button Press

Ps = 1003 -> send VT200 Hilite Mouse Row & Column on Button Press

ESC [?Psl DEC Private Mode Reset (DECRST)

Ps = 1 -> Normal Cursor Keys (DECCKM)

Ps = 3 -> 80 Column Mode (DECCOLM)

Ps = 4 -> Jump (Fast) Scroll (DECSCLM)

Ps = 5 -> Normal Video (DECSCNM)

Ps = 6 -> Normal Cursor Mode (DECOM)

Ps = 7 -> No Wraparound Mode (DECAWM)

Ps = 8 -> No Auto-repeat Keys (DECARM)

Ps = 9 -> Don’t Send MIT Mouse Row & Column on Button Press

Ps = 40 -> Disallow 80 <--> 132 Mode

Ps = 41 -> No curses(5) fix

Ps = 44 -> Turn Off Margin Bell

Ps = 45 -> No Reverse-wraparound Mode

Ps = 46 -> Stop Logging

Ps = 47 -> Use Normal Screen Buffer

Ps = 1000 -> Don’t send Mouse Row & Column on Button Press

Ps = 1003 -> Don’t send Hilite Mouse Row & Column on Button Press

ESC [?Psr Restore DEC Private Mode

Ps = 1 -> Normal/Application Cursor Keys (DECCKM)

Ps = 3 -> 80/132 Column Mode (DECCOLM)

Ps = 4 -> Jump (Fast)/Smooth (Slow) Scroll (DECSCLM)

Ps = 5 -> Normal/Reverse Video (DECSCNM)

Ps = 6 -> Normal/Origin Cursor Mode (DECOM)

Ps = 7 -> No Wraparound/Wraparound Mode (DECAWM)

Ps = 8 -> Auto-repeat/No Auto-repeat Keys (DECARM)

Ps = 9 -> Don’t Send/Send MIT Mouse Row & Column on Button Press

Ps = 40 -> Disallow/Allow 80 <--> 132 Mode

Ps = 41 -> Off/On curses(5) fix

Ps = 44 -> Turn Off/On Margin Bell

Ps = 45 -> No Reverse-wraparound/Reverse- wraparound Mode

Ps = 46 -> Stop/Start Logging

Ps = 47 -> Use Normal/Alternate Screen Buffer

Ps = 1000 -> Don't send/send VT200 Mouse Row &Column onButton Press

Ps = 1003 -> Don't send/send VT200 HiliteMouse Row & Column on Button Press

ESC [?Pss Save DEC Private Mode

Ps = 1 -> Normal/Application Cursor Keys (DECCKM)

Ps = 3 -> 80/132 Column Mode (DECCOLM)

Ps = 4 -> Jump (Fast)/Smooth (Slow) Scroll (DECSCLM)

Ps = 5 -> Normal/Reverse Video (DECSCNM)

Ps = 6 -> Normal/Origin Cursor Mode (DECOM)

Ps = 7 -> No Wraparound/Wraparound Mode (DECAWM)

Ps = 8 -> Auto-repeat/No Auto-repeat Keys (DECARM)

Ps = 9 -> Don't Send/Send MIT Mouse Row & Column on Button Press

Ps = 40 -> Disallow/Allow 80 <--> 132 Mode

Ps = 41 -> Off/On curses(5) fix

Ps = 44 -> Turn Off/On Margin Bell

Ps = 45 -> No Reverse-wraparound/Reverse-wraparound Mode

Ps = 46 -> Stop/Start Logging

Ps = 47 -> Use Normal/Alternate Screen Buffer

Ps = 1000 -> Don't send/send VT200 Mouse Row & Column on Button Press

Ps = 1003 -> Don't send/send VT200 Hilite Mouse Row & Column on Button Press

ESC]Ps;PtBEL

Set Text Parameters

Ps = 0 -> Change Window Name and Title to Pt

Ps = 1 -> Change Window Name to Pt

Ps = 2 -> Change Window Title to Pt

Ps = 46 -> Change Log File to Pt

Ps = 50 -> Change Font to Pt

ESC c Full Reset (RIS)

ESC n Locking Shift Select of G2 Character Set (LS2)

ESC Locking Shift Select of G3 Character Set (LS3)

E.2.3 Tektronix 4014 Mode

Most of these sequences are standard Tektronix 4014 control sequences. The major features missing are the alternate (APL) character set and the write-thru and defocused modes.

BEL Bell (Ctrl-G)

BS Backspace (Ctrl-H)

TAB Horizontal Tab (Ctrl-I)

LF Line Feed or New Line (Ctrl-J)

VT Vertical Tab (Ctrl-K)

FF Form Feed or New Page (Ctrl-L)

CR Carriage Return (Ctrl-M)

ESC ETX Switch to VT102 Mode

ESC ENQ Return Terminal Status

ESC LF PAGE (Clear Screen)

ESC ETB COPY (Save Tektronix Codes to File)

ESC CAN Bypass Condition

ESC SUB GIN mode

ESC FS Special Point Plot Mode

ESC GS Graph Mode (same as GS)

ESC RS Incremental Plot Mode (same as RS)

ESC US Alpha Mode (same as US)

ESC 8 Select Large Character Set

ESC 9 Select #2 Character Set

ESC : Select #3 Character Set

ESC ; Select Small Character Set

ESC]Ps;PtBEL

Set Text Parameters

Ps = 0 -> Change Window Name and Title to Pt

Ps = 1 -> Change Icon Name to Pt

Ps = 2 -> Change Window Title to Pt

Ps = 46 -> Change Log File to Pt

ESC ` Normal Z Axis and Normal (solid) Vectors

ESC a Normal Z Axis and Dotted Line Vectors

ESC b Normal Z Axis and Dot-Dashed Vectors

ESC c Normal Z Axis and Short-Dashed Vectors

ESC d Normal Z Axis and Long-Dashed Vectors

ESC h Defocused Z Axis and Normal (solid) Vectors

ESC i Defocused Z Axis and Dotted Line Vectors

ESC j Defocused Z Axis and Dot-Dashed Vectors

ESC k Defocused Z Axis and Short-Dashed Vectors

ESCl Defocused Z Axis and Long-Dashed Vectors

ESC p Write-Thru Mode and Normal (solid) Vectors

ESC q Write-Thru Mode and Dotted Line Vectors

ESC r Write-Thru Mode and Dot-Dashed Vectors

ESC s Write-Thru Mode and Short-Dashed Vectors

ESC t Write-Thru Mode and Long-Dashed Vectors

FS Point Plot Mode

GS Graph Mode

RS Incremental Plot Mode

US Alpha Mode