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Version 1.1

MENUS

Includes Demonstration Program MenusPascal

Introduction

Types of Menu

A menu is a user interface element which allows the user to view, or choose from, a list of choices and commands provided by your application. There are basically three types of menus:

- **Pull-Down Menu.** A pull-down menu is identified by a menu title in the menu bar. Each pull-down menu comprises a menu title and one or more menu items.
- **Pop-Up Menu.** A pop-up menu is a menu which does not appear in the menu bar but rather appears on another part of the screen when the user presses the mouse button while the cursor is at a particular location. Pop-up menus are generally located within dialog boxes.
- **Submenu.** A submenu is a menu that is attached to another menu. A menu to which a submenu is attached is referred to as a hierarchical menu. Note that submenus should not normally be attached to pop-up menus as this tends to make the interface more complex and less intuitive to the user.

Pull-Down Menus

Menu Definition Procedures and Menu Bar Definition Functions

The Menu Manager uses the following to display, and to perform basic operations on, menus and the menu bar:

- **Menu Definition Procedure.** When you define a menu, you must specify the required menu definition procedure. The Menu Manager uses that menu definition procedure to draw the menu items in a menu, determine which item the user chose, insert scrolling indicators as items in a menu, calculate the menu's dimensions, etc.
- **Menu Bar Definition Function.** The Menu Manager uses the menu bar definition function to draw and clear the menu bar, determine whether the cursor is currently within the menu bar or any currently displayed menu, calculate the left edges of menu titles, highlight a menu title, invert the entire menu bar, draw the menu's shadow box, and save/restore the bits behind a menu.

Standard Menu Definition Procedure and Menu Bar Definition Function

The system software provides a standard menu definition procedure and a standard menu bar definition function, which are stored as code resources in the System file. The standard menu definition procedure is the 'MDEF' resource with a resource ID of 0. The standard menu bar definition function is the 'MBDF' resource with a resource ID of 0.

When you define your menus and menu bar, you specify the definition routines that the Menu Manager should use when managing them. Ordinarily, you will use the standard routines; however, as with most other elements of the Macintosh user interface, the option is available to write your own custom definition function/procedure if you need to provide features not available in the standard routines.¹

The Menu Bar and Menus

The Menu Bar

The menu bar extends across the top of the screen. As defined by the standard menu bar definition function, the menu bar is white and high enough to display menu titles in the height of the system font (Chicago 12 point for Roman Scripts) plus a single pixel bottom border.

Generally, the menu bar should always be visible. If you want to hide the menu bar for some reason, you should provide a method (for example, a keyboard equivalent for a menu command) to allow the user to make the menu bar reappear.

The 'MBAR' Resource. Each application has its own menu bar, which is defined by an 'MBAR' resource. This resource lists the order and resource ID of each menu appearing in your menu bar. Your menu's 'MBAR' resource should be defined such that the Apple menu is the first menu in the menu bar, with the File and Edit menus being the next two. The Help and Application menus do not need to be defined in the 'MBAR' resource, since the Menu Manager automatically adds them to the menu bar when the application calls `GetNewMBar` provided that your menu bar includes the Apple menu.

Menus

All Macintosh applications should provide, as a minimum, the **standard menus**. The standard menus are the Apple menu, the File menu and the Edit menu.

Your application can disable any menu, which causes the Menu Manager to dim that menu's title and all associated menu items. The menu items can also be disabled individually. Your application should specify whether menu items are enabled or disabled when it first defines and creates a menu and can enable or disable items at any time thereafter.

The 'MENU' Resource. For each menu, you define the menu title and the individual characteristics of its menu items in a 'MENU' resource.

The 'mctb' Resource. Ordinarily, the Menu Manager uses default colours (black text on a white background) for menus. However, the default colours of the title, item text, and background can be changed if you provide a menu colour table ('mctb') resource with the same ID as the associated 'MENU' resource².

Menu Items

A menu item can contain text or a dividing line (that is, a **divider**). A divider is always dimmed. Each menu item, other than dividers, can have a number of characteristics as follows:

¹Chapter 18 — Lists and Custom List Definition Functions and Chapter 19 — Custom Control Definition Functions and VBL Tasks include examples of custom definition functions for other elements of the user interface known as lists and controls.

²If you use ResEdit to create your menu resources, the 'mctb' resource will be created automatically when you specify a coloured title, item text and/or background within the menu resource editor.

- An icon, small icon, reduced icon or colour icon to the left of the menu item's text. (Note that items with small or reduced icons cannot have submenus.)
- A checkmark or other marking character to the left of the menu item's text, indicating the status of the menu item or the mode it controls. (A menu item can have a mark or a submenu, but not both.)
- The symbol for the Command key (⌘) and another 1-byte character to the right of the menu item's text (referred to as the **keyboard equivalent** of a command). (An item that has a keyboard equivalent cannot have a submenu, a small icon or a reduced icon.)
- A triangular indicator to the right of a menu item's text to indicate that the item has a submenu. (An item that has a submenu cannot have a keyboard equivalent, a marking character, a small icon or a reduced icon.)
- A font style (bold, italic, etc.) for the menu item's text.
- The text of the menu item.
- The ellipsis character (...) as the last character in the text of the menu item, indicating that, before executing the command, the application will display a dialog box requesting more information from the user. (The ellipsis character should not be used in menu items which display informational dialogs or a confirmational alert.³)
- A dimmed appearance when the application disables the item. (When the menu title is dimmed, all menu items in that menu are also dimmed.)

A menu can contain any number of menu items; however, only the first 31 can be disabled.

Groups of Menu Items

Where appropriate, menu items should be grouped, with each group separated by a divider. For example, a menu can contain commands which perform actions and commands which set attributes. The action commands which are logically related should be grouped, as should attribute commands which are interdependent. The attribute commands which are mutually exclusive, and those which form accumulating attributes (for example, Bold, Italic and Underline), should also be grouped.

Keyboard Equivalents for Menu Commands

The Menu Manager provides support for **Command-key equivalents**⁴. You detect a Command-key equivalent by examining the `modifiers` field of the event record for a keyboard event, which allows you to determine if the Command key was pressed at the same time as the keyboard event. If so, your application typically calls `MenuKey`, which determines if the one-byte character matches any of the keyboard equivalents defined for your menu items. (Note that `MenuKey` does not distinguish between uppercase and lowercase letters.)

Reserved Keyboard Equivalents. Apple reserves the following keyboard equivalents, which should be used in the File and Edit menus of your application:

³It is interesting to note, however, that Apple itself does not always obey this rule. For example, choosing About This Macintosh... (note the ellipsis) from the Finder's Apple menu displays an informational dialog box only.

⁴The term **keyboard equivalent** refers to a keyboard combination, such as ⌘-C, or any other combination of the Command key, another key and one or more modifier keys. The term **Command-key equivalent** refers specifically to a keyboard equivalent comprising the Command key and one other key other than a modifier key.

Keys	Command	Menu
⌘-A	Select All	Edit
⌘-C	Copy	Edit
⌘-N	New	File
⌘-O	Open...	File
⌘-P	Print...	File
⌘-Q	Quit	File
⌘-S	Save	File
⌘-V	Paste	Edit
⌘-W	Close	File
⌘-X	Cut	Edit
⌘-Z	Undo	Edit

Other common keyboard equivalents are:

Keys	Command	Menu
⌘-B	Bold	Style
⌘-F	Find	File
⌘-G	Find Again	File
⌘-I	Italic	Style
⌘-T	Plain Text	Style
⌘-U	Underline	Style

Menus Added Automatically By the Menu Manager

The menus added automatically by the Menu Manager (the Help and Application menus) have icons as titles and are sometimes referred to as the **system-managed menus**. The Help menu is displayed only if space is available. The application menu is invariably displayed, overlapping the main part of a long menu if this becomes necessary.

Your application does not need to take any action if the user chooses an item from the Application menu. However, if the user chooses an item added by your application to the Help menu, your application is responsible for taking the appropriate action.

The Apple Menu

The Apple menu should be defined as the first in your application. Typically, applications provide an **About** command as the first menu item, followed by a divider. The remaining items are, of course, controlled by the contents of the Apple Menu Items folder in the System folder.

To create your application's Apple menu, firstly define the Apple menu title, the characteristics of your application's **About** command and the divider following it in a 'MENU' resource. Then insert the contents of the Apple Menu Items folder into your application's Apple menu by calling `AppendResMenu`, with 'DRVR' specified as the resource type in the parameter `theType`.

When the user chooses the **About** command, your application should display a dialog box or an alert box containing your application's name, version number, copyright information, any other information as required, and an OK button.

When the user chooses an item other than the **About** command, your application should call the `OpenDeskAcc` function, which schedules the chosen item for execution and then returns to your application. At the next call to `WaitNextEvent`, your application receives a suspend event and the chosen item becomes the foreground process.

The File Menu

The standard File menu contains commands related to the management of documents, plus the **Quit** command. The standard commands (see Fig 1) should be supported by your application. Any other commands added to the standard section of the menu should pertain to the management of documents.

The actions your application should take when File menu commands are chosen are detailed at Chapter 13 — Printing and Chapter 14 — Files.

File	
New	⌘N
Open...	⌘O
Close	⌘W
Save	⌘S
Save As...	
Page Setup...	
Print...	⌘P
Quit	⌘Q

FIG 1 - STANDARD FILE MENU

The Edit Menu

The standard Edit menu (see Fig 2) provides commands which allow the user to edit the contents of their documents, to copy data between different applications using the Clipboard, and to facilitate data sharing between documents created by different applications via publish and subscribe.

Edit	
Undo	⌘Z
Cut	⌘H
Copy	⌘C
Paste	⌘V
Clear	
Select All	⌘A
Create Publisher...	
Subscribe To...	
Publisher Options...	
Show Clipboard	

FIG 2 - STANDARD EDIT MENU

All Macintosh applications should include the standard editing commands (Undo, Cut, Copy, Paste and Clear) so as to support those operations in dialog boxes and in old-style desk accessories launched in the application's partition. (Old-style desk accessories utilise the host application's menus.)

An additional word or phrase should be added to Undo to clarify exactly what action your application will reverse. Other commands may be added if they are related to editing or changing the contents of your application's documents.

The Help Menu

You can add items to the end of the Help menu to give the user access to any online help that your application provides in addition to help balloons. Items are added to the Help menu using `HMGetHelpMenuHandle` and `AppendMenu`. When adding items, include the name of your application in the command so as to indicate to the user just which application the help relates to.

Help Balloons

In the Help menu, the effect of selecting **Show Balloons** and **Hide Balloons** is global and affects all applications. The Help Manager provides balloons for the Apple, Help and Application menu titles, for items in the Application menu, and for the standard items in the Help menu. Your application should provide the content of help balloons for all other menu items and menus in your application.

The Application Menu

When the user chooses an item from the Application menu, the Menu Manager handles the event as appropriate. For example, if the user chooses another application, the Menu Manager sends your application a suspend event.

Font Menus

If your application has a **Font** menu, you should list in that menu the names of all currently available fonts (that is, all those residing in the Fonts folder in the System folder). Fonts are added to the **Font** menu using `AppendResMenu` or `InsertResMenu`, which add items to the specified menu in alphabetical order.

Your application should indicate which font is in use by adding a checkmark to the left of the name in the **Font** menu. If the current selection contains more than one font, a dash should be placed next to the name of each font the selection contains. When the user starts entering text at the insertion point, your application should display text in the current font.

Font Attributes

Separate menus should be used to accommodate lists of font attributes such as styles and sizes. Since the system software supports both bitmapped and TrueType fonts, your application should not provide an upper limit for font sizes.

Pop-Up Menus

Pop-up menus are used to present the user with a list of choices in a dialog box or window. They are identified by a downward pointing triangle within the **pop-up box** (see Fig 3).

Pop-up menus work well when your application needs to present several choices to the user and it is acceptable to hide these choices until the menu is opened. (Other methods of displaying choices are checkboxes and radio buttons.) Pop-up menus should not be used for multiple choice lists or as a way to provide more commands. They should contain attributes rather than actions; accordingly, Command-key equivalents should not be used in pop-up menus.

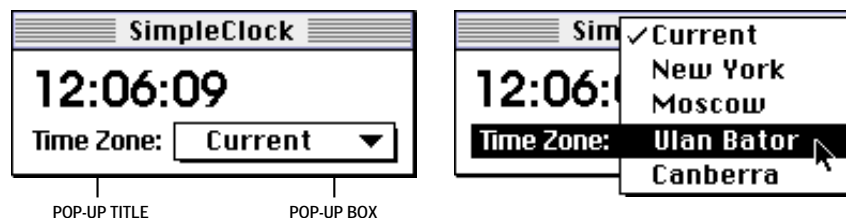


FIG 3 - POP-UP MENU (EXAMPLE)

If you do not provide a title for the pop-up menu, the current pop-up menu item serves as the title.

Pop-Up Control Definition Function

The standard pop-up menu is actually implemented as a **control**, its appearance and behaviour being determined by a **pop-up control definition function**. If the menu is in a dialog box and your application uses the Dialog Manager, the Dialog Manager uses the pop-up control definition function

to display the pop-up menu and to handle all user interaction with the menu. The pop-up control definition function handles all highlighting and unhighlighting and adds the checkmark to the current menu item. When the user releases the mouse button, it changes the text in the pop-up box and stores the item number of the chosen item as the value of the control⁵.

Use of Control Manager Routines

The Control Manager function `GetControlValue` may be used to retrieve the value of the control.

If the pop-up menu is in one of your application's windows, your application needs to determine which control the cursor was in when the user pressed the mouse button. Your application can then use Control Manager routines to display the pop-up menu and to handle user interaction with the control.

Type-In Pop-Up Menu

Type-in pop-up menus (see Fig 4) are used to offer the user a list of choices while, at the same time, allowing the user to type in an additional choice.



FIG 4 - TYPE-IN POP-UP MENU (EXAMPLE)

The standard pop-up control definition function, however, does not provide specific support for type-in menus; accordingly, you must create your own control definition function to handle such menus.

Hierarchical Menus

A hierarchical menu is a menu which has a submenu attached to it. Hierarchical menus should be used to provide the user with additional choices in the nature of attributes. They should not be used to provide additional commands. There should only ever be one hierarchical level, that is, there should be only one level of submenus.

Menu Records, Menu IDs, Item Numbers, and Menu Lists

The Menu Record

The Menu Manager maintains information about menus in **menu records**, a data structure of type `MenuInfo` defined in `menus.p`:

```
type
  MenuInfo = record
    menuID:      integer;
    menuWidth:   integer;
    menuHeight:  integer;
    menuProc:    Handle;
    enableFlags: longint;
    menuData:    Str255;
  end;
```

⁵Controls and their values are explained at Chapter 5 — Controls.

```
MenuPtr = ^MenuInfo;
MenuHandle = ^MenuPtr;
MenuRef = MenuHandle;
```

You typically specify most of this information in a 'MENU' resource. When you create a menu, the Menu Manager creates a menu record for the menu and returns a handle to that record. The Menu Manager automatically updates the menu record when you make any changes to the menu.

Menu IDs

To refer to a menu, you usually use either the menu's ID or the handle to the menu's menu record. Accordingly, you must assign a **menu ID** to each menu in your application as follows:

- Pull-down and pop-up menus must use a menu ID greater than 0.
- Submenus of an application must use a menu ID of from 1 to 235.

Item Numbers

To refer to a menu item, you use the item's **item number**. Item numbers in a menu start at 1.

The Menu List

The **menu list** contains handles to the menu records of one or more menus (although a menu list can, in fact, be empty). The end of a menu list contains handles to the menu records of submenus and pop-up menus, if any, the phrase "submenu portion of the menu list" referring to this portion of the list.

When your application initialises the Menu Manager, the Menu Manager creates the menu list. The menu list is initially empty but changes as your application adds menus to it or removes menus from it.

Creating Your Application's Menus

Creating Resources

Creating 'MENU' Resources for Menus

A 'MENU' resource defines the menu title and the characteristics of menu items in a menu. The following is a typical 'MENU' resource in Rez format, in this case a resource for the Apple menu:

```
#define mApple 128
...
resource 'MENU' (mApple, preload) /* Resource ID, preload resource. */
{
    mApple, /* Menu ID. */
    textMenuProc, /* Uses standard menu definition procedure. */
    0b11111111111111111111111111111101, /* Enable About, disable divider, enable rest. */
    enabled, /* Enable menu title. */
    apple, /* Menu title. */
    {
        "About This Application...", /* FIRST MENU ITEM text. */
        noicon, /* Icon number (if any). */
        nokey, /* Keyboard equivalent or submenu or icon. */
        nomark, /* Marking character or submenu ID. */
        plain; /* Style of menu item text. */
        "- ", /* SECOND MENU ITEM text. */
        noicon, nokey, nomark, plain
    }
};
```

Resource ID and Menu ID. The resource ID for this menu is specified as 128. Any number equal to or greater than 128 may be used as the resource ID for a menu. By convention, 128 is used as the resource ID of the Apple menu and sequential numbers are used for the remaining menus. Also by convention, the menu ID is usually set to the same number as the resource ID, though this is not strictly


```

...
resource 'MBAR' (rMenuBar, preload) /* Resource ID, preload */
{
    { mApple, mFile, mEdit }; /* Resource IDs of menus in this menu bar */
};

```

Help Balloons - 'hmmu' Resources

You should also define Help balloons for each of your application's menu items and each menu title. Help balloons are defined in 'hmmu' resources.

Creating the Menu Bar and Pull-Down Menus

Your application should call `GetNewMBar` to create a menu list as defined in an 'MBAR' resource. `GetNewMBar` returns a handle to the created menu list. For each menu defined by the resource, `GetNewMBar` creates a menu record, creates each menu according to the menu definition in its corresponding 'MENU' resource, and inserts each menu into the menu list.

`SetMenuBar` should then be used to set the **current menu list** as the menu list created by your application. A call to `DrawMenuBar` completes the process by drawing the menu bar, displaying all the menu titles in the current menu list.

Adding Menus to the Menu List

A menu may be added to the current menu list using one of the following procedures:

- Read the relevant 'MENU' resource in with `GetMenu`, add it to the current menu list with `InsertMenu`, and update the menu bar with `DrawMenuBar`.
- Use `NewMenu` to create a new empty menu, use `AppendMenu`, `InsertMenuItem`, `InsertResMenu`, or `AppendResMenu` to fill the menu with menu items, add the menu to the current menu list using `InsertMenu`, and update the menu bar using `DrawMenuBar`.

Note that `GetMenuHandle` may be used to obtain a handle to the menu record of any menu in the current menu list.

Creating a Hierarchical Menu

`GetNewMBar` does not read in the resource descriptions of submenus but simply records the menu ID of any submenu in the menu record. Submenu descriptions are read in with `GetMenu` and the submenu is inserted in the current menu list using `InsertMenu`, with the constant `hierMenu` passed as the second parameter to that call.⁶

Creating a Pop-Up Menu

As previously stated, pop-up menus are actually implemented as controls. To create a pop-up menu, define the pop-up menu and its menu items in the same way as for other menus (that is, using a 'MENU' resource), create a control which uses the standard pop-up control definition function (that is, specify the `popupMenuProc` constant in `procID` field of the resource description of the control), and associate the control with a window or dialog box⁷.

If you specify `popupMenuProc` in the `procID` field of the resource description of a control, when your application creates the control (with a call to `GetNewControl`), the Control Manager creates the pop-up control, which includes the pop-up title and the pop-up box with a one-pixel drop shadow.

⁶As the user traverses menu items, if an item has a submenu, the `MenuSelect` function looks in the submenu portion of the menu list for the submenu. It then searches for a menu with a defined menu ID that matches the menu ID specified by the hierarchical menu item. If it finds a match, it attaches the submenu to the menu item.

⁷If you add the constant `useWFont` to the constant `popupMenuProc`, the pop-up title and menu item text will be drawn in the current graphics port's font rather than the system font.

Pop-up Menus in Dialog Boxes

Dialog Manager or Control Manager routines, not Menu Manager routines, are used to display and manage pop-up menus. For example, if you define a modal dialog box that contains a pop-up control and use the Dialog Manager to display and help handle events in the dialog box, the Dialog Manager automatically uses the pop-up control definition function to draw the control and handle all user interaction. The Control Manager function `GetControlValue` will get the value of the control, which will equate to the number of the item selected by the user.

Pop-up Menus in Windows

If your application defines a control in one of your application's windows, you can use `TrackControl` and other Control Manager routines to handle the pop-up menu.

Changing the Appearance of Items in a Menu

Menu Manager routines may be used to change the appearance of items in a menu, for example, the font style, text or other characteristics. Most of the routines which get or set menu characteristics require three parameters:

- A handle to the menu record of the menu containing the desired item.
- The number of the menu item.
- A variable which either specifies the data to set or identifies where to return information about that item.

Enabling and Disabling Menu Items

Specific menu items or entire menus are disabled and enabled using `DisableMenu` and `EnableMenu`, which both take a handle to the menu record that identifies the desired menu and either the item number of the menu to be enabled/disabled or a value of 0 to indicate that the entire menu is to be enabled/disabled.

When an entire menu is disabled or enabled, `DrawMenuBar` should be called to update the appearance of the menu bar. If you do not need to update the menu bar immediately, you can use `InvalidMenuBar` instead of `DrawMenuBar`, causing the Event Manager to redraw the menu bar the next time it scans for update events. This will reduce the menu bar flicker which will occur if `DrawMenuBar` is called more than once in rapid succession.

If you disable an entire menu, the Menu Manager dims that menu's title at the next call to `DrawMenuBar` and dims all menu items when it displays the menu. If you enable an entire menu, the Menu Manager enables only the menu title and any items that you did not previously disable individually.

Changing the Text and Font Style of Menu Items

`GetMenuItemText` and `SetMenuItemText` are used to get and set the text of a menu item. `GetItemStyle` and `SetItemStyle` are used to get and set the font style of a menu item.

Changing the Mark and Icons of Menu Items

`GetItemMark` and `SetItemMark` are used to get and set the marking character of a menu item. `GetItemIcon` and `SetItemIcon` are used to get and set the icon of a menu.

Adding Items to a Menu

Adding Items Other Than the Names of Resources

`AppendMenu` or `InsertMenuItem` are used to add items other than the names of resources (such as font resources) to a previously created menu. These functions allow you to specify the same characteristics for menu items as are available when defining a 'MENU' resource. They require:

- A handle to the menu record of the menu involved.
- A string describing the items to add.

The string consists of the text of the menu item and any required characteristics. You can specify a hyphen as the menu item text to create a divider line. You can also use various **metacharacters** in the text string to separate menu items and to specify the required characteristics. The following metacharacters may be used:

MetaCharacter	Description
; or Return	Separates menu items.
^	When followed by an icon number, defines the icon for the item.
!	When followed by a character, defines the mark for the item. If the keyboard equivalent field contains \$1B, this value is interpreted as the menu ID of a submenu of this menu item.
<	When followed by one or more of the characters B, I, U, O, and S, defines the character style of the item to, respectively, bold, italic, underline, outline or shadow.
/	When followed by a character, defines the keyboard equivalent for the item. When followed by \$1B, specifies that this menu item has a submenu. (To specify that the menu item has a script code, small icon, or reduced icon, use <code>SetItemCmd</code> to set the keyboard equivalent field to, respectively, \$1C, \$1D or \$1E.)
(Defines the menu item as disabled.

As an example of the use of metacharacters, the following is a string list ('STR#') resource, in Rez input format, which stores the text of some menu items:

```
resource 'STR#' (300, "Text for appended menu items") {
{
    /* [1] */
    "Pick a Colour...";
    /* [2] */
    " (^2!=Everything<B/E";
}
};
```

The second string in this resource uses metacharacters to specify that the menu item is to be disabled, that it has an icon with a resource ID 258 (2+256)⁸, that it has the "=" character as a marking character, that the text style is bold, and that the item has a keyboard equivalent of Command-E.

Examples

The following code uses `AppendMenu` to append a menu item with no specific characteristics other than its text to the menu identified by the menu handle. The text for the menu item is "Pick a Colour..." as stored in the preceding 'STR#' resource.

```
var
    myMenu: MenuHandle;
    itemString: string;

...
myMenu := GetMenuHandle(mLibrary);
GetIndString(itemString, 300, 1);
AppendMenu(myMenu, itemString);
```

⁸The Menu Manager adds 256 to the number you specify, and uses the result as the icon's resource ID.

To insert an item after a given menu item, use `InsertMenuItem`. The following code inserts the menu item "Everything" after the menu item with the item number specified in the `iRed` constant:

```
var
    myMenu: MenuHandle;
    itemString: string;

...
myMenu := GetMenuHandle(mColours);
GetIndString(itemString, 300, 2);
InsertMenuItem(myMenu, itemString, iRed);
```

The following code appends multiple items to the Edit menu using `AppendMenu`:

```
var
    myMenu: MenuHandle;

...
myMenu := GetMenuHandle(mEdit);
AppendMenu(myMenu, 'Undo/Z; -; Cut/X; Copy/C; Paste/V');
```

`InsertMenuItem` differs from `AppendMenu` in the way it handles the given text string when that string contains multiple items, inserting them in reverse order. This code is equivalent to the last line of the preceding code:

```
InsertMenuItem(myMenu, 'Paste/V; Copy/C; Cut/X-; -; Undo/Z', 0);
```

The following code adds a divider to the Edit menu:

```
myMenu := GetMenuHandle(mFile);
AppendMenu(myMenu, ' -');
```

Adding Items Comprising Resource Names to a Menu

`AppendResMenu` OR `InsertResMenu` may be used to add items that consist of resource names to a menu.

For example, you can use `AppendResMenu` to add the names of all font resources in the Fonts folder as menu items in your application's Font menu. Similarly, `AppendResMenu` can be used to add all of the items from the Apple Menu Items folder to your application's Apple menu (with 'DRVR' specified as the resource type in the call). These are common instances of when you will need to add items not already defined in a 'MENU' resource.

Items are added to your application's Help menu using `AppendMenu` OR `InsertMenuItem`.

Handling Menu Choices

Determining the Menu ID and Menu Item — `MenuSelect` and `MenuKey`

When the user presses the mouse button while the cursor is in the menu bar, your application should first adjust its menus (that is, enable or disable menu items and add or remove marks as required) and then call `MenuSelect`. `MenuSelect` tracks the mouse, displays menus, highlights menu titles, displays and highlights enabled menu items, handles all user activity until the user releases the mouse button, and returns a long integer as its function result. The long integer contains the menu ID in the high word and the item number in the low word.

If some of your menu items have keyboard equivalents, your application should detect such key-down events. If an examination of the `modifiers` field of the event record reveals that the Command key was down, your application should first adjust its menus and then call `MenuKey`. `MenuKey` scans the current menu list for a menu item that has a matching keyboard equivalent. Like `MenuSelect`, `MenuKey` returns a long integer indicating which menu item was chosen.

If the user did not actually choose a menu command with the mouse, or if the user pressed a keyboard combination which did not map to a keyboard equivalent, `MenuSelect` and `MenuKey` return 0 in the high word, the value in the low word being undefined.

The long word returned by `MenuSelect` and `MenuKey` should be passed as a parameter to an application-defined function which switches according to the menu ID in the high word and passes the low word to other application-defined functions which respond appropriately to that menu command.

Unhighlighting the Menu Title

Recall that one of the actions of `MenuSelect` and `MenuKey` is to highlight the menu title. Ordinarily, your application should not unhighlight the menu title (using `HiLiteMenu`) until it performs the action associated with the menu command chosen by the user. However, if, in response to a menu command, your application displays a modal dialog box containing an editable text item, you should unhighlight the menu title immediately so that the user can access the Edit menu.

Adjusting Menus

Menu adjustment should be on the basis of the type of window that is currently the frontmost window, for example, a text window, a desk accessory, a modal dialog box or a modeless dialog box. Accordingly, the application-defined menu adjustment function should first determine which window is the front window. The following are examples of menu adjustment functions:

```
procedure doAdjustMenus;

var
  myWindowPtr: WindowPtr;
  windowType: integer;

begin
  myWindowPtr := FrontWindow;
  windowType := doGetWindowType(myWindowPtr);

  case windowType of
    kMyDocWindow:
      begin
        doAdjustFileMenuForDocWindow;
        doAdjustEditMenuForDocWindow;
        {Adjust others.}
      end;

    kMyDialogWindow:
      begin
        doAdjustMenusForDialogs;
      end;

    kNil:
      begin
        doAdjustMenusNoWindows;
      end;
  end;
  {of case statement}

  DrawMenuBar;
end;
{of procedure doAdjustMenus}
```

```
procedure doAdjustFileMenuForDocWindow;

var
  menuHdl: MenuHandle;

begin
  menuHdl := GetMenuHandle(mFile);

  EnableItem(menuHdl, iNew);
  EnableItem(menuHdl, iOpen);
  EnableItem(menuHdl, iClose);
```

```

DisableItem(menuHdl, i Save);
DisableItem(menuHdl, i SaveAs);
DisableItem(menuHdl, i PageSetup);
DisableItem(menuHdl, i Print);
EnableItem (menuHdl, i Quit);
end;
{of procedure doAdjustFileMenuForDocWindow}

```

Handling Apple Menu Choices

When the user chooses an item in the Apple menu, `MenuSelect` returns the menu ID of your application's Apple menu in the high word and the item number in the low word.

If your application provides an **About** command as the first menu item in the Apple menu, and the user chooses this item, you should display the About box. Otherwise, your application should use the `GetMenuItemText` function to get the menu item text and then call the `OpenDeskAcc` function, passing the text of the chosen menu item as a parameter.

The `OpenDeskAcc` function prepares to open the desktop object chosen by the user. For example, if the user chose a document created by the SimpleText application, `OpenDeskAcc` schedules SimpleText for execution (or prepares to open it if it was not already open) and returns to your application. On your application's next call to `WaitNextEvent`, your application receives a suspend event and the Process Manager makes SimpleText the foreground process, instructing it to open the chosen document.

Handling Help Menu Choices

Both the `MenuSelect` and `MenuKey` functions return the `kHMHelpMenuID` constant (-16490) in the high word if the user chooses an appended item from the Help menu. The item number of the appended item is returned in the low word. When the `kHMHelpMenuID` constant is detected, an application-defined function should be called to respond to the user's choice of a Help menu command. That function must accommodate the fact that Apple reserves the right to change the number of standard items in the Help menu.

Handling a Size Menu

Preamble

Font sizes in Size menus should be outlined to indicate which sizes are directly provided by the current font. For bitmapped fonts, you should outline only those sizes that exist in the Fonts folder. For TrueType fonts, all sizes supported by that font should be outlined. The current font size should be indicated with a checkmark. If the current selection contains more than one font size, a dash should be placed next to each font size in the selection.

Size menus should, in addition to displaying available font sizes, provide an **Other** command to enable the user to specify a size not currently listed in the menu. When the user chooses the **Other** command, the current font size should be displayed in a dialog box which allows the user to enter the desired font size. If the user chooses a size not already in the menu, a check mark should be added to the **Other** menu item and the chosen size should be added in parenthesis to the text of the **Other** command.

Handling the Menu Choice

The following is an example application-defined function which handles a user's choice of an item in the Size menu:

```

procedure doHandleSizeCommand(menuItem: integer);
var
  numItems: integer;
  addItem: boolean;
  sizeChosen: longint;

```

```

begin
  numItems := CountItems(GetMenuHandle(mSize));
  if (menuItem = numItems) {If user chose Other, display dialog box.}
  then begin
    doDisplayOtherBox(sizeChosen);
    {If the user-specified size is not in the menu, add a checkmark to the
     Other command and add the new font size to the text of the Other command.}
  end

  else begin {User chose a size.}
    doRemoveMarksFromSizeMenu; {Remove marks from item/s showing previous size.}
    CheckItem(GetMenuHandle(mSize), menuItem, true); {Add mark to chosen item}
    sizeChosen := doItemToSize(menuItem); {Convert item number to font size.}
  end;

  doResizeSelection(sizeChosen); {Update document state or user selection.}
end;

```

Accessing Menus From Alert and Dialog Boxes

When alert boxes and dialog boxes are displayed, the Dialog Manager and the Menu Manager interact to provide varying degrees of access to menus in your menu bar. In some circumstances, you can rely on the system software to disable the appropriate menus and menu items. In other circumstances, you application must contribute to, or control, the matter of menu access.

The subject of menu access when alert boxes, modal dialog boxes, moveable modal dialog boxes, and modeless dialog boxes are displayed is somewhat involved, and is addressed in detail at Chapter 6 — Dialogs and Alerts.

Main Menu Manager Constants, Data Types and Routines

Constants

For markChar **Parameter of SetItemMark Calls**

```

noMark      = 0
commandMark = 17
checkMark   = 18
diamondMark = 19
appleMark   = 20

```

For beforeID **Parameter of InsertMenu** **to Insert Submenu or Pop-up Menu Into the Submenu Portion of the Menu List**

```

hierMenu    = -1

```

Data Types

Menu Record

```

type
  MenuInfo = record
    menuID:      integer;
    menuWidth:   integer;
    menuHeight:  integer;
    menuProc:    Handle;
    enableFlags: longint;
    menuData:    Str255;
  end;

  MenuPtr = ^MenuInfo;
  MenuHandle = ^MenuPtr;
  MenuRef = MenuHandle;

```


Routines

Note: Some Menu Manager routines can be accessed using more than one spelling of the routine's name, depending on the interface files supported by your development environment. The following reflects the newest spellings, as specified in version 2.1 of the Universal Interfaces.

Initializing the Menu Manager

```
procedure InitMenus;
```

Creating Menus

```
function NewMenu(menuID: integer; menuTitle: ConstStr255Param): MenuRef;  
function GetMenu(resourceID: integer): MenuRef;
```

Adding Menus to and Removing Menus From the Current Menu List

```
procedure InsertMenu(theMenu: MenuRef; beforeID: integer);  
procedure DeleteMenu(menuID: integer);  
procedure ClearMenuBar;
```

Getting a MenuBar Description From an 'MBAR' resource

```
function GetNewMBar(menuBarID: integer): Handle;
```

Getting and Setting the Menu Bar

```
function GetMenuBar: Handle;  
procedure SetMenuBar(menuList: Handle);  
function GetMBarHeight: integer;
```

Drawing the Menu Bar

```
procedure DrawMenuBar;  
procedure InvalidateMenuBar;
```

Responding to User Choice of a Menu Command

```
function MenuKey(ch: char): longint;  
function MenuSelect(startPt: Point): longint;  
function MenuChoice(void);  
procedure HiliteMenu(menuID: integer);  
function PopUpMenuSelect(menu: MenuRef; top: integer; left: integer;  
    popUpItem: integer): longint;
```

Getting a Handle to a Menu Record

```
function GetMenuHandle(menuID: integer): MenuRef;  
function HMGGetHelpMenuHandle(var mh: MenuRef): OSErr;
```

Adding and Deleting Menu Items

```
procedure AppendMenu(menu: MenuRef; data: ConstStr255Param);  
procedure InsertMenuItem(theMenu: MenuRef; itemString: ConstStr255Param;  
    afterItem: integer);  
procedure DeleteMenuItem(theMenu: MenuRef; item: integer);  
procedure AppendResMenu(theMenu: MenuRef; theType: ResType);  
procedure InsertResMenu(theMenu: MenuRef; theType: ResType; afterItem: integer);
```

Getting and Setting the Appearance of Menus

```
procedure EnableItem(theMenu: MenuRef; item: integer);  
procedure DisableItem(theMenu: MenuRef; item: integer);  
procedure GetMenuItemText(theMenu: MenuRef; item: integer; var itemString: Str255);  
procedure SetMenuItemText(theMenu: MenuRef; item: integer; itemString: ConstStr255Param);  
procedure GetItemStyle(theMenu: MenuRef; item: integer; var chStyle: Style);  
procedure SetItemStyle(theMenu: MenuRef; item: integer; chStyle: Style);  
procedure GetItemMark(theMenu: MenuRef; item: integer; var markChar: char);  
procedure SetItemMark(theMenu: MenuRef; item: integer; markChar: char);  
procedure CheckItem(theMenu: MenuRef; item: integer; checked: boolean);  
procedure GetItemIcon(theMenu: MenuRef; item: integer; var iconIndex: Byte);  
procedure SetItemIcon(theMenu: MenuRef; item: integer; iconIndex: integer);
```

```

procedure GetItemCmd(theMenu: MenuRef; item: integer; var cmdChar: char);
procedure SetItemCmd(theMenu: MenuRef; item: integer; cmdChar: char);

```

Disposing of Menus

```

procedure DisposeMenu(theMenu: MenuRef);

```

Counting Items in a Menu

```

function CountMenuItems(theMenu: MenuRef): integer;

```

Highlighting the Menu Bar

```

procedure FlashMenuBar(menuID: integer);
procedure SetMenuFlash(count: integer);

```

Recalculating Menu Dimensions

```

procedure CalcMenuSize(theMenu: MenuRef);

```

Demonstration Program

```

1 { #####
2 // MenusPascal.p
3 // #####
4 //
5 // This program:
6 //
7 // • Opens a window.
8 //
9 // • Creates these pull-down menus: Apple, File, Edit, Font, Size and Special.
10 //
11 // The Apple menu includes an 'About...' menu item for the program.
12 //
13 // The second menu item in the Special menu contains a submenu.
14 //
15 // A 'Help' menu item for the program is appended to the Help menu.
16 //
17 // • Creates a pop-up menu in the window.
18 //
19 // • Displays text in the window indicating the menu selection made by the user.
20 //
21 // The implementation of the Size menu is nominal only. The current size is indicated
22 // with a checkmark; however, the number of sizes shown is not font-dependent and there
23 // is no 'Other' item.
24 //
25 // Because the primary purpose of the program is to demonstrate menu creation and
26 // handling, no code is included to update and activate/deactivate the window or to
27 // respond to events which are not relevant to the demonstration.
28 //
29 // The program is terminated by selecting Quit from the File menu, by pressing the
30 // keyboard equivalent for that item (Command-Q), or by clicking in the window's go-away
31 // box.
32 //
33 // The program utilises the following resources:
34 //
35 // • A 'WIND' resource (purgeable) (initially not visible).
36 //
37 // • An 'MBAR' resource (preload, non-purgeable).
38 //
39 // • 'MENU' resources for the drop-down, hierarchical and pop-up menus (all preload,
40 // all non-purgeable).
41 //
42 // • A 'CNTL' resource for the pop-up menu (purgeable).
43 //
44 // ##### }
45
46 program MenusPascal(input, output);
47
48 { ..... include the following Universal Interfaces }
49
50 uses
51

```

```

52     Windows, Fonts, Menus, Controls, TextEdit, Dialogs, Quickdraw, Devices, Events, Types,
53     Processes, Memory, Balloons, ToolUtils, QuickdrawText, OSUtils, Segload;
54
55     { ..... define the following constants }
56
57     const
58
59         mApple = 128;
60         iAbout = 1;
61
62         mFile = 129;
63         iQuit = 11;
64
65         mEdit = 130;
66         iUndo = 1;
67         iCut = 3;
68         iCopy = 4;
69         iPaste = 5;
70         iClear = 6;
71
72         mFont = 131;
73
74         mStyle = 132;
75         iPlain = 1;
76         iBold = 3;
77         iItalic = 4;
78         iUnderline = 5;
79         iOutline = 6;
80         iShadow = 7;
81
82         mSize = 133;
83         iTen = 1;
84         iTwelve = 2;
85         iEighteen = 3;
86         iTwentyFour = 4;
87
88         mSpecial = 134;
89         iFirstItem = 1;
90         hmSecondItem = 100;
91         siFirstSub = 1;
92         siSecondSub = 2;
93
94         pControlResID = 128;
95         pSydney = 1;
96         pNewYork = 2;
97         pLondon = 3;
98         pRome = 4;
99
100        rWindowResource = 128;
101
102        { ..... global variables }
103
104        var
105
106            gDone : Boolean;
107            gCurrentFont : integer;
108            gCurrentStyle : Style;
109            gCurrentSize : integer;
110            eventRec : EventRecord;
111            myWindowPtr : WindowPtr;
112
113        { ##### ProcedureName }
114
115        procedure DoInitManagers;
116
117            begin
118                MaxApplZone;
119                MoreMasters;
120
121                InitGraf(@qd.thePort);
122                InitFonts;
123                InitWindows;
124                InitMenus;
125                TEInit;
126                InitDialogs(nil);
127

```

```

128   InitCursor;
129   FlushEvents(everyEvent, 0);
130   end;
131   {of procedure DoInitManagers}
132
133 { ##### DrawItemString }
134
135 procedure DrawItemString(eventString : string);
136
137   var
138     tempRegion : RgnHandle;
139     myWindowPtr : WindowPtr;
140     scrollBox : Rect;
141
142   begin
143     myWindowPtr := FrontWindow;
144     tempRegion := NewRgn;
145
146     scrollBox := myWindowPtr^.portRect;
147     scrollBox.top := scrollBox.top + 50;
148
149     ScrollRect(scrollBox, 0, -24, tempRegion);
150     DisposeRgn(tempRegion);
151
152     MoveTo(8, 286);
153     DrawString(eventString);
154   end;
155   {of procedure DrawItemString}
156
157 { ##### DoCheckForControlAndValue }
158
159 function DoCheckForControlAndValue(eventRec : EventRecord;
160                                     myWindowPtr: WindowPtr) : integer;
161
162   var
163     controlHdl : ControlHandle;
164     startControlValue, finishControlValue, ignored : integer;
165
166   begin
167     SetPort(myWindowPtr);
168     GlobalToLocal(eventRec.where);
169
170     if (FindControl(eventRec.where, myWindowPtr, controlHdl) <> 0) then
171       begin
172         startControlValue := GetControlValue(controlHdl);
173         ignored := TrackControl(controlHdl, eventRec.where, ControlActionUPP(-1));
174         finishControlValue := GetControlValue(controlHdl);
175       end;
176
177     if (finishControlValue <> startControlValue)
178     then DoCheckForControlAndValue := finishControlValue
179     else DoCheckForControlAndValue := 0;
180
181   end;
182   {of function DoCheckForControlAndValue}
183
184 { ##### DoAdjustMenus }
185
186 procedure DoAdjustMenus;
187
188   begin
189     {Adjust menus here}
190
191   end;
192   {of procedure DoAdjustMenus}
193
194 { ##### DoPopupMenuChoice }
195
196 procedure DoPopupMenuChoice(popupItem : integer);
197
198   begin
199     case (popupItem) of
200
201     pSydney:
202       begin

```

```

204         DrawItemString(' Sydney' );
205     end;
206
207     pNewYork:
208         begin
209             DrawItemString(' New York' );
210         end;
211
212     pLondon:
213         begin
214             DrawItemString(' London' );
215         end;
216
217     pRome:
218         begin
219             DrawItemString(' Rome' );
220         end;
221     end;
222     {of case statement}
223
224 end;
225     {of procedure DoPopupMenuChoice}
226
227 { ##### DoAppleMenu }
228
229 procedure DoAppleMenu(menuItem : integer);
230
231     var
232         itemName : string;
233         daDriverRefNum : integer;
234
235     begin
236         if (menuItem = iAbout)
237             then DrawItemString(' About Menus...')
238
239             else begin
240                 GetMenuItemText(GetMenuHandle(mApple), menuItem, itemName);
241                 daDriverRefNum := OpenDeskAcc(itemName);
242                 end;
243
244     end;
245     {of procedure DoAppleMenu}
246
247 { ##### DoFileMenu }
248
249 procedure DoFileMenu(menuItem : integer);
250
251     begin
252         if (menuItem = iQuit) then
253             gDone := true;
254         end;
255     {of procedure DoFileMenu}
256
257 { ##### DoEditMenu }
258
259 procedure DoEditMenu(menuItem : integer);
260
261     begin
262         case (menuItem) of
263
264             iUndo:
265                 begin
266                     DrawItemString(' Undo' );
267                 end;
268
269             iCut:
270                 begin
271                     DrawItemString(' Cut' );
272                 end;
273
274             iCopy:
275                 begin
276                     DrawItemString(' Copy' );
277                 end;
278
279             iPaste:

```

```

280     begin
281     DrawItemString(' Paste');
282     end;
283
284     iClear:
285     begin
286     DrawItemString(' Clear');
287     end;
288
289     end;
290     {of case statement}
291
292 end;
293 {of procedure DoEditMenu}
294
295 { ##### DoFontMenu }
296
297 procedure DoFontMenu(menuItem : integer);
298
299     var
300     fontMenuHdl : MenuHandle;
301     fontName : string;
302     fontNumber : integer;
303
304     begin
305     fontMenuHdl := GetMenuHandle(mFont);
306
307     CheckItem(fontMenuHdl, gCurrentFont, false);
308     CheckItem(fontMenuHdl, menuItem, true);
309
310     gCurrentFont := menuItem;
311
312     GetMenuItemText(fontMenuHdl, menuItem, fontName);
313     GetFNum(fontName, fontNumber);
314     TextFont(fontNumber);
315
316     DrawItemString(fontName);
317
318     end;
319     {of procedure DoFontMenu}
320
321 { ##### DoStyleMenu }
322
323 procedure DoStyleMenu(menuItem : integer);
324
325     var
326     styleMenuHdl : MenuHandle;
327
328     begin
329     case (menuItem) of
330
331         iPlain:
332         begin
333         gCurrentStyle := [];
334         end;
335
336         iBold:
337         begin
338         if (bold in gCurrentStyle)
339         then gCurrentStyle := gCurrentStyle - [bold]
340         else gCurrentStyle := gCurrentStyle + [bold];
341         end;
342
343         iItalic:
344         begin
345         if (italic in gCurrentStyle)
346         then gCurrentStyle := gCurrentStyle - [italic]
347         else gCurrentStyle := gCurrentStyle + [italic];
348         end;
349
350         iUnderline:
351         begin
352         if (underline in gCurrentStyle)
353         then gCurrentStyle := gCurrentStyle - [underline]
354         else gCurrentStyle := gCurrentStyle + [underline];
355         end;

```

```

356
357     iOutline:
358         begin
359             if (outline in gCurrentStyle)
360                 then gCurrentStyle := gCurrentStyle - [outline]
361                 else gCurrentStyle := gCurrentStyle + [outline];
362             end;
363
364     iShadow:
365         begin
366             if (shadow in gCurrentStyle)
367                 then gCurrentStyle := gCurrentStyle - [shadow]
368                 else gCurrentStyle := gCurrentStyle + [shadow];
369             end;
370         end;
371     {of case statement}
372
373 styleMenuHdl := GetMenuHandle(mStyle);
374
375 CheckItem(styleMenuHdl, iPlain, (gCurrentStyle = []));
376 CheckItem(styleMenuHdl, iBold, (bold in gCurrentStyle));
377 CheckItem(styleMenuHdl, iItalic, (italic in gCurrentStyle));
378 CheckItem(styleMenuHdl, iUnderline, (underline in gCurrentStyle));
379 CheckItem(styleMenuHdl, iOutline, (outline in gCurrentStyle));
380 CheckItem(styleMenuHdl, iShadow, (shadow in gCurrentStyle));
381
382 TextFace(gCurrentStyle);
383
384 DrawItemString('Style change');
385
386 end;
387 {of procedure DoStyleMenu}
388
389 { ##### DoSizeMenu }
390
391 procedure DoSizeMenu(menuItem : integer);
392
393     var
394         sizeMenuHdl : MenuHandle;
395
396     begin
397         case (menuItem) of
398
399             iTen:
400                 begin
401                     TextSize(10);
402                 end;
403
404             iTwelve:
405                 begin
406                     TextSize(12);
407                 end;
408
409             iEighteen:
410                 begin
411                     TextSize(18);
412                 end;
413
414             iTwentyFour:
415                 begin
416                     TextSize(24);
417                 end;
418             end;
419         {of case statement}
420
421         sizeMenuHdl := GetMenuHandle(mSize);
422
423         CheckItem(sizeMenuHdl, gCurrentSize, false);
424         CheckItem(sizeMenuHdl, menuItem, true);
425
426         gCurrentSize := menuItem;
427
428         DrawItemString('Size change');
429
430     end;
431     {of procedure DoSizeMenu}

```

```

432 { ##### DoSpecialMenu }
433
434 procedure DoSpecialMenu(menuItem : integer);
435
436     begin
437     if(menuItem = iFirstItem) then
438         DrawItemString('First Item');
439     end;
440     {of procedure DoSpecial}
441
442 { ##### DoSubMenus }
443
444 procedure DoSubMenus(menuItem : integer);
445
446     begin
447     case (menuItem) of
448
449         siFirstSub:
450             begin
451                 DrawItemString('Subitem 1');
452             end;
453
454         siSecondSub:
455             begin
456                 DrawItemString('Subitem 2');
457             end;
458
459     end;
460     {of case statement}
461 end;
462 {of procedure DoSubMenus}
463
464 { ##### DoHelpMenu }
465
466 procedure DoHelpMenu(menuItem : integer);
467
468     var
469     helpMenuHdl : MenuHandle;
470     origHelpItems, numItems : integer;
471     theErr : OSErr;
472
473     begin
474     theErr := HMGetHelpMenuHandle(helpMenuHdl);
475
476     if (theErr <> noErr) then
477         begin
478             SysBeep(10);
479             ExitToShell;
480         end;
481
482     numItems := CountMItems(helpMenuHdl);
483     origHelpItems := numItems - 1;
484
485     if (menuItem > origHelpItems) then
486         DrawItemString('Menus Help');
487     end;
488     {of procedure DoHelpMenu}
489
490 { ##### DoMenuChoice }
491
492 procedure DoMenuChoice(menuChoice : longint);
493
494     var
495     menuID, menuItem : longint;
496
497     begin
498     menuID := HiWord(menuChoice);
499     menuItem := LoWord(menuChoice);
500
501     if (menuID = 0) then
502         exit(DoMenuChoice);
503
504     case (menuID) of
505
506         mApple:

```



```

508         begin
509             DoAppLeMenu(menuItem);
510         end;
511
512     mFile:
513         begin
514             DoFileMenu(menuItem);
515         end;
516
517     mEdit:
518         begin
519             DoEditMenu(menuItem);
520         end;
521
522     mFont:
523         begin
524             DoFontMenu(menuItem);
525         end;
526
527     mStyle:
528         begin
529             DoStyleMenu(menuItem);
530         end;
531
532     mSize:
533         begin
534             DoSizeMenu(menuItem);
535         end;
536
537     mSpecial:
538         begin
539             DoSpecialMenu(menuItem);
540         end;
541
542     hmSecondItem:
543         begin
544             DoSubMenus(menuItem);
545         end;
546
547     kHMHelpMenuID:
548         begin
549             DoHelpMenu(menuItem);
550         end;
551
552     end;
553     {of case statement}
554
555     HiLiteMenu(0);
556 end;
557 {of procedure DoMenuChoice}
558
559 { ##### DoMouseDown }
560
561 procedure DoMouseDown(eventRec : EventRecord);
562
563     var
564         myWindowPtr : WindowPtr;
565         partCode, popupItem : integer;
566         menuChoice : longint;
567
568     begin
569         partCode := FindWindow(eventRec.where, myWindowPtr);
570
571         case (partCode) of
572
573             inSysWindow:
574                 begin
575                     SystemClick(eventRec, myWindowPtr);
576                 end;
577
578             inMenuBar:
579                 begin
580                     DoAdjustMenus;
581                     menuChoice := MenuSelect(eventRec.where);
582                     DoMenuChoice(menuChoice);
583                 end;

```

```

584
585     inContent:
586     begin
587         if (myWindowPtr <> FrontWindow)
588             then SelectWindow(myWindowPtr)
589
590         else begin
591             popupItem := DoCheckForControlAndValue(eventRec, myWindowPtr);
592             if (popupItem <> 0) then
593                 DoPopupMenuChoice(popupItem);
594             end;
595         end;
596
597     inDrag:
598     begin
599         DragWindow(myWindowPtr, eventRec.where, qd.screenBits.bounds);
600     end;
601
602     inGoAway:
603     begin
604         if (TrackGoAway(myWindowPtr, eventRec.where)) then
605             gDone := true;
606         end;
607
608     end;
609     {of case statement}
610
611 end;
612 {of procedure DoMouseDown}
613
614 { ##### DoGetMenus }
615
616 procedure DoGetMenus(myWindowPtr : WindowPtr);
617
618     var
619     menubarHdl : Handle;
620     menuHdl : MenuHandle;
621     theErr : OSErr;
622     popupControlHdl : ControlHandle;
623
624     begin
625     menubarHdl := GetNewMBar(128);
626     if (menubarHdl = nil) then
627         ExitToShell;
628     SetMenuBar(menubarHdl);
629     DrawMenuBar;
630
631     menuHdl := GetMenuHandle(mApple);
632     if (menuHdl <> nil)
633         then AppendResMenu(menuHdl, 'DRVR')
634         else ExitToShell;
635
636     menuHdl := GetMenuHandle(mFont);
637     if (menuHdl <> nil)
638         then AppendResMenu(menuHdl, 'FONT')
639         else ExitToShell;
640
641     menuHdl := GetMenu(hmSecondItem);
642     if (menuHdl <> nil)
643         then InsertMenu(menuHdl, hierMenu)
644         else ExitToShell;
645
646     theErr := HMGetHelpMenuHandle(menuHdl);
647     if (theErr = noErr)
648         then AppendMenu(menuHdl, 'Menus Help')
649         else ExitToShell;
650
651     popupControlHdl := GetNewControl(pControlResID, myWindowPtr);
652     if (popupControlHdl = nil) then
653         ExitToShell;
654
655     DoFontMenu(gCurrentFont);
656     DoStyleMenu(0);
657     DoSizeMenu(gCurrentSize);
658
659 end;

```

```

660     {of procedure DoGetMenus}
661
662 { ##### DoEvents }
663
664 procedure DoEvents(eventRec : EventRecord);
665
666     var
667     theChar: char;
668
669     begin
670     case (eventRec.what) of
671
672         mouseDown:
673             begin
674                 DoMouseDown(eventRec);
675             end;
676
677         keyDown, autoKey:
678             begin
679                 theChar := CHR(BAnd(eventRec.message, charCodeMask));
680                 if (BAnd(eventRec.modifiers, cmdKey) <> 0) then
681                     begin
682                         DoAdjustMenus;
683                         DoMenuChoice(MenuKey(theChar));
684                     end;
685             end;
686
687         updateEvt:
688             begin
689                 BeginUpdate(WindowPtr(eventRec.message));
690                 EndUpdate(WindowPtr(eventRec.message));
691             end;
692
693         osEvt:
694             begin
695                 HiliteMenu(0);
696             end;
697
698     end;
699     {of case statement}
700
701 end;
702 {of DoEvents}
703
704 { ##### start of main program }
705
706 begin
707     gCurrentFont := 1;
708     gCurrentStyle := [];
709     gCurrentSize := 2;
710
711     { ..... initialize manager }
712
713     DoInitManagers;
714
715     { ..... open a window }
716
717     myWindowPtr := GetNewWindow(rWindowResource, nil, WindowPtr(-1));
718     if (myWindowPtr = nil) then
719         begin
720             SysBeep(10);
721             ExitToShell;
722         end;
723
724     SetPort(myWindowPtr);
725
726     { ..... set up menu bar and menus, then show window and pop-up menu }
727
728     DoGetMenus(myWindowPtr);
729     ShowWindow(myWindowPtr);
730     DrawControls(myWindowPtr);
731
732     { ..... event loop }
733
734     gDone := false;
735

```

```

736     while (not gDone) do
737         begin
738             if (WaitNextEvent(everyEvent, eventRec, 180, nil)) then
739                 DoEvents(eventRec);
740             end;
741         end.
742     end.
743
744 { ##### }

```

Demonstration Program Comments

When this program is run, the user should make menu selections from all menus, including the Apple menu, the Help menu and the pop-up menu. Selections should be made using the mouse and, where appropriate, the Command key equivalents. The user should also note the effects on the menu bar of clicking outside, then inside, the program's window, that is, of sending the program to the background and returning it to the foreground.

The constant declaration block

Lines 59-100 establish constants relating to the pull-down and hierarchical menu IDs and resources, menu item numbers and subitem numbers. The constant at Line 94 represents the resource ID of the 'CNTL' resource associated with the popup menu, and Lines 95-98 represent the item numbers of the items in this menu. The constant at Line 100 represents the resource ID for the 'WIND' resource.

The variable declaration block

The global variable gDone relates to the main event loop. When set to true, the loop will exit and the program will terminate. The remaining three global variables will hold the current choices, in terms of item numbers, from the Font, Style and Size menus.

The procedure DrawItemString

The DrawItemString procedure is incidental to the demonstration, being called by the menu selection handling functions to draw text in the application's window to reflect the user's menu choices. It is similar to the DrawItemString procedure in the demonstration program at Chapter 2 – Low-Level and Operating System Events.

The function DoCheckForControlAndValue

DoCheckForControlAndValue ascertains whether a mouse-down event occurred within the pop-up menu's control rectangle and, if so, whether the user actually chose an item from the menu.

Line 167 ensures that the window's graphics port is set as the current port. Line 168 then converts the contents of the event record's where field from global to local coordinates, that is, to the coordinate system of the current graphics port.

These local coordinates are required in the call to FindControl at Line 170. This call establishes whether the event occurred in the popup menu control or elsewhere in the content region. If an active control was located at the point specified in its first parameter, FindControl will receive a handle to that control into its third parameter and return a part code, otherwise it will return 0.

If an active control is detected, it can be safely assumed in this program that it is the pop-up menu's control. (The window contains no other controls.) Accordingly, the control's current value is saved at Line 172 preparatory to handing over control to TrackControl at Line 173. TrackControl tracks user action until the mouse button is released and returns an integer which we ignore.

Note the third parameter of the TrackControl call. The pop-up menu control definition function contains code which is referred to as an "action procedure", and which is invoked repeatedly as long as the mouse button remains down. This action procedure will not be invoked unless TrackControl's third parameter, in calls relating to pop-up menus, is set to -1, cast to be of type ControlActionUPP. (Action procedures are addressed at Chapter 5 – Controls, and action procedures within control definition functions are addressed at Chapter 19 – Custom Control Definition Functions and VBL Tasks.)

On release of the mouse button, Line 174 gets the control's new value. This will only have been changed by the pop-up control definition function if the user did not release the mouse button with the cursor outside the menu and if the user actually chose a new menu item. If the control's value before and after the TrackControl call differs, Line 178 causes the

control's new value to be returned to the calling function. (For pop-up menus, the control's value equates to the item number of the menu.) If there is no difference, Line 179 returns zero to the calling function, which will defeat the calling by that function of further application-defined pop-up menu handling functions.

The procedure DoAdjustMenus

DoAdjustMenus is called when a mouse-down occurs in the menu bar and when examination of a key-down event reveals that a menu item's keyboard equivalent has been pressed. No action is taken in this simple program because only one window, whose content never changes, is ever open.

(Later demonstration programs contain examples of menu adjustment functions which cater for specific circumstances. For example, the menu adjustment function in the demonstration program at Chapter 6 – Dialogs and Alerts accommodates the situation where the front window could be either a document window, a movable modal dialog box, or a modeless dialog box.)

The procedure DoPopupMenuChoice

DoPopupMenuChoice branches according to the integer returned by GetControlValue, which represents the popup menu item number chosen by the user. This function completes the popup menu handling in this demonstration.

The procedure DoAppleMenu

DoAppleMenu takes the short integer representing the menu item. If this value represents the first item in the Apple menu (the inserted "About..." item), text representing this item is drawn in the scrolling display (Lines 236-237).

If the value passed to DoAppleMenu represents other items in the Apple menu (Line 239), the call to GetMenuItemText at Line 240 gets the string representing the item's name. This string (which excludes metacharacters) is used as the parameter in the OpenDeskAcc call at Line 241. OpenDeskAcc opens the chosen object and passes control to the chosen object.

The procedure DoFileMenu

DoFileMenu handles selections from the File menu. In this demonstration, only the Quit item is enabled, all other items having been disabled in the File menu's 'MENU' resource. When this item is chosen, the global variable gDone is set to true (Line 253), causing termination of the program.

The procedure DoEditMenu

DoEditMenu branches according to the menu item number, drawing text representing the chosen item in the window.

The procedure DoFontMenu

DoFontMenu first gets a handle to the Font menu record (Line 305) required by the CheckItem calls at Lines 307-308. The CheckItem calls uncheck the current font menu item and check the menu item passed to DoFontMenu. This latter menu item number is then assigned to the gCurrentFont global variable (Line 310).

The call to GetMenuItemText at Line 312 extracts the string representing the item's name. This string is passed as the first parameter in the call to GetFNum (Line 313), which gets the font number associated with the name. This number is then used in the call to TextFont at Line 314, which will cause subsequent text drawing to be conducted in the specified font. Line 316 draws the name of the font in that font.

The procedure DoStyleMenu

DoStyleMenu branches according to the menu item chosen in the Style menu. Lines 331-370 cause the items in the global set variable gCurrentStyle to be added or removed according to the font styles selected. Note that in Pascal the Style type is defined as

```
StyleItem = (bold, italic, underline, outline, shadow, condense, extend);  
Style = set of StyleItem;
```

and so must be manipulated as a set. The code reflects the fact that Bold, Italic, Underline, Outline and Shadow style selections are additive, not mutually exclusive, and that a selection of Plain must remove all elements of gCurrentStyle. The code also reflects the requirement that, except in the case of the Plain item, the selection of a checked item must cause that item to be unchecked, and vice versa.

With the appropriate inclusions/removals in `gCurrentStyle` attended to, a handle to the `Style` menu record is then obtained (Line 373). This is required for the `CheckItem` calls at Lines 375-380, which check or uncheck the individual menu items according to whether the third argument evaluates to, respectively, true or false.

At Line 382, the call to `TextFace` sets the style for subsequent text drawing. Line 386 draws some text to prove that the desired effect was achieved.

The procedure DoSizeMenu

`DoSizeMenu` branches according to the menu item chosen in the `Size` menu, sets the text size for all text drawing to that size (397-418), unchecks the current size item (Line 423) and checks the newly selected item (Line 424). `gCurrentSize` is set to the selected menu item number (Line 426) before the function returns.

The procedure DoSpecialMenu

`DoSpecialMenu` handles a selection of the first item in the `Special` menu. Since the second item is the title of a submenu, only the first item is attended to in this function.

The procedure DoSubMenus

`DoSubMenus` branches according to the chosen subitem in the hierarchical menu represented by the second menu item in the `Special` menu.

The procedure DoHelpMenu

`DoHelpMenu` handles the selection of the "Menus Help" item added by this program to the system-managed `Help` Menu. This code reflects the fact that Apple reserves the right to add items to the `Help` menu in future versions of the system software.

At Line 475, `HMGetHelpMenuHandle` gets a handle to the `Help` menu record. At Line 483, the call to `CountMItems` returns the number of items in the `Help` menu. Since we know that we have added one item to this menu, Line 484 will establish the original number of help items. If the value passed to the `doHelpMenu` function is greater than this (Line 486), it must therefore represent the item number of our "Menus Help" item, in which case some text is drawn in the window to register the fact (Line 487).

The procedure DoMenuChoice

`DoMenuChoice` takes the long integer returned by the `MenuSelect` and `MenuKey` calls, extracts the high word (the menu ID) and the low word (the menu item number) and switches according to the menu ID.

At lines 499-500, the menu ID and the menu item number are extracted from the long integer. Lines 502-503 will cause an immediate return if the high word equals 0, (meaning that either the mouse button was released when the pointer was outside the menu box or `MenuKey` found no menu list match for the key pressed in conjunction with the `Command` key).

Lines 505-552 branch according to the menu ID, calling the appropriate application-defined individual menu handling function. Note the handling of the hierarchical menu at Lines 542-545. Note also that, at Line 547, the `kHMHelpMenuID` constant (-16490) is returned in the high word if the user chooses an appended item from the `Help` menu.

`MenuKey` and `MenuSelect` leave the menu title highlighted if an item was actually selected. Accordingly, Line 555 unhighlights the menu title when the action associated with the user's drop-down menu choice is complete.

The procedure DoMouseDown

`DoMouseDown` first establishes the window and window part in which the mouse-down event occurred (Line 569), and branches accordingly. This demonstration program is specifically interested in mouse-downs in the menu bar and the content region of the window, the latter because the pop-up menu is located in the window.

Lines 574-576 pass mouse-downs in a system window to `SystemClick` for further handling.

If the event occurred in this program's menu bar (Line 578), menu enabling/disabling is attended to (Line 580) before the call to `MenuSelect` (Line 581). `MenuSelect` tracks the user's actions until the mouse button is released, at which time it returns a long integer. If the user actually chose a menu item, this long integer contains the menu ID in the high word and

the item number in the low word, otherwise it contains 0 in the high word. At Line 582, this long integer is passed to the DoMenuChoice procedure.

If the mouse-down event occurred in the content region of the window (Line 585), and if the window to which the mouse-down refers is not the front window, SelectWindow is called to effect basic window activation/deactivation (Lines 587-588). If, however, the window receiving the mouse-down is the front window, Line 591 calls an application-defined function which checks whether the cursor was within the pop-up's control rectangle and, if it was, returns the control's value if the user actually chose a pop-up menu item. If the user actually chose a pop-up menu item (that is, if the received value was non-zero), the control's value is passed to an application-defined function which handles the choice (Lines 592-593). (The control's value equates to the chosen menu item's number.)

Lines 598-600 respond to a mouse-down in the drag bar. Not that, if the window is dragged to a new position, the pop-up menu will be redrawn automatically, together with the window, with no assistance from the program.

Lines 603-605 respond to a mouse-down in the go-away box, setting gDone to true and thus terminating the program if the cursor is still within the go-away box when the mouse button is released.

The procedure DoGetMenus

DoGetMenus sets up the menu bar and the various menus.

At Line 625, GetNewMBar reads in the 'MENU' resources for each menu specified in the 'MBar' resource and creates a menu record for each of those menus. (Note that the error handling here and in other areas of this program is somewhat rudimentary: the program simply terminates (Lines 626-627).) At Lines 628-629, SetMenuBar makes the newly created menu list the current list and DrawMenuBar draws the menu bar.

Lines 631-634 add the contents of the Apple Menu Items folder to the Apple menu. The use of 'DRVr' as the second parameter to the AppendResMenu call is automatically interpreted to mean that the Apple menu is being created, so that all items in the Apple Menu Items folder are added rather than resources of type 'DRVr'.

Lines 636-639 add the names of all resident fonts to the Font menu. Using 'FONT' in the second parameter in the call to AppendResMenu causes all such resources to be searched out and their names added to the specified menu.

Lines 641-644 insert the application's single submenu into the submenu portion of the menu list. GetNewMBar does not read in the resource descriptions of submenus, so the first step is to read in the 'MENU' resource with GetMenu. InsertMenu inserts a menu record for this menu into the menu list at the location specified in the second parameter to this call. Using the constant hierMenu (-1) as the second parameter causes the menu to be installed in the submenu portion of the menu list.

Lines 646-649 append a menu item with the name "Menus Help" to the Help menu.

Line 651 sets up the popup menu. GetNewControl loads the specified 'CNTL' resource into a control record and creates the control in the specified window. (The 'CNTL' resource specifies popUpMenuProc in the procID field, so the control is created as a popup menu. The Min field of the 'CNTL' resource description contains the 'MENU' resource ID for the popup menu, which ensures that the GetNewControl call will load the popup menu resource and create a menu record in the submenu portion of the menu list.)

Lines 655-657 set checkmarks against the appropriate font, style and size menu items according to the initialised values of the associated global variables.

The procedure DoEvents

DoEvents branches according to the type of low-level or Operating System event received. Further processing is called for in the case of mouse-down or Command key equivalents, these being central to the matter of menu handling.

In the case of key-down and auto-key events, the character code is first extracted from the event record's message field (Line 679). A check is then made of the modifiers field to establish whether the Command key was also pressed at the time (Line 680). If so, menu enabling/disabling is attended to (Line 682) before the call to MenuKey (Line 683) establishes whether the character code is associated with a currently enabled menu or submenu item in the menu list. If a match is found, MenuKey returns a long integer containing the menu ID in the high word and the item number in the low word, otherwise it returns 0 in the high word. This long integer is then passed to the DoMenuChoice procedure.

The call to HiliteMenu at Line 695 is made to unhighlight the Apple menu title when the user brings the demonstration program to the foreground having previously sent it to the background by choosing an Apple Menu Items folder item from the Apple menu.

The main program block

This initialises the system software managers (Line 713), creates a window and makes its graphics port the current port (Lines 717-724), calls the application-defined function which sets up the menus (Line 728), shows the window and pop-up menu (Lines 729-730) and enters the main event loop (Lines 736-740).

Creating 'MBAR' and 'MENU' Resources Using ResEdit

When learning to create the major resource types in ResEdit, it is recommended that you open Macintosh C to the page containing the relevant example resource definition in Rez input format and relate what you are doing within ResEdit to that definition. Accordingly, the methodology used in the following is to "walk through" the 'MBAR' and 'MENU' resources for the Menu demonstration program, relating what you see in ResEdit to the example definitions in this chapter.

Open the chap03pascal_demo demonstration program folder and double-click on the Menus.μ.rsrc icon to start ResEdit and open Menus.μ.rsrc. The Menus.μ.rsrc window opens.

'MBAR' Resources

Double-click the MBAR icon. The MBARs from Menus.μ.rsrc window opens. One 'MBAR' resource (ID 128) appears in the list in the window. Double-click that list entry. The MBAR ID = 128 from Menus.μ.rsrc window opens.

The following relates the example 'MBAR' resource in Rez input format in this chapter to the ResEdit display and interface:

resource 'MBAR'	This was established when the resource was created by choosing Resource/Create New Resource. A small dialog opened, the item MBAR was clicked, and the dialog's OK button was clicked.
(rMenuBar,	Choose Resource/Get Resource Info. The Info for MBAR 128 ... window opens. Note the editable text text item ID:. (ResEdit automatically assigns 128 as the ID of the first 'MBAR' resource you create.)
preload)	Also note, in the Attributes section, that the Preload checkbox is checked. Close the Info for MBAR 128 ... window.
mApple mFile mEdit	Back in the MBAR ID = 128 from Menus.u.rsrc window, note entries 1), 2), and 3). MENU resource IDs are added by clicking on the next entry number (e.g., 8) ****), choosing Resource/Insert New Field, and entering the resource ID at the associated Menu res ID editable text item. MENU resources may be deleted by clicking the entry number (e.g. 8) ****) and choosing Edit/Cut.

Close the MBAR ID = 128 from Menus.μ.rsrc window. Close the MBARs from Menus.μ.rsrc window.

'MENU' Resources

Double-click the MENU icon. The MENUs from Menus.μ.rsrc window opens. Double-click the Apple menu icon ('MENU' resource ID 128). The MENU ID = 128 from Menus.μ.rsrc window opens.

The following relates the example 'MENU' resource in Rez input format in this chapter to the ResEdit display and interface:

resource 'MENU'	This was established when the resource was created by choosing Resource/Create New Resource. A small dialog opened, the item MENU was clicked, and the dialog's OK button was clicked.
(mApple,	mApple is the resource ID (128). Choose Resource/Get Resource Info. The Info for MENU 128 ... window opens. Note the editable text item titled ID:. This is where you set the resource ID. ResEdit automatically assigns 128 as the resource ID of the first 'MENU' resource you create.
preload)	While the Info for MENU 128 ... window is open, compare the Attributes check boxes to the Resource Attributes table at Chapter 1. Note that the Preload checkbox is checked.
mApple	Close the Info for MENU 128 ... window and choose MENU/Edit Menu & MDEF ID. A dialog box opens. Note the editable text item titled Menu ID. Note that the Menu ID is the same as the 'MENU' resource ID displayed in the Info for MENU 128 ... window. ResEdit automatically makes the MENU ID the same as the 'MENU' resource ID, although you can assign a different MENU ID here if you want to.
textMenuProc	Also note that 0 appears in the editable text item titled MDEF ID. This means that the standard menu definition procedure is specified. Choose Cancel to close the dialog.
0b111111111111 ...	At the left of the MENU ID = 128 ... window, click, in turn, on the About Menus... item and the separator-line item, and observe the checkbox titled Enabled at the right of the window.
enable	Click on the menu title (the apple icon) and observe the checkbox titled Enabled at the right of the window.
apple	Click on the menu title (the apple icon) and note the radio button titled Apple menu under the editable text item at the right of the window.
"About ... "	Click on the About Menus... item in the list at the left of the window and note that you can edit this in the editable text item at the right of the window.
noIcon	Choose MENU/Choose an Icon. A Choose an icon ... dialog opens. (Simply note this for now. The matter of icons in menu items is addressed at Chapter 12). Close the dialog.
noKey	Note the small editable text item titled Cmd-Key at bottom right. This is where you enter the Command key equivalent for a menu item.
noMark	Note the popup menu titled Mark at bottom right. This is where you can specify the mark to be inserted into the menu item.
plain	Open the Style menu. (Note that this menu has been used to set the style of the items in the Style menu ('MENU' resource ID 132).
-	Click on the separator-line item and note the radio button titled (separator line) under the editable text item at the right of the window.
noIcon noKey noMark plain	(As above)

Note that, when you click on the menu's title at the left of the window, three Color pop-ups appear at the bottom right of the MENU ID = ... window. If you use these pop-ups to specify colours for the title, item text and/or background, ResEdit automatically creates a 'mctb' (menu color table) resource with the same resource ID as the associated 'MENU' resource.

Hierarchical Menu

At the example hierarchical menu resource in Rez input format in this chapter, note the line beginning Label Style and the following description of the associated submenu.

With the MENUs from Menus.µ.rsrc window open, double click the Special menu icon ('MENU' resource ID 134). The MENU ID = 134 ... window opens. Click on the item Second Item. Note that the has Submenu checkbox is checked and that the ID: box shows an ID of 100.

Close the MENU ID = 134 ... window. In the MENUs from Menus.µ.rsrc window, note the 'MENU' resource with ID 100. Also note that the name of the menu item Second Item is also the title of the 'MENU' resource with ID 100.

Pop-up Menu

With the MENUs from Menus.µ.rsrc window open, note the 'MENU' resource with ID 135.

The matter of 'CNTL' resources for pop-up menus is addressed at Chapter 5 — Controls.