ANSI Escape Codes

ANSI.md

ANSI Escape Sequences

Standard escape codes are prefixed with `Escape`:

- Ctrl-Key: `^[`
- Octal: `\033`
- Unicode: `\u001b`
- Hexadecimal: `\x1B`
- Decimal: `27`

Followed by the command, somtimes delimited by opening square bracket (`[`), known as a Control Sequence Introducer (CSI), optionally followed by arguments and the command itself.

Arguments are delimeted by semi colon (`;`).

For example:

```
\x1b[1;31m  # Set style to bold, red foreground.
```

Sequences

- `ESC` - sequence starting with `ESC` (`\x1B`)
- `CSI` - Control Sequence Introducer: sequence starting with `ESC [` or CSI (`\x9B`)
- `DCS` - Device Control String: sequence starting with `ESC P` or DCS (`\x90`)
- `OSC` - Operating System Command: sequence starting with `ESC ]` or OSC (`\x9D`)

Any whitespaces between sequences and arguments should be ignored. They are present for improved readability.

General ASCII Codes

Name	decimal	octal	hex	C-escape	Ctrl-Key	Description
`BEL`	7	007	0x07	`\a`	`^G`	Terminal bell
`BS`	8	010	0x08	`\b`	`^H`	Backspace
`HT`	9	011	0x09	`\t`	`^I`	Horizontal TAB
`LF`	10	012	0x0A	`\n`	`^J`	Linefeed (newline)
`VT`	11	013	0x0B	`\v`	`^K`	Vertical TAB
`FF`	12	014	0x0C	`\f`	`^L`	Formfeed (also: New page `NP`)
`CR`	13	015	0x0D	`\r`	`^M`	Carriage return
`ESC`	27	033	0x1B	`\e` *	`^[`	Escape character
`DEL`	127	177	0x7F	`<none>`	`<none>`	Delete character

> **Note:** Some control escape sequences, like `\e` for `ESC` , are not guaranteed to work in all languages and compilers. It is recommended to use the decimal, octal or hex representation as escape code.

> **Note:** The **Ctrl-Key** representation is simply associating the non-printable characters from ASCII code 1 with the printable (letter) characters from ASCII code 65 ("A"). ASCII code 1 would be `^A` (Ctrl-A), while ASCII code 7 (BEL) would be `^G` (Ctrl-G). This is a common representation (and input method) and historically comes from one of the VT series of terminals.

Cursor Controls

ESC Code Sequence	Description
`ESC[H`	moves cursor to home position (0, 0)
`ESC[{line};{column}H` `ESC[{line};{column}f`	moves cursor to line #, column #

`ESC[#A`	moves cursor up # lines
`ESC[#B`	moves cursor down # lines
`ESC[#C`	moves cursor right # columns
`ESC[#D`	moves cursor left # columns
`ESC[#E`	moves cursor to beginning of next line, # lines down
`ESC[#F`	moves cursor to beginning of previous line, # lines up
`ESC[#G`	moves cursor to column #
`ESC[6n`	request cursor position (reports as `ESC[#;#R`)
`ESC M`	moves cursor one line up, scrolling if needed
`ESC 7`	save cursor position (DEC)
`ESC 8`	restores the cursor to the last saved position (DEC)
`ESC[s`	save cursor position (SCO)
`ESC[u`	restores the cursor to the last saved position (SCO)

> **Note:** Some sequences, like saving and restoring cursors, are private sequences and are not standardized. While some terminal emulators (i.e. xterm and derived) support both SCO and DEC sequences, they are likely to have different functionality. It is therefore recommended to use DEC sequences.

Erase Functions

ESC Code Sequence	Description
`ESC[J`	erase in display (same as ESC[0J)
`ESC[0J`	erase from cursor until end of screen
`ESC[1J`	erase from cursor to beginning of screen
`ESC[2J`	erase entire screen
`ESC[3J`	erase saved lines

`ESC[K`	erase in line (same as ESC[0K)
`ESC[0K`	erase from cursor to end of line
`ESC[1K`	erase start of line to the cursor
`ESC[2K`	erase the entire line

> Note: Erasing the line won't move the cursor, meaning that the cursor will stay at the last position it was at before the line was erased. You can use `\r` after erasing the line, to return the cursor to the start of the current line.

Colors / Graphics Mode

ESC Code Sequence	Reset Sequence	Description
`ESC[1;34;{...}m`		Set graphics modes for cell, separated by semicolon (`;`).
`ESC[0m`		reset all modes (styles and colors)
`ESC[1m`	`ESC[22m`	set bold mode.
`ESC[2m`	`ESC[22m`	set dim/faint mode.
`ESC[3m`	`ESC[23m`	set italic mode.
`ESC[4m`	`ESC[24m`	set underline mode.
`ESC[5m`	`ESC[25m`	set blinking mode
`ESC[7m`	`ESC[27m`	set inverse/reverse mode
`ESC[8m`	`ESC[28m`	set hidden/invisible mode
`ESC[9m`	`ESC[29m`	set strikethrough mode.

> **Note:** Some terminals may not support some of the graphic mode sequences listed above.

> **Note:** Both dim and bold modes are reset with the `ESC[22m` sequence. The `ESC[21m` sequence is a non-specified sequence for double underline mode and only work in some terminals and is reset with `ESC[24m` .

Color codes

Most terminals support 8 and 16 colors, as well as 256 (8-bit) colors. These colors are set by the user, but have commonly defined meanings.

8-16 Colors

Color Name	Foreground Color Code	Background Color Code
Black	`30`	`40`
Red	`31`	`41`
Green	`32`	`42`
Yellow	`33`	`43`
Blue	`34`	`44`
Magenta	`35`	`45`
Cyan	`36`	`46`
White	`37`	`47`
Default	`39`	`49`
Reset	`0`	`0`

> **Note:** the *Reset* color is the reset code that resets *all* colors and text effects, Use *Default* color to reset colors only.

Most terminals, apart from the basic set of 8 colors, also support the "bright" or "bold" colors. These have their own set of codes, mirroring the normal colors, but with an additional `;1` in their codes:

```
# Set style to bold, red foreground.
\x1b[1;31mHello
# Set style to dimmed white foreground with red background.
\x1b[2;37;41mWorld
```

Terminals that support the **aixterm specification** (https://sites.ualberta.ca/dept/chemeng/AIX-43/share/man/info/C/a_doc_lib/cmds/aixcmds1/aixterm.htm) provides bright versions of the ISO colors, without the need to use the bold modifier:

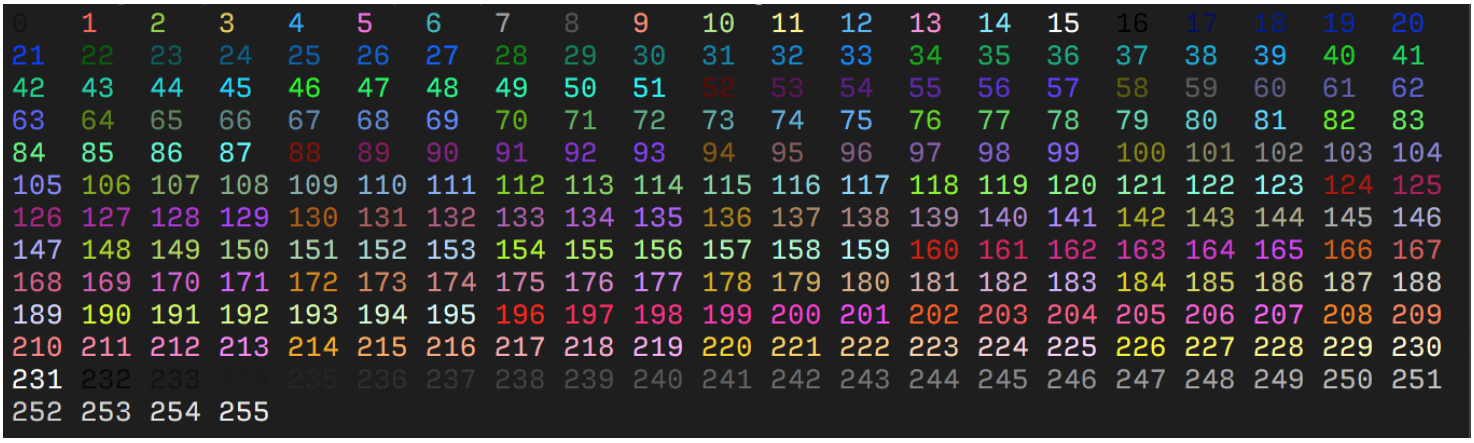
Color Name	Foreground Color Code	Background Color Code
Bright Black	90	100
Bright Red	91	101
Bright Green	92	102
Bright Yellow	93	103
Bright Blue	94	104
Bright Magenta	95	105
Bright Cyan	96	106
Bright White	97	107

256 Colors

The following escape codes tells the terminal to use the given color ID:

ESC Code Sequence	Description
`ESC[38;5;{ID}m`	Set foreground color.
`ESC[48;5;{ID}m`	Set background color.

Where `{ID}` should be replaced with the color index from 0 to 255 of the following color table:



(https://user-images.githubusercontent.com/995050/47952855-ecb12480-df75-11e8-89d4-ac26c50e80b9.png)

The table starts with the original 16 colors (0-15).

The proceeding 216 colors (16-231) or formed by a 3bpc RGB value offset by 16, packed into a single value.

The final 24 colors (232-255) are grayscale starting from a shade slighly lighter than black, ranging up to shade slightly darker than white.

Some emulators interpret these steps as linear increments (`256 / 24`) on all three channels, although some emulators may explicitly define these values.

RGB Colors

More modern terminals supports **Truecolor** (https://en.wikipedia.org/wiki/Color_depth#True_color_.2824-bit.29) (24-bit RGB), which allows you to set foreground and background colors using RGB.

These escape sequences are usually not well documented.

ESC Code Sequence	Description
`ESC[38;2;{r};{g};{b}m`	Set foreground color as RGB.
`ESC[48;2;{r};{g};{b}m`	Set background color as RGB.

> Note that `;38` and `;48` corresponds to the 16 color sequence and is interpreted by the terminal to set the foreground and background color respectively. Where as `;2` and `;5` sets the color format.

Screen Modes

Set Mode

ESC Code Sequence	Description
`ESC[={value}h`	Changes the screen width or type to the mode specified by value.
`ESC[=0h`	40 x 25 monochrome (text)
`ESC[=1h`	40 x 25 color (text)

`ESC[=2h`	80 x 25 monochrome (text)
`ESC[=3h`	80 x 25 color (text)
`ESC[=4h`	320 x 200 4-color (graphics)
`ESC[=5h`	320 x 200 monochrome (graphics)
`ESC[=6h`	640 x 200 monochrome (graphics)
`ESC[=7h`	Enables line wrapping
`ESC[=13h`	320 x 200 color (graphics)
`ESC[=14h`	640 x 200 color (16-color graphics)
`ESC[=15h`	640 x 350 monochrome (2-color graphics)
`ESC[=16h`	640 x 350 color (16-color graphics)
`ESC[=17h`	640 x 480 monochrome (2-color graphics)
`ESC[=18h`	640 x 480 color (16-color graphics)
`ESC[=19h`	320 x 200 color (256-color graphics)
`ESC[={value}l`	Resets the mode by using the same values that Set Mode uses, except for 7, which disables line wrapping. The last character in this escape sequence is a lowercase L.

Common Private Modes

These are some examples of private modes, which are not defined by the specification, but are implemented in most terminals.

ESC Code Sequence	Description
`ESC[?25l`	make cursor invisible
`ESC[?25h`	make cursor visible
`ESC[?47l`	restore screen
`ESC[?47h`	save screen
`ESC[?1049h`	enables the alternative buffer

`ESC[?1049l`	disables the alternative buffer

Refer to the **XTerm Control Sequences** (https://invisible-island.net/xterm/ctlseqs/ctlseqs.html) for a more in-depth list of private modes defined by XTerm.

> Note: While these modes may be supported by the most terminals, some may not work in multiplexers like tmux.

Keyboard Strings

`ESC[{code};{string};{...}p`

Redefines a keyboard key to a specified string.

The parameters for this escape sequence are defined as follows:

- `code` is one or more of the values listed in the following table. These values represent keyboard keys and key combinations. When using these values in a command, you must type the semicolons shown in this table in addition to the semicolons required by the escape sequence. The codes in parentheses are not available on some keyboards. `ANSI.SYS` will not interpret the codes in parentheses for those keyboards unless you specify the `/X` switch in the `DEVICE` command for `ANSI.SYS`.
- `string` is either the ASCII code for a single character or a string contained in quotation marks. For example, both 65 and "A" can be used to represent an uppercase A.

> **IMPORTANT:** Some of the values in the following table are not valid for all computers. Check your computer's documentation for values that are different.

List of keyboard strings

Key	Code	SHIFT+code	CTRL+code	ALT+code
F1	0;59	0;84	0;94	0;104
F2	0;60	0;85	0;95	0;105
F3	0;61	0;86	0;96	0;106
F4	0;62	0;87	0;97	0;107
F5	0;63	0;88	0;98	0;108

F6	0;64	0;89	0;99	0;109
F7	0;65	0;90	0;100	0;110
F8	0;66	0;91	0;101	0;111
F9	0;67	0;92	0;102	0;112
F10	0;68	0;93	0;103	0;113
F11	0;133	0;135	0;137	0;139
F12	0;134	0;136	0;138	0;140
HOME (num keypad)	0;71	55	0;119	--
UP ARROW (num keypad)	0;72	56	(0;141)	--
PAGE UP (num keypad)	0;73	57	0;132	--
LEFT ARROW (num keypad)	0;75	52	0;115	--
RIGHT ARROW (num keypad)	0;77	54	0;116	--
END (num keypad)	0;79	49	0;117	--
DOWN ARROW (num keypad)	0;80	50	(0;145)	--
PAGE DOWN (num keypad)	0;81	51	0;118	--
INSERT (num keypad)	0;82	48	(0;146)	--
DELETE (num keypad)	0;83	46	(0;147)	--
HOME	(224;71)	(224;71)	(224;119)	(224;151)
UP ARROW	(224;72)	(224;72)	(224;141)	(224;152)
PAGE UP	(224;73)	(224;73)	(224;132)	(224;153)
LEFT ARROW	(224;75)	(224;75)	(224;115)	(224;155)
RIGHT ARROW	(224;77)	(224;77)	(224;116)	(224;157)
END	(224;79)	(224;79)	(224;117)	(224;159)
DOWN ARROW	(224;80)	(224;80)	(224;145)	(224;154)
PAGE DOWN	(224;81)	(224;81)	(224;118)	(224;161)

INSERT	(224;82)	(224;82)	(224;146)	(224;162)
DELETE	(224;83)	(224;83)	(224;147)	(224;163)
PRINT SCREEN	--	--	0;114	--
PAUSE/BREAK	--	--	0;0	--
BACKSPACE	8	8	127	(0)
ENTER	13	--	10	(0
TAB	9	0;15	(0;148)	(0;165)
NULL	0;3	--	--	--
A	97	65	1	0;30
B	98	66	2	0;48
C	99	66	3	0;46
D	100	68	4	0;32
E	101	69	5	0;18
F	102	70	6	0;33
G	103	71	7	0;34
H	104	72	8	0;35
I	105	73	9	0;23
J	106	74	10	0;36
K	107	75	11	0;37
L	108	76	12	0;38
M	109	77	13	0;50
N	110	78	14	0;49
O	111	79	15	0;24
P	112	80	16	0;25

Q	113	81	17	0;16
R	114	82	18	0;19
S	115	83	19	0;31
T	116	84	20	0;20
U	117	85	21	0;22
V	118	86	22	0;47
W	119	87	23	0;17
X	120	88	24	0;45
Y	121	89	25	0;21
Z	122	90	26	0;44
1	49	33	--	0;120
2	50	64	0	0;121
3	51	35	--	0;122
4	52	36	--	0;123
5	53	37	--	0;124
6	54	94	30	0;125
7	55	38	--	0;126
8	56	42	--	0;126
9	57	40	--	0;127
0	48	41	--	0;129
-	45	95	31	0;130
=	61	43	---	0;131
[	91	123	27	0;26
]	93	125	29	0;27
	92	124	28	0;43

;	59	58	--	0;39
'	39	34	--	0;40
,	44	60	--	0;51
.	46	62	--	0;52
/	47	63	--	0;53
`	96	126	--	(0;41)
ENTER (keypad)	13	--	10	(0;166)
/ (keypad)	47	47	(0;142)	(0;74)
* (keypad)	42	(0;144)	(0;78)	--
- (keypad)	45	45	(0;149)	(0;164)
+ (keypad)	43	43	(0;150)	(0;55)
5 (keypad)	(0;76)	53	(0;143)	--

Resources

- **Wikipedia: ANSI escape code** (https://en.wikipedia.org/wiki/ANSI_escape_code)
- **Build your own Command Line with ANSI escape codes** (http://www.lihaoyi.com/post/BuildyourownCommandLinewithANSIescapecodes.html)
- **ascii-table: ANSI Escape sequences** (http://ascii-table.com/ansi-escape-sequences.php)
- **bluesock: ansi codes** (https://bluesock.org/~willkg/dev/ansi.html)
- **bash-hackers: Terminal Codes (ANSI/VT100) introduction** (http://wiki.bash-hackers.org/scripting/terminalcodes)
- **XTerm Control Sequences** (https://invisible-island.net/xterm/ctlseqs/ctlseqs.html)
- **VT100 – Various terminal manuals** (https://vt100.net/)
- **xterm.js – Supported Terminal Sequences** (https://xtermjs.org/docs/api/vtfeatures/)