

**NAME**

**delay\_output**, **filter**, **flushinp**, **getwin**, **key\_name**, **keyname**, **nofilter**, **putwin**, **unctrl**, **use\_env**, **use\_tioctl**, **wunctrl** - miscellaneous **curses** utility routines

**SYNOPSIS**

```
#include <curses.h>
```

```
const char *unctrl(chtype c);
wchar_t *wunctrl(cchar_t *c);
```

```
const char *keyname(int c);
const char *key_name(wchar_t w);
```

```
void filter(void);
void nofilter(void);
```

```
void use_env(bool f);
void use_tioctl(bool f);
```

```
int putwin(WINDOW *win, FILE *filep);
WINDOW *getwin(FILE *filep);
```

```
int delay_output(int ms);
int flushinp(void);
```

**DESCRIPTION****unctrl**

The **unctrl** routine returns a character string which is a printable representation of the character *c*, ignoring attributes. Control characters are displayed in the **^X** notation. Printing characters are displayed as is. The corresponding **wunctrl** returns a printable representation of a wide character.

**keyname/key\_name**

The **keyname** routine returns a character string corresponding to the key *c*:

- ⊕ Printable characters are displayed as themselves, e.g., a one-character string containing the key.
- ⊕ Control characters are displayed in the **^X** notation.
- ⊕ DEL (character 127) is displayed as **^?**.

- ⊕ Values above 128 are either meta characters (if the screen has not been initialized, or if **meta(3X)** has been called with a **TRUE** parameter), shown in the **M-X** notation, or are displayed as themselves. In the latter case, the values may not be printable; this follows the X/Open specification.
- ⊕ Values above 256 may be the names of the names of function keys.
- ⊕ Otherwise (if there is no corresponding name) the function returns null, to denote an error. X/Open also lists an "UNKNOWN KEY" return value, which some implementations return rather than null.

The corresponding **key\_name** returns a character string corresponding to the wide-character value *w*. The two functions do not return the same set of strings; the latter returns null where the former would display a meta character.

### **filter/nofilter**

The **filter** routine, if used, must be called before **initscr** or **newterm** are called. Calling **filter** causes these changes in initialization:

- ⊕ **LINES** is set to 1;
- ⊕ the capabilities **clear**, **cul1**, **cul**, **cup**, **cuu1**, **cuu**, **vpa** are disabled;
- ⊕ the capability **ed** is disabled if **bce** is set;
- ⊕ and the **home** string is set to the value of **cr**.

The **nofilter** routine cancels the effect of a preceding **filter** call. That allows the caller to initialize a screen on a different device, using a different value of **\$TERM**. The limitation arises because the **filter** routine modifies the in-memory copy of the terminal information.

### **use\_env**

The **use\_env** routine, if used, should be called before **initscr** or **newterm** are called (because those compute the screen size). It modifies the way **ncurses** treats environment variables when determining the screen size.

- ⊕ Normally **ncurses** looks first at the terminal database for the screen size.

If **use\_env** was called with **FALSE** for parameter, it stops here unless **use\_tioctl** was also called with **TRUE** for parameter.

- ⊕ Then it asks for the screen size via operating system calls. If successful, it overrides the values from the terminal database.
- ⊕ Finally (unless **use\_env** was called with **FALSE** parameter), **ncurses** examines the **LINES** or **COLUMNS** environment variables, using a value in those to override the results from the operating system or terminal database.

**Ncurses** also updates the screen size in response to **SIGWINCH**, unless overridden by the **LINES** or **COLUMNS** environment variables,

### **use\_tioctl**

The **use\_tioctl** routine, if used, should be called before **initscr** or **newterm** are called (because those compute the screen size). After **use\_tioctl** is called with **TRUE** as an argument, **ncurses** modifies the last step in its computation of screen size as follows:

- ⊕ checks if the **LINES** and **COLUMNS** environment variables are set to a number greater than zero.
- ⊕ for each, **ncurses** updates the corresponding environment variable with the value that it has obtained via operating system call or from the terminal database.
- ⊕ **ncurses** re-fetches the value of the environment variables so that it is still the environment variables which set the screen size.

The **use\_env** and **use\_tioctl** routines combine as summarized here:

#### *use\_env use\_tioctl* Summary

|       |       |   |
|-------|-------|---|
| TRUE  | FALSE | This is the default behavior. <b>ncurses</b> uses operating system calls unless overridden by \$LINES or \$COLUMNS environment variables. |
| TRUE  | TRUE  | <b>ncurses</b> updates \$LINES and \$COLUMNS based on operating system calls.   |
| FALSE | TRUE  | <b>ncurses</b> ignores \$LINES and \$COLUMNS, uses operating system calls to obtain size.   |
| FALSE | FALSE | <b>ncurses</b> relies on the terminal database to determine size.   |

### **putwin/getwin**

The **putwin** routine writes all data associated with window (or pad) *win* into the file to which *filep* points. This information can be later retrieved using the **getwin** function.

The **getwin** routine reads window related data stored in the file by **putwin**. The routine then creates and initializes a new window using that data. It returns a pointer to the new window. There are a few caveats:

- ⊕ the data written is a copy of the **WINDOW** structure, and its associated character cells. The format differs between the wide-character (**ncursesw**) and non-wide (**ncurses**) libraries. You can transfer data between the two, however.
- ⊕ the retrieved window is always created as a top-level window (or pad), rather than a subwindow.
- ⊕ the window's character cells contain the color pair *value*, but not the actual color *numbers*. If cells in the retrieved window use color pairs which have not been created in the application using **init\_pair**, they will not be colored when the window is refreshed.

### **delay\_output**

The **delay\_output** routine inserts an *ms* millisecond pause in output. This routine should not be used extensively because padding characters are used rather than a CPU pause. If no padding character is specified, this uses **napms** to perform the delay.

### **flushinp**

The **flushinp** routine throws away any typeahead that has been typed by the user and has not yet been read by the program.

## **RETURN VALUE**

Except for **flushinp**, routines that return an integer return **ERR** upon failure and **OK** (SVr4 specifies only "an integer value other than **ERR**") upon successful completion.

Routines that return pointers return **NULL** on error.

X/Open does not define any error conditions. In this implementation

#### **flushinp**

returns an error if the terminal was not initialized.

#### **putwin**

returns an error if the associated **fwrite** calls return an error.

## **PORTABILITY**

### **filter**

The SVr4 documentation describes the action of **filter** only in the vaguest terms. The description here

is adapted from the XSI Curses standard (which erroneously fails to describe the disabling of **cuu**).

### **keyname**

The **keyname** function may return the names of user-defined string capabilities which are defined in the terminfo entry via the **-x** option of **tic**. This implementation automatically assigns at run-time keycodes to user-defined strings which begin with "k". The keycodes start at **KEY\_MAX**, but are not guaranteed to be the same value for different runs because user-defined codes are merged from all terminal descriptions which have been loaded. The **use\_extended\_names(3X)** function controls whether this data is loaded when the terminal description is read by the library.

### **nofilter/use\_tioctl**

The **nofilter** and **use\_tioctl** routines are specific to **ncurses**. They were not supported on Version 7, BSD or System V implementations. It is recommended that any code depending on **ncurses** extensions be conditioned using **NCURSES\_VERSION**.

### **putwin/getwin**

The **putwin** and **getwin** functions have several issues with portability:

- ⊕ The files written and read by these functions use an implementation-specific format. Although the format is an obvious target for standardization, it has been overlooked.

Interestingly enough, according to the copyright dates in Solaris source, the functions (along with **scr\_init**, etc.) originated with the University of California, Berkeley (in 1982) and were later (in 1988) incorporated into SVr4. Oddly, there are no such functions in the 4.3BSD curses sources.

- ⊕ Most implementations simply dump the binary **WINDOW** structure to the file. These include SVr4 curses, NetBSD and PDCurses, as well as older **ncurses** versions. This implementation (as well as the X/Open variant of Solaris curses, dated 1995) uses textual dumps.

The implementations which use binary dumps use block-I/O (the **fwrite** and **fread** functions). Those that use textual dumps use buffered-I/O. A few applications may happen to write extra data in the file using these functions. Doing that can run into problems mixing block- and buffered-I/O. This implementation reduces the problem on writes by flushing the output. However, reading from a file written using mixed schemes may not be successful.

### **unctrl/wunctrl**

The XSI Curses standard, Issue 4 describes these functions. It states that **unctrl** and **wunctrl** will return a null pointer if unsuccessful, but does not define any error conditions. This implementation checks for three cases:

- ⊕ the parameter is a 7-bit US-ASCII code. This is the case that X/Open Curses documented.
- ⊕ the parameter is in the range 128-159, i.e., a C1 control code. If **use\_legacy\_coding(3X)** has been called with a **2** parameter, **unctrl** returns the parameter, i.e., a one-character string with the parameter as the first character. Otherwise, it returns "~@", "~A", etc., analogous to "^@", "^A", C0 controls.

X/Open Curses does not document whether **unctrl** can be called before initializing curses. This implementation permits that, and returns the "~@", etc., values in that case.

- ⊕ parameter values outside the 0 to 255 range. **unctrl** returns a null pointer.

The strings returned by **unctrl** in this implementation are determined at compile time, showing C1 controls from the upper-128 codes with a "~" prefix rather than "^". Other implementations have different conventions. For example, they may show both sets of control characters with "^", and strip the parameter to 7 bits. Or they may ignore C1 controls and treat all of the upper-128 codes as printable. This implementation uses 8 bits but does not modify the string to reflect locale. The **use\_legacy\_coding(3X)** function allows the caller to change the output of **unctrl**.

Likewise, the **meta(3X)** function allows the caller to change the output of **keyname**, i.e., it determines whether to use the "M-" prefix for "meta" keys (codes in the range 128 to 255). Both **use\_legacy\_coding(3X)** and **meta(3X)** succeed only after curses is initialized. X/Open Curses does not document the treatment of codes 128 to 159. When treating them as "meta" keys (or if **keyname** is called before initializing curses), this implementation returns strings "M-^@", "M-^A", etc.

X/Open Curses documents **unctrl** as declared in `<unctrl.h>`, which **ncurses** does. However, **ncurses'** `<curses.h>` includes `<unctrl.h>`, matching the behavior of SVr4 curses. Other implementations may not do that.

#### **use\_env/use\_tioctl**

If **ncurses** is configured to provide the sp-functions extension, the state of **use\_env** and **use\_tioctl** may be updated before creating each *screen* rather than once only (**curs\_sp\_funcs(3X)**). This feature of **use\_env** is not provided by other implementation of curses.

#### **SEE ALSO**

**curses(3X)**, **curs\_initscr(3X)**, **curs\_inopts(3X)**, **curs\_kernel(3X)**, **curs\_scr\_dump(3X)**, **curs\_sp\_funcs(3X)**, **curs\_variables(3X)**, **legacy\_coding(3X)**.