Xterm Control Sequences

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Definitions

\[ c \]  The literal character \( c \).

\( C \)  A single (required) character.

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

\( P_m \)  A multiple numeric parameter composed of any number of single numeric parameters, separated by semicolon(s).

\( P_t \)  A text parameter composed of printable characters.

VT100 Mode

Most of these control sequences are standard VT102 control sequences, but there are some sequences here from later DEC VT terminals, too. VT102 features not supported are smooth scrolling, double size characters, blinking characters, and VT52 mode. There are additional control sequences to provide Xterm-dependent functions, like the scrollbar or window size. Where the function is specified by DEC or ISO 6429, the code assigned to it is given in parentheses. The escape codes to designate and invoke character sets are specified by ISO 2022; see that document for a discussion of character sets.

\[ \text{BEL} \]  Bell (Ctrl-G)

\[ \text{BS} \]  Backspace (Ctrl-H)

\[ \text{TAB} \]  Horizontal Tab (HT) (Ctrl-I)

\[ \text{LF} \]  Line Feed or New Line (NL) (Ctrl-J)

\[ \text{VT} \]  Vertical Tab (Ctrl-K) same as LF

\[ \text{FF} \]  Form Feed or New Page (NP) (Ctrl-L) same as LF

\[ \text{CR} \]  Carriage Return (Ctrl-M)

\[ \text{SO} \]  Shift Out (Ctrl-N) → Switch to Alternate Character Set: invokes the G1 character set.

\[ \text{SI} \]  Shift In (Ctrl-O) → Switch to Standard Character Set: invokes the G0 character set (the default).

\[ \text{ESC} \#8 \]  DEC Screen Alignment Test (DECALN)

\[ \text{ESC}C \]  Designate G0 Character Set (ISO 2022)

\( C = 0 \)  → DEC Special Character and Line Drawing Set

\( C = \text{A} \)  → United Kingdom (UK)
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VT100 Mode

Designate G1 Character Set (ISO 2022)
\[
\text{ESC} \quad C
\]
\(C = \text{[B]} \) → United States (USASCII)
\(C = \text{[A]} \) → United Kingdom (UK)
\(C = \text{[B]} \) → United States (USASCII)

Designate G2 Character Set (ISO 2022)
\[
\text{ESC} \quad * \quad C
\]
\(C = \text{[0]} \) → DEC Special Character and Line Drawing Set
\(C = \text{[A]} \) → United Kingdom (UK)
\(C = \text{[B]} \) → United States (USASCII)

Designate G3 Character Set (ISO 2022)
\[
\text{ESC} \quad + \quad C
\]
\(C = \text{[0]} \) → DEC Special Character and Line Drawing Set
\(C = \text{[A]} \) → United Kingdom (UK)
\(C = \text{[B]} \) → United States (USASCII)

Save Cursor (DECS)
\[
\text{ESC} \quad 7
\]
Restore Cursor (DECR)
\[
\text{ESC} \quad 8
\]
Application Keypad (DECPAM)
\[
\text{ESC} \quad =
\]
Normal Keypad (DECPNM)
\[
\text{ESC} \quad >
\]
Index (IND)
\[
\text{ESC} \quad D
\]
Next Line (NEL)
\[
\text{ESC} \quad E
\]
Cursor to lower left corner of screen (if enabled by the \textbf{hp}LowerleftBugCompat resource).
\[
\text{ESC} \quad F
\]
Tab Set (HTS)
\[
\text{ESC} \quad H
\]
Reverse Index (RI)
\[
\text{ESC} \quad M
\]
Single Shift Select of G2 Character Set (SS2): affects next character only
\[
\text{ESC} \quad N
\]
Single Shift Select of G3 Character Set (SS3): affects next character only
\[
\text{ESC} \quad O
\]
Device Control String (DCS)
\[
\text{ESC} \quad P \quad P_1 \quad \text{ESC} \quad \backslash
\]
\(xterm\) implements no DCS functions; \(P_1\) is ignored. \(P_1\) need not be printable characters.

Return Terminal ID (DECID). Obsolete form of \text{ESC} \quad [ \quad c \quad ] \quad (DA).
\[
\text{ESC} \quad Z
\]
Insert \(P_1\) (Blank) Character(s) (default = 1) (ICH)
\[
\text{ESC} \quad [ \quad P_1 \quad @
\]
Cursor Up \(P_1\) Times (default = 1) (CUU)
\[
\text{ESC} \quad [ \quad P_1 \quad A
\]
Cursor Down \(P_1\) Times (default = 1) (CUD)
\[
\text{ESC} \quad [ \quad P_1 \quad B
\]
Cursor Forward \(P_1\) Times (default = 1) (CUF)
\[
\text{ESC} \quad [ \quad P_1 \quad C
\]
Cursor Backward \(P_1\) Times (default = 1) (CUB)
\[
\text{ESC} \quad [ \quad P_1 \quad D
\]
Cursor Position [row;column] (default = [1,1]) (CUP)
\[
\text{ESC} \quad [ \quad P_1 \quad J
\]
Erase in Display (ED)
\[
\text{ESC} \quad [ \quad P_1 \quad K
\]
Erase in Line (EL)
\[
\text{ESC} \quad [ \quad P_1 \quad L
\]
\(P_1 = \text{[0]} \) → Clear Below (default)
\(P_1 = \text{[1]} \) → Clear Above
\(P_1 = \text{[2]} \) → Clear All
\(P_1 = \text{[0]} \) → Clear to Right (default)
\(P_1 = \text{[1]} \) → Clear to Left
Xterm Control Sequences

VT100 Mode

\[ P_s = \left[ \begin{array}{c} 2 \end{array} \right] \rightarrow \text{Clear All} \]

Insert \( P_s \) Line(s) (default = 1) (IL)

Delete \( P_s \) Line(s) (default = 1) (DL)

Delete \( P_s \) Character(s) (default = 1) (DCH)

\[ \text{Initiate hitle mouse tracking. Parameters are [func;startx;starty;firstrow;lastrow]. See the section \textbf{Mouse Tracking}.} \]

Send Device Attributes (DA)

\[ P_s = \left[ \begin{array}{c} 0 \end{array} \right] \text{or omitted} \rightarrow \text{request attributes from terminal} \]

\[ \rightarrow \left[ \text{ESC}[3?1;2c \right] \text{ ("I am a VT100 with Advanced Video Option."')} \]

Horizontal and Vertical Position \[ \text{[row;column]} \text{ (default = [1,1]) (HVP)} \]

Tab Clear (TBC)

\[ P_s = \left[ \begin{array}{c} 0 \end{array} \right] \rightarrow \text{Clear Current Column (default)} \]

\[ P_s = \left[ \begin{array}{c} 3 \end{array} \right] \rightarrow \text{Clear All} \]

Set Mode (SM)

\[ P_s = \left[ \begin{array}{c} 4 \end{array} \right] \rightarrow \text{Insert Mode (IRM)} \]

\[ P_s = \left[ \begin{array}{c} 2 \end{array} \right] \left[ \begin{array}{c} 0 \end{array} \right] \rightarrow \text{Automatic Newline (LNM)} \]

Reset Mode (RM)

\[ P_s = \left[ \begin{array}{c} 4 \end{array} \right] \rightarrow \text{Replace Mode (IRM)} \]

\[ P_s = \left[ \begin{array}{c} 2 \end{array} \right] \left[ \begin{array}{c} 0 \end{array} \right] \rightarrow \text{Normal Linefeed (LNM)} \]

Character Attributes (SGR)

\[ P_s = \left[ \begin{array}{c} 0 \end{array} \right] \rightarrow \text{Normal (default)} \]

\[ P_s = \left[ \begin{array}{c} 1 \end{array} \right] \rightarrow \text{Bold} \]

\[ P_s = \left[ \begin{array}{c} 4 \end{array} \right] \rightarrow \text{Underscore} \]

\[ P_s = \left[ \begin{array}{c} 5 \end{array} \right] \rightarrow \text{Blink (appears as Bold)} \]

\[ P_s = \left[ \begin{array}{c} 7 \end{array} \right] \rightarrow \text{Inverse} \]

Device Status Report (DSR)

\[ P_s = \left[ \begin{array}{c} 5 \end{array} \right] \rightarrow \text{Status Report [ESC][0n} \text{ ("OK")} \]

\[ P_s = \left[ \begin{array}{c} 6 \end{array} \right] \rightarrow \text{Report Cursor Position (CPR) [row;column] as [ESC][r}; \text{cR} \]

Set Scrolling Region \[ \text{[top;bottom]} \text{ (default = full size of window) (DECSTBM)} \]

Request Terminal Parameters (DECREQTPARM)

DEC Private Mode Set (DECESET)

\[ P_s = \left[ \begin{array}{c} 1 \end{array} \right] \rightarrow \text{Application Cursor Keys (DECCKM)} \]

\[ P_s = \left[ \begin{array}{c} 2 \end{array} \right] \rightarrow \text{Designate USASCII for character sets G0-G3. (In the VT102, this selects VT52 mode (DECANM), which \textit{xterm} doesn’t support.)} \]

\[ P_s = \left[ \begin{array}{c} 3 \end{array} \right] \rightarrow \text{132 Column Mode (DECCOLM)} \]

\[ P_s = \left[ \begin{array}{c} 4 \end{array} \right] \rightarrow \text{Smooth (Slow) Scroll (DECSSLM)} \]

\[ P_s = \left[ \begin{array}{c} 5 \end{array} \right] \rightarrow \text{Reverse Video (DECSNRM)} \]

\[ P_s = \left[ \begin{array}{c} 6 \end{array} \right] \rightarrow \text{Origin Mode (DECOM)} \]

\[ P_s = \left[ \begin{array}{c} 7 \end{array} \right] \rightarrow \text{Wraparound Mode (DECAWM)} \]

\[ P_s = \left[ \begin{array}{c} 8 \end{array} \right] \rightarrow \text{Auto-repeat Keys (DECARM)} \]
$P_9 = 9 \rightarrow \text{Send Mouse X & Y on button press. See the section Mouse Tracking.}$

$P_9 = [3 8] \rightarrow \text{Enter Tektronix Mode (DECTEK)}$

$P_9 = [4 0] \rightarrow \text{Allow 80 <-> 132 Mode}$

$P_9 = [4 1] \rightarrow \text{more(1) fix (see curses resource)}$

$P_9 = [4 4] \rightarrow \text{Turn On Margin Bell}$

$P_9 = [4 5] \rightarrow \text{Reverse-wraparound Mode}$

$P_9 = [4 6] \rightarrow \text{Start Logging (normally disabled by a compile-time option)}$

$P_9 = [4 7] \rightarrow \text{Use Alternate Screen Buffer (unless disabled by the titleInhibit resource)}$

$P_9 = [1 0 0 0 1] \rightarrow \text{Send Mouse X & Y on button press and release. See the section Mouse Tracking.}$

$P_9 = [1 0 0 1] \rightarrow \text{Use Hilite Mouse Tracking. See the section Mouse Tracking.}$

\[
\text{ESC} \text{ ] } \text{ ] } \text{ ? } P_m \text{ ] 1 }
\]

**DEC Private Mode Reset (DECRST)**

$P_9 = [1] \rightarrow \text{Normal Cursor Keys (DECCKM)}$

$P_9 = [3] \rightarrow \text{80 Column Mode (DECCOLM)}$

$P_9 = [4] \rightarrow \text{Jump (Fast) Scroll (DECSCLM)}$

$P_9 = [5] \rightarrow \text{Normal Video (DECSNVT)}$

$P_9 = [6] \rightarrow \text{Normal Cursor Mode (DECOM)}$

$P_9 = [7] \rightarrow \text{No Wraparound Mode (DECAWM)}$

$P_9 = [8] \rightarrow \text{No Auto-repeat Keys (DECARG)}$

$P_9 = [9] \rightarrow \text{Don’t Send Mouse X & Y on button press}$

$P_9 = [4 0] \rightarrow \text{Disallow 80 <-> 132 Mode}$

$P_9 = [4 1] \rightarrow \text{No more(1) fix (see curses resource)}$

$P_9 = [4 4] \rightarrow \text{Turn Off Margin Bell}$

$P_9 = [4 5] \rightarrow \text{No Reverse-wraparound Mode}$

$P_9 = [4 6] \rightarrow \text{Stop Logging (normally disabled by a compile-time option)}$

$P_9 = [4 7] \rightarrow \text{Use Normal Screen Buffer}$

$P_9 = [1 0 0 0 0] \rightarrow \text{Don’t Send Mouse X & Y on button press and release}$

$P_9 = [1 0 0 0 1] \rightarrow \text{Don’t Use Hilite Mouse Tracking}$

\[
\text{ESC} \text{ ] } \text{ ] } \text{ ? } P_m \text{ ] } r
\]

**Restore DEC Private Mode Values.** The value of $P_i$ previously saved is restored. $P_i$ values are the same as for DECSET.

\[
\text{ESC} \text{ ] } \text{ ] } \text{ ? } P_m \text{ ] } s
\]

**Save DEC Private Mode Values.** $P_i$ values are the same as for DECSET.

**Set Text Parameters**

\[
P_9 = [0] \rightarrow \text{Change Icon Name and Window Title to $P_i$}
\]

\[
P_9 = [1] \rightarrow \text{Change Icon Name to $P_i$}
\]

\[
P_9 = [2] \rightarrow \text{Change Window Title to $P_i$}
\]

\[
P_9 = [4 6] \rightarrow \text{Change Log File to $P_i$ (normally disabled by a compile-time option)}
\]

\[
P_9 = [5 0] \rightarrow \text{Set Font to $P_i$}
\]

**Privacy Message (PM)**

\[
\text{xterm implements no PM functions; } P_i \text{ is ignored. } P_i \text{ need not be printable characters.}
\]
There are three mutually exclusive modes, each enabled (or disabled) by a different parameter in the DECSET (or DECRST) escape sequence. Parameters for all mouse tracking escape sequences generated by xterm encode numeric parameters in a single character as value×10. For example, [-4] is 1. The screen coordinate system is 1-based.

Mouse Tracking

The VT widget can be set to send the mouse position and other information on button presses. These modes are typically used by editors and other full-screen applications that want to make use of the mouse.

There are three mutually exclusive modes, each enabled (or disabled) by a different parameter in the DECSET (or DECRST) escape sequence. Parameters for all mouse tracking escape sequences generated by xterm encode numeric parameters in a single character as value×10. For example, [-4] is 1. The screen coordinate system is 1-based.

X10 compatibility mode sends an escape sequence on button press encoding the location and the mouse button pressed. It is enabled by specifying parameter 9 to DECSET. On button press, xterm sends $\text{ESC} \left[ \text{t} \right] C_9 C_6 C_7$ (6 characters). $C_9$ is button—1. $C_6$ and $C_7$ are the x and y coordinates of the mouse when the button was pressed.

Normal tracking mode sends an escape sequence on both button press and release. Modifier information is also sent. It is enabled by specifying parameter 1000 to DECSET. On button press or release, xterm sends $\text{ESC} \left[ \text{t} \right] C_9 C_6 C_7$. The low two bits of $C_9$ encode button information: 0=MB1 pressed, 1=MB2 pressed, 2=MB3 pressed, 3=release. The upper bits encode what modifiers were down when the button was pressed and are added together. 4=Shift, 8=Meta, 16=Control. $C_6$ and $C_7$ are the x and y coordinates of the mouse event. The upper left corner is (1,1).

Mouse hilite tracking notifies a program of a button press, receives a range of lines from the program, highlights the region covered by the mouse within that range until button release, and then sends the program the release coordinates. It is enabled by specifying parameter 1001 to DECSET. Warning: use of this mode requires a cooperating program or it will hang xterm. On button press, the same information as for normal tracking is generated; xterm then waits for the program to send mouse tracking information. All X events are ignored until the proper escape sequence is received from the pty: $\text{ESC} \left[ \text{t} \right] C_9 C_6 C_7$. The parameters are $\text{func}$, $\text{startx}$, $\text{starty}$, $\text{firstrow}$, and $\text{lastrow}$. $\text{func}$ is non-zero to initiate hilite tracking and zero to abort. $\text{startx}$ and $\text{starty}$ give the starting x and y location for the highlighted region. The ending location tracks the mouse, but will never be above row $\text{firstrow}$ and will always be above row $\text{lastrow}$. (The top of the screen is row 1.) When the button is released, xterm reports the ending position one of two ways: if the start and end coordinates are valid text locations: $\text{ESC} \left[ \text{t} \right] C_9 C_6 C_7$. If either coordinate is past the end of the line: $\text{ESC} \left[ \text{t} \right] C_9 C_6 C_7 C_7 C_7 C_7$. The parameters are $\text{startx}$, $\text{starty}$, $\text{endx}$, $\text{endy}$, $\text{mousex}$, and $\text{mousey}$. $\text{startx}$, $\text{starty}$, $\text{endx}$, and $\text{endy}$ give the starting and ending character positions of the region. $\text{mousex}$ and $\text{mousey}$ give the location of the mouse at button up, which may not be over a character.

Tektronix 4014 Mode

Most of these sequences are standard Tektronix 4014 control sequences. Graph mode supports the 12-bit addressing of the Tektronix 4014. The major features missing are the write-thru and defocused modes. This document does not describe the commands used in the various Tektronix plotting modes but does describe the commands to switch modes.
Xterm Control Sequences

Bel (Ctrl-G)
BS Backspace (Ctrl-H)
Tab Horizontal Tab (Ctrl-I)
LF Line Feed or New Line (Ctrl-J)
VT Cursor up (Ctrl-K)
FF Form Feed or New Page (Ctrl-L)
Cr Carriage Return (Ctrl-M)
ESC Switch to VT100 Mode (ESC Ctrl-C)
ESC Return Terminal Status (ESC Ctrl-E)
ESC PAGE (Clear Screen) (ESC Ctrl-L)
ESC Begin 4015 APL mode (ignored by xterm) (ESC Ctrl-N)
ESC End 4015 APL mode (ignored by xterm) (ESC Ctrl-O)
ESC COPY (Save Tektronix Codes to file COPYyy-mm-dd.hh:mm:ss) (ESC Ctrl-W)
ESC Bypass Condition (ESC Ctrl-X)
ESC GIN mode (ESC Ctrl-Z)
ESC Special Point Plot Mode (ESC Ctrl-
ESC 8 Select Large Character Set
ESC 9 Select #2 Character Set
ESC ; Select #3 Character Set
ESC ; Select Small Character Set
ESC ] P] ; P[BEL] Set Text Parameters of VT window
ESC P = [0] → Change Icon Name and Window Title to P
ESC P = [1] → Change Icon Name to P
ESC P = [2] → Change Window Title to P
ESC Normal Z Axis and Normal (solid) Vectors
ESC Normal Z Axis and Dotted Line Vectors
ESC Normal Z Axis and Dot-Dashed Vectors
ESC Normal Z Axis and Short-Dashed Vectors
ESC Normal Z Axis and Long-Dashed Vectors
ESC Defocused Z Axis and Normal (solid) Vectors
ESC Defocused Z Axis and Dotted Line Vectors
ESC Defocused Z Axis and Dot-Dashed Vectors
ESC Defocused Z Axis and Short-Dashed Vectors
ESC Defocused Z Axis and Long-Dashed Vectors
ESC Write-Thru Mode and Normal (solid) Vectors
ESC Write-Thru Mode and Dotted Line Vectors
ESC Write-Thru Mode and Dot-Dashed Vectors
ESC Write-Thru Mode and Short-Dashed Vectors
ESC Write-Thru Mode and Long-Dashed Vectors
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