# UNIT IV

**Controls: Characteristics of device based controls, Selecting the proper device based controls, Operable controls, Text Entry/Read-only controls, Selection controls, Combination Entry/selection controls, Selecting the proper controls**

## Characteristics of device based controls

➢ Device-based controls, often called input devices, are the mechanisms through which people communicate their desires to the system.

➢ Several specific tasks are performed using graphical systems.

  ✓ To point at an object on the screen.

  ✓ To select the object or identify it as the focus of attention.

  ✓ To drag an object across the screen.

  ✓ To draw something free form on the screen.

  ✓ To track or follow a moving object.

  ✓ To orient or position an object.

  ✓ To enter or manipulate data or information.

➢ The various devices vary in how well they can perform these actions. Consider two very important factors. First, is the mechanism a direct or indirect pointing device? Second, in terms of *direction, distance*, and *speed,* what is the relationship between movement of the hand-operated device and the corresponding pointer movement on the screen*?* Does the pointer movement track control movement exactly or does it not?

➢ **Trackball**

  ■ Description:

    ✓ A spherical object (ball) that rotates freely in all directions in its socket.

    ✓ Direction and speed is tracked and translated into cursor movement.

  ■ Advantages:

    ✓ Direct relationship between hand and pointer movement in terms of direction and speed.

    ✓ Does not obscure vision of screen.

    ✓ Does not require additional desk space (if mounted on keyboard).

  ■ Disadvantages:

    ✓ Movement is indirect, in a plane different from the screen.

    ✓ No direct relationship exists between hand and pointer movement in terms of distance.

    ✓ Requires a degree of eye-hand coordination.

    ✓ Requires hand to be removed from keyboard keys.

- ✓ Requires different hand movements.
- ✓ Requires hand to be removed from keyboard (if not mounted on keyboard).
- ✓ Requires additional desk space (if not mounted on keyboard).
- ✓ May be difficult to control.
- ✓ May be fatiguing to use over extended time.

➢ **Joystick**

■ Description:

- ✓ A stick or bat-shaped device anchored at the bottom.
- ✓ Variable in size, smaller ones being operated by fingers, larger ones requiring the whole hand.
- ✓ Variable in cursor direction movement method, force joysticks respond to pressure, movable ones respond to movement.
- ✓ Variable in degree of movement allowed, from horizontal-vertical only to continuous.

■ Advantages:

- ✓ Direct relationship between hand and pointer movement in terms of direction.
- ✓ Does not obscure vision of screen.
- ✓ Does not require additional desk space (if mounted on keyboard).

■ Disadvantages:

- ✓ Movement indirect, in plane different from screen.
- ✓ Indirect relationship between hand and pointer in terms of speed and distance.
- ✓ Requires a degree of eye-hand coordination.
- ✓ Requires hand to be removed from keyboard keys.
- ✓ Requires different hand movements to use.
- ✓ Requires hand to be removed from keyboard (if not mounted on keyboard).
- ✓ Requires additional desk space (if not mounted on keyboard).
- ✓ May be fatiguing to use over extended time.
- ✓ May be slow and inaccurate.

➢ **Graphic Tablet**

■ Description:

- ✓ Pressure-, heat-, light-, or light-blockage-sensitive horizontal surfaces that lie on the desktop or keyboard.
- ✓ May be operated with fingers, light pen, or objects like a stylus or pencil.
- ✓ Pointer imitates movements on tablet.

- ■ Advantages:
  - ✓ Direct relationship between touch movements and pointer movements in terms of direction, distance, and speed.
  - ✓ More comfortable horizontal operating plane.
  - ✓ Does not obscure vision of screen.
- ■ Disadvantages:
  - ✓ Movement is indirect, in a plane different from screen.
  - ✓ Requires hand to be removed from keyboard.
  - ✓ Requires hand to be removed from keyboard keys.
  - ✓ Requires different hand movements to use.
  - ✓ Requires additional desk space.
  - ✓ Finger may be too large for accuracy with small objects

➢ **Touch Screen**

- ■ Description:
  - ✓ A special surface on the screen sensitive to finger or stylus touch.
- ■ Advantages:
  - ✓ Direct relationship between hand and pointer location in terms of direction, distance, and speed.
  - ✓ Movement is direct, in the same plane as screen.
  - ✓ Requires no additional desk space.
  - ✓ Stands up well in high-use environments.
- ■ Disadvantages:
  - ✓ Finger may obscure part of screen.
  - ✓ Finger may be too large for accuracy with small objects.
  - ✓ Requires moving the hand far from the keyboard to use.
  - ✓ Very fatiguing to use for extended period of time.
  - ✓ May soil or damage the screen.
- ■ Design Guidelines:
  - ✓ Screen objects should be at least $3/4'' \times 3/4''$ in size.
  - ✓ Object separation should be at least $1/8''$.
  - ✓ Provide visual feedback in response to activation. Auditory feedback may also be appropriate.
  - ✓ When the consequences are destructive, require confirmation after selection to eliminate inadvertent selection.
  - ✓ Provide an instructional invitation to begin using.

- **Light Pen**
  - Description:
    - ✓ A special surface on a screen sensitive to the touch of a special stylus or pen.
  - Advantages:
    - ✓ Direct relationship between hand and pointer movement in terms of direction, distance, and speed.
    - ✓ Movement is direct, in the same plane as screen.
    - ✓ Requires minimal additional desk space.
    - ✓ Stands up well in high-use environments.
    - ✓ More accurate than finger touching.
  - Disadvantages:
    - ✓ Hand may obscure part of screen.
    - ✓ Requires picking it up to use.
    - ✓ Requires moving the hand far from the keyboard to use.
    - ✓ Very fatiguing to use for extended period of time.
- **Voice**
  - Description:
    - ✓ Automatic speech recognition by the computer.
  - Advantages:
    - ✓ Simple and direct.
    - ✓ Useful for people who cannot use a keyboard.
    - ✓ Useful when the user's hands are occupied.
  - Disadvantages:
    - ✓ High error rates due to difficulties in:
      - • Recognizing boundaries between spoken words.
      - • Blurred word boundaries due to normal speech patterns.
    - ✓ Slower throughput than with typing.
    - ✓ Difficult to use in noisy environments.
    - ✓ Impractical to use in quiet environments.

- **Mouse**
  - Description:
    - ✓ A rectangular or dome-shaped, movable, desktop control containing from one to three buttons used to manipulate objects and information on the screen.
    - ✓ Movement of screen pointer mimics the mouse movement.

■ Advantages:

    ✓ Direct relationship between hand and pointer movement in terms of direction, distance, and speed.

    ✓ Permits a comfortable hand resting position

    ✓ Selection mechanisms are included on mouse.

    ✓ Does not obscure vision of the screen.

■ Disadvantages:

    ✓ Movement is indirect, in a plane different from screen.

    ✓ Requires hand to be removed from keyboard.

    ✓ Requires additional desk space.

    ✓ May require long movement distances.

    ✓ Requires a degree of eye-hand coordination.

➢ *Mouse Usage Guidelines*

■ Provide a "hot zone" around small or thin objects that might require extremely fine mouse positioning.

■ Never use double-clicks or double-drags as the only means of carrying out essential operations.

■ Do not use mouse plus keystroke combinations.

■ Do not require a person to point at a moving target.

➢ *Keyboard*

■ Description:

    ✓ Standard typewriter keyboard and cursor movement keys.

■ Advantages:

    ✓ Familiar.

    ✓ Accurate.

    ✓ Does not take up additional desk space.

    ✓ Very useful for:

• Entering text and alphanumeric data.

• Inserting in text and alphanumeric data.

• Keyed shortcuts—accelerators.

• Keyboard mnemonics—equivalents.

    ✓ Advantageous for:

• Performing actions when less than three mouse buttons exist.

• Use with very large screens.

• Touch typists.

■ Disadvantages:

  ✓ Slow for non-touch-typists.

  ✓ Slower than other devices in pointing.

  ✓ Requires discrete actions to operate.

  ✓ No direct relationship between finger or hand movement on the keys and cursor movement on screen in terms of speed and distance.

### Keyboard Guidelines

■ Provide keyboard accelerators.

  ✓ Assign single keys for frequently performed, small-scale tasks.

  ✓ Use standard platform accelerators.

  ✓ Assign Shift-key combinations for actions that extend or are complementary to the actions of the key or key combination used without the Shift-key.

  ✓ Assign Ctrl-key combinations for:

    • Infrequent actions.

    • Tasks that represent larger-scale versions of the task assigned to the unmodified key.

■ Provide keyboard equivalents.

  ✓ Use standard platform equivalents.

  ✓ Use the first letter of the item description.

  ✓ If first letter conflicts exist, use:

    • Another distinctive consonant in the item description.

    • A vowel in the item description.

■ Provide window navigation through use of keyboard keys.

## Selecting the Proper Device-Based Controls

### ➤ Keyboard versus Mouse

➤ Why do many skilled typists prefer a keyboard to a mouse? Speed is obviously one reason. An experienced typist, through kinesthetic memory, has memorized the location of keyboard keys.

➤ The keying process becomes exceptionally fast and well learned. The mouse is slower, and it has a tendency to move about the desk. Its location cannot be memorized.

➤ The keyboard keys always remain in the same spot.

➤ Consider the following: When using the mouse, the time to move one's hand from the keyboard, grasp the mouse, and point at a screen object ranges from 1.5 to 2 seconds.

➤ A very skilled typist can type 13 to 15 characters in that amount of time; an average typist can type 4 to 6 characters. No wonder the keyboard is often preferred.

### Control Research

➢ Which devices work better for which tasks and under what conditions has been addressed by a number of investigators. A survey of the research literature comparing and evaluating different devices yields the following summarization concerning tasks involving pointing and dragging:

- ✓ The fastest tools for pointing at stationary targets on screens are the devices that permit direct pointing: the touch screen and light pen. This is most likely due to their high level of eye-hand coordination and because they use an action familiar to people.

- ✓ In terms of positioning speed and accuracy for stationary targets, the indirect pointing devices—the mouse, trackball, and graphic tablet, do not differ greatly from one another. The joystick is the slowest, although it is as accurate as the others. Of most importance in selecting one of these devices will be its fit to the user's task and working environment.

- ✓ A separate confirmation action that must follow pointer positioning increases pointing accuracy but reduces speed. The mouse offers a very effective design configuration for tasks requiring this confirmation.

- ✓ For tracking small, slowly moving targets, the mouse, trackball, and graphic tablet are preferred to the touch screen and light pen because the latter may obscure the user's view of the target.

➢ Another common manipulation task is dragging an object across the screen. Using a mouse, graphic tablet, and trackball for this task, as well as pointing, was studied by MacKenzie, Sellen, and Buxton (1991). They report the following:

- ✓ The graphic tablet yielded best performance during pointing.
- ✓ The mouse yielded best performance during dragging.
- ✓ The trackball was a poor performer for both pointing and dragging, and it had a very high error rate in dragging.

### Guidelines for Selecting the Proper Device-Based Control

■ Consider the characteristics of the task.

✓ Provide keyboards for tasks involving:

- • Heavy text entry and manipulation.
- • Movement through structured arrays consisting of a few discrete objects.

✓ Provide an alternative pointing device for graphical or drawing tasks. The following are some suggested best uses:

- • Mouse—pointing, selecting, drawing, and dragging.
- • Joystick—selecting and tracking.
- • Trackball—pointing, selecting and tracking.

    • Touch screen—pointing and selecting.

    • Graphic tablet—pointing, selecting, drawing, and dragging.

✓ Provide touch screens under the following conditions:

    • The opportunity for training is minimal.

    • Targets are large, discrete, and spread out.

    • Frequency of use is low.

    • Desk space is at a premium.

    • Little or no text input requirement exists.

■ Consider user characteristics and preferences.

    ✓ Provide keyboards for touch typists.

■ Consider the characteristics of the environment.

■ Consider the characteristics of the hardware.

■ Consider the characteristics of the device in relation to the application.

■ Provide flexibility.

■ Minimize eye and hand movements between devices.

### Pointer Guidelines

■ The pointer:

    ✓ Should be visible at all times.

    ✓ Should contrast well with its background.

    ✓ Should maintain its size across all screen locations and during movement.

    ✓ The hotspot should be easy to locate and see.

    ✓ Location should not warp (change position).

■ The user should always position the pointer.

■ The shape of a pointer:

    ✓ Should clearly indicate its purpose and meaning.

    ✓ Should be constructed of already defined shapes.

    ✓ Should not be used for any other purpose other than its already defined meaning.

    ✓ Do not create new shapes for already defined standard functions.

■ Use only as many shapes as necessary to inform the user about current location and status.

Too many shapes can confuse a person.

■ Be conservative in making changes as the pointer moves across the screen.

    ✓ Provide a short "time-out" before making noncritical changes on the screen.

■ Animation should not:

    ✓ Distract.

    ✓ Restrict one's ability to interact.

Screen-based controls, often simply called *controls* and sometimes called *widgets*, are the elements of a screen that constitute its body. By definition, they are graphic objects that represent the properties or operations of other objects. A control may:

- ✓ Permit the entry or selection of a particular value.
- ✓ Permit the changing or editing of a particular value.
- ✓ Display only a particular piece of text, value, or graphic.
- ✓ Cause a command to be performed.
- ✓ Possess a contextual pop-up window.

Three extremely important principles regarding controls are:

- ✓ A control must:    Look the way it works.        Work the way it looks.
- ✓ A control must be used exactly as its design intended.
- ✓ A control must be presented in a standard manner.

## Operable Controls

➢ Operable controls are those that permit the entry, selection, changing, or editing of a particular value, or cause a command to be performed. Classes include buttons, text entry/read-only, selection, combination entry/selection, and other specialized controls.

### Buttons

■ Description:

- ✓ A square or rectangular-shaped control with a label inside that indicates action to be accomplished. The label may consist of text, graphics, or both.

■ Purpose:

- ✓ To start actions.
- ✓ To change properties.
- ✓ To display a pop-up menu.


Command buttons.


Toolbar buttons without labels.


A symbol button.

■ Advantages:

- ✓ Always visible, reminding one of the choices available.
- ✓ Convenient.
- ✓ Can be logically organized in the work area.
- ✓ Can provide meaningful descriptions of the actions that will be performed.
- ✓ Larger size generally provides faster selection target.
- ✓ Can possess 3-D appearance:
  - • Adds an aesthetically pleasing style to the screen.
  - • Provides visual feedback through button movement when activated.
- ✓ May permit use of keyboard equivalents and accelerators.

✓ Faster than using a two-step menu bar/pull-down sequence.

■ Disadvantages:

✓ Consumes screen space.

✓ Size limits the number that may be displayed.

✓ Requires looking away from main working area to activate.

✓ Requires moving the pointer to select.

■ Proper usage:

✓ Use for frequently used actions that are specific to a window.

  • To cause something to happen immediately.

  • To display another window.

  • To display a menu of options.

  • To set a mode or property value.

### *Command Buttons*

Command button guidelines include the following.

### Usage

■ For windows with a menu bar:

  ✓ Use to provide fast access to frequently used or critical commands.

■ For windows without a menu bar:

  ✓ Use to provide access to all necessary commands.

### Structure

■ Provide a rectangular shape with the label inscribed within it.

■ Give the button a raised appearance.

■ Maintain consistency in style throughout an application.

### Labels

■ Use standard button labels when available.

■ Provide meaningful descriptions of the actions that will be performed.

■ Use single-word labels whenever possible.

  ✓ Use two-three words for clarity, if necessary.

■ Use mixed-case letters with the first letter of each significant label word capitalized.

■ Display labels:

  ✓ In the regular system font and the same size font.

■ Do not number labels.

■ Center the label within the button borders, leaving at least two pixels between the text and the button border.

■ Provide consistency in button labeling across all screens.

Common button functions should have standard names and uses. Microsoft windows, for example, provides these standard names and definitions:

**OK**: Any changed information in the window is accepted and the window is closed.

**Cancel**: Closes window without implementing unsubmitted changes.

**Reset**: Resets defaults and cancels any changed information that has not been submitted.

**Apply**: Any changed information in the window is accepted and again displayed in the window that remains open.

**Close**: Closes the window.

**Help**: Opens online Help.

**Size**

➢ Provide as large a button as feasible.

➢ Maintain consistent button heights and widths.

➢ Exception: Buttons containing excessively long labels may be wider.

**Number**

➢ Restrict the number of buttons on a window to six or fewer.



A much too large Color Palette button.

A properly sized Color Palette button.

**Location and Layout**

➢ Maintain consistency in button location between windows.

➢ Never simply "fit" buttons in available space.

➢ If buttons are for exiting the dialog:

   ✓ Position them centered and aligned horizontally at the bottom.

➢ If buttons are used for invoking a dialog feature or expanding the dialog:

   ✓ Position them centered and aligned vertically on the right side.

➢ If a button has a contingent relationship to another control:

   ✓ Position it adjacent to the related control.
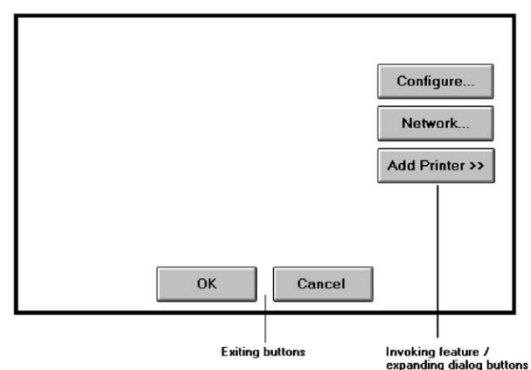


Exiting and invoking feature/expanding dialog buttons.
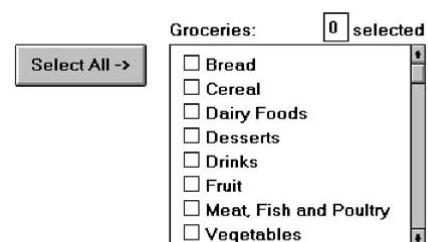


Button with contingent relationship to a control.

- ➢ If a button has a contingent relationship to a group of controls:
  - ✓ Position it at the bottom or to right of related controls.
- ➢ If, due to space constraints, exiting and expanding/invoking feature buttons must be placed together:
  - ✓ If at the bottom, place exiting buttons to the right, separating the groupings by one button's width.
  - ✓ If along the right side, place exiting buttons at the bottom, separating the groupings by one button's height.
- ➢ For exiting and expanding/invoking feature buttons, do not:
  - ✓ Align with the other screen controls.
  - ✓ Present displayed within a line border.
- ➢ Provide equal and adequate spacing between adjacent buttons.
- ➢ Provide adequate spacing between buttons and the screen body controls.

**Organization**

- ➢ Organize standard buttons in the manner recommended by the platform being used.
- ➢ For other buttons, organize them in common and customary grouping schemes.
  - ✓ For buttons ordered left to right, place those for most frequent actions to the left.
  - ✓ For buttons ordered top to bottom, place those for most frequent actions at the top.
- ➢ Keep related buttons grouped together.
- ➢ Separate potentially destructive buttons from frequently chosen selections.
- ➢ Buttons found on more than one window should be consistently positioned.
- ➢ The order should never change.
- ➢ For mutually exclusive actions, use two buttons; do not dynamically change the text.

**Intent Indicators**

- ➢ When a button causes an action to be immediately performed, no intent indicator is necessary.
- ➢ When a button leads to a cascading dialog, include an ellipsis (...) after the label.
- ➢ When a button leads to a menu, include a triangle pointing in the direction the menu will appear after the label.

Button with contingent relationship to a grouping.

➢ When a button leads to an expanding dialog, include a double arrow (>>) with the label.

**Options >>**

**Expansion Buttons**

➢ Gray them out after expansion.

➢ Provide a contraction button, if necessary.

    ✓ Locate it beneath, or to right of, the expansion button.

    ✓ Gray it out when not applicable.

**Defaults**

➢ Intent:

    ✓ When a window is first displayed, provide a default action, if practical.

➢ Selection:

    ✓ A default should be the most likely action:

    • A confirmation.

    • An application of the activity being performed.

    • A positive action such as OK, unless the result is catastrophic.

    ✓ If a destructive action is performed (such as a deletion), the default should be Cancel.

➢ Presentation:

    ✓ Indicate the default action by displaying the button with a bold or double border.

➢ Procedures:

    ✓ The default can be changed as the user interacts with the window.

    ✓ When the user navigates to a button, it can temporarily become the default.

    ✓ Use the Enter key to activate a default button.

    ✓ If another control requires use of the Enter key, temporarily disable the default while the focus is on the other control.

    ✓ Permit double-clicking on a single selection control in a window to also carry out the default command.

**Unavailable Choices**

➢ Temporarily unavailable choices should be dimmed or grayed out.

**Keyboard Equivalents and Accelerators**

➢ Equivalents:

    ✓ Assign a keyboard equivalent mnemonic to each button to facilitate keyboard selection.

    ✓ The mnemonic should be the first character of the button's label.

    • If duplication exists in first characters, for duplicate items, use another character in the label.

- • Preferably, choose the first succeeding consonant.
- ✓ Designate the mnemonic character by underlining it.
- ✓ Maintain the same mnemonic on all identical buttons on other screens.

> Accelerators:
>> ✓ Assign a keyboard accelerator to each button to facilitate keyboard selection.

**Scrolling**

> If a window can be scrolled, do not scroll the command buttons.
>> ✓ Exception: if the screen cannot scroll independently of the buttons.
> Use buttons to move between multipage forms, not scroll bars.
>> ✓ Label buttons Next and Previous.

**Button Activation**

> Pointing:
>> ✓ Highlight the button in some visually distinctive manner when the pointer is resting on it and the button is available for selection.

> Activation:
>> ✓ Call attention to the button in another visually distinctive manner when it has been activated or pressed.
>> ✓ If a button can be pressed continuously, permit the user to hold the mouse button down and repeat the action.

**Toolbars**

> *Toolbars* are compilations of commands, actions, or functions, usually graphical in structure but sometimes textual, grouped together for speedy access.
> Microsoft Windows defines a toolbar as a panel that contains a *set* of controls. Toolbars may also be called *button bars*, *control bars,* or *access bars*.

**Usage**

> To provide easy and fast access to most frequently used commands or options across multiple screens.
> To invoke a sub-application within an application.
> To use in place of certain menu items.

**Structure**

> Images:
>> ✓ Provide buttons of equal size.
>> ✓ Create a meaningful and unique icon.
>> • Design them using icon design guidelines.
>> ✓ Center the image within the button.

- ✓ Give the button a raised appearance.
- ✓ Ensure that toolbar images are discernible from Web page graphical images.

➢ Text:
- ✓ Create a meaningful label, adhering to label guidelines for command buttons.
- ✓ Create toolbar buttons of equal size, following the size guidelines recently described.

➢ Consistency:
- ✓ Use the same icon throughout an application and between applications.

**Size**

➢ Button:
- ✓ 24 (w) by 22 (h) pixels, including border.
- ✓ 32 (w) by 30 (h) pixels, including border.
- ✓ Larger buttons can be used on high-resolution displays.

➢ Label:
- ✓ 16 (w) by 16 (h) pixels.  or 14 (w) by 24 (h) pixels.

➢ Default:
- ✓ Provide the smaller size as the default size with a user option to change it.

➢ Image:
- ✓ Center the image in the button.

**Organization**

➢ Order the buttons based on common and customary grouping schemes.
- ✓ For buttons ordered left to right, place those for the most frequently used actions to the left.
- ✓ For buttons ordered top to bottom, place those for the most frequently used actions at the top.

➢ Keep related buttons grouped together.

➢ Separate potentially destructive buttons from frequently chosen selections.

➢ Permit user reconfiguration of button organization.

**Location**

➢ Position main features and functions bar horizontally across top of window just below menu bar.

➢ Position subtask and subfeatures bars along sides of window.

➢ Permit the location of the bar to be changed by the user.

➢ Permit display of the bar to be turned on or off by the user.
- ✓ Also provide access through standard menus.

**Active Items**

➢ Make only currently available toolbar items available.

➢ Temporarily not available items may be displayed grayed out.

**Customization**

➢ Permit toolbars to be turned off by the user.

➢ Allow the customizing of toolbars.

    ✓ Provide a default, however.

**Keyboard Equivalents and Accelerators**

➢ Equivalents:

    ✓ Assign keyboard equivalents to facilitate keyboard selection.

    ✓ Maintain the same mnemonic on all identical buttons on all screens.

➢ Accelerators:

    ✓ Assign a keyboard accelerator to facilitate keyboard selection.

**Button Activation**

➢ Pointing:

    ✓ Highlight the button in some visually distinctive manner when the pointer is resting on it and the button is available for selection.

➢ Activation:

    ✓ Call attention to the button in another visually distinctive manner when it has been activated or pressed.

# TEXT ENTRY/READ-ONLY CONTROLS

➢ A Text Entry/Read-Only control contains text that is exclusively entered or modified through the keyboard. It may also contain entered text being presented for reading or display purposes only.

**Text Boxes**

➢ Description:

    ✓ A control, usually rectangular in shape, in which:

        • Text may be entered or edited.

        • Text may be displayed for read-only purposes.

    ✓ Usually possesses a caption describing the kind of information contained within it.

    ✓ An outline field border:

        • Is included for enterable/editable text boxes.

        • Is not included for read-only text boxes.

    ✓ Two types exist:

        • Single line.

        • Multiple line.

    ✓ When first displayed, the box may be blank or contain an initial value.

- ➢ Purpose:
  - ✓ To permit the display, entering, or editing of textual information.
  - ✓ To display read-only information.
- ➢ Advantages:
  - ✓ Very flexible.
  - ✓ Familiar.
  - ✓ Consumes little screen space.
- ➢ Disadvantages:
  - ✓ Requires use of typewriter keyboard.
  - ✓ Requires user to remember what must be keyed.
- ➢ Proper usage:
  - ✓ Most useful for data that is:
    - • Unlimited in scope.
    - • Difficult to categorize.
    - • Of a variety of different lengths.
  - ✓ When using a selection list is not possible.

### *Single-Line and Multiple-Line Text Boxes*

- ➢ Single line:
  - ✓ Description:
    - • A control consisting of no more than one line of text.
  - ✓ Purpose:

    • To make textual entries when the information can be contained within one line of the screen.
  - ✓ Typical uses:
    - • Typing the name of a file to save.
    - • Typing the path of a file to copy.
    - • Typing variable data on a form.
    - • Typing a command.
- ➢ Multiple line:
  - ✓ Description:  A control consisting of a multiline rectangular box for multiple lines of text.
  - ✓ Purpose:
    - • To type, edit, and read passages of text.

    Entry/Modification: [Information]

    Display/Read Only:  Information

    Text boxes.
  - ✓ Typical uses:
    - • Creating or reading an electronic mail message.
    - • Displaying and editing text files.

*Captions*

➢ Structure and size:

✓ Provide a descriptive caption to identify the kind of information to be typed, or contained within, the text box.

✓ Use a mixed-case font.

✓ Display the caption in normal intensity or in a color of moderate brightness.

➢ Formatting:

✓ Single fields:

• Position the field caption to the left of the text box.

Composition:

🔸 Place a colon (:) immediately following the caption.

🔸 Separate the colon from the text box by one space.

• Alternately, the caption may be placed above the text box.

Composition:

🔸 Place a colon (:) immediately following the caption.

🔸 Position above the upper-left corner of the box, flush with the left edge.

✓ Multiple occurrence fields:

Offices:

• For entry/modification text boxes:

🔸 Position the caption left-justified one line above the column of entry fields.

Date:
```
07/17/94
07/21/94
01/26/95
08/21/95
11/18/96
```

• For display/read-only boxes:

🔸 If the data field is long and fixed-length, or the displayed data is about the same length, center the caption above the displayed text box data.

Location:
```
Alice Springs
Kakadu National Park
Traralgon
Wagga Wagga
Whyalla
```

🔸 If the data displayed is alphanumeric, short, or quite variable in length, left-justify the caption above the displayed text box data.

Balances:
```
12,642,123.05
53.98
355,125.44
199.13
612.01
```

🔸 If the data field is numeric and variable in length, right-justify the caption above the displayed text box data.

*Fields*

➢ Structure:

✓ Identify entry/modification text boxes with a line border or reverse polarity rectangular box.

  • To visually indicate that it is an enterable field, present the box in a recessed manner.

Account: | Savings |

  • Present display/read-only text boxes on the window background.

**Account:  Savings**

✓ Break up long text boxes through incorporation of slashes ( / ), dashes (-), spaces, or other common delimiters.

Date: [ ] [ ] [ ]

Telephone: [ ] [ ] [ ]

Date: [    /    /    ]

Telephone: [ (    )    -    ]

➢ Size:

✓ Size to indicate the approximate length of the field.

✓ Text boxes for fixed-length data must be large enough to contain the entire entry.

✓ Text boxes for variable-length data must be large enough to contain the majority of the entries.

✓ Where entries may be larger than the entry field, scrolling must be provided to permit keying into, or viewing, the entire field.

✓ Employ word wrapping for continuous text in multiple-line text boxes.

➢ Highlighting:

✓ Call attention to text box data through a highlighting technique.

    • Higher intensity.

    • If color is used, choose one that both complements the screen background and contrasts well with it.

➢ Unavailable fields:

✓ Gray-out temporarily unavailable text boxes.

➢ Fonts:

✓ To support multiple fonts, use a *Rich-Text Box.*

## SELECTION CONTROLS

➢ A selection control presents on the screen all the possible alternatives, conditions, or choices that may exist for an entity, property, or value. The relevant item or items are selected from those displayed.

➢ Selection controls include radio buttons, check boxes, list boxes, drop-down/pop-up list boxes, and palettes.

### Radio Buttons

➢ Description:

   ✓ A two-part control consisting of the following:

      • Small circles, diamonds, or rectangles.

      • Choice descriptions.

   ✓ When a choice is selected:

      • The option is highlighted.

      • Any existing choice is automatically unhighlighted and deselected.

➢ Purpose:

   ✓ To set one item from a small set of mutually exclusive options (2 to 8).

➢ ■ Advantages:

   ✓ Easy-to-access choices.

   ✓ Easy-to-compare choices.

   ✓ Preferred by users.
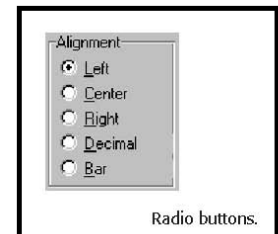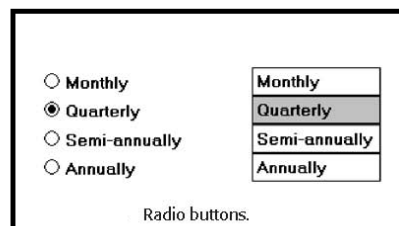
➢ ■ Disadvantages:

   ✓ Consume screen space.

   ✓ Limited number of choices.

➢ ■ Proper usage:

   ✓ For setting attributes, properties, or values.

   ✓ For mutually exclusive choices (that is, only one can be selected).

   ✓ Where adequate screen space is available.

   ✓ Most useful for data and choices that are:

      • Discrete.

      • Small and fixed in number.

      • Not easily remembered.

      • In need of a textual description to meaningfully describe the alternatives.

      • Most easily understood when the alternatives can be seen together and compared to one another.

      • Never changed in content.

- ✓ Do not use:
  - For commands.
  - Singly to indicate the presence or absence of a state.

### *Choice Descriptions*

➢ Provide meaningful, fully spelled-out choice descriptions clearly describing the values or effects set by the radio buttons.

➢ Display in a single line of text.

➢ Display using mixed-case letters, using the sentence style.

➢ Position descriptions to the right of the button. Separate them by at least one space from the button.

➢ When a choice is conditionally unavailable for selection, display the choice description grayed out or dimmed.

➢ Include a None choice if it adds clarity.

### *Size*

➢ Show a minimum of two choices, a maximum of eight.

### *Defaults*

➢ When the control possesses a state or affect that has been predetermined to have a higher probability of selection than the others, designate it as the default and display its button filled in.

➢ When the control includes choices whose states cannot be predetermined, display all the buttons without setting a dot, or in the *indeterminate* state.

➢ When a multiple selection includes choices whose states vary, display the buttons in nother unique manner, or in the *mixed value* state

### *Structure*

➢ A columnar orientation is the preferred manner of presentation.

➢ Left-align the buttons and choice descriptions.

➢ If vertical space on the screen is limited, orient the buttons horizontally.

○ Red
◉ Yellow
○ Green
○ Blue

➢ Provide adequate separation between choices so that the buttons are associated with the proper description.

◉ Green      ○ Blue      ○ Yellow      ○ Red

- ✓ A distance equal to three spaces is usually sufficient.

➢ Enclose the buttons in a border to visually strengthen the relationship they possess.

○ Red
○ Yellow
○ Green
○ Blue

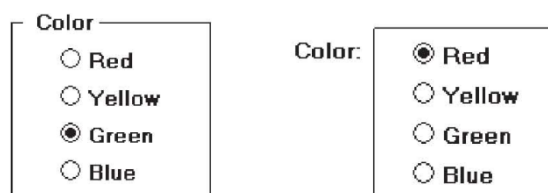○ Green    ○ Blue    ○ Yellow    ○ Red
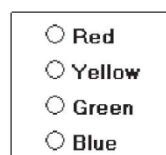
### *Organization*

➢ Arrange selections in expected order or follow other patterns such as frequency of occurrence, sequence of use, or importance.

   ✓ For selections arrayed top to bottom, begin ordering at the top.

   ✓ For selections arrayed left to right, begin ordering at the left.

➢ If, under certain conditions, a choice is not available, display it subdued or less brightly than the available choices.
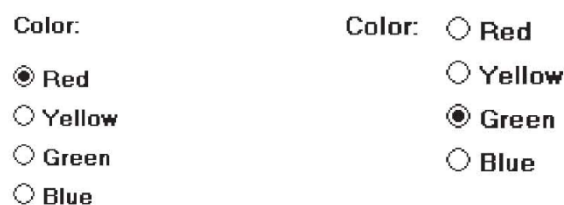
### *Related Control*

➢ Position any control related to a radio button immediately to the right of the choice description.

➢ If the radio button choice description also acts as the label for the control that follows it, end the label with an arrow (>).

⦿ Responsible Person >   | Grandfather |

○ No Resposible Party

### *Captions*

➢ Structure:

   ✓ Provide a caption for each radio button control.

      • Exception: In screens containing only one radio button control, the screen title may serve as the caption.

➢ Display:

   ✓ Fully spelled out.

   ✓ In mixed-case letters, capitalizing the first letter of all significant words.

➢ Columnar orientation:

   ✓ With a control border, position the caption:

      • Upper-left-justified within the border.

      • Alternately, the caption may be located to the left of the topmost choice description.

```
┌─ Color ──────┐            Color:  ┌──────────────┐
│  ○ Red        │                   │  ⦿ Red        │
│  ○ Yellow     │                   │  ○ Yellow     │
│  ⦿ Green      │                   │  ○ Green      │
│  ○ Blue       │                   │  ○ Blue       │
└──────────────┘                    └──────────────┘
```

   ✓ Without an enclosing control border, position the caption:

      • Left-justified above the choice descriptions, separated by one space line.

      • Alternately, the caption may be located to the left of the topmost choice description

```
        Color:                 Color:  ○ Red
                                       ○ Yellow
        ⦿ Red                          ⦿ Green
        ○ Yellow                       ○ Blue
        ○ Green
        ○ Blue
```

➢ Horizontal orientation:

  ✓ Position the caption to the left of the choice descriptions.

<p align="center">Color:   ○ Green    ○ Blue    ○ Yellow    ○ Red</p>

  • Alternately, with an enclosing control border, left-justified within the border.

<p align="center">┌─ Color ──────────────────────────┐<br>│ ○ Green    ○ Blue    ○ Yellow    ◉ Red │<br>└──────────────────────────────────┘</p>

  ✓ Be consistent in caption style and orientation within a screen.

### *Keyboard Equivalents*

➢ Assign a keyboard mnemonic to each choice description.

➢ Designate the mnemonic by underlining the applicable letter in the choice description.

<p align="center">◉ <u>R</u>ed</p>

### *Selection Method and Indication*

➢ Pointing:

  ✓ The selection target area should be as large as possible.

    • Include the button and the choice description text.

  ✓ Highlight the selection choice in some visually distinctive way when the cursor's esting on it and the choice is available for selection.

    • This cursor should be as long as the longest choice description plus one space at each end. Do not place the cursor over the small button.

<p align="center">○ Red<br>○ Yellow<br>○ Green<br>○ ⌐Blue ⌐</p>

➢ Activation:

  ✓ When a choice is selected, distinguish it visually from the unselected choices.

  • A radio button should be filled in with a solid dark dot or made to look depressed or higher through use of a shadow.

  ✓ When a choice is selected, any other selected choice must be deselected.

➢ Defaults:

  ✓ If a radio button control is displayed that contains a choice previously selected or a default choice, display the selected choice as set in the control

**Check Boxes**

➢ Description:

   ✓ A two-part control consisting of a square box and choice description.

   ✓ Each option acts as a switch and can be either "on" or "off."

   • When an option is selected (on), a mark such as an "X" or "check" appears within the square box, or the box is highlighted in some other manner.

   • Otherwise the square box is unselected or empty (off).

   ✓ Each box can be:

     • Switched on or off independently.

     • Used alone or grouped in sets.

➢ Purpose:

   ✓ To set one or more options as either on or off.

➢ Advantages

   ✓ Easy-to-access choices.

   ✓ Easy-to-compare choices.

   ✓ Preferred by users.

➢ Disadvantages:

   ✓ Consume screen space.

   ✓ Limited number of choices.

   ✓ Single check boxes difficult to align with other screen controls.

➢ ■ Proper usage:

   ✓ For setting attributes, properties, or values.

   ✓ For nonexclusive choices (that is, more than one can be selected).

   ✓ Where adequate screen space is available.

   ✓ Most useful for data and choices that are:

     • Discrete.

     • Small and fixed in number.

     • Not easily remembered.

     • In need of a textual description to describe meaningfully.

     • Most easily understood when the alternatives can be seen together and comparedto one another.

     • Never changed in content.

   ✓ Can be used to affect other controls.

   ✓ Use only when both states of a choice are clearly opposite and unambiguous.

Check boxes.

*Choice Descriptions*

➢ Provide meaningful, fully spelled-out choice descriptions clearly describing the values or effects set by the check boxes.

➢ Display them in a single line of text.

➢ Display them using mixed-case letters in sentence style.

➢ Position descriptions to the right of the check box. Separate by at least one space from the box.

➢ When a choice is unavailable for selection under a certain condition, display the choice description visually dimmed.

*Size*

➢ Show a minimum of one choice, a maximum of eight.

*Defaults*

➢ When the control possesses a state or affect that has been preset, designate it as the default and display its check box marked.

➢ When a multiple selection includes choices whose states vary, display the buttons in another unique manner, or the *mixed value* state.

*Structure*

➢ Provide groupings of related check boxes.

➢ A columnar orientation is the preferred manner of presentation for multiple related check boxes.

☒ Bold
☐ Italic
☐ Underline

➢ Left-align the check boxes and choice descriptions.

➢ If vertical space on the screen is limited, orient the boxes horizontally.

➢ Provide adequate separation between boxes so that the buttons are associated with the proper description.

☒ Bold    ☐ Italic    ☐ Underline

✓ A distance equal to three spaces is usually sufficient.

➢ Enclose the boxes in a border to visually strengthen the relationship they possess.

☒ Bold
☐ Italic
☐ Underline

☒ Bold    ☐ Italic    ☐ Underline

*Organization*

➢ Arrange selections in logical order or follow other patterns such as frequency of occurrence, sequence of use, or importance.

✓ For selections arrayed top to bottom, begin ordering at the top.

✓ For selections arrayed left to right, begin ordering at the left.

➢ If, under certain conditions, a choice is not available, display it subdued or less brightly than the available choices.

### *Related Control*

- ➢ Position any control related to a check box immediately to the right of the choice description.
- ✓ If a the check box choice description also acts as the label for the control that follows it , end the label with an arrow (>).

### *Captions*

- ➢ Structure:
  - ✓ Provide a caption for each grouping of related check boxes.
    - Exception: In screens containing only one check box grouping, the screen title may serve as the caption.
  - ✓ Display:
    - Fully spelled out.
    - In mixed-case letters capitalizing the first letter of all significant words.
- ➢ Columnar orientation:
  - ✓ With a control border, position the caption:
    - Upper-left-justified within the border.
    - Alternately, the caption may be located to the left of the topmost choice description.
- ➢ Without an enclosing control border, position the caption:
  - Left-justified above the choice descriptions separated by one space line.
  - Alternately, the caption may be located to the left of the topmost choice description.
- ➢ Horizontal orientation
  - ✓ Position the caption to the left of the choice descriptions.

  - Alternately, with an enclosing control border, it should be left-justified within the border.

- ➢ Be consistent in caption style and orientation within a screen.

### Keyboard Equivalents

➢ Assign a keyboard mnemonic to each check box.

➢ Designate the mnemonic by underlining the applicable letter in the choice description.

### Selection Method and Indication

➢ Pointing:

✓ The selection target area should be as large as possible.

• Include the check box and the choice description text.

✓ Highlight the selection choice in some visually distinctive way when the cursor's resting on it and the choice is available for selection.

• This cursor should be as long as the longest choice description plus one space at each end. Do not place the cursor over the check box.

➢ Activation:

✓ When a choice is selected, distinguish it visually from the non-selected choices.

• A check box should be filled in or made to look depressed or higher through use of a shadow.

➢ Defaults:

✓ If a check box is displayed that contains a choice previously selected or default choice, display the selected choice as set in the control.

➢ Select/deselect all:

✓ Do not use *Select All* and *Deselect All* check boxes.

➢ Mixed-value state:

✓ When a check box represents a value, and a multiple selection encompasses multiple value occurrences set in both the on and off state, display the check box in a *mixed value* state.

• Fill the check box with another easily differentiable symbol or pattern.

✓ Toggle the check box as follows:

• Selection 1: Set the associated value for all elements. Fill the check box with an "X" or "check."

• Selection 2: Unset the value for all associated elements. Blank-out the check box.

• Selection 3: Return all elements to their original state. Fill the check box with the mixed value symbol or pattern.

**Palettes**

➢ Description:

    ✓ A control consisting of a series of graphical alternatives. The choices themselves are descriptive, being composed of colors, patterns, or images.

    ✓ In addition to being a standard screen control, a palette may also be presented on a pull-down or pop-up menu or a toolbar.
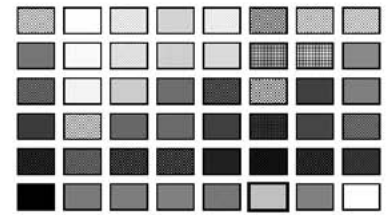

Palette.

➢ Purpose: To set one of a series of mutually exclusive options presented graphically or pictorially.

➢ Advantages:

    ✓ Pictures aid comprehension.

    ✓ Easy-to-compare choices.

    ✓ Usually consume less screen space than textual equivalents.

➢ Disadvantages:

    ✓ A limited number of choices can be displayed.

    ✓ Difficult to organize for scanning efficiency.

    ✓ Requires skill and time to design meaningful and attractive graphical representations.

➢ Proper usage:

    ✓ For setting attributes, properties, or values.

    ✓ For mutually exclusive choices (that is, only one can be selected).

    ✓ Where adequate screen space is available.

    ✓ Most useful for data and choices that are:

        • Discrete. , Frequently selected.

        • Limited in number.

        • Variable in number.

        • Not easily remembered.

        • Most easily understood when the alternatives may be seen together and compared to one another.

        • Most meaningfully represented pictorially or by example.

        • Can be clearly represented pictorially.

        • Rarely changed in content.

    ✓ Do not use:

        • Where the alternatives cannot be meaningfully and clearly represented pictorially.

        • Where words are clearer than images.

        • Where the choices are going to change.

### Graphical Representations

➢ Provide meaningful, accurate, and clear illustrations or representations of choices.

➢ Create images large enough to:

    ✓ Clearly illustrate the available alternatives.

    ✓ Permit ease in pointing and selecting.

➢ Create images of equal size.

➢ Always test illustrations before implementing them.

### Size

➢ Present all available alternatives within the limits imposed by:

    ✓ The size of the graphical representations.

    ✓ The screen display's capabilities.

### Layout

➢ Create boxes large enough to:

    ✓ Effectively illustrate the available alternatives.

    ✓ Permit ease in pointing and selecting.

➢ Create boxes of equal size.

➢ Position the boxes adjacent to, or butted up against, one another.

➢ A columnar orientation is the preferred manner.

➢ If vertical space on the screen is limited, orient the choices horizontally.

### Organization

➢ Arrange palettes in expected or normal order.

    ✓ For palettes arrayed top to bottom, begin ordering at the top.

    ✓ For palettes arrayed left to right, begin ordering at the left.

➢ If an expected or normal order does not exist, arrange choices by frequency of occurrence, sequence of use, importance, or alphabetically (if textual).

➢ If, under certain conditions, a choice is not available, display it subdued or less brightly than the other choices.

### Captions

➢ Provide a caption for each palette.

    ✓ On screens containing only one palette, the screen title may serve as the caption.

➢ Display the caption fully spelled out using mixed-case letters.
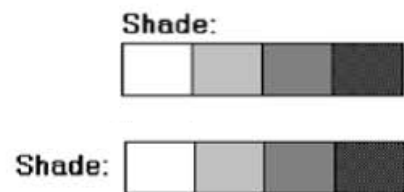
Columnar orientation:

    ✓ The field caption may be positioned left-aligned above the palette.

    ✓ Alternately, the caption may be positioned to the left of the topmost alternative.
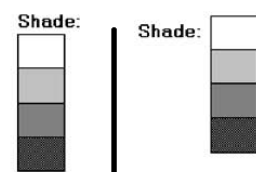
➢ Horizontal orientation:

  ✓ The field caption may be positioned above the palette.

  ✓ Alternately, the caption may be positioned to the left of
    the alternatives.

Shade:

Shade:

### *Selection Method and Indication*

➢ Pointing:

  ✓ Highlight the choice in some visually distinctive way when the pointer or cursor is resting
    on it and the choice is available for selection.

➢ Activation:

  ✓ When a choice is selected, distinguish it visually from the unselected choices by
    highlighting it in a manner different from when it is pointed at, or by placing a bold border
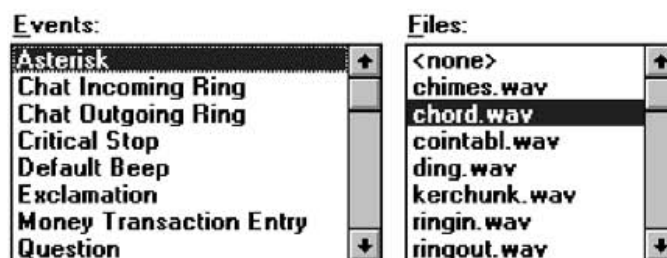    around it.

➢ Defaults:

  ✓ If a palette is displayed with a choice previously selected or a default choice, display the
    currently active choice in the manner used when it was selected.

### List Boxes

➢ Description:

  ✓ A permanently displayed box-shaped control containing a list of attributes or objects from
    which:

    • A single selection is made (mutually exclusive), or

    • Multiple selections are made (non-mutually-exclusive).

  ✓ The choice may be text, pictorial representations, or graphics.

  ✓ Selections are made by using a mouse to point and click.

  ✓ Capable of being scrolled to view large lists of choices.

  ✓ No text entry field exists in which to type text.

  ✓ A list box may be may be associated with a *summary list box* control, which allows the
    selected choice to be displayed or an item added to the list.

Events:

Asterisk
Chat Incoming Ring
Chat Outgoing Ring
Critical Stop
Default Beep
Exclamation
Money Transaction Entry
Question

Files:

<none>
chimes.wav
chord.wav
cointabl.wav
ding.wav
kerchunk.wav
ringin.wav
ringout.wav

List boxes.

- ➢ Purpose:
  - ✓ To display a collection of items containing:
    - • Mutually exclusive options.
    - • Non-mutually-exclusive options.
- ➢ Advantages:
  - ✓ Unlimited number of choices.
  - ✓ Reminds users of available options.
  - ✓ Box always visible.
- ➢ Disadvantages:
  - ✓ Consumes screen space.
  - ✓ Often requires an action (scrolling) to see all list choices.
  - ✓ The list content may change, making it hard to find items.
  - ✓ The list may be ordered in an unpredictable way, making it hard to find items.
- ➢ Proper usage:
  - ✓ For selecting values or setting attributes.
  - ✓ For choices that are:
    - • Mutually exclusive (only one can be selected).
    - • Non-mutually-exclusive (one or more may be selected).
  - ✓ Where screen space is available.
  - ✓ For data and choices that are:
    - • Best represented textually.
    - • Not frequently selected.
    - • Not well known, easily learned, or remembered.
    - • Ordered in an unpredictable fashion.
    - • Frequently changed.
    - • Large in number.
    - • Fixed or variable in list length.
  - ✓ When screen space or layout considerations make radio buttons or check boxes impractical.

### *List Box General Guidelines*
### Selection Descriptions

- ➢ Clearly and meaningfully describe the choices available. Spell them out as fully as possible.
  - ✓ Graphical representations must clearly represent the options.
- ➢ Present in mixed case, using the sentence style structure.
- ➢ Left-align into columns.

**List Size**

➢ Not actual limit in size.

➢ Present all available alternatives.

➢ Require no more than 40 page-downs to search a list.

   ✓ If more are required, provide a method for using search criteria or scoping the options.

**Box Size**

➢ Must be long enough to display 6 to 8 choices without requiring scrolling.

   ✓ Exceptions:

     • If screen space constraints exist, the box may be reduced in size to display at least three items.

     • If it is the major control within a window, the box may be larger.

   ✓ If more items are available than are visible in the box, provide vertical scrolling to display all items.

➢ Must be wide enough to display the longest possible choice.

   ✓ When box cannot be made wide enough to display the longest entry:

     • Make it wide enough to permit entries to be distinguishable, or,

     • Break the long entries with an ellipsis (...) in the middle, or,

     • Provide horizontal scrolling.



**Organization**

➢ Order in a logical and meaningful way to permit easy browsing.

   ✓ Consider using separate controls to enable the user to change the sort order or filter items displayed in the list.

➢ If a particular choice is not available in the current context, omit it from the list.

   ✓ Exception: If it is important that the existence and unavailability of a particular list item be communicated, display the choice dimmed or grayed out instead of deleting it.

**Layout and Separation**

➢ Enclose the choices in a box with a solid border.

   ✓ The border should be the same color as the choice descriptions.

➢ Leave one blank character position between the choice descriptions and the left border.

➢ Leave one blank character position between the longest choice description in the list and the right border, if possible.

**Captions**

➢ Use mixed-case letters.

➢ The preferred position of the control caption is above the upper-left corner of the list box.

   • Alternately, the caption may be located to the left of the topmost choice description.
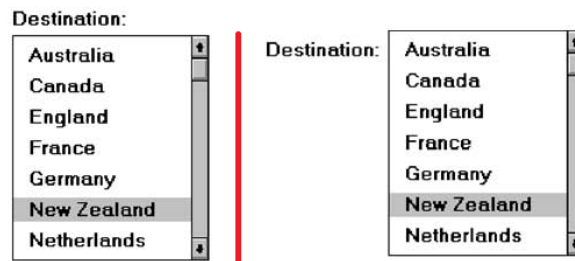
- Be consistent in caption style and orientation within a screen, and related screens.

**Disabling**

➢ When a list box is disabled, display its caption and show its entries as grayed out or dimmed.

**Selection Method and Indication**

➢ Pointing:

✓ Highlight the selection choice in some visually distinctive way when the pointer or cursor is resting on it and the choice is available for selection.

➢ Selection:

✓ Use a reverse video or reverse color bar to surround the choice description when it is selected.



✓ The cursor should be as wide as the box itself.

✓ Mark the selected choice in a distinguishing way.

➢ Activation:

✓ Require the pressing of a command button when an item, or items, is selected.

***Single-Selection List Boxes***

➢ Purpose:

✓ To permit selection of only one item from a large listing.

➢ Design guidelines:

✓ Related text box

• If presented with an associated text box control:

✓ Position the list box below and as close as possible to the text box.

✓ The list box caption should be worded similarly to the text box caption.

✓ If the related text box and the list box are very close in proximity, the caption may be omitted from the list box.

Destination:

| Australia |
| Canada |
| **England** |
| France |
| Germany |
| New Zealand |
| Netherlands |

✓ Use the same background color for the text box as is used in the list box.
✓ Defaults:
  • When the list box is first displayed:
    o Present the currently active choice highlighted or marked with a circle or diamond to the left of the entry.
    o If a choice has not been previously selected, provide a default choice and display it in the same manner that is used in selecting it.
    o If the list represents mixed values for a multiple selection, do not highlight an entry.
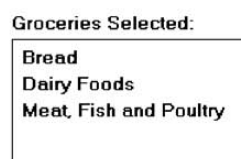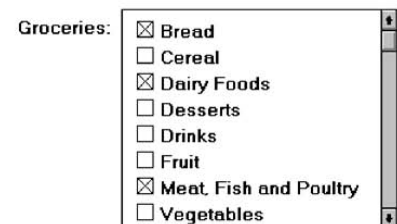✓ Other:
  • Follow other relevant list box guidelines.

### *Extended and Multiple-Selection List Boxes*

➢ Purpose:
  ✓ To permit selection of more than one item in a long listing.
    • Extended list box: Optimized for individual item or range selection.
    • Multiple-selection list box: Optimized for independent item selection.

➢ Design guidelines:
  ✓ Selection indication:

  Groceries:
  | ☒ Bread |
  | ☐ Cereal |
  | ☒ Dairy Foods |
  | ☐ Desserts |
  | ☐ Drinks |
  | ☐ Fruit |
  | ☒ Meat, Fish and Poultry |
  | ☐ Vegetables |

    • Mark the selected choice with an X or check mark to the left of the entry.
   • Consider providing a *summary list box*.
  ✓ Position it to the right of the list box.
  ✓ Use the same colors for the summary list box as are used in the list box.

Groceries:
| ☒ Bread |
| ☐ Cereal |
| ☒ Dairy Foods |
| ☐ Desserts |
| ☐ Drinks |
| ☐ Fruit |
| ☒ Meat, Fish and Poultry |
| ☐ Vegetables |

Groceries Selected:
| Bread |
| Dairy Foods |
| Meat, Fish and Poultry |

✓ Provide command buttons to *Add* (one item) or *Add All* (items) to the summary list box, and *Remove* (one item) or *Remove All* (items) from the summary list box.

    • Consider providing a display-only text control indicating how many choices have been selected.

✓ Position it justified upper-right above the list box.



✓ Select All and Deselect All buttons

    • Provide command buttons to accomplish fast *Select All* and *Deselect All* actions, when these actions must be frequently or quickly performed.

✓ Defaults:

    • When the list box is first displayed:

         o Display the currently active choices highlighted.

         o Mark with an X or check mark to the left of the entry.

         o If the list represents mixed values for a multiple selection, do not highlight an entry.

✓ Other:

    • Follow other relevant list box guidelines.

**List View Controls**

➢ Description:

✓ A special extended-selection list box that displays a collection of items, consisting of an icon and a label.

✓ The contents can be displayed in four different views:

    • Large Icon: Items appear as a full-sized icon with a label below.

    • Small Icon: Items appear as a small icon with label to the right.

    • List: Items appear as a small icon with label to the right.

         o Arrayed in a columnar, sorted layout.

    • Report: Items appear as a line in a multicolumn format.

         o Leftmost column includes icon and its label.

         o Subsequent columns include application-specific information.

➢ Purpose and usage:

✓ Where the representation of objects as icons is appropriate.

✓ To represent items with multiple columns of information.

### Drop-down/Pop-up List Boxes

➢ Description

✓ A single rectangular control that shows one item with a small button to the right side.

   • The button provides a visual cue that an associated selection box is available but hidden.

✓ When the button is selected, a larger associated box appears, containing a list of choices from which one may be selected.

✓ Selections are made by using the mouse to point and click.

✓ Text may not be typed into the control.
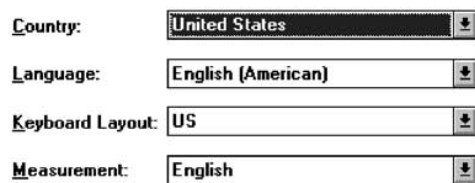


Drop-down list boxes. There are four unopened boxes, Country, Language, Keyboard Layout, and Measurement.

Drop-down list box opened for Country.

➢ Purpose:

✓ To select one item from a large list of mutually exclusive options when screen space is limited.

➢ Advantages:

✓ Unlimited number of choices.

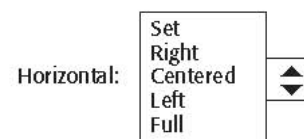✓ Reminds users of available options.

✓ Conserves screen space.

➢ Disadvantages:



Pop-up list box, closed and opened.

✓ Requires an extra action to display the list of choices.

✓ When displayed, all choices may not always be visible, requiring scrolling.

✓ The list may be ordered in an unpredictable way, making it hard to find items.

➢ Proper usage:

✓ For selecting values or setting attributes.

✓ For choices that are mutually exclusive (only one can be selected).

✓ Where screen space is limited.

✓ For data and choices that are:

   • Best represented textually.

   • Infrequently selected.

   • Not well known, easily learned, or remembered.

   • Ordered in a unpredictable fashion.

   • Large in number.

   • Variable or fixed in list length.

- ✓ Use drop-down/pop-up lists when:
  - Screen space or layout considerations make radio buttons or single-selection list boxes impractical.
  - The first, or displayed, item will be selected most of the time.
- ✓ Do not use a drop-down list if it important that all options be seen together.

### Prompt Button

- ➢ Provide a visual cue that a box is hidden by including a downward pointing arrow, or other meaningful image, to the right side of the selection field.
- ✓ Position the button directly against, or within, the selection field.    Sport: [                    ] v

### Selection Descriptions

- ➢ Clearly and meaningfully describe the choices available. Spell them out as fully as possible.
- ✓ Graphical representations must clearly represent the options.
- ✓ Left-align them in columns.
- ✓ Display the descriptions using mixed-case letters.

### List Size

- ➢ Not limited in size.          ➢ Present all available alternatives.

### Box Size

- ➢ Long enough to display 6 to 8 choices without scrolling.
  - ✓ If more than eight choices are available, provide vertical scrolling to display all items.
- ➢ Wide enough to display the longest possible choice.
- ➢ When a box cannot be made wide enough to display the longest entry:
  - ✓ Make it wide enough to permit entries to be distinguishable, or,
  - ✓ Break long entries with ellipses (...) in the middle, or,
  - ✓ Provide horizontal scrolling.

### Organization

- ➢ Order in a logical and meaningful way to permit easy browsing.
- ➢ If a particular choice is not available in the current context, omit it from the list.
- ✓ Exception: If it is important that the existence and unavailability of a particular list item be communicated, display the choice dimmed or grayed out instead of deleting it.

### Layout and Separation

- ➢ Enclose the choices in a box composed of a solid line border.
- ✓ The border should be the same color as the choice descriptions.
- ✓ Leave one blank character position between the choices and the left border.
- ✓ Leave one blank character position between the longest choice description in the list and the right border, if possible.

### *Captions*

➢ Display using mixed-case letters.

➢ Position the caption to the left of the box.

   ✓ Alternately, it may be positioned left-justified above the box.

### *Defaults*

➢ When the drop-down/pop-up listing is first presented, display the currently set value.

➢ If a choice has not been previously selected, provide a default choice.

### *Disabling*

➢ When a drop-down/pop-up list box is disabled, display its caption and entries as disabled or dimmed.

### *Selection Method and Indication*

➢ Pointing:

✓ Highlight the selection choice in some visually distinctive way when the pointer or cursor is resting on it and the choice is available for selection.

➢ Activation:

✓ Close the drop-down/pop-up list box when an item is selected.

## COMBINATION ENTRY/SELECTION CONTROLS

➢ It is possible for a control to possess the characteristics of both a text field and a selection field. In this type of control, information may either be keyed into the field or selected and placed within it. The types of combination entry/selection fields are spin boxes, attached combination boxes, and drop-down/pop-up combination boxes.

### Spin Boxes

➢ Description:

✓ A single-line field followed by two small, vertically arranged buttons.

   • The top button has an arrow pointing up.

   • The bottom button has an arrow pointing down.

✓ Selection/entry is made by:

   • Using the mouse to point at one of the directional buttons and clicking. Items will change by one unit or step with each click.

   • Keying a value directly into the field itself.

➢ Purpose:

✓ To make a selection by either scrolling through a small set of meaningful predefined choices or typing text.

- ➢ Advantages:
- ✓ Consumes little screen space.
- ✓ Flexible, permitting selection or typed entry.
- ➢ Disadvantages:
- ✓ Difficult to compare choices.
- ✓ Can be awkward to operate.
- ✓ Useful only for certain kinds of data.
- ➢ Proper usage:
- ✓ For setting attributes, properties, or values.
- ✓ For mutually exclusive choices (only one can be selected).
- ✓ When the task requires the option of either key entry or selection from a list.
- ✓ When the user prefers the option of either key entry or selection from a list.
- ✓ Where screen space is limited.
- ✓ Most useful for data and choices that are:
  - • Discrete.
  - • Infrequently selected.
  - • Well known, easily learned or remembered, and meaningful.
  - • Ordered in a predictable, customary, or consecutive fashion.
  - • Infrequently changed.
  - • Small in number.
  - • Fixed or variable in list length.

### *List Size*

- ➢ Keep the list of items relatively short.
- ➢ To reduce the size of potentially long lists, break the listing into subcomponents, if possible.

### *List Organization*

- ➢ Order the list in the customary, consecutive, or expected order of the information contained within it.
  - ✓ Ensure that the user can always anticipate the next (not-yet-visible) choice.
- ➢ When first displayed, present a default choice in the box.

### *Other Spin Box Guidelines*

- ➢ Box size: The spin box should be wide enough to display the longest entry or choice.
- ➢ Caption:
  - ✓ Display it using mixed-case letters.
  - ✓ Position the caption to the left of the box.
    - • Alternately, it may be positioned left-justified above the box.

➢ Entry and selection methods:
  ✓ Permit completion by:
    • Typing directly into the box.
    • Scrolling and selecting with a mouse.
    • Scrolling and selecting with the up/down arrow keys.
  ✓ For alphabetical values:
    • Move down the order using the down arrow.
    • Move up the order using the up arrow.
    • For numeric values or magnitudes:
    • Show a larger value using the up arrow.
    • Show a smaller value using the down arrow.

**Combo Boxes**

➢ Description:
  ✓ A single rectangular text box entry field, beneath which is a larger rectangular list box (resembling a drop-down list box) displaying a list of options.
  ✓ The text box permits a choice to be keyed within it.
  ✓ The larger box contains a list of mutually exclusive choices from which one may be selected for placement in the entry field.
    • Selections are made by using a mouse to point and click.
  ✓ As text is typed into the text box, the list scrolls to the nearest match.
  ✓ When an item in the list box is selected, it is placed into the text box, replacing the existing content.
  ✓ Information keyed may not necessarily have to match the list items.

➢ Purpose:
  ✓ To allow either typed entry in a text box or selection from a list of options in a permanently displayed list box attached to the text box.

➢ Advantages:
  ✓ Unlimited number of entries and choices.
  ✓ Reminds users of available options.
  ✓ Flexible, permitting selection or typed entry.
  ✓ Entries not necessarily restricted to items selectable from list box.
  ✓ List box always visible.

- ➢ Disadvantages:
    - ✓ Consumes some screen space.
    - ✓ All list box choices not always visible, requiring scrolling.
    - ✓ Users may have difficulty recalling sufficient information to type entry, making text box unusable.
    - ✓ The list may be ordered in an unpredictable way, making it hard to find items.
- ➢ ■ Proper usage:
    - ✓ For entering or selecting objects or values or setting attributes.
    - ✓ For information that is mutually exclusive (only one can be entered or selected).
    - ✓ When users may find it practical to, or prefer to, type information rather than selecting it from a list.
    - ✓ When users can recall and type information faster than selecting it from a list.
    - ✓ When it is useful to provide the users a reminder of the choices available.
    - ✓ Where data must be entered that is not contained in the selection list.
    - ✓ Where screen space is available.
    - ✓ For data and choices that are:
        - • Best represented textually.
        - • Somewhat familiar or known.
        - • Ordered in an unpredictable fashion.
        - • Frequently changed.
        - • Large in number.  • Variable or fixed in list length.

**Drop-down/Pop-up Combo Boxes**

- ➢ Description:
    - ✓ A single rectangular text box with a small button to the side and an associated hidden list of options.
        - • The button provides a visual cue that an associated selection box is available but hidden.
    - ✓ When requested, a larger associated rectangular box appears, containing a scrollable list of choices from which one is selected.
    - ✓ Selections are made by using the mouse to point and click.
    - ✓ Information may also be keyed into the field.
    - ✓ As text is typed into the text box, the list scrolls to the nearest match.
    - ✓ When an item in the list box is selected, it is placed into the text box, replacing the existing content.
    - ✓ The information keyed does not necessarily have to match list items.
    - ✓ Combines the capabilities of both a text box and a drop-down/pop-up list box.

➢ Purpose:

  ✓ To allow either typed entry or selection from a list of options in a list box that may be closed and retrieved as needed.

➢ Advantages:

  ✓ Unlimited number of entries and choices.

  ✓ Reminds users of available options.

  ✓ Flexible, permitting selection or typed entry.

  ✓ Entries not restricted to items selectable from list box.

  ✓ Conserves screen space.

**Baud Rate:** `9600` ▾

Windows 3.1 Drop-down combo box, closed.

**Baud Rate:** `9600` ▾
1200 ▲
2400
4800
**9600**
19200 ▼
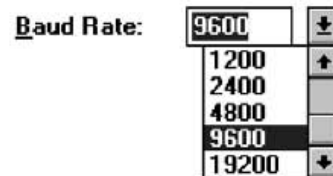
Windows 3.1 Drop-down combo box, opened.

➢ Disadvantages:

  ✓ Requires an extra step to display the list of choices.

  ✓ When displayed, all box choices may not always be visible, requiring scrolling.

  ✓ User may have difficulty in recalling what to type.

  ✓ The list content may change, making it hard to find items.

  ✓ The list may be ordered in an unpredictable way, making it hard to find items.

➢ Proper usage:

  ✓ For entering or selecting objects or values or setting attributes.

  ✓ For information that is mutually exclusive (only one can be entered or selected).

  ✓ When users may find it practical to, or prefer to, type information rather than selecting it from a list.

  ✓ When users can recall and type information faster than selecting from a list.

  ✓ When it is useful to provide the users with an occasional reminder of the choices available.

  ✓ Where data must be entered that is not contained in the selection list.

  ✓ Where screen space is limited.

  ✓ For data and choices that are:

    • Best represented textually.                    • Frequently changed.

    • Somewhat familiar or known.                    • Large in number.

    • Ordered in an unpredictable fashion.           • Variable or fixed in list length.

### *Prompt Button*

➢ Provide a visual cue that a list box is hidden by including a downward-pointing arrow to the right of the text box.

➢ Separate the button from the text box by a small space.

**Sport:** [                    ] ▾

# SELECTING THE PROPER CONTROLS

- ➢ Providing the proper control, or mix of controls, is critical to a system's success. The proper control will enable a person to make needed selections, entries, and changes quickly, efficiently, and with fewer mistakes.
- ➢ Improper selection most often leads to the opposite result.

**Entry versus Selection—A Comparison**

*Choosing a Type of Control*

- ➢ For familiar, meaningful data choose the technique that, in theory, requires the fewest number of keystrokes to complete.
- ➢ If the data is unfamiliar or prone to typing errors, choose a selection technique.

*Aided versus Unaided Entry*

- ➢ Provide aided entry whenever possible.
    - ✓ Absorb any extra and unnecessary keystrokes.
    - ✓ Provide an auditory signal that auto completion has been performed.

**Comparison of GUI Controls**

- ➢ Direct Manipulation.
    1. Drag and drop on.
    2. Drag and drop between.
- ➢ Selection.
    3. Icons.
    4. Radio buttons.
    5. Menus (drop-down list boxes).
- ➢ Entry.
    6. One entry area.
    7. Four entry areas.

## Controls Evaluated by Tullis and Kodimer (1992)

**DIRECT MANIPULATION**

1. Drag and Drop On
   - The items are arrayed horizontally. An item is dragged to a new location above another item and released. The item in that position moves to the old location of the arriving item.

2. Drag and Drop Between
   - The items are arrayed horizontally. An item is dragged to a new location between two other items and released. The items are readjusted into new positions, including, when necessary, automatic wrap-around for items located at the end of the line.

**SELECTION**

3. Icons
   - The items are arrayed horizontally. Icons are positioned between each pair of items. Selecting an icon switches the positions of each adjacent item.

4. Radio Buttons
   - The items are presented in a matrix, item name along the left side, item position numbers across the top. Radio buttons in the matrix are selected to represent each item's position.

5. Menus (Drop-down List Boxes)
   - Items are positioned horizontally. A drop-down listing is activated, and the item for that location selected.

**ENTRY**

6. One Entry Area
   - A single text entry field is provided. A one-character mnemonic (F,N,S,D) is provided for each choice. The mnemonics are keyed in the order in which the items are to be arrayed.

7. Four Entry Areas
   - Four text entry fields, labeled with the item names are arranged vertically. A number (1-4) is keyed into each field, indicating the manner in which the items are to be ordered.

**Control Selection Criteria**

➢ Selection of the proper control, then, depends on several factors. The first is the structure and characteristics of the property or data itself. Other considerations include the nature of the task, the nature of the user, and the limitations of the display screen itself.

➢ Property or data considerations reflect the characteristics of the data itself. Some kinds of controls are very restrictive in that they permit only specific kinds of information with specific qualities to be presented within them.

➢ Other kinds of controls may not be as restrictive concerning a data's qualities, but they are not well suited to the kind of data being used.

Data considerations include the following:

➤ Is the property or data *mutually exclusive* or *nonexclusive*? Does entry/selection require single or multiple items?

➤ Is the property or data *discrete* or *continuous*? Discrete data can be meaningfully specified and categorized, while continuous data cannot.

➤ Is the property or data *limited* or *unlimited* in scope? If limited, how many items will the data normally not exceed?

➤ Is the property or data *fixed* or *variable* in list length? Are there always a fixed number of items, or will it vary?

➤ Is the property or data ordered in a *predictable* or *unpredictable* fashion? If predictable, will the user be able to anticipate the next, unseen, item?

➤ Can the property or data be *represented pictorially*? Will a picture or graphic be as meaningful as a textual description?

Task considerations reflect the nature of the job. Considerations include the following:

➤ *How often* is an item *entered* or *selected*?

➤ *How often* is an item *changed*?

➤ How *precisely* must the item be entered or selected?

User considerations reflect the characteristics of the user. Important considerations:

➤ How much *training* in control operation will be provided?

➤ How *meaningful* or *known* is the property or data to the user?

➤ How *easily remembered or learned* by the user is the property or data?

➤ How *frequently used* will the system be?

➤ Is the user an *experienced typist*?

➤ Display considerations reflect the characteristics of the screen and hardware.

➤ How much *screen space* is available to display the various controls?


## Choosing a Control Form

### *When to Permit Text Entry*

➤ Permit text entry if any of the following questions can be answered *Yes*:

  ✓ Is the data unlimited in size and scope?

  ✓ Is the data familiar?

  ✓ Is the data *not* conducive to typing errors?

  ✓ Will typing be faster than choice selection?

  ✓ Is the user an experienced typist?

## *What Kind of Control to Choose*

### Best Controls for Certain Tasks and Screen Conditions

| TASK | BEST CONTROL | IF SCREEN SPACE CONSTRAINTS EXIST |
|---|---|---|
| Mutually Exclusive | Radio Buttons | Drop-down/Pop-up List Box |
| Not Mutually Exclusive | Check Boxes | Multiple-Selection List Box |
| Select or Type a Value Text Entry Field | Radio Buttons with "Other" | Drop-down Combo Box |
| Setting a Value within a Range | Spin Button | Text Box |

### Suggested Uses for Graphical Controls

| 1. IF: | USE: |
|---|---|

- *Mutually exclusive* alternatives.
- Discrete data.
- Best represented verbally.
- Very limited in number (2 to 8).

*AND:*
- Typed entry is never necessary.          Radio Buttons
- Content can never change.
- Adequate screen space is available.

*OR:*
- Typed entry is never necessary.          Drop-down/Pop-up List Box
- Content can never change.
- Adequate screen space is not available.

*OR:*
- Typed entry may be necessary.          Combo box
- Content can change.
- Adequate screen space is available.

*OR:*
- Typed entry may be necessary.          Drop-down/Pop-up Combo Box
- Content can change.
- Adequate screen space is not available.

| 2. IF: | USE: |
|---|---|

- *Mutually exclusive* alternatives.
- Discrete data.
- Best represented verbally.
- Potentially large in number (9 or more).

*AND:*
- Typed entry is never necessary.          Single-Selection List Box
- Content can never change.
- Adequate screen space is available.

*OR:*
- Typed entry is never necessary.          Drop-down/Pop-up List Box
- Content can never change.
- Adequate screen space is not available.

*OR:*
- Typed entry may be necessary.          Combo Box
- Content can change.
- Adequate screen space is available.

*OR:*
- Typed entry may be necessary.          Drop-down/Pop-up Combo Box
- Content can change.
- Adequate screen space is not available.

Continued

| 3. *IF:* | *USE:* |
|---|---|
| • *Mutually exclusive* alternatives.<br>• Discrete data.<br>• Best represented graphically.<br>• Content rarely changes.<br>• Small or large number of items. | Palette |

| 4. *IF:* | *USE:* |
|---|---|
| • *Mutually exclusive* alternatives.<br>• Not frequently selected.<br>• Content does not change.<br>• Well-known, easily remembered data.<br>• Predictable, consecutive data.<br>• Typed entry sometimes desirable. | |
| *AND:*<br>• Adequate screen space is not available. | Spin Box |
| *OR:*<br>• Adequate screen space is available. | Combo Box |

| 5. *IF:* | *USE:* |
|---|---|
| • *Mutually exclusive* alternatives.<br>• Continuous data with a limited range<br>  of settings.<br>• Value increases/decreases in a well-known,<br>  predictable way.<br>• Spatial representation enhances comprehension. | Slider |

| 6. *IF:* | *USE:* |
|---|---|
| • *Nonexclusive* alternatives.<br>• Discrete data.<br>• Best represented verbally.<br>• Typed entry is never necessary.<br>• Content can never change.<br>• Adequate screen space is available. | |
| *AND:*<br>• Very limited in number (2 to 8). | Check Boxes |
| OR:<br>· Potentially large in number (9 or more). | Multiple-Selection List Box |

### Choosing between Buttons and Menus for Commands

Determining the proper way to present a command also depends on several factors.

The following considerations are involved in choosing the correct command form:

✓ Whether or not the command part of a *standard tool set*.

✓ The total *number* of commands in the application.

✓ The *complexity* of the commands.

✓ The *frequency* with which commands are used.

✓ Whether or not the command is used in association *with another control*.

Guidelines for choosing the proper command form are presented in Table

#### Choosing a Command Form

| IF THE COMMANDS: | USE: |
| --- | --- |
| Are standard commands provided by a tool set. | Commands provided by the tool set |
| Total seven or more, and can be arranged hierarchically into groups. | Menu bar and pull-downs |
| Total six or fewer, are selected frequently, and affect an entire window. | Buttons in a window |
| Total seven or more, are selected frequently, and affect an entire window. | Buttons in a toolbar |
| Are used with other controls, or are complicated commands and need to be simplified. | Buttons in a dialog box |
| Are sometimes used frequently and are sometimes used infrequently. | Buttons in a dialog box |
| Are frequently accessed and have only two conditions. | Toggled menu item |