

Free Menu is a standard input/output feature of Lisp. This appendix contains Lyric information as well as Medley release enhancements. Medley additions are indicated with revision bars in the right margin. The following description should be added to the Menus segment of Chapter 28, Windows and Menus, in the *Interlisp-D Reference Manual*.

28.7 Free Menus

Free Menus are powerful and flexible menus that are useful for applications needing menus with different types of items, including command items, state items, and items that can be edited. A Free Menu is part of a window. It can be opened and closed as desired, or attached as a control menu to the application window.

28.7.1 Making a Free Menu

A Free Menu is built from a description of the contents and layout of the menu. As a Free Menu is simply a group of items, a Free Menu Description is simply a specification of a group of items. Each group has properties associated with it, as does each Free Menu Item. These properties specify the format of the items in the group, and the behavior of each item. The function **FREEMENU** takes a Free Menu Description, and returns a closed window with the Free Menu in it.

The easiest way to make a Free Menu is to define a specific function which calls **FREEMENU** with the Free Menu Description in the function. This function can then also set up the Free Menu window as required by the application. The Free Menu Description is saved as part of the specific function when the application is saved. Alternately, the Free Menu Description can be saved as a variable in your file; then just call **FREEMENU** with the name of the variable. This may be a more difficult alternative if the backquote facility is used to build the Free Menu Description (see Section 28.7.7, Free Menu Item Descriptions, for more information on using backquote with a Free Menu Description).

28.7.2 Free Menu Formatting

A Free Menu can be formatted in one of four ways. The items in any group can be automatically laid out in rows, in columns, or in a table, or else the application can specify the exact location of each item in the group. Free Menu keeps track of the region that a group of items occupies, and items can be justified within that region. This way an item can be automatically positioned at one of the nine justification locations, top-left, top-center, top-right, middle-left, etc.

28.7.3 Free Menu Description

A Free Menu Description, specifying a group of items, is a list structure. The first entry in the list is an optional list of the properties for this group of items. This entry is in the form:

(PROPS <PROP> <VALUE> <PROP> <VALUE> ...)

The keyword PROPS determines whether or not the optional group properties list is specified. Section 28.7.4, "Free Menu Group Properties," describes each group property.

One important group property is FORMAT. The four types of formatting, ROW, TABLE, COLUMN, or EXPLICIT, determine the syntax of the rest of the Free Menu Description. When using EXPLICIT formatting, the rest of the description is any number of Item Descriptions which have LEFT and BOTTOM properties specifying the position of the item in the menu. The syntax is:

```
((PROPS FORMAT EXPLICIT ...)
  <ITEM DESCRIPTION>
  <ITEM DESCRIPTION> ...)
```

When using ROW or TABLE formatting, the rest of the description is any number of item groups, each group corresponding to a row in the menu. These groups are identical in syntax to an EXPLICIT group description. The groups have an optional PROPS list and any number of Item Descriptions. The items need not have LEFT and BOTTOM properties, as the location of each item is determined by the formatter. However, the order of the rows and items is important. The menu is laid out top to bottom by row, and left to right within each row. The syntax is:

```
((PROPS FORMAT ROW ...)
  (<ITEM DESCRIPTION>          ; props of this group
   <ITEM DESCRIPTION> ...        ; items in first row)
  ((PROPS ...)                  ; props of second row
   <ITEM DESCRIPTION>          ; items in second row
   <ITEM DESCRIPTION> ...))
```

(The comments above only describe the syntax.)

For COLUMN formatting, the syntax is identical to that of ROW formatting. However, each group of items corresponds to a column in the menu, rather than a row. The menu is laid out left to right by column, top to bottom within each column.

Finally, a Free Menu Description can have recursively nested groups. Anywhere the description can take an Item Description, it can take a group, marked by the keyword GROUP. A nested group inherits all of the properties of its mother group, by default. However, any of these properties can be overridden in the nested groups PROPS list, including the FORMAT. The syntax is:

```

( ; no PROPS list, default row format
(<ITEM DESCRIPTION> ; first in row
(GROUP ; nested group, second in row
  (PROPS FORMAT COLUMN ...) ; optional props
  (<ITEM DESCRIPTION> ...) ; first column
  (<ITEM DESCRIPTION> ...))
  <ITEM DESCRIPTION>)) ; third in row

```

Here is an example of a simple Free Menu Description for a menu which might provide access to a simple data base:

```

(((LABEL LOOKUP SELECTEDFN MYLOOKUPFN)
  (LABEL EXIT SELECTEDFN MYEXITFN))
  ((LABEL Name: TYPE DISPLAY) (LABEL "" TYPE EDIT ID NAME))
  ((LABEL Address: TYPE DISPLAY) (LABEL "" TYPE EDIT ID ADDRESS))
  ((LABEL Phone: TYPE DISPLAY)
    (LABEL "" TYPE EDIT LIMITCHARS MYPHONEP ID PHONE)))

```

This menu has two command buttons, LOOKUP and EXIT, and three edit fields, with IDs NAME, PHONE, and ADDRESS. The Edit items are initialized to the empty string, as in this example they need no other initial value. The user could select the Name: prompt, type a person's name, and then press the LOOKUP button. The function **MYLOOKUPFN** would be called. That function would look at the NAME Edit item, look up that name in the data base, and fill in the rest of the fields appropriately. The PHONE item has **MYPHONEP** as a **LIMITCHARS** function. This function would be called when editing the phone number, in order to restrict input to a valid phone number. After looking up Perry, the Free Menu might look like:

LOOKUP	EXIT
Name: Herbert Q Perry	
Address: 13 Middleperry Dr	
Phone: (411) 767-1234	

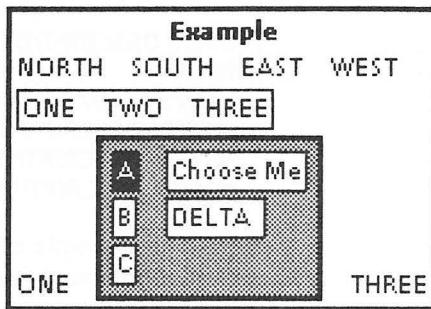
Here is a more complicated example:

```

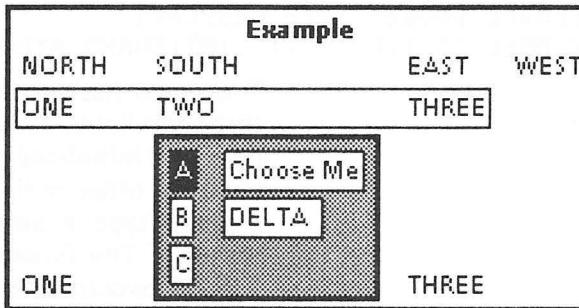
((PROPS FONT (MODERN 10))
  ((LABEL Example FONT (MODERN 10 BOLD) HJUSTIFY CENTER))
  ((LABEL NORTH) (LABEL SOUTH) (LABEL EAST) (LABEL WEST)))
  ((PROPS ID ROW3 BOX 1)
    (LABEL ONE) (LABEL TWO) (LABEL THREE))
  ((PROPS ID ROW4)
    (LABEL ONE ID ALPHA)
    (GROUP (PROPS FORMAT COLUMN BACKGROUND 23130 BOX 2 BOXSPACE 4)
      ((TYPE NWAY LABEL A BOX 1 COLLECTION COL1 NWAYPROPS (DESELECT T))
       (TYPE NWAY LABEL B BOX 1 COLLECTION COL1)
       (TYPE NWAY LABEL C BOX 1 COLLECTION COL1))
      ((TYPE STATE LABEL "Choose Me" BOX 1 MENUITEMS (BRAVO DELTA)
        INITSTATE DELTA LINKS (DISPLAY (GROUP ALPHA))))
      (TYPE DISPLAY ID ALPHA LABEL "" BOX 1 MAXWIDTH 35)))
    (LABEL THREE)))

```

which will produce the following Free Menu:



And if the Free Menu were formatted as a Table, instead of in Rows, it would look like:



The following breakdown of the example explains how each part contributes to the Free Menu shown above.

(PROPS FONT (MODERN 10))

This line specifies the properties of the group that is the entire Free Menu. These properties are described in Section 28.7.4, Free Menu Group Properties. In this example, all items in the Free Menu, unless otherwise specified, will be in Modern 10.

((LABEL Example FONT (MODERN 10 BOLD) HJUSTIFY CENTER))

This line of the Free Menu Description describes the first row of the menu. Since the **FORMAT** specification of a Free Menu is, by default, **ROW** formatting, this line sets the first row in the menu. If the menu were in **COLUMN** formatting, this position in the description would specify the first column in the menu.

In this example the first row contains only one item. The item is, by default, a type **MOMENTARY** item. It has its own Font declaration (**FONT (MODERN 10 BOLD)**), that overrides the font specified for the Free Menu as a whole, so the item appears bolded.

Finally, the item is justified, in this case centered. The **HJUSTIFY** Item Property indicates that the item is to be centered horizontally within its row.

((LABEL NORTH) (LABEL SOUTH) (LABEL EAST) (LABEL WEST))

This line specifies the second row of the menu. The second row has four very simple items, labeled NORTH, SOUTH, EAST, and WEST next to each other within the same row.

```
((PROPS ID ROW3 BOX 1)
 (LABEL ONE) (LABEL TWO) (LABEL THREE))
```

The third row in the menu is similar to the second row, except that it has a box drawn around it. The box is specified in the PROPS declaration for this row. Rows (and columns) are just like Groups in that the first thing in the declaration can be a list of properties for that row. In this case the row is named by giving it an ID property of ROW3. It is useful to name your groups if you want to be able to access and modify their properties later (via the function FM.GROUPPROP). It is boxed by specifying the BOX property with a value of 1, meaning draw the box one dot wide.

```
((PROPS ID ROW4)
 (LABEL ONE ID ALPHA)
 (GROUP (PROPS FORMAT COLUMN BACKGROUND 23130 BOX 2 BOXSPACE 4)
 ((TYPE NWAY LABEL A BOX 1 COLLECTION COL1 NWAYPROPS (DESELECT T))
 (TYPE NWAY LABEL B BOX 1 COLLECTION COL1)
 (TYPE NWAY LABEL C BOX 1 COLLECTION COL1))
 ((TYPE STATE LABEL "Choose Me" BOX 1 MENUITEMS (BRAVO DELTA)
 INITSTATE DELTA LINKS (DISPLAY (GROUP ALPHA)))
 (TYPE DISPLAY ID ALPHA LABEL "" BOX 1 MAXWIDTH 35)))
 (LABEL THREE)))
```

This part of the description specifies the fourth row in the menu. This row consists of: an item labelled ONE, a group of items, and an item labelled THREE. That is, Free Menu thinks of the group as an entry, and formats the rest of the row just as it were a large item.

```
(GROUP (PROPS FORMAT COLUMN BACKGROUND 23130 BOX 2 BOXSPACE 4)
 ((TYPE NWAY LABEL A BOX 1 COLLECTION COL1 NWAYPROPS (DESELECT T))
 (TYPE NWAY LABEL B BOX 1 COLLECTION COL1)
 (TYPE NWAY LABEL C BOX 1 COLLECTION COL1))
 ((TYPE STATE LABEL "Choose Me" BOX 1 MENUITEMS (BRAVO DELTA)
 INITSTATE DELTA LINKS (DISPLAY (GROUP ALPHA)))
 (TYPE DISPLAY ID ALPHA LABEL "" BOX 1 MAXWIDTH 35)))
```

The second part of this row is a nested group of items. It is declared as a group by placing the keyword GROUP as the first word in the declaration. A group can be declared anywhere a Free Menu Description can take a Free Menu Item Description (as opposed to a row or column declaration).

The first thing in what would have been the second item declaration in this row is the keyword GROUP. Following this keyword comes a normal group description, starting with an optional list of properties, and followed by any number of things to go in the group (based on the format of the group).

This group's Props declaration is:

```
(PROPS FORMAT COLUMN BACKGROUND 23130 BOX 2 BOXSPACE 4).
```

It specifies that the group is to be formatted as a number of columns (instead of rows, the default). The entire group will have a background shade of 23130, and a box of width 2 around it, as you can see in the sample menu. The BOXSPACE declaration tells Free Menu to leave an extra four dots of room between the edge of the group (ie the box around the group) and the items in the group.

The first column of this group is a Collection of **NWAY** items:

```
((TYPE NWAY LABEL A BOX 1 COLLECTION COL1 NWAYPROPS (DESELECT T))
 (TYPE NWAY LABEL B BOX 1 COLLECTION COL1)
 (TYPE NWAY LABEL C BOX 1 COLLECTION COL1))
```

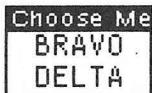
The three items, labelled A, B, and C are all declared as **NWAY** items, and are also specified to belong to the same **NWAY** Collection, Col1. This is how a number of **NWAY** items are collected together. The property **NWAYPROPS (DESELECT T)** on the first **NWAY** item specifies that the Col1 Collection is to have the Deselect property enabled. This simply means that the **NWAY** collection can be put in the state where none of the items (A, B, or C) are selected (highlighted). Additionally, each item is declared with a box whose width is one dot (pixel) around it.

The second column in this nested group is specified by:

```
((TYPE STATE LABEL "Choose Me" BOX 1 MENUITEMS (BRAVO DELTA)
    INITSTATE DELTA LINKS (DISPLAY (GROUP ALPHA)))
 (TYPE DISPLAY ID ALPHA LABEL "" BOX 1 MAXWIDTH 35))
```

Column two contains two items, a **STATE** item and a **DISPLAY** item. The **STATE** item is labelled "Choose Me." A Label can be a string or a bitmap, as well as an atom. Selecting the **STATE** item will cause a pop-up menu to appear with two choices for the state of the item, BRAVO and DELTA. The items to go in the pop-up menu are designated by the **MENUITEMS** property.

The pop-up menu would look like:



The initial state of the "Choose Me" item is designated to be DELTA by the **INITSTATE** Item Property. The initial state can be anything; it does not have to be one of the items in the pop-up menu.

Next, the **STATE** item is Linked to a **DISPLAY** item, so that the current state of the item will be displayed in the Free Menu. The link's name is **DISPLAY** (a special link name for **STATE** items), and the item linked to is described by the Link Description, (**GROUP ALPHA**). Normally the linked item can just be described by its ID. But in this case, there is more than one item whose ID is ALPHA (for the sake of this example), specifically the first item in the fourth row and the display item in this nested group. The form (**GROUP ALPHA**) tells Free Menu to search for an item whose ID is ALPHA, limiting the search to the items that are within this lexical group. The lexical group is the smallest group that is declared with the **GROUP** keyword (i.e., not row and column groups) that contains this item declaration. So in this case, Free Menu will link the **STATE** item to the **DISPLAY** item, rather than the first item in the fourth row, since *that* item is outside of the nested group. For further discussion of linking items, see Section 28.7.12, Free Menu Item Links.

Now, establish the **DISPLAY** item:

(TYPE DISPLAY ID ALPHA LABEL "" BOX 1 MAXWIDTH 35)

We have given it the ID of Alpha that the above **STATE** item uses in finding the proper **DISPLAY** item to link to. This display item is used to display the current state of the item "Choose Me." Every item is required to have a Label property specified, but the label for this **DISPLAY** item will depend on the state of "Choose Me." That is, when the state of the "Choose Me" item is changed from **DELTA** to **BRAVO**, the label of the **DISPLAY** item will also change. The null string serves to hold the place for the changeable label.

A box is specified for this item. Since the label is the empty string, Free Menu would draw a very small box. Instead, the **MAXWIDTH** property indicates that the label, whatever it becomes, will be limited to a stringwidth of 35. The width restriction of 35 was chosen because it is big enough for each of the possible labels for this display item. So Free Menu draws the box big enough to enclose any item within this width restriction.

Finally we specify the final item in row four:

(LABEL THREE)

28.7.4 Free Menu Group Properties

Each group has properties. Most group properties are relevant and should be set in the group's **PROPS** list in the Free Menu Description. User properties can be freely included in the **PROPS** list. A few other properties are set up by the formatter. The macros **FM.GROUPPROP** or **FM.MENUPROP** allow access to group properties after the Free Menu is created.

ID The identifier of this group. Setting the group **ID** is desirable, for example, if the application needs to get handles on items in particular groups, or access group properties.

FORMAT One of **ROW**, **COLUMN**, **TABLE**, or **EXPLICIT**. The default is **ROW**.

FONT A font description of the form **(FAMILY SIZE FACE)**, or a **FONTDESCRIPTOR** data type. This will be the default font for each item in this group. The default font of the top group is the value of the variable **DEFAULTFONT**.

COORDINATES One of **GROUP** or **MENU**. This property applies only to **EXPLICIT** formatting. If **GROUP**, the items in the **EXPLICIT** group are positioned in coordinates relative to the lower left corner of the group, as determined by the mother group. If **MENU**, which is the default, the items are positioned relative to the lower left corner of the menu.

LEFT Specifies a left offset for this group, pushing the group to the right.

BOTTOM Specifies a bottom offset for this group, pushing the group up.

ROWSPACE Specifies the number of dots between rows in this group.

COLUMNSPACE Specifies the number of dots between columns in this group.

BOX	Specifies the number of dots in the box around this group of items.
BOXSHADE	Specifies the shade of the box.
BOXSPACE	Specifies the number of bits between the box and the items.
BACKGROUND	The background shade of this group. Nested groups inherit this background shade, but items in this group and nested groups do not. This is because, in general, it is difficult to read text on a background, so items appear on a white background by default. This can be overridden by the BACKGROUND Item Property.

28.7.5 Other Group Properties

The following group properties are set up and maintained by Free Menu. The application should probably not change any of these properties.

ITEMS	A list of the items in the group.
REGION	The region that is the extent of the items in the group.
MOTHER	The ID of the group that is the mother of this group.
DAUGHTERS	A list of ID of groups which are daughters to this group.

28.7.6 Free Menu Items

Each Free Menu Item is stored as an instance of the data type **FREEMENUITEM**. Free Menu Items can be thought of as objects, each item having its own particular properties, such as its type, label, and mouse event functions. A number of useful item types, described in Section 28.7.11, Predefined Item Types, are predefined by Free Menu. New types of items can be defined by the application, using Display items as a base. Each Free Menu Item is created from a Free Menu Item Description when the Free Menu is created.

CAUTION: Edit (and thus Number) Freemenu Items do not perform well when boxed or when there is another item to the right in the same row. The display to the right of the edit item may be corrupted under editing and fm.changelabel operations.

28.7.7 Free Menu Item Descriptions

A Free Menu Item Description is a list in property list format, specifying the properties of the item. For example:

(LABEL Refetch SELECTEDFN MY.REFETCHFN)

describes a **MOMENTARY** item labelled Refetch, with the function **MY.REFETCHFN** to be called when the item is selected. None of the property values in an item description are evaluated. When constructing Free Menu descriptions that incorporate evaluated expressions (for example labels that are bitmaps) it is helpful to use the backquote facility. For instance, if the value of the variable **MYBITMAP** is a bitmap, then

(FREEMENU '(((LABEL A) (LABEL ,MYBITMAP))))

would create a Free Menu of one row, with two items in that row, the second of which has the value of **MYBITMAP** as its label.

28.7.8 Free Menu Item Properties

The following Free Menu Item Properties can be set in the Item Description. Any other properties given in an Item Description will be treated as user properties, and will be saved on the **USERDATA** property of the item.

TYPE	The type of the item. Choose from one of the Free Menu Item type keywords MOMENTARY , TOGGLE , 3STATE , STATE , NWAY , EDITSTART , EDIT , NUMBER , or DISPLAY . The default is MOMENTARY .
LABEL	An atom, string, or bitmap. Bitmaps are always copied, so that the original will not be changed. This property must be specified for every item.
FONT	The font in which the item appears. The default is the font specified for the group containing this item. Can be a font description of the form (FAMILY SIZE FACE), or a FONTDESCRIPTOR data type.
ID	May be used to specify a unique identifier for this item, but is not necessary.
LEFT and BOTTOM	When ROW , COLUMN , or TABLE formatting, these specify offsets, pushing the item right and up, respectively, from where the formatter would have put the item. In EXPLICIT formatting, these are the actual coordinates of the item, in the coordinate system given by the group's COORDINATES property.
HJUSTIFY	Indicates horizontal justification type: LEFT , CENTER , or RIGHT . Specifies that this item is to be horizontally justified within the extent of its group. Note that the main group, as opposed to the smaller row or column group, is used.
VJUSTIFY	Specifies that this item is to be vertically justified. Values are TOP , MIDDLE , or BOTTOM .
HIGHLIGHT	Specifies the highlighted looks of the item, that is, how the item changes when a mouse event occurs on it. See Section 28.7.12, Free Menu Item Highlighting, for more details on highlighting.
MESSAGE	Specifies a string that will be printed in the prompt window after a mouse cursor selects this item for MENUHELDWAIT milliseconds. Or, if an atom, treated as a function to get the message. The function is passed three arguments, ITEM , WINDOW , and BUTTONS , and should return a string. The default is a message appropriate to the type of the item.
INITSTATE	Specifies the initial state of the item. This is only appropriate to TOGGLE , 3STATE , and STATE items.
MAXWIDTH	Specifies the width allowed for this item. The formatter will leave enough space after the item for the item to grow to this width without collisions.
MAXHEIGHT	Similar to MAXWIDTH , but in the vertical dimension.

BOX	Specifies the number of bits in the box around this item. Boxes are made around MAXWIDTH and MAXHEIGHT dimensions. If unspecified, no box is drawn.
BOXSHADE	Specifies the shade that the box is drawn in. The default is BLACKSHADE .
BOXSPACE	Specifies the number of bits between the box and the label. The default is one bit.
BACKGROUND	Specifies the background shade on which the item appears. The default is WHITESHADE , regardless of the group's background.
LINKS	Can be used to link this item to other items in the Free Menu. See Section 28.7.13, Free Menu Item Links, for more information.

28.7.9 Mouse Properties

The following properties provide a way for application functions to be called under certain mouse events. These functions are called with the ITEM , the WINDOW , and the BUTTONS passed as arguments. These application functions do not interfere with any Free Menu system functions that take care of handling the different item types. In each case, though, the application function is called after the system function. The default for all of these functions is NILL . The value of each of the following properties can be the name of a function, or a lambda expression.	
SELECTEDFN	Specifies the function to be called when this item is selected. The Edit and EditStart items cannot have a SELECTEDFN . See the Edit Free Menu item description in Section 28.7.11, Predefined Item Types, for more information.
DOWNFN	Specifies the function to be called when the item is selected with the mouse cursor.
HELDNFN	Specifies the function to be called repeatedly when the item is selected with the mouse cursor.
MOVEDFN	Specifies the function to be called when the mouse cursor moves off this item (mouse buttons are still depressed).

28.7.10 System Properties

The following Free Menu Item properties are set and maintained by Free Menu. The application should probably not change these properties directly.	
GROUPID	Specifies the ID of the smallest group that the item is in. For example, in a row formatted group, the item's GROUPID will be set to the ID of the row that the item is in, not the ID of the whole group.
STATE	Specifies the current state of TOGGLE , 3STATE , or STATE items. The state of an NWAY item behaves like that of a toggle item.
BITMAP	Specifies the bitmap from which the item is displayed.

REGION	Specifies the region of the item, in window coordinates. This is used for locating the display position, as well as determining the mouse sensitive region of the item.
MAXREGION	Specifies the maximum region the item may occupy, determined by the MAXWIDTH and MAXHEIGHT properties (see Section 28.7.8, Free Menu item Properties). This is used by the formatter and the display routines.
SYSDOWNFN	
SYSMOVEDFN	
SYSSELECTEDFN	These are the system mouse event functions, set up by Free Menu according to the item type. These functions are called before the mouse event functions, and are used to implement highlighting, state changes, editing, etc.
USERDATA	Specifies how any other properties are stored on this list in property list format. This list should probably not need to be manipulated directly.

28.7.11 Predefined Item Types

MOMENTARY	[Free Menu Item]
	MOMENTARY items are like command buttons. When the button is selected, its associated function is called.
TOGGLE	[Free Menu Item]
	Toggle items are simple two-state buttons. When pressed, the button is highlighted; it stays that way until pressed again. The states of a toggle button are T and NIL ; the initial state is NIL .
3STATE	[Free Menu Item]
	3STATE items rotate through NIL , T , and OFF , states each time they are pressed. The default looks of the OFF state are with a diagonal line through the button, while T is highlighted, and NIL is normal. The default initial state is NIL . The following Item Property applies to 3STATE items:
OFF	Specifies the looks of a 3STATE item in its OFF state. Similar to HIGHLIGHT . The default is that the label gets a diagonal slash through it.
	NOTE: If you specify special highlighting (a different bitmap or string) for Toggle or 3State items AND use this item in a group formatted as a Column or a Table, the highlight looks of the item may not appear in the correct place.
STATE	[Free Menu Item]
	STATE items are general multiple state items. The following Item Property determines how the item changes state:
CHANGESTATE	This Item Property can be changed at any time to change the effect of the item. If a MENU data type, this menu pops up when the item is selected, and the user can select the new state. Otherwise, if this property is given, it is treated as a function name, which is passed three arguments, ITEM , WINDOW , and

BUTTONS. This function can do whatever it wants, and is expected to return the new state (an atom, string, or bitmap), or **NIL**, indicating the state should not change. The state of the item can automatically be indicated in the Free Menu, by setting up a **DISPLAY** link to a **DISPLAY** item in the menu (see Section 28.7.13, Free Menu Item Links). If such a link exists, the label of the **DISPLAY** item will be changed to the new state. The possible states are not restricted at all, with the exception of selections from a pop-up menu. The state can be changed to any atom, string, or bitmap, manually via **FM.CHANGESTATE**.

The following Item Properties are relevant to **STATE** items when building a Free Menu:

MENUITEMS	If specified, should be a list of items to go in a pop-up menu for this item. Free Menu will build the menu and save it as the CHANGESTATE property of the item.
MENUFONT	The font of the items in the pop-up menu.
MENUTITLE	The title of the pop-up menu. The default title is the label of the STATE item.

NWAY

[Free Menu Item]

NWAY items provide a way to collect any number of items together, in any format within the Free Menu. Only one item from each Collection can be selected at a time, and that item is highlighted to indicate this. The following Item Properties are particular to **NWAY** items:

COLLECTION	An identifier that specifies which NWAY Collection this item belongs to.
NWAYPROPS	A property list of information to be associated with this collection. This property is only noticed in the Free Menu Description on the first item in a COLLECTION . NWAY Collections are formed by creating a number of NWAY items with the same COLLECTION property. Each NWAY item acts individually as a Toggle item, and can have its own mouse event functions. Each NWAY Collection itself has properties, its state for instance. After the Free Menu is created, these Collection properties can be accessed by the macro FM.NWAYPROPS . Note that NWAY Collections are different from Free Menu Groups. There are three NWAY Collection properties that Free Menu looks at:
DESELECT	If given, specifies that the Collection can be deselected, yielding a state in which no item in the Collection is selected. When this property is set, the Collection can be deselected by selecting any item in the Collection and pressing the right mouse button .
STATE	The current state of the Collection, which is the actual item selected.
INITSTATE	Specifies the initial state of the Collection. The value of this property is an Item Link Description (see Section 28.7.13, Free Menu Item Links.)

EDIT

[Free Menu Item]

EDIT items are textual items that can be edited. The label for an **EDIT** item cannot be a bitmap. When the item is selected an edit caret appears at that cursor position within the item, allowing insertion and deletion of characters at that point. If selected with the right mouse button, the item is cleared before editing starts. While editing, the left mouse button moves the caret to a new position within the item. The right mouse button deletes from the caret to the cursor. CONTROL-W deletes the previous word. Editing is stopped when another item is selected, when the user moves the cursor into another TTY window and clicks the cursor, or when the Free Menu function **FM.ENDEDIT** is called (called when the Free Menu is reset, or the window is closed). The Free Menu editor will time out after about a minute, returning automatically. Because of the many ways in which editing can terminate, **EDIT** items are not allowed to have a **SELECTEDFN**, as it is not clear when this function should be called. Each **EDIT** item should have an ID specified, which is used when getting the state of the Free Menu, since the string being edited is defined as the state of the item, and thus cannot distinguish edit items. The following Item Properties are specific to **EDIT** items.

MAXWIDTH

Specifies the maximum string width of the item, in bits, after which input will be ignored. If **MAXWIDTH** is not specified, the item becomes infinitely wide and input is never restricted.

INFINITEWIDTH

This property is set automatically when **MAXWIDTH** is not specified. This tells Free Menu that the item has no right end, so that the item becomes mouse sensitive from its left edge to the right edge of the window, within the vertical space of the item.

In Medley, Changestate of an infinite width Edit item to a smaller item clears the old item properly.

LIMITCHARS

The input characters allowed can be restricted in two ways: If this item property is a list, it is treated as a list of legal characters; any character not in the list will be ignored. If it is an atom, it is treated as the name of a test predicate, which is passed three arguments, **ITEM**, **WINDOW**, and **CHARACTER**, when each character is typed. This predicate should return T if the character is legal, NIL otherwise. The **LIMITCHARS** function can also call **FM.ENDEDIT** to force the editor to terminate, or **FM.SKIPNEXT**, to cause the editor to jump to the next edit item in the menu.

ECHOCHAR

This item property can be set to any character. This character will be echoed in the window, regardless of what character is typed. However the item's label contains the actual string typed. This is useful for operations like password prompting. If **ECHOCHAR** is used, the font of the item must be fixed pitch. Unrestricted **EDIT** items should not have other items to their right in the menu, as they will be replaced. If the item is boxed, input is restricted to what will fit in the box. Typing off the edge of the window will cause the window to scroll appropriately. Control characters can be edited, including the carriage return and line feed, and they are echoed as a black box. While editing, the Skip/Next key ends editing the current item, and starts editing the next **EDIT** item in the Free Menu.

NUMBER	[Free Menu Item]
---------------	------------------

NUMBER items are **EDIT** items that are restricted to numerals. The state of the item is coerced to the the number itself, not a string of numerals. There is one **NUMBER**- specific Item Property:

NUMBERTYPE	If FLOATP (or FLOAT), then decimals are accepted. Otherwise only whole numbers can be edited.
-------------------	--

EDITSTART	[Free Menu Item]
------------------	------------------

EDITSTART items serve the purpose of starting editing on another item when they are selected. The associated Edit item is linked to the EditStart item by an **EDIT** link (see Free Menu Item Links below). If the **EDITSTART** item is selected with the right mouse button, the Edit item is cleared before editing is started. Similar to **EDIT** items, **EDITSTART** items cannot have a **SELECTEDFN**, as it is not clear when the associated editing will terminate.

In Medley, **EDITSTART** items linked to a Number item properly set number state when editing has completed.

DISPLAY	[Free Menu Item]
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DISPLAY items serve two purposes. First, they simply provide a way of putting dummy text in a Free Menu, which does nothing when selected. The item's label can be changed, though. Secondly, **DISPLAY** items can be used as the base for new item types. The application can create new item types by specifying **DOWNFN**, **HELDNFN**, **MOVEDFN**, and **SELECTEDFN** for a **DISPLAY** item, making it behave as desired.

28.7.12 Free Menu Item Highlighting

Each Free Menu Item can specify how it wants to be highlighted. First of all, if the item does not specify a **HIGHLIGHT** property, there are two default highlights. If the item is not boxed, the label is simply inverted, as in normal menus. If the item is boxed, it is highlighted in the shade of the box. Alternatively, the value of the **HIGHLIGHT** property can be a **SHADE**, which will be painted on top of the item when a mouse event occurs on it. Or the **HIGHLIGHT** property can be an alternate label, which can be an atom, string or bitmap. If the highlight label is a different size than the item label, the formatter will leave enough space for the larger of the two. In all of these cases, the looks of the highlighted item are determined when the Free Menu is built, and a bitmap of the item with these looks is created. This bitmap is stored on the item's **HIGHLIGHT** property, and simply displayed when a mouse event occurs. The value of the highlight property in the Item Description is copied to the **USERDATA** list, in case it is needed later for a label change.

28.7.13 Free Menu Item Links

Links between items are useful for grouping items in abstract ways. In particular, links are used for associating **EDITSTART** items with their item to edit, and **STATE** items with their state

display. The Free Menu Item property **LINKS** is a property list, where the value of each Link Name property is a pointer to another item. In the Item Description, the value of the **LINK** property should be a property list as above. The value of each Link Name property is a Link Description. A Link Description can be one of the following forms:

- | | |
|-------------------------------------|--|
| <ID> | An ID of an item in the Free Menu. This is acceptable if items can be distinguished by ID alone. |
| (<GROUPID> <ID>) | A list whose first element is a GROUPID, and whose second element is the ID of an item in that group. This way items with similar purposes, and thus similar ID's, can be distinguished across groups. |
| (GROUP <ID>) | A list whose first element is the keyword GROUP, and whose second element is an item ID. This form describes an item with ID, in the same group that this item is in. This way you do not need to know the GROUPID, just which group it is in. |

Then after the entire menu is built, the links are set up, turning the Link Descriptions into actual pointers to Free Menu Items. There is no reason why circular Item Links cannot be created, although such a link would probably not be very useful. If circular links are created, the Free Menu will not be garbage collected after it is not longer being used. The application is responsible for breaking any such links that it creates.

28.7.14 Free Menu Window Properties

FM.PROMPTWINDOW	Specifies the window that Free Menu should use for displaying the item's messages. If not specified, PROMPTWINDOW is used.
FM.BACKGROUND	The background shade of the entire Free Menu. This property can be set automatically by specifying a BACKGROUND argument to the function FREEMENU. The window border must be 4 or greater when a Free Menu background is used, due to the way the Window System handles window borders.
FM.DONTRESHAPE	Normally, Free Menu will attempt to use empty space in a window by pushing items around to fill the space. When a Free Menu window is reshaped, the items are repositioned in the new shape. This can be disabled by setting the FM.DONTRESHAPE window property.

28.7.15 Free Menu Interface Functions

(FREEMENU DESCRIPTION TITLE BACKGROUND BORDER)	[Function]
Creates a Free Menu from a Free Menu Description, returning the window. This function will return quickly unless new display fonts have to be created.	[Function]

28.7.16 Accessing Functions

(FM.GETITEM ID GROUP WINDOW)	[Function]
Gets item <i>ID</i> in <i>GROUP</i> of the Free Menu in <i>WINDOW</i> . This function will search the Free Menu for an item whose <i>ID</i> property	[Function]

matches, or secondly whose **LABEL** property matches *ID*. If **GROUP** is **NIL**, then the entire Free Menu is searched. If no matching item is found, **NIL** is returned.

(FM.GETSTATE WINDOW)

[Function]

Returns in property list format the ID and current **STATE** of every **NWAY** Collection and item in the Free Menu. If an item's or Collection's state is **NIL**, then it is not included in the list. This provides an easy way of getting the state of the menu all at once. If the state of only one item or Collection is needed, the application can directly access the **STATE** property of that object using the Accessing Macros described in Section 28.7.20, Free Menu Macros. This function can be called when editing is in progress, in which case it will provide the label of the item being edited at that point.

28.7.17 Changing Free Menus

Many of the following functions operate on Free Menu Items, and thus take the item as an argument. The *ITEM* argument to these functions can be the Free Menu Item itself, or just a reference to the item. In the second case, **FM.GETITEM** (see Section 28.7.16, Accessing Functions) will be used to find the item in the Free Menu. The reference can be in one of the following forms:

- <ID> Specifies the first item in the Free Menu whose ID or LABEL property matches <ID>.
- (<GROUPID> <ID>) Specifies the item whose ID or LABEL property matches <ID> within the group specified by <GROUPID>.

(FM.CHANGELABEL ITEM NEWLABEL WINDOW UPDATEFLG)

[Function]

Changes an *ITEM*'s label after the Free Menu has been created. It works for any type of item, and **STATE** items will remain in their current state. If the window is open, the item will be redisplayed with its new appearance. **NEWLABEL** can be an atom, a string, or a bitmap (except for **EDIT** items), and will be restricted in size by the **MAXWIDTH** and **MAXHEIGHT** Item Properties. If these properties are unspecified, the *ITEM* will be able to grow to any size. **UPDATEFLG** specifies whether or not the regions of the groups in the menu are recalculated to take into account the change of size of this item. The application should not change the label of an **EDIT** item while it is being edited. The following Item Property is relevant to changing labels:

- | | |
|--------------------------|--|
| CHANGELABELUPDATE | Exactly like UPDATEFLG except specified on the item, rather than as a function parameter. |
|--------------------------|--|

(FM.CHANGESTATE X NEWSTATE WINDOW)

[Function]

Programmatically changes the state of items and **NWAY** Collections. *X* is either an item or a Collection name. For items **NEWSTATE** is a state appropriate to the type of the item. For **NWAY** Collections, **NEWSTATE** should be the desired item in the Collection, or **NIL** to deselect. For **EDIT** and **NUMBER** items, this

function just does a label change. If the window is open, the item will be redisplayed.

(FM.RESETSTATE ITEM WINDOW)	[Function]
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Sets an *ITEM* back to its initial state.

(FM.RESETMENU WINDOW)	[Function]
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Resets every item in the menu back to its initial state.

(FM.RESETSHAPE WINDOW ALWAYSFLG)	[Function]
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Reshapes the *WINDOW* to its full extent, leaving the lower-left corner unmoved. Unless *ALWAYSFLG* is T, the window will only be increased in size as a result of resetting the shape.

(FM.RESETGROUPS WINDOW)	[Function]
--------------------------------	------------

Recalculates the extent of each group in the menu, updating group boxes and backgrounds appropriately.

(FM.HIGHLIGHTITEM ITEM WINDOW)	[Function]
---------------------------------------	------------

Programmatically forces an *ITEM* to be highlighted. This might be useful for *ITEMs* which have a direct effect on other *ITEMs* in the menu. The *ITEM* will be highlighted according to its **HIGHLIGHT** property, as described in Section 28.7.12, Free Menu Item Highlighting. This highlight is temporary, and will be lost if the *ITEM* is redisplayed, by scrolling for example.

28.7.18 Editor Functions

(FM.EDITITEM ITEM WINDOW CLEARFLG)	[Function]
---	------------

Starts editing an **EDIT** or **NUMBER** *ITEM* at the beginning of the *ITEM*, as long as the *WINDOW* is open. This function will most likely be useful for starting editing of an *ITEM* that is currently the null string. If *CLEARFLG* is set, the *ITEM* is cleared first.

(FM.SKIPNEXT WINDOW CLEARFLG)	[Function]
--------------------------------------	------------

Causes the editor to jump to the beginning of the next **EDIT** item in the Free Menu. If *CLEARFLG* is set, then the next item will be cleared first. If there is not another **EDIT** item in the menu, this function will simply cause editing to stop. If this function is called when editing is not in progress, editing will begin on the first **EDIT** item in the menu. This function can be called from any process, and can also be called from inside the editor, in a **LIMITCHARS** function.

(FM.ENDEDIT WINDOW WAITFLG)	[Function]
------------------------------------	------------

Stops any editing going on in *WINDOW*. If *WAITFLG* is T, then block until the editor has completely finished. This function can be called from another process, or from a **LIMITCHARS** function.

(FM.EDITP WINDOW)	[Function]
--------------------------	------------

If an item is in the process of being edited in the Free Menu *WINDOW*, that item is returned. Otherwise, **NIL** is returned.

28.7.19 Miscellaneous Functions

(FM.REDISPLAYMENU WINDOW)	[Function]
Redisplays the entire Free Menu in its <i>WINDOW</i> , if the <i>WINDOW</i> is open.	
(FM.REDISPLAYITEM ITEM WINDOW)	[Function]
Redisplays a particular Free Menu <i>ITEM</i> in its <i>WINDOW</i> , if the <i>WINDOW</i> is open.	
(FM.SHADE X SHADE WINDOW)	[Function]
<i>X</i> can be an item, or a group ID. <i>SHADE</i> is painted on top of the item or group. Note that this is a temporary operation, and will be undone by redisplaying. For more permanent shading, the application may be able to add a REDEDISPLAYFN and SCROLLFN for the window as necessary to update the shading.	
(FM.WHICHITEM WINDOW POSorX Y)	[Function]
Locates and identifies an item from its known location within the <i>WINDOW</i> . If <i>WINDOW</i> is NIL, (WHICHW) is used, and if <i>POSorX</i> is NIL, the current cursor location is used.	
(FM.TOPGROUPID WINDOW)	[Function]
Returns the ID of the top group of this Free Menu.	

28.7.20 Free Menu Macros

These Accessing Macros are provided to allow the application to get and set information in the Free Menu data structures. They are implemented as macros so that the operation will compile into the actual access form, rather than figuring that out at run time.

(FM.ITEMPROP ITEM PROP {VALUE})	[Macro]
Similar to WINDOWPROP , this macro provides an easy access to the fields of a Free Menu Item. The function FM.GETITEM gets the <i>ITEM</i> , described in Section 28.7.16, Accessing Function. <i>VALUE</i> is optional, and if not given, the current value of the <i>PROP</i> property will be returned. If <i>VALUE</i> is given, it will be used as the new value for that <i>PROP</i> , and the old value will be returned. When a call to FM.ITEMPROP is compiled, if the <i>PROP</i> is known (quoted in the calling form), the macro figures out what field to access, and the appropriate Data Type access form is compiled. However, if the <i>PROP</i> is not known at compile time, the function FM.ITEMPROP , which goes through the necessary property selection at run time, is compiled. The TYPE and USERDATA properties of a Free Menu Item are Read Only, and an error will result from trying to change the value of one of these properties.	
(FM.GROUPPROP WINDOW GROUP PROP {VALUE})	[Macro]

Provides access to the Group Properties set up in the *PROPS* list for each group in the Free Menu Description. *GROUP* specifies

the ID of the desired group, and *PROP* the name of the desired property. If *VALUE* is specified, it will become the new value of the property, and the old value will be returned. Otherwise, the current value is returned.

(FM.MENUPROP WINDOW PROP {VALUE})

[Macro]

Provides access to the group properties of the top-most group in the Free Menu, that is to say, the entire menu. This provides an easy way for the application to attach properties to the menu as a whole, as well as access the Group Properties for the entire menu.

(FM.NWAYPROP WINDOW COLLECTION PROP {VALUE})

[Macro]

This macro works just like **FM.GROUOPPROP**, except it provides access to the **NWay** Collections.