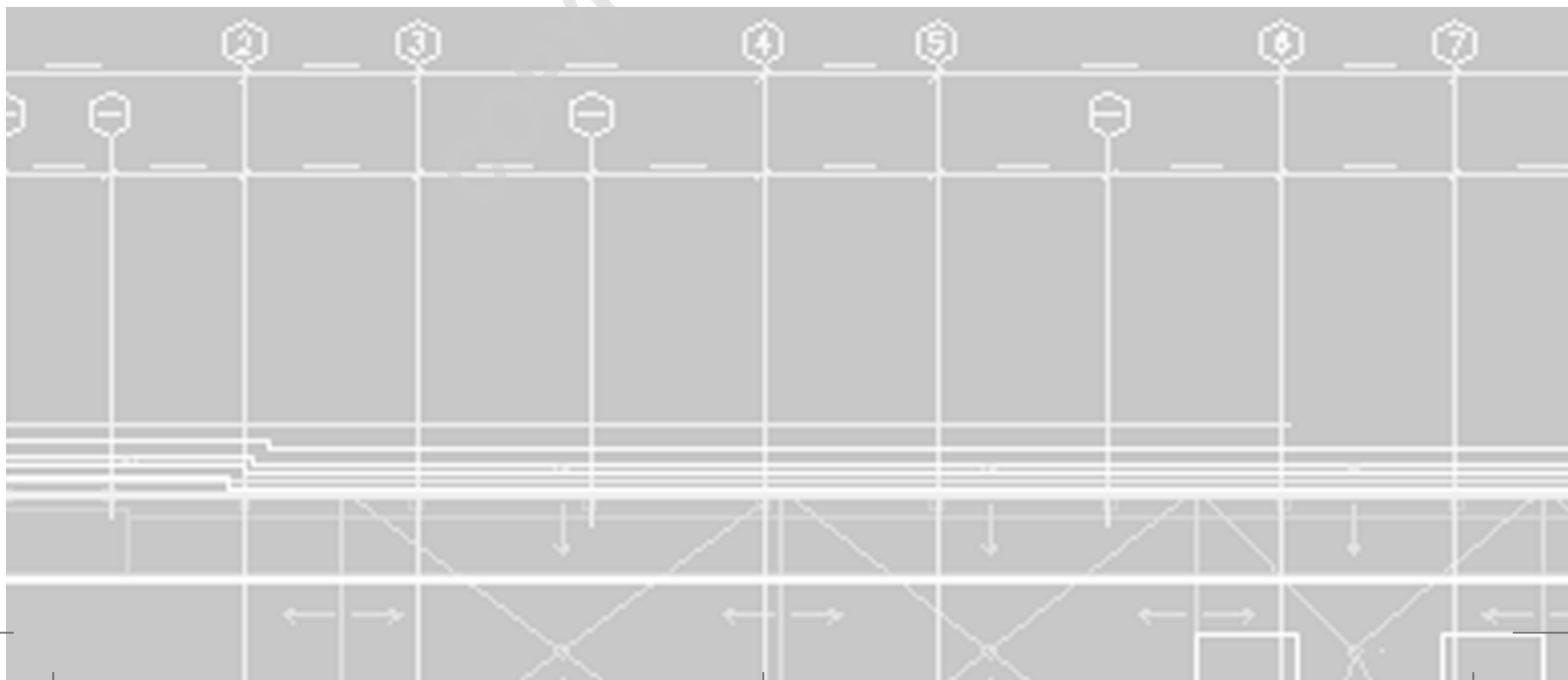
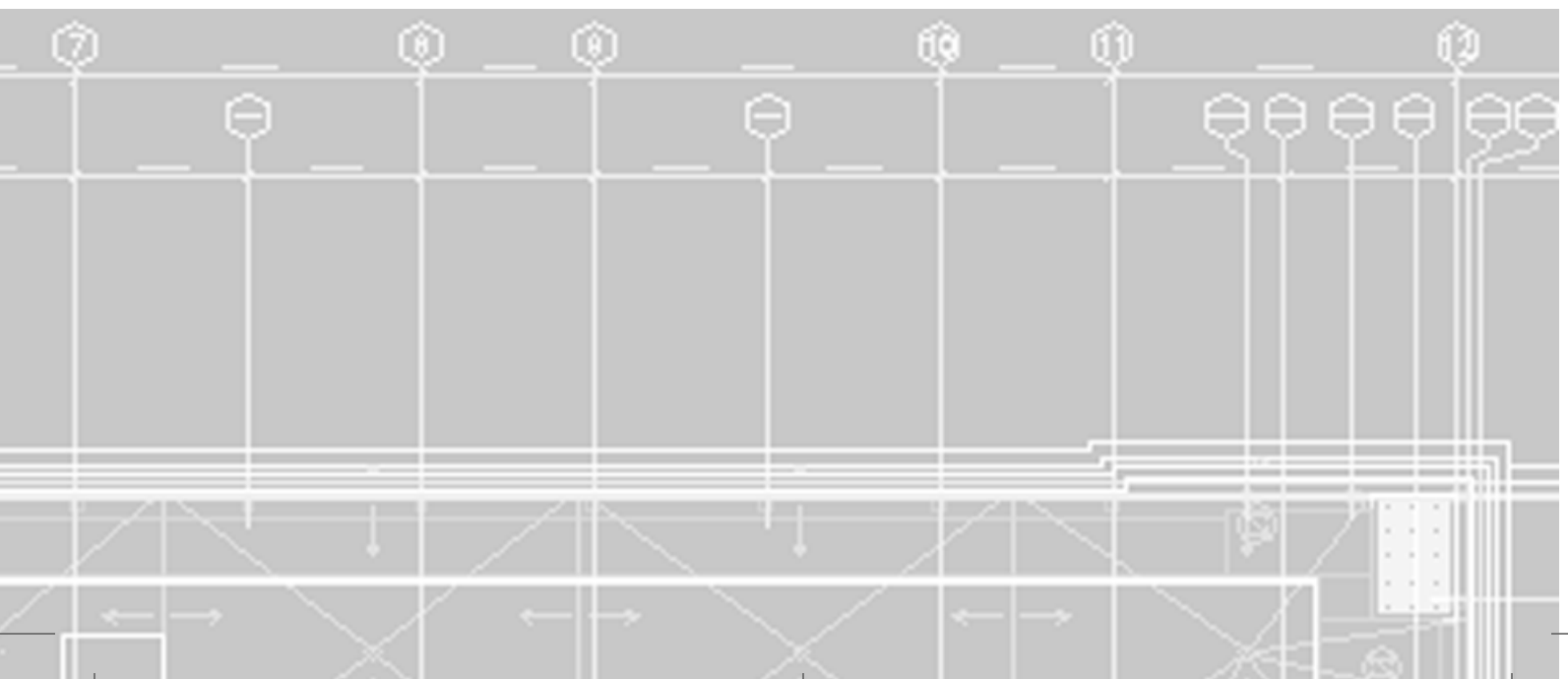
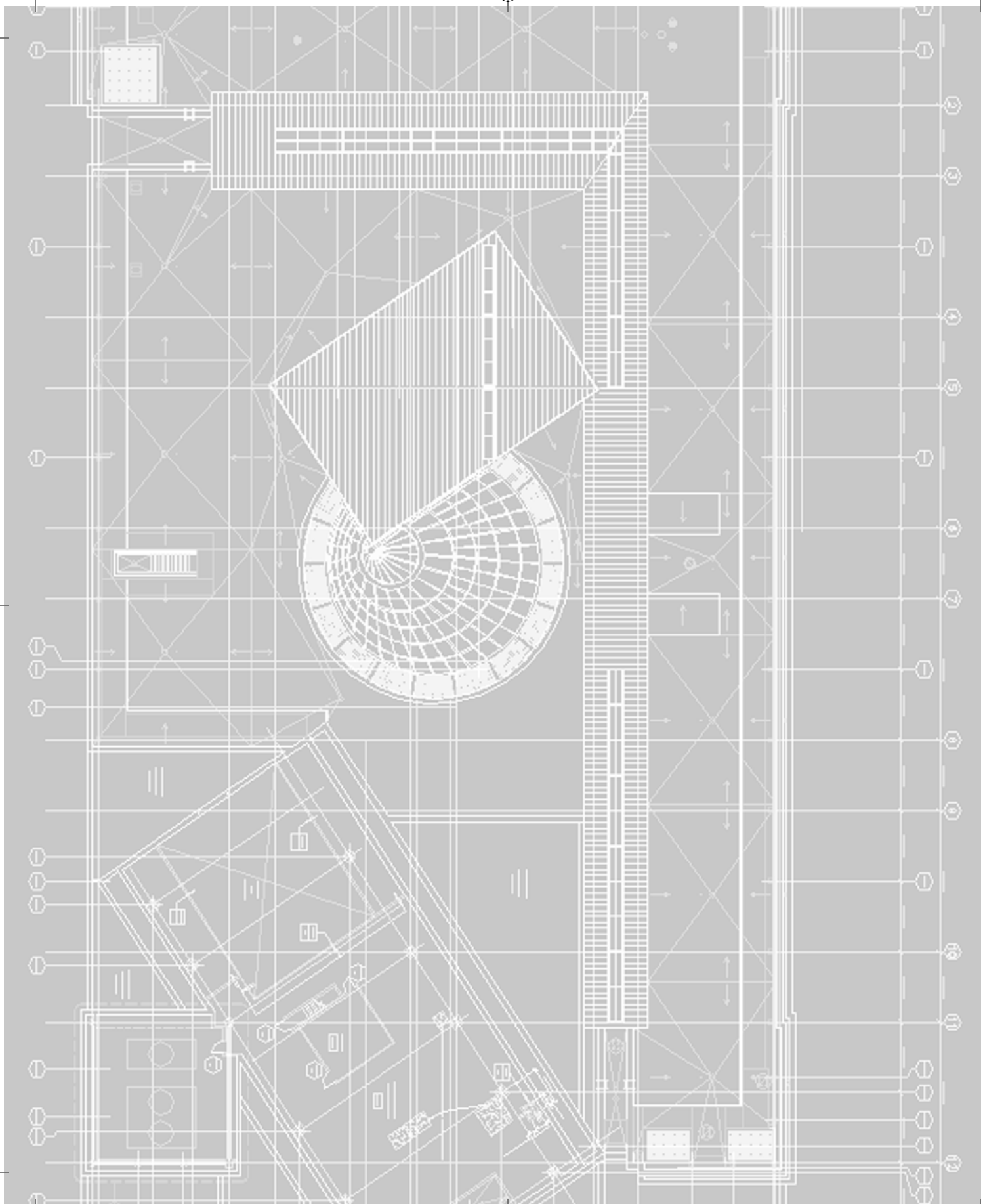
PART I



The Basics





CHAPTER

ONE

1

This Is AutoCAD

- Taking a Guided Tour
- Working with AutoCAD
- If You Want to Experiment…

Over the years, AutoCAD has evolved from a DOS-based, command-line-driven program to a full-fledged Windows application. AutoCAD 2000 continues this trend with a new look and a wealth of new features that allow you to work more efficiently and with less effort. Like Release 14, AutoCAD 2000 is strictly a Windows 95/98/NT program; there are no UNIX or DOS versions.

By concentrating on a single operating system, Autodesk is able to create a more efficient, faster AutoCAD. AutoCAD 2000 offers the speed you demand with the convenience of a Windows multitasking environment. You'll also find that AutoCAD makes great use of the Windows environment. For example, you can use Windows's OLE features to paste documents directly into AutoCAD from Microsoft Excel, Windows Paint, or any other programs that support OLE as a server application. And, as in Releases 13 and 14, you can export AutoCAD drawings directly to other OLE clients. This means no more messy conversions and reworking to get spreadsheet, database, text, or other data into AutoCAD. It also means that if you want to include a photograph in your AutoCAD drawing, all you have to do is cut and paste. Text-based data can also be cut and pasted, saving you time in transferring data, such as layer or block names.

NOTE

OLE stands for *Object Linking and Embedding*—a Windows feature that lets different applications share documents. See Chapter 14 for a more detailed discussion of OLE.

With Windows, you have the freedom to arrange AutoCAD's screen by clicking and dragging its components. AutoCAD 2000 now sports a look that is more in line with the Microsoft Office suite of applications, with Excel-like sheet tabs and borderless toolbar buttons. The changes in AutoCAD 2000 are not only skin deep either. Among the many new features of AutoCAD 2000, you can now open multiple documents during a single session of AutoCAD. This means an easier exchange of data between different files, and the ability to compare files more easily. AutoCAD 2000 also introduces a wealth of new tools to help you manage your drawing projects. If you are new to AutoCAD, this is the version you may have been waiting for. Even with its many new features, the programmers at Autodesk have managed to make AutoCAD easier to use than previous releases. AutoCAD's interface has been trimmed down and is more consistent than prior versions. They have even improved the messages you receive from AutoCAD to make them more understandable.

But in one sense, AutoCAD 2000 represents a return to an old feature of AutoCAD: Autodesk has begun to listen to the user community again and has clearly incorporated many of the wish-list features users have been asking for over the years. So whether you're an old hand at AutoCAD or whether you are just starting out, AutoCAD 2000 offers a powerful drawing and design tool that is easier to use than ever.

So let's get started! This first chapter looks at many of AutoCAD's basic operations, such as opening and closing files, getting a close-up look at part of a drawing, and making changes to a drawing.

Taking a Guided Tour

First, you will get a chance to familiarize yourself with the AutoCAD screen and how you communicate with AutoCAD. As you do these exercises, you will also get a feel for how to work with this book. Don't worry about understanding or remembering everything that you see in this chapter. You will get plenty of opportunities to probe the finer details of the program as you work through the later chapters. If you are already familiar with earlier versions of AutoCAD, you may want to read through this chapter anyway, to get acquainted with new features and the graphical interface. To help you remember the material, you will find a brief exercise at the end of each chapter. For now, just enjoy your first excursion into AutoCAD.

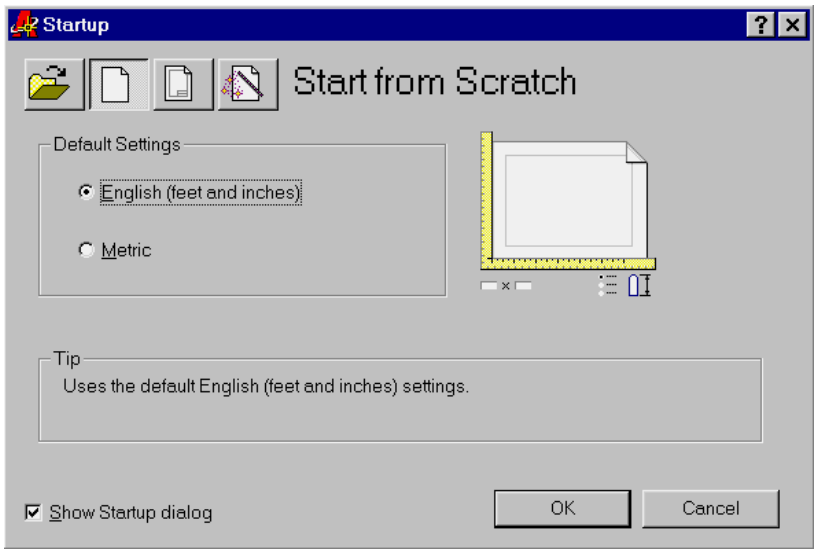
TIP

Consider purchasing either *Mastering Windows 95* by Robert Cowart or *The ABCs of Windows 95* by Sharon Crawford, both published by Sybex. For Windows 98, try *Windows 98: No Experience Required,* also by Sharon Crawford. For Windows NT, *Windows NT Server Complete,* edited by Mark Minasi, is a good bet.

If you already installed AutoCAD, and you are ready to jump in and take a look, then proceed with the following steps to launch the program:

1. Click the Start button in the lower-left corner of the Windows 95/98 or Windows NT 4 screen. Then choose Program ➢ AutoCAD 2000 ➢ AutoCAD 2000. You can also double-click the AutoCAD 2000 icon on your Windows Desktop.
2. The opening greeting, called a *splash screen,* tells you which version of AutoCAD you are using, to whom the program is registered, and the AutoCAD dealer's name and phone number, should you need help.

3. Next, the Create New Drawing dialog box appears. This dialog box is a convenient tool for setting up new drawings. You'll learn more about this tool in later chapters. For now, click Cancel in the Create New Drawing dialog box.



Message to Veteran AutoCAD Users

Autodesk is committed to the Windows operating environment. The result is a graphical user interface (GUI) that is easier on the AutoCAD neophyte, but perhaps a bit foreign to a veteran AutoCAD user.

If you've been using AutoCAD for a while, and you prefer the older interface, you can still enter AutoCAD commands through the keyboard, and you can still mold AutoCAD's interface into one that is more familiar to you.

You can, for example, restore the side menu that appears in the DOS version of AutoCAD. Here's how it's done:

1. Select Tools ➢ Options.
2. In the Options dialog box, click the Display tab.
3. Click the check box labeled Display AutoCAD Screen Menu in Drawing Window.
4. Finally, click OK. The side menu appears.

Continued on next page

A word of caution: If you are accustomed to pressing Ctrl+C to cancel an operation, you must now retrain yourself to press the Esc (Escape) key. Ctrl+C now conforms to the Windows standard, making this key combination a shortcut for saving marked items to the Clipboard. Similarly, instead of using F1 to view the full text window, you must use F2. F1 is most commonly reserved for the Help function in Windows applications.

If you prefer entering commands from the keyboard, you'll also want to know about some changes to specific commands in AutoCAD 2000. Several commands that usually invoke dialog boxes can be used through the Command window prompt. Here is a list of those commands:

Bhatch	Boundary	Group	Hatchedit	Image
Layer	Linetype	Mtext	Pan	Block
XBind	Style	Osnap	Xref	Wblock

When you enter these commands from the keyboard, you normally see a dialog box. In the case of the Pan command, you will see the real-time Pan hand graphic. To utilize these commands from the command prompt, add a minus sign (-) to the beginning of the command name. For example, to use the old Layer command in the command-line method, enter **–layer** at the command prompt. To use the old Pan command, enter **–pan** at the command prompt.

Even if you don't care to enter commands from the keyboard, knowing about the use of the minus sign can help you create custom macros. See Chapter 22 for more on AutoCAD customization.

The AutoCAD Window

The AutoCAD program window is divided into five parts:

- Pull-down menu bar
- Docked and floating toolbars
- Drawing area
- Command window
- Status bar

NOTE

A sixth hidden component, the Aerial View window, displays your entire drawing and lets you select close-up views of parts of your drawing. After you've gotten more familiar with AutoCAD, consult Chapter 6 for more on this feature.

Figure 1.1 shows a typical layout of the AutoCAD program window. Along the top is the *menu bar*, and at the bottom are the *Command window* and the *status bar*. Just below the menu bar and to the left of the window are the *toolbars*. The *drawing area* occupies the rest of the screen.

Many of the elements in the AutoCAD window can be easily moved and reshaped. Figure 1.2 demonstrates how different AutoCAD can look after some simple rearranging of window components. Toolbars can be moved from their default locations to any location on the screen. When they are in their default location, they are in their *docked* position. When they are moved to a location where they are free-floating, they are *floating*.

FIGURE 1.1:

A typical arrangement of the elements in the AutoCAD window

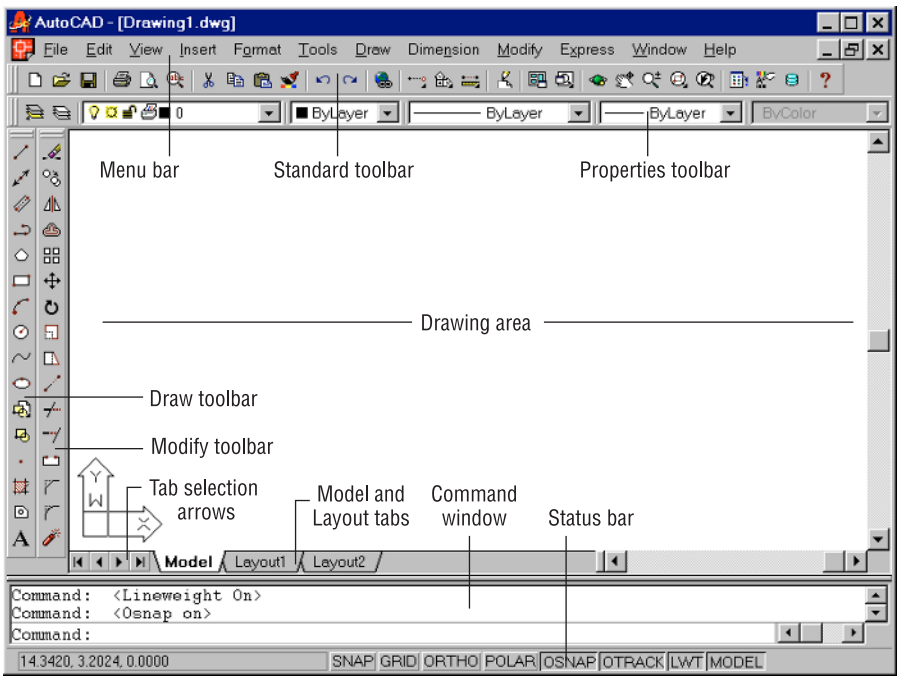
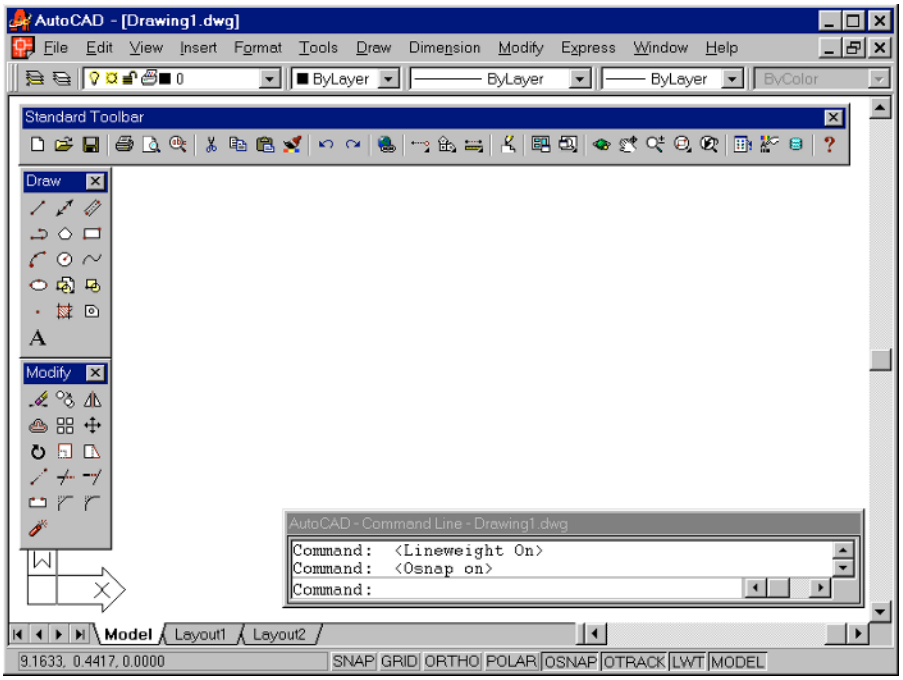


FIGURE 1.2:

An alternative arrangement of the elements in the AutoCAD window



The menu bar at the top of the drawing area (as shown in Figure 1.3) offers pull-down menus from which you select commands in a typical Windows fashion. The toolbars offer a variety of commands through tool buttons and drop-down lists. For example, the *layer* name or number that you are presently working on is displayed in a drop-down list in the Object Properties toolbar. The layer name is preceded by tools that inform you of the status of the layer. The tools and lists on the toolbar are plentiful, and you'll learn more about all of them later in this chapter and as you work through this book.

NOTE

A *layer* is like an overlay that allows you to separate different types of information. AutoCAD allows an unlimited number of layers. On new drawings, the default layer is 0. You'll get a detailed look at layers and the meaning of the Layer tools in Chapter 4.

The Draw and Modify toolbars (Figure 1.4) offer commands that create new objects and edit existing ones. These are just two of many toolbars available to you.

FIGURE 1.3:

The components of the menu bar and the Standard toolbar

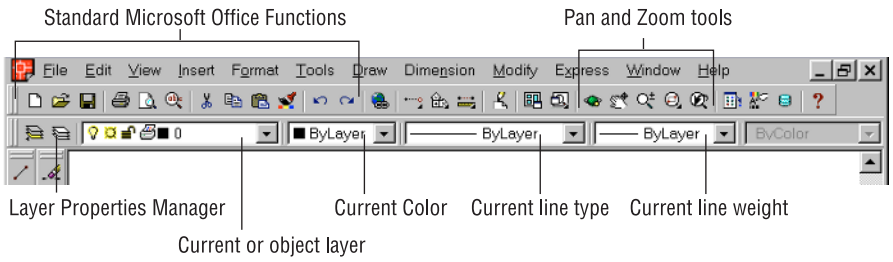
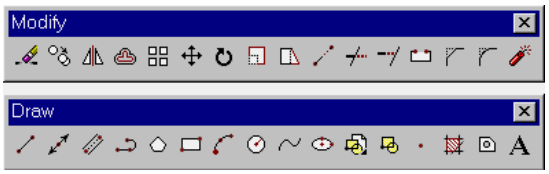


FIGURE 1.4:

Here are the Draw and Modify toolbars as they appear when they are floating.



The drawing area—your workspace—occupies most of the screen. Everything you draw appears in this area. As you move your mouse around, you see crosshairs appear to move within the drawing area. This is your drawing cursor that lets you point to locations in the drawing area. At the bottom of the drawing area, the status bar (see Figure 1.5) gives you information at a glance about the drawing. For example, the coordinate readout toward the far left of the status line tells you the location of your cursor. By the way, your screen may show the drawing area in black. You can set the drawing area background color using the Options dialog box. Appendix B describes how this can be done. The figures in this book show the drawing area background in white for clarity.

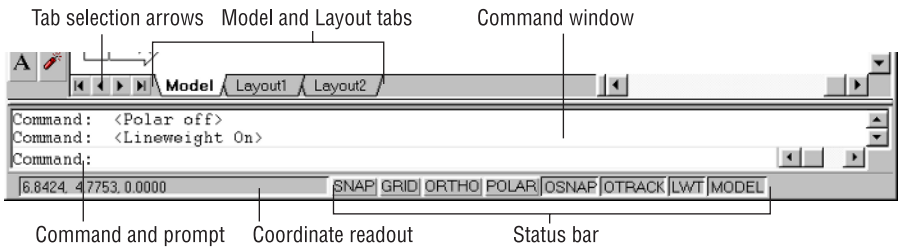
A set of tabs gives you access to the Layout views of your drawing. These are views that let you layout your drawing like a desktop publishing program. You'll learn about the Layout tabs in Chapter 7. The arrows to the left of the tabs let you navigate the tabs when there are more tabs than can fit in the window. The Command window can be moved and resized in a manner similar to toolbars. By default, the Command window is in its docked position, shown here. Let's practice using the coordinate readout and drawing cursor.

NOTE

Some AutoCAD users prefer to turn off the scrollbars to the right and at the bottom of the drawing area. This allows you to maximize the size of the drawing area. Settings that control the scroll bars and other screen-related functions can be found in the Options dialog box. See Appendix B for more information on the Options dialog box.

FIGURE 1.5:

The status bar and Command window



Picking Points

1. Move the cursor around in the drawing area. As you move, note how the coordinate readout changes to tell you the cursor's location. It shows the coordinates in an *X,Y* format.
2. Now place the cursor in the middle of the drawing area and press and immediately release the left mouse button. You have just picked a point. Move the cursor, and a rectangle follows. This is a *selection window*; you'll learn more about this window in Chapter 2.
3. Move the cursor a bit in any direction; then press and let go of the left mouse button again. Notice that the rectangle disappears.
4. Try picking several more points in the drawing area.

If you accidentally press the right mouse button, a popup menu appears. This will be a surprise to both new and experienced AutoCAD users. In AutoCAD 2000, a right mouse click frequently brings up a popup menu with options that are context sensitive. This means that the contents of the popup menu depend on where you right-click as well as the command that is active at the time of your right-click. If options are not appropriate at the time of the right-click, AutoCAD treats the right-click as a ↵. You'll learn more about these options as you progress through the book. For now, if you happen to open this menu by accident, press the Esc key to dismiss it.

NOTE

The ↵ symbol is used in this book to denote the Enter key. Whenever you see it, press the Enter key, also known as the Return key.

NOTE

Terminology to Remember: The operation you performed in steps 1 and 2—placing the cursor on a specific point and pressing the left mouse button—is referred to as *clicking* or *clicking a point*.

UCS Icon

In the lower-left corner of the drawing area, you see a thick, L-shaped arrow outline. This is the *User Coordinate System (UCS)* icon, which tells you your orientation in the drawing. This icon becomes helpful as you start to work with complex 2D drawings and 3D models. The *X* and *Y* inside the icon indicate the x- and y-axes of your drawing. The *W* tells you that you are in what is called the *World Coordinate System*. Chapter 16 discusses this icon in detail. For now, you can use it as a reference to tell you the direction of the axes.

NOTE

If you can't find the UCS icon... The UCS icon can be turned on and off, so if you are on someone else's system and you don't see the icon, don't panic. It also changes shape depending on whether you are in Paper Space mode in the Layout tab or in Model Space mode! If you don't see the icon or it doesn't look like it does in this chapter, see *Switching to Paper Space* in Chapter 12 for more information on Paper Space and Model Space. Chapter 16 can give you more information on the UCS icon.

The Command Window

At the bottom of the screen, just above the status bar, is a small horizontal window called the *Command window.* Here AutoCAD displays responses to your input. It shows three lines of text. The bottom line shows the current messages and the top two lines show messages that have scrolled by, or in some cases, components of the current message that do not fit in a single line. Right now, the bottom line displays the message `Command` (see Figure 1.5). This tells you that AutoCAD is waiting for your instructions. As you click a point in the drawing area, you'll see the message `Other corner`. At the same time, the cursor starts to draw a selection window that disappears when you click another point.

As a new user, it is important to pay special attention to messages displayed in the Command window because this is how AutoCAD communicates with you. Besides giving you messages, the Command window records your activity in AutoCAD. You can use the scroll bar to the right of the Command window to review previous messages. You can also enlarge the window for a better view. (Chapter 2 discusses these components in more detail.)

NOTE

As you become more familiar with AutoCAD, you may find you don't need to rely on the Command window as much. For new users, however, the Command window can be quite helpful in understanding what steps to take as you work.

Now let's look at AutoCAD's window components in detail.

The Pull-Down Menus

Like most Windows programs, the pull-down menus available on the menu bar offer an easy-to-understand way to access the general controls and settings for AutoCAD. Within these menus you'll find the commands and functions that are the heart of AutoCAD. By clicking menu items, you can cut and paste items to and from AutoCAD, change the settings that make AutoCAD work the way you want it to, set up the measurement system you want to use, access the help system, and much more.

TIP

To close a pull-down menu without selecting anything, press the Esc key. You can also click any other part of the AutoCAD window or click another pull-down menu.

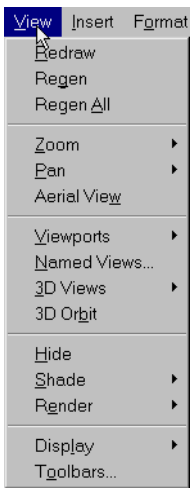
The pull-down menu options perform four basic functions:

- Display additional menu choices
- Display a dialog box that contains settings you can change
- Issue a command that requires keyboard or drawing input
- Offer an expanded set of the same tools found in the Draw and Modify toolbars

As you point to commands and options in the menus or toolbars, AutoCAD provides additional help for you in the form of brief descriptions of each menu option, which appear in the status bar.

Here's an exercise to let you practice with the pull-down menus and get acquainted with AutoCAD's interface:

1. Click View in the menu bar. The list of items that appears includes the commands and settings that let you control the way AutoCAD displays your drawings. Don't worry if you don't understand them; you'll get to know them in later chapters.



2. Move the highlight cursor slowly down the list of menu items. As you highlight each item, notice that a description of it appears in the status line at the bottom of the AutoCAD window. These descriptions help you choose the menu option you need.

3. Some of the menu items have triangular pointers to their right. This means the command has additional choices. For instance, highlight the Zoom item, and you'll see another set of options appear to the right of the menu.

NOTE

If you look carefully at the command descriptions in the status bar, you'll see an odd word at the end. This is the keyboard command equivalent to the highlighted option in the menu or toolbar. You can actually type in these keyboard commands to start the tool or menu item that you are pointing to. You don't have to memorize these command names, but knowing them will be helpful to you later if you want to customize AutoCAD.

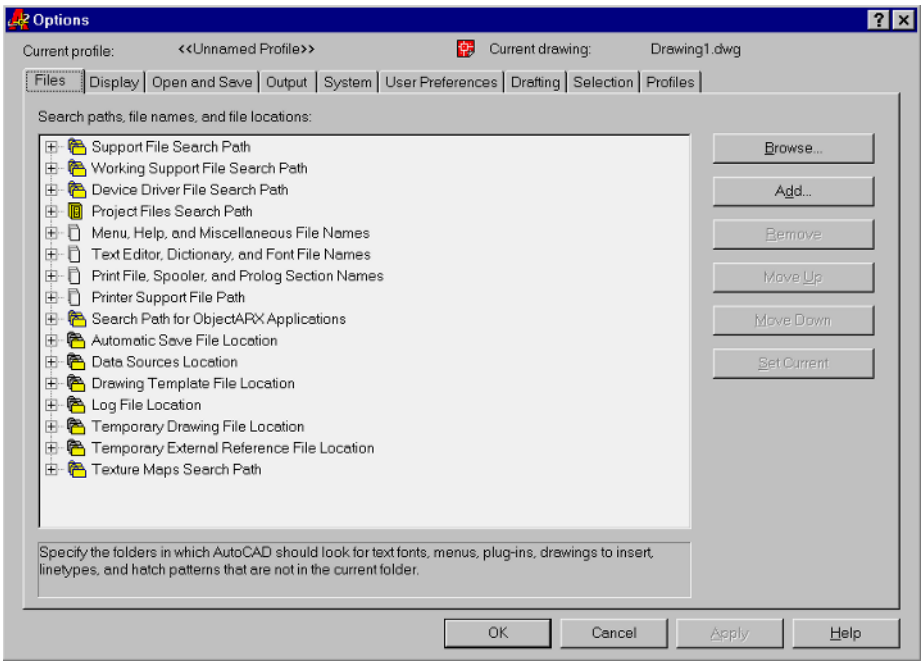
This second set of options is called a *cascading menu*. Whenever you see a pull-down menu item with the triangular pointer, you know that this item opens a cascading menu offering a more detailed set of options.

You might have noticed that other pull-down menu options are followed by an ellipsis (…). This indicates that the option brings up a dialog box, as the following exercise demonstrates:

1. Move the highlight cursor to the Tools option in the menu bar.

NOTE If you prefer, you can click and drag the highlight cursor over the pull-down menu to select an option.

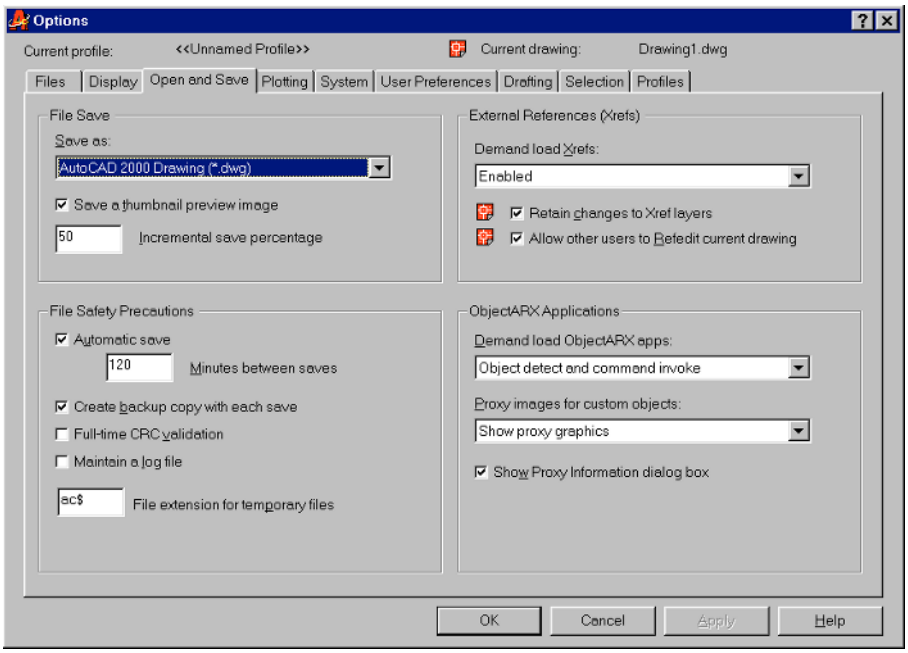
2. Click the Options item. The Options dialog box appears.



NOTE If you're familiar with the Windows 95/98 Explorer, you should feel at home with the Files tab of the Options dialog box. Clicking the plus sign to the left of the items in the list expands the option to display more detail.

This dialog box contains several "pages," indicated by the tabs across the top, that contain settings for controlling what AutoCAD shows you on its screens, where you want it to look for special files, and other "housekeeping" settings. You needn't worry about what these options mean at this point. Appendix B describes the Options dialog box in more detail.

3. In the Options dialog box, click the tab labeled Open and Save. The options change to reveal new options.



In the middle-left side of the dialog box, you'll see a check box labeled Automatic Save, with the Minutes Between Saves input box set to 120 minutes. This setting controls how frequently AutoCAD performs an automatic save.

4. Change the 120 to 20, and then click OK. You have just changed AutoCAD's Automatic Save feature to automatically save files every 20 minutes instead of every two hours. (Let this be a reminder to give your eyes a rest!)

5. Finally, click the OK button at the bottom of the dialog box to save your changes and dismiss the dialog box.

The third type of item you'll find on pull-down menus is a command that directly executes an AutoCAD operation. Let's try an exercise to explore these commands.

1. Click the Draw option from the menu bar, and then click the Rectangle command. Notice that the Command window now shows the following prompt:

```
Specify first corner point or [Chamfer/Elevation/Fillet/
Thickness/Width]:
```

AutoCAD is asking you to select the first corner for the rectangle, and in brackets, it is offering a few options that you can take advantage of at this point in the command. Don't worry about those options right now. You'll have an opportunity to learn about command options in Chapter 2.

2. Click a point roughly in the lower-left corner of the drawing area, as shown in Figure 1.6. Now as you move your mouse, you'll see a rectangle follow the cursor with one corner fixed at the position you just selected. You'll also see the following prompt in the Command window:

   ```
   Specify other corner point:
   ```

3. Click another point anywhere in the upper-right region of the drawing area. A rectangle appears (see Figure 1.7). You'll learn more about the different cursor shapes and what they mean in Chapter 2.

At this point you've seen how most of AutoCAD's commands work. You'll find that dialog boxes are offered when you want to change settings, while many drawing and editing functions present messages in the Command window. Also, be aware that many of the pull-down menu items are duplicated in the toolbars that you will explore next.

FIGURE 1.6:

Selecting the first point of a rectangle

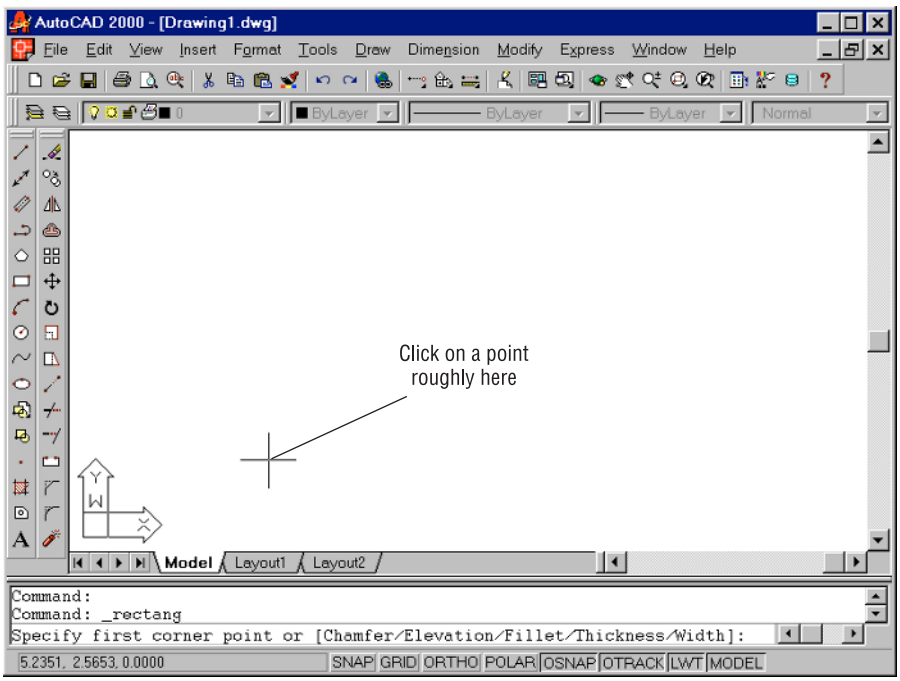
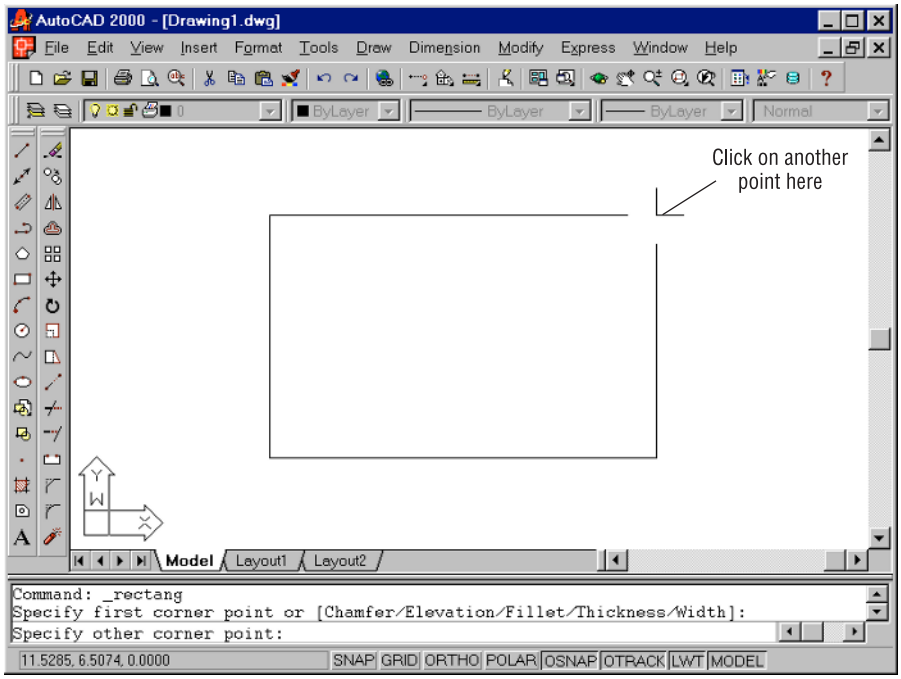


FIGURE 1.7:

Once you've selected your first point of the rectangle, the cursor disappears and you see a rectangle follow the motion of your mouse.



Communicating with AutoCAD

AutoCAD is the perfect servant: It does everything you tell it to, and no more. You communicate with AutoCAD using the pull-down menus and the toolbars. These devices invoke AutoCAD commands. A command is a single-word instruction you give to AutoCAD telling it to do something, such as draw a line (the Line tool in the Draw toolbar) or erase an object (the Erase tool in the Modify toolbar). Whenever you invoke a command, by either typing it in or selecting a menu or toolbar item, AutoCAD responds by presenting messages to you in the Command window or by displaying a dialog box.

The messages in the Command window often tell you what to do next, or they offer a list of options. A single command often presents several messages, which you answer to complete the command. These messages serve as an aid to new users who need a little help. If you ever get lost while using a command, or forget what you are supposed to do, look at the Command window for clues. As you become more comfortable with AutoCAD, you will find that you won't need to refer to these messages as frequently.

Continued on next page

As an additional aid, you can right-click to display a context-sensitive menu. If you are in the middle of a command and are not selecting points, this menu offers a list of options specifically related to that command. For example, if you had right-clicked your mouse before picking the first point for the rectangle command in the previous exercise, a popup menu would have appeared, offering the same options that were listed in the command prompt, plus some additional options.

A dialog box is like a form you fill out on the computer screen. It lets you adjust settings or make selections from a set of options pertaining to a command. You'll get a chance to work with commands and dialog boxes later in this chapter.

The Toolbars

While the pull-down menus offer a full range of easy-to-understand options, they require some effort to navigate. The toolbars, on the other hand, offer quick, single-click access to the most commonly used AutoCAD features. In the default AutoCAD window arrangement, you see the most commonly used toolbars. Other toolbars are available but they are hidden from view until you open them.

The tools in the toolbars perform three types of actions, just like the pull-down menu commands: They display further options, open dialog boxes, and issue commands that require keyboard or cursor input.

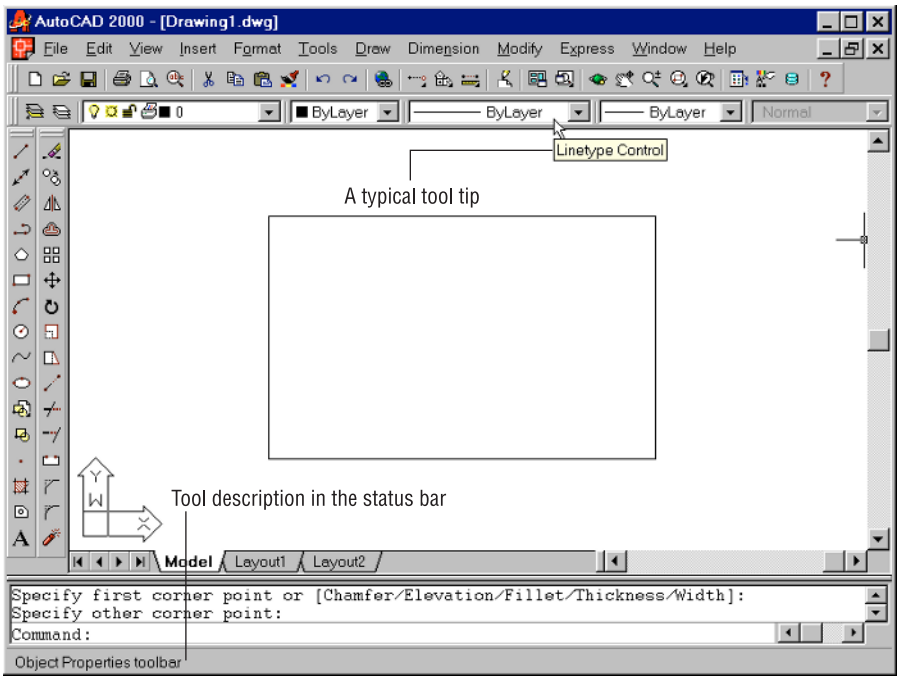
The Toolbar Tool Tips

AutoCAD's toolbars contain tools that represent commands. To help you understand each tool, a *tool tip* appears just below the arrow cursor when you rest the cursor on a tool. Each tool tip helps you identify the tool with its function. A tool tip appears when you follow these steps:

1. Move the arrow cursor onto one of the toolbar tools and leave it there for a second or two. Notice that the command's name appears nearby—this is the tool tip. In the status bar, a brief description of the button's purpose appears (see Figure 1.8).
2. Move the cursor across the toolbar. As you do, notice that the tool tips and status bar descriptions change to describe each tool. The keyboard command equivalent of the tool is also shown in the status bar at the end of the description.

FIGURE 1.8:

Tool tips show you the function of each tool in the toolbar. AutoCAD also displays a description of the tool in the status bar.



Flyouts

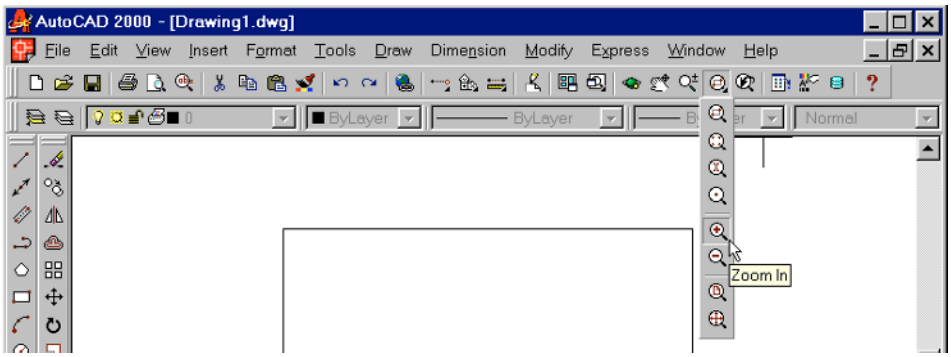
Most toolbar tools start a command as soon as you click them, but other tools display a set of additional tools (similar to the menus in the menu bar) that are related to the tool you have selected. This set of additional tools is called a toolbar *flyout*. If you've used other Windows graphics programs, chances are you've seen flyouts. Look closely at the tools just below the Express or Dimension pull-down menu options on your screen or in Figure 1.8. You'll be able to identify which toolbar tools have flyouts; they'll have a small right-pointing arrow in the lower-right corner of the tool.

TIP

Remember: When an instruction says, "click," you should lightly press the left mouse button until you hear a click; then immediately let it go. Don't hold it down.

The following steps show you how a flyout works:

1. Move the cursor to the Zoom Window tool in the Standard toolbar. Click and hold the left mouse button to display the flyout. Don't release the mouse button.



2. Still holding down the left mouse button, move the cursor over the flyout; notice that the tool tips appear here as well. Also, notice the description in the status bar.
3. Move the cursor to the Zoom Window tool at the top of the flyout and release the mouse button.
4. You won't need to use this tool yet, so press the Esc key to cancel this tool.

As you can see from this exercise, you get a lot of feedback from AutoCAD!

Moving the Toolbars

One unique characteristic of AutoCAD's toolbars is their mobility. They can be either floating anywhere on the AutoCAD window or in a *docked* position. Docked means the toolbar is placed against the top and side borders of the AutoCAD window, so that the toolbar occupies a minimal amount of space. If you want to, you can move the toolbar to any location on your desktop, thus turning it into a floating toolbar.

Later in this section you'll find descriptions of all of AutoCAD's toolbars, but first try the following exercise to move the Object Properties toolbar away from its current position in the AutoCAD window.

1. Move the arrow cursor so that it points to the vertical bars, called *grab bars*, to the far left of the Object Properties toolbar, as shown here:

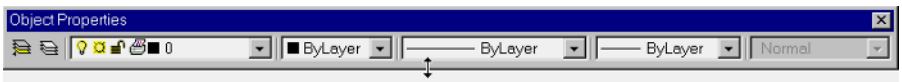
2. Press and hold down the left mouse button. Notice that a gray rectangle appears by the cursor.
3. Still holding down the mouse button, move the mouse downward. The gray box follows the cursor.
4. When the gray box is over the drawing area, release the mouse button and the Object Properties toolbar—now a floating toolbar—moves to its new location.

NOTE

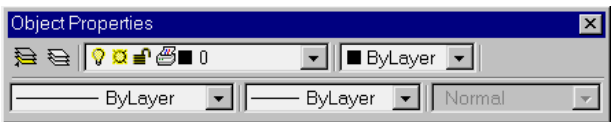
Terminology to Remember: The action you perform in steps 2 and 3 of this exercise—holding down the mouse/pick button while simultaneously moving the mouse—is called *click and drag*. (If you have used other Windows applications, you already know this.) From now on, this book will use the term "click and drag" to describe this type of action.

You can now move the Object Properties toolbar to any location on the screen that suits you. You can also change the shape of the toolbar. Try the following steps:

1. Place the cursor on the bottom-edge border of the Object Properties toolbar. The cursor becomes a double-headed arrow, as shown here:

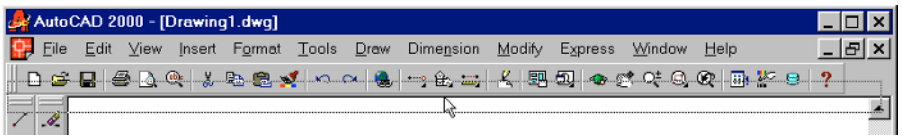


2. Click and drag the border downward. The gray rectangle jumps to a new, taller rectangle as you move the cursor.
3. When the gray rectangle changes to the shape you want, release the mouse button to reshape the toolbar.



4. To move the toolbar back into its docked position, place the arrow cursor on the toolbar's title bar and slowly click and drag the toolbar so that the

cursor is in position in the upper-left corner of the AutoCAD window. Notice how the gray outline of the toolbar changes as it approaches its docked position.



5. When the outline of the Object Properties toolbar is near its docked position, release the mouse button. The toolbar moves back into its previous position in the AutoCAD window.

TIP

You can also move a toolbar from a docked position to a floating one by double-clicking the toolbar's grab bar. Double-click the title bar of a floating toolbar to move the toolbar to its docked position.

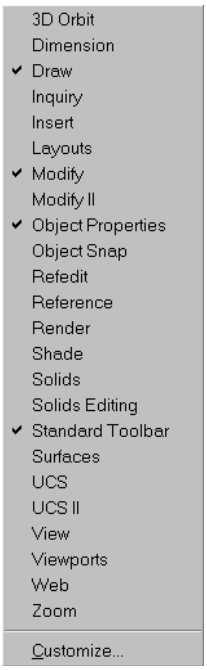
You can move and reshape any of AutoCAD's toolbars to place them out of the way, yet still have them at the ready to give you quick access to commands. You can also put them away altogether when you don't need them and bring them back at will, as shown in the following steps:

1. Click and drag the Draw toolbar from its position at the left of the AutoCAD window to a point near the center of the drawing area. Remember to click and drag the grab bars at the top of the toolbar.
2. Click the Close button in the upper-left corner of the Draw floating toolbar. This is the small square button with the *x* in it. The toolbar disappears.

NOTE

Terminology to Remember: When this book asks you to select an option from the pull-down menu, you will see the notation *Menu* ➢ *Option*. For cascading menus, the notation will be *Menu* ➢ *Option* ➢ *Option;* the second ➢ *Option* is in a cascading menu. In either case, the selected menu option issues a command that performs the function being discussed. As mentioned earlier, the actual command name appears in the status bar when you point to a menu option or toolbar tool.

3. To recover the Draw toolbar, right-click any toolbar—the Properties toolbar, for example. A popup list of toolbars appears.



4. Locate and select Draw in the popup list of toolbars. The Draw toolbar reappears.
5. Click and drag the Draw toolbar back to its docked position in the far-left side of the AutoCAD window.

AutoCAD remembers your toolbar arrangement between sessions. When you exit and then reopen AutoCAD later, the AutoCAD window appears just as you left it.

You may have noticed several other toolbars listed in the popup list of toolbars that don't appear in the AutoCAD window. To keep the screen from becoming cluttered, many of the toolbars are not placed on the screen. The toolbars you'll be using most often are displayed first; others that are less frequently used are kept out of sight until they are needed. Here are brief descriptions of all the toolbars available on the popup list:

3D Orbit Tools to control 3D views.

Dimension Commands that help you dimension your drawings. Many of these commands are duplicated in the Dimension pull-down menu. See Chapter 9.

Draw Commands for creating common objects, including lines, arcs, circles, curves, ellipses, and text. This toolbar appears in the AutoCAD window by default. Many of these commands are duplicated in the Draw pull-down menu.

Inquiry Commands for finding distances, point coordinates, object properties, mass properties, and areas.

Insert Commands for importing other drawings, raster images, and OLE objects.

Layouts Tools that let you set up drawing layouts for viewing, printing, and plotting.

Modify Commands for editing existing objects. You can Move, Copy, Rotate, Erase, Trim, Extend, and so on. Many of these commands are duplicated in the Modify pull-down menu.

Modify II Commands for editing special complex objects such as polylines, multilines, 3D solids, and hatches.

Object Properties Commands for manipulating the properties of objects. This toolbar is normally docked below the pull-down menu bar.

Object Snap Tools to help you select specific points on objects, such as endpoints and midpoints. See Chapter 3.

Refedit Tools that allow you to make changes to symbols or background drawings that are imported as external reference drawings. See Chapter 12.

Reference Commands that control cross-referencing of drawings. See Chapters 6 and 12.

Render Commands to operate AutoCAD's rendering feature. See Chapter 17.

Shade Offers tools to control the way 3D models are displayed. See Chapter 15 for more on Shade.

Solids Commands for creating 3D solids. See Chapter 18.

Solids Editing Command for editing 3D solids. See Chapter 18.

Standard Toolbar The most frequently used commands for view control, file management, and editing. This toolbar is normally docked below the pull-down menu bar.

Surfaces Commands for creating 3D surfaces. See Chapters 15 and 16.

UCS Tools for setting up a plane on which to work. UCS stands for User Coordinate System. This is most useful for 3D modeling, but it can be helpful in 2D drafting, as well. See Chapter 16.

UCS II Tools for selecting from a set of predefined user coordinate systems.

View Offers tools to control the way you view 3D models. See Chapter 15 for more on 3D views.

Viewports Tools that let you create and edit multiple views to your drawing. See Chapter 12 for more in viewports.

Web Tools for accessing the World Wide Web.

Zoom Commands that allow you to navigate your drawing.

You'll get a chance to work with all of the toolbars as you work through this book. Or, if you plan to use the book as a reference rather than working through it as a chapter-by-chapter tutorial, any exercise you try explains which toolbar to use for performing a specific operation.

Menus versus the Keyboard

Throughout this book, you will be told to select commands and command options from the pull-down menus and toolbars. For new and experienced users alike, menus and toolbars offer an easy-to-remember method for accessing commands. If you are an experienced AutoCAD user who is used to the earlier versions of AutoCAD, you still have the option of entering commands directly from the keyboard. Most of the commands you know and love still work as they did from the keyboard.

Another method for accessing commands is to use *accelerator keys,* which are special keystrokes that open and activate pull-down menu options. You might have noticed that the commands in the menu bar and the items in the pull-down menus all have an underlined character. By pressing the Alt key followed by the key corresponding to the underlined character, you activate that command or option, without having to engage the mouse. For example, to issue File ➢ Open, press Alt, then F, then finally O (Alt+F+O).

Many tools and commands have keyboard *shortcuts;* shortcuts are one-, two-, or three-letter abbreviations of a command name. As you become more proficient with AutoCAD, you may find these shortcuts helpful. As you work through this book, the shortcuts will be identified for your reference.

Finally, if you are feeling adventurous, you can create your own accelerator keys and keyboard shortcuts for executing commands by adding them to the AutoCAD support files. Chapters 21 and 22 discuss customization of the menus, toolbars, and keyboard shortcuts.

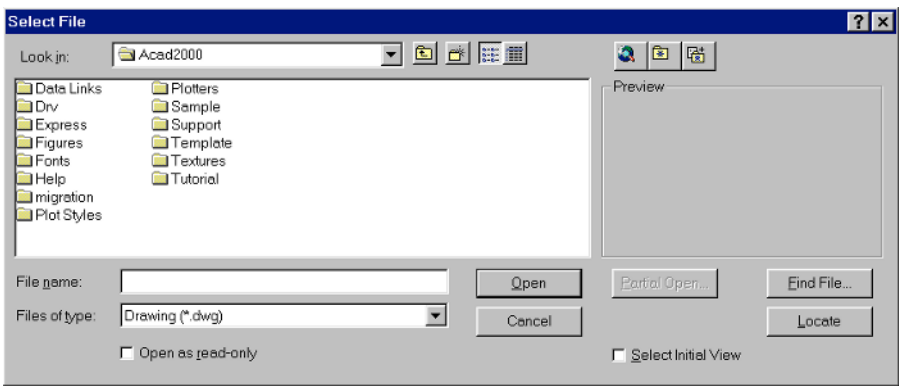
Working with AutoCAD

Now that you've been introduced to the AutoCAD window, let's try using a few of AutoCAD's commands. First, you'll open a sample file and make a few simple modifications to it. In the process, you'll become familiar with some common methods of operation in AutoCAD.

Opening an Existing File

In this exercise, you will get a chance to see and use a typical Select File dialog box. To start with, you will open an existing file.

1. From the menu bar, choose File ➢ Close. A message appears asking you if you want to save the changes you've made to the current drawing. Click No.
2. Choose File ➢ Open. The Select File dialog box appears. This is a typical Windows file dialog box, with an added twist. The large Preview box on the right allows you to preview a drawing before you open it, thereby saving time while searching for files.
3. In the Select File dialog box, go to the Directories list and locate the directory named `Figures` (you may need to scroll down the list to find it). Point to it and double-click (press the mouse/pick button twice in rapid succession). (If you're having trouble opening files with a double-click, here's another way to do it until you are more proficient with the mouse: Click the file once to highlight it, and then click the OK button.) The file list on the left changes to show the contents of the `Figures` directory.



4. Move the arrow to the file named `Nozzle3d` and click it. Notice that the `Nozzle3d.dwg` filename now appears in the File Name input box above the file list. Also, the Preview box now shows a thumbnail image of the file.

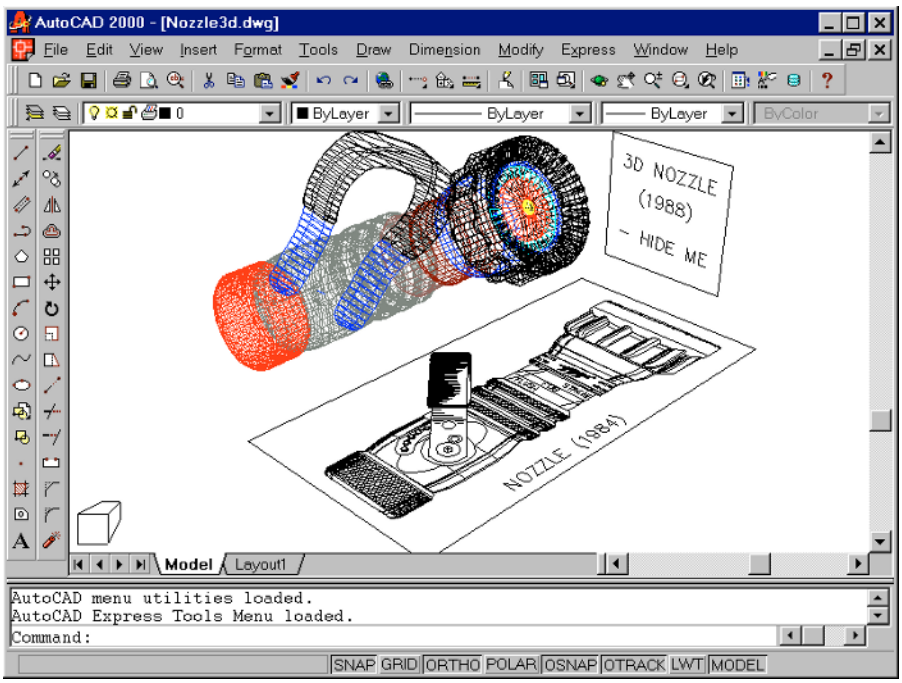
NOTE

The `Nozzle3D` drawing is included on the companion CD-ROM. If you cannot find this file, be sure you have installed the sample drawings from the companion CD-ROM. See Appendix C for installation instructions.

5. Click the OK button at the bottom of the Select File dialog box. AutoCAD opens the `Nozzle3d` file, as shown in Figure 1.9.

FIGURE 1.9:

In the early days, this nozzle drawing became the unofficial symbol of AutoCAD, frequently appearing in ads for AutoCAD third-party products.

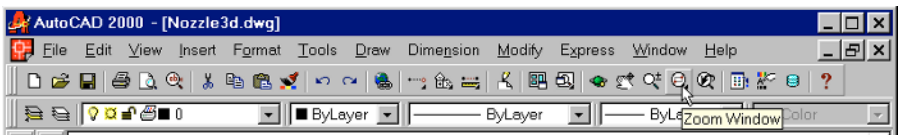


The `Nozzle3d` file opens to display the entire drawing. Also, the AutoCAD window's title bar displays the name of the drawing. This offers easy identification of the file. This particular file contains both a 2D and 3D model of a fire hose nozzle. The opening view is actually a 3D view.

Getting a Closer Look

One of the most frequently used commands is the Zoom command. Zoom lets you get a closer look at a part of your drawing. It offers a variety of ways to control your view. Now you'll enlarge a portion of the Nozzle drawing to get a more detailed look. To tell AutoCAD what area you wish to enlarge, you use what is called a *window*.

1. Choose View ➢ 3D Views ➢ Plan View ➢ World UCS. Your view changes to display a two-dimensional view looking down on the drawing.
2. Click the Zoom Window button on the Standard toolbar.



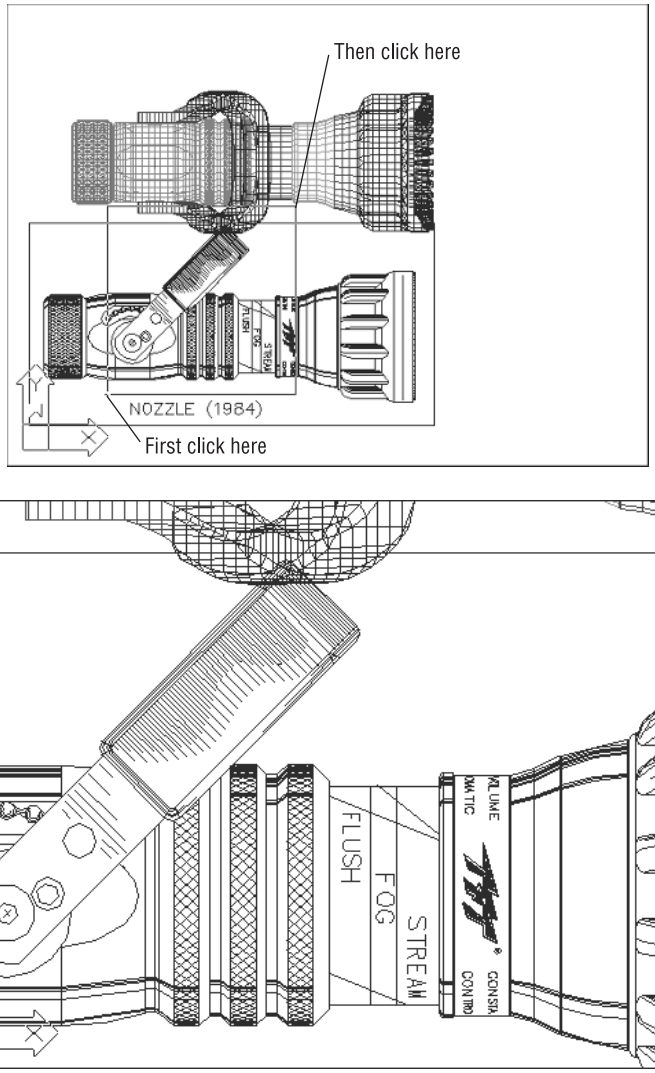
   You can also Choose View ➢ Zoom ➢ Window from the pull-down menu or type the command: **Z**↵ **W**↵.
3. The Command window displays the `First corner:` prompt. Look at the top image of Figure 1.10. Move the crosshair cursor to a location similar to the one shown in the figure, then left-click the mouse. Move the cursor and the rectangle appears, with one corner fixed on the point you just picked, while the other corner follows the cursor.
4. The Command window now displays the `Specify first corner:` and `Specify opposite corner:` prompts. Position the other corner of the window so it encloses the handle of the nozzle, as shown in the top image of Figure 1.10, and press the mouse/pick button. The handle enlarges to fill the screen (see the bottom image of Figure 1.10).

NOTE

Notice that tiny crosses appear where you picked points. These are called *blips*—markers that show where you've selected points. They do not become a permanent part of your drawing, nor do they print onto printed output.

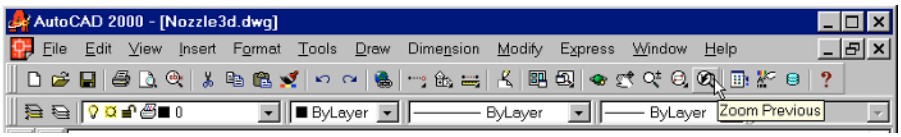
FIGURE 1.10:

Placing the Zoom window around the nozzle handle. After clicking the Zoom Window button in the Standard toolbar, select the two points shown in this figure.



In this exercise, you used the Window option of the Zoom command to define an area to enlarge for your close-up view. You saw how AutoCAD prompts you to indicate first one corner of the window and then the other. These messages are helpful for first-time users of AutoCAD. You will be using the Window option frequently—not just to define views, but also to select objects for editing.

Getting a close-up view of your drawing is crucial to working accurately with a drawing, but you'll often want to return to a previous view to get the overall picture. To do so, click the Zoom Previous button on the Standard toolbar.



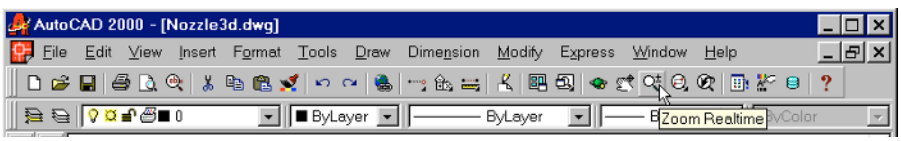
Do this now, and the previous view—one showing the entire nozzle—returns to the screen. You can also get there by choosing View ➢ Zoom ➢ Previous.

You can quickly enlarge or reduce your view using the Zoom Realtime button on the Standard toolbar.

NOTE

You can also zoom in and out using the Zoom In and Zoom Out buttons in the Zoom Window flyout of the Standard toolbar. The Zoom In button shows a magnifying glass with a plus sign; the Zoom Out button shows a minus sign. If you have a mouse equipped with a scroll wheel, you can zoom in and out just by turning the wheel. The location of the cursor at the time you move the wheel will determine the center of the zoom. A click-and-drag of the scroll wheel will let you pan your view.

1. Click the Zoom Realtime button on the Standard Toolbar.



The cursor changes into a magnifying glass.

2. Place the Zoom Realtime cursor slightly above the center of the drawing area, and then click and drag downward. Your view zooms out to show more of the drawing.
3. While still holding the left mouse button, move the cursor upward. Your view zooms in to enlarge your view. When you have a view similar to the

one shown in Figure 1.11, release the mouse button. (Don't worry if you don't get the *exact* same view as the figure. This is just for practice.)

4. You are still in Zoom Realtime mode. Click and drag the mouse again to see how you can further adjust your view. To exit, select another command besides a Zoom or Pan command, press the Esc key, or right-click your mouse.

5. Go ahead and right-click now. A popup menu appears.

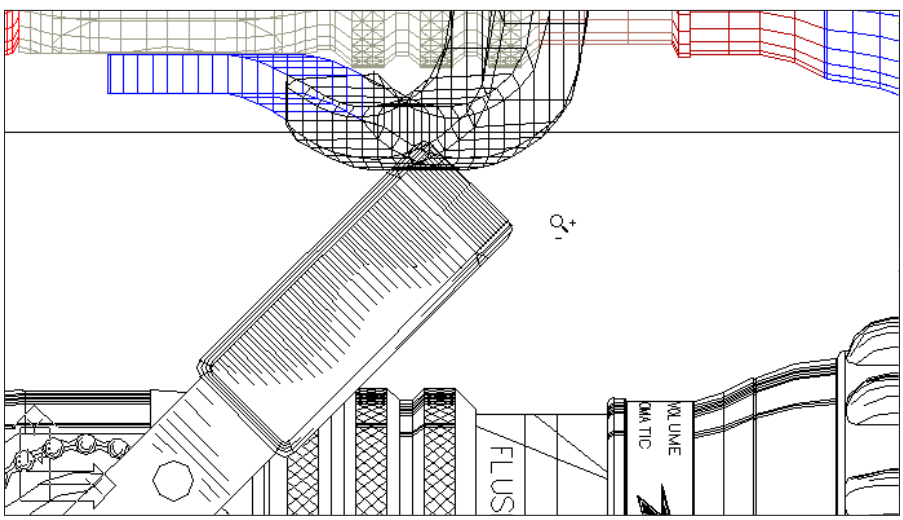
This menu lets you select other display-related options.

6. Click Exit from the popup menu to exit the Zoom Realtime command.

As you can see from this exercise, you have a wide range of options for viewing your drawings, just by using a few buttons. In fact, these three buttons, along with the scroll bars at the right side and bottom of the AutoCAD window are all you need to control the display of your 2D drawings.

FIGURE 1.11:

The final view you want to achieve in step 3 of the exercise



The Aerial View Window

The *Aerial View* window is an optional AutoCAD display tool. It gives you an overall view of your drawing, regardless of the magnification you are using for the drawing editor. Aerial View also makes it easier to get around in a large-scale drawing. You'll find that this feature is best suited to complex drawings that cover great areas, such as site plans, topographical maps, or city planning documents.

The Aerial View is not discussed much in this chapter, because it can be a bit confusing for the first-time AutoCAD user. However, as you become more comfortable with AutoCAD, you may want to try it out. You'll find a detailed description of the Aerial View window in Chapter 6.

Saving a File As You Work

It is a good idea to periodically save your file as you work on it. You can save it under its original name (with File ➢ Save) or under a different name (with File ➢ Save As), thereby creating a new file.

By default, AutoCAD automatically saves your work at 120-minute intervals under the name `AUTO.SV$`; this is known as the *Automatic Save* feature. Using settings in the Options dialog box or system variables, you can change the name of the autosaved file and control the time between autosaves. See the *Using AutoCAD's Automatic Save Feature* sidebar in Chapter 3 for details.

Let's first try the Save command. This quickly saves the drawing in its current state without exiting the program.

Choose File ➢ Save. You will notice some disk activity while AutoCAD saves the file to the hard disk. As an alternative to choosing File ➢ Save from the menu, you can type **Alt+F S**. This is the accelerator key, also called *hotkey*, for the File ➢ Save command.

Now try the Save As command. This command brings up a dialog box that allows you to save the current file under a new name.

1. Choose File ➢ Save As, or type **Saveas**↵ at the command prompt. The Select File dialog box appears. Note that the current filename, `Nozzle3d.dwg`, is highlighted in the File Name input box at the bottom of the dialog box.

2. Type **Myfirst**. As you type, the name `Nozzle3d` disappears from the input box and is replaced by `Myfirst`. You don't need to enter the .dwg filename extension. AutoCAD adds it to the filename automatically when it saves the file.
3. Click the Save button. The dialog box disappears, and you will notice some disk activity.

You now have a copy of the nozzle file under the name `Myfirst.dwg`. The name of the file displayed in the AutoCAD window's title bar has changed to `Myfirst`. From now on, when you use the File ➢ Save option, your drawing will be saved under its new name. Saving files under a different name can be useful when you are creating alternatives or when you just want to save one of several ideas you have been trying out.

TIP

If you are working with a monitor that is on the small side, you may want to consider closing the Draw and Modify toolbars. The Draw and Modify pull-down menus offer the same commands, so you won't lose any functionality by closing these toolbars. If you really want to maximize your drawing area, you can also turn off the scroll bars and reduce the Command window to a single line. See *Setting Options* in Appendix B for details on how to do this.

Making Changes

You will be making frequent changes to your drawings. In fact, one of AutoCAD's chief advantages is the ease with which you can make changes. The following exercise shows you a typical sequence of operations involved in making a change to a drawing:

1. From the Modify toolbar, click the Erase tool (the one with a pencil eraser touching paper). This activates the Erase command. You can also choose Modify ➢ Erase from the pull-down menu.

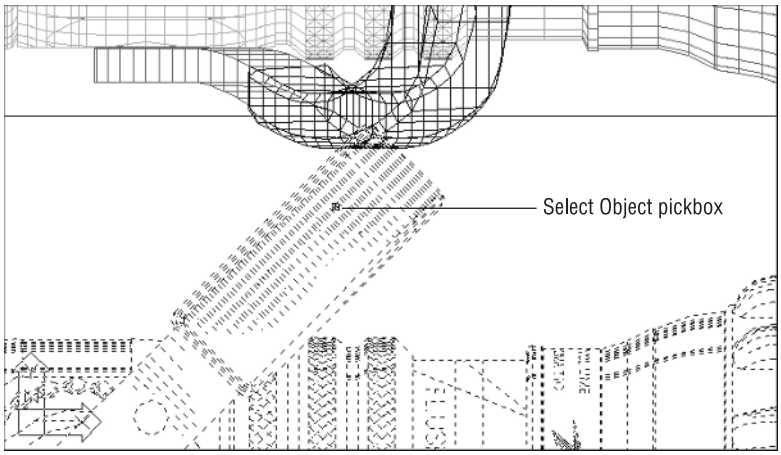
Notice that the cursor has turned into a small square; this square is called the *pickbox*. You also see `Select object:` in the command prompt area. This message helps remind new users what to do.

2. Place the pickbox on the diagonal pattern of the nozzle handle (see Figure 1.12) and click it. The 2D image of the nozzle becomes highlighted. The pickbox and the `Select object:` prompt remain, telling you that you can continue to select objects.

3. Now press ↵. The nozzle and the rectangle disappear. You have just erased a part of the drawing.

FIGURE 1.12:

Erasing a portion of the nozzle handle



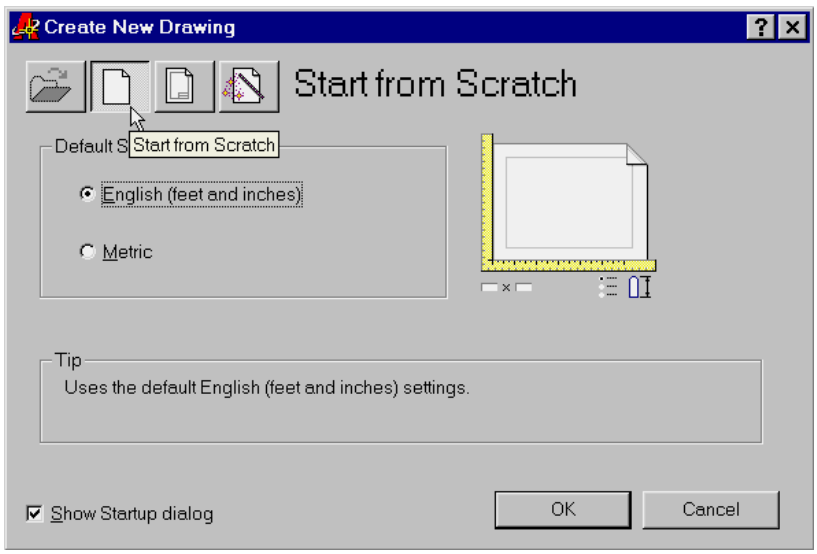
In this exercise, you first issued the Erase command, and then selected an object by clicking it using a pickbox. The pickbox tells you that you must select items on the screen. Once you've done that, press ↵ to move on to the next step. This sequence of steps is common to many of the commands you will work with in AutoCAD.

Opening Multiple Files

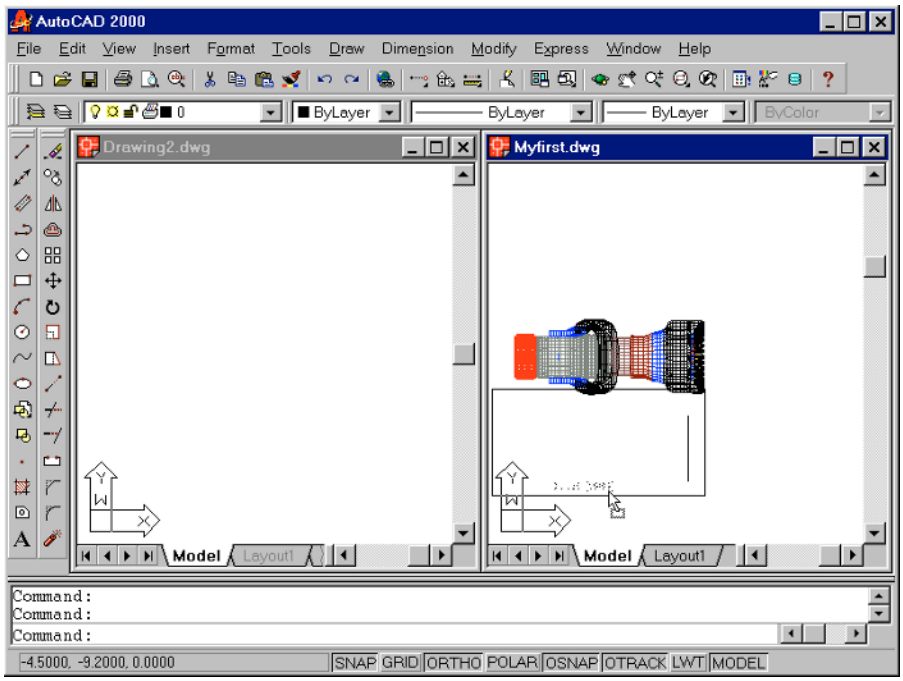
With AutoCAD 2000, you can now have multiple documents open at the same time. This can be especially helpful if you want to exchange parts of drawings

between files or if you just want to have another file open for reference. Try the following exercise to see how multiple documents work in AutoCAD:

1. Choose File ➢ New.
2. In the Create New Drawing dialog box, click the Start from Scratch button at the top of the dialog box.



3. Click the English radio button, then click OK. You'll get a blank drawing file.
4. Choose Window ➢ Tile Vertically to get a view of both drawing files. The options in the Window pull-down menu act just like their counterparts in other Windows programs that allow multiple document editing.
5. Click in the window with the `Nozzle3d` drawing to make it active.
6. Choose View ➢ Zoom ➢ All to get an overall view of the drawing.
7. Click the words `Nozzle 1984` near the bottom of the drawing.
8. Click and drag on the words `Nozzle 1984`. You'll see a small rectangle appear next to the cursor.



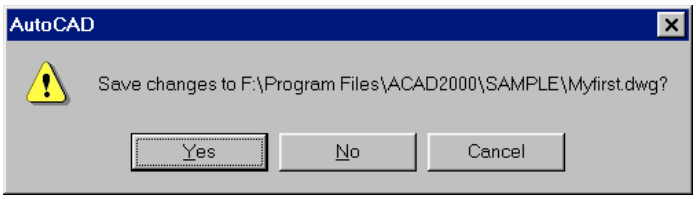
9. While still holding the left mouse button, drag the cursor to the new file window. When you see the words `Nozzle 1984` appear in the new drawing window, release the mouse button. You've just copied a text object from one file to another.

Now you have two files open at once. You can have as many files open as you want, as long as you have adequate memory to accommodate them. You can control the individual document windows as you would any window using the Window pull-down menu or the window control buttons in the upper-right corner of the document window.

Closing AutoCAD

When you are done with your work on one drawing, you can open another drawing, temporarily leave AutoCAD, or close AutoCAD entirely. To close all the open files at once and exit AutoCAD, use the Exit option on the File menu.

1. Choose File ➢ Exit, the last item in the File menu. A dialog box appears, asking you if you want to "Save Changes to `Myfirst.dwg`?" and offering three buttons labeled Yes, No, and Cancel.



2. Click the No button.
3. AutoCAD displays another message asking you if you want to save `Drawing2.dwg`, which is the new drawing you opened in the last exercise. Click the No button again. AutoCAD closes both the nozzle drawing and the new drawing and exits without saving your changes.

Whenever you attempt to exit a drawing that has been changed, you get this same inquiry box. This request for confirmation is a safety feature that lets you change your mind and save your changes before you exit AutoCAD. In the previous exercise, you discarded the changes you made, so the nozzle drawing reverts back to its state before you erased the handle. The new drawing is completely discarded and no file is saved.

If you only want to exit AutoCAD temporarily, you can minimize it so it appears as a button on the Windows 95/98 or Windows NT 4 toolbar. You do this by clicking the Minimize button in the upper-right corner of the AutoCAD window; the Minimize button is the title bar button that looks like an underscore (_). Alternatively, you can use the Alt+Tab key combination to switch to another program.

If You Want to Experiment...

Try opening and closing some of the sample drawing files.

1. Start AutoCAD by choosing Start ➢ Programs ➢ AutoCAD 2000 ➢ AutoCAD 2000.
2. Click File ➢ Open.

3. Use the dialog box to open the `Myfirst` file again. Notice that the drawing appears on the screen with the handle enlarged. This is the view you had on screen when you used the Save command in the earlier exercise.
4. Erase the handle, as you did in the earlier exercise.
5. Click File ➢ Open again. This time, open the `Dhouse` file from the companion CD-ROM. Notice that you now see the Save Changes inquiry box that you saw when you used the Exit option earlier. File ➢ Open acts just like Exit, but instead of exiting AutoCAD altogether, it closes the current file and then opens a different one.
6. Click the No button. The 3D `Dhouse` drawing opens.
7. Click File ➢ Exit. Notice that you exit AutoCAD without getting the Save Changes dialog box. This is because you didn't make any changes to the `Dhouse` file.