

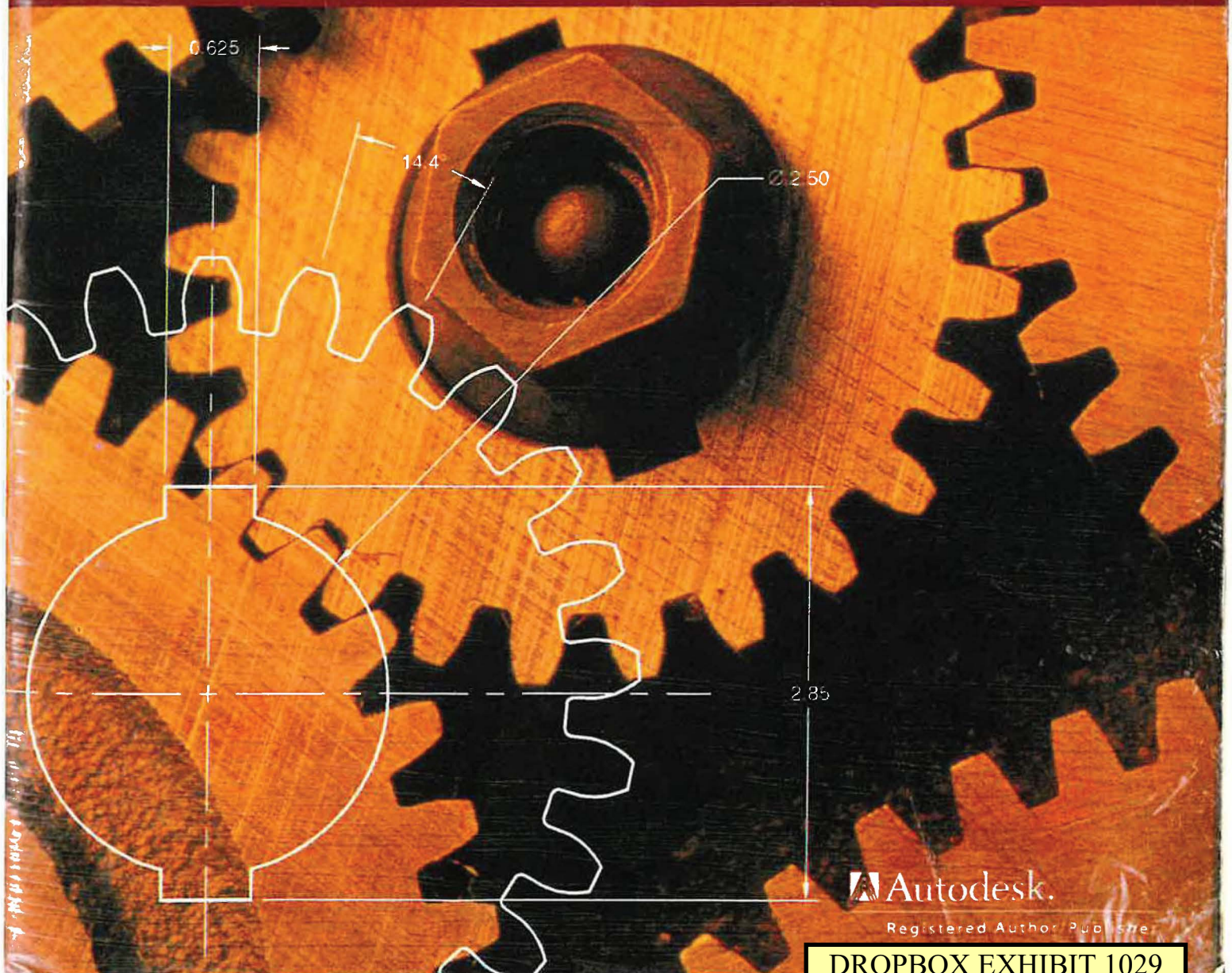
Release 14

AutoCAD

and its applications

Basics

Terence M. Shumaker / David A. Madsen



 Autodesk.

Registered Author/Publisher

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Release 14

AutoCAD

and its applications Basics

by

Terence M. Shumaker

Manager

Autodesk Premier Training Center

Clackamas Community College, Oregon City, OR

David A. Madsen

Chairperson

Drafting Technology

Autodesk Premier Training Center

Clackamas Community College, Oregon City, OR

Former Board of Director

American Design Drafting Association

 **Autodesk.**

Registered Author/Publisher

Publisher

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BASIC THREE-DIMENSIONAL DRAWING

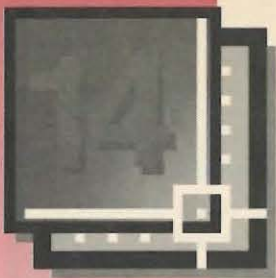
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Introduction to AutoCAD Features

Learning Objectives

After completing this chapter, you will be able to:

- Describe the methods and procedures used in computer-aided drafting.
- Explain the value of planning your work and system management.
- Describe the appropriate locations for saving drawing files.
- Identify the meaning of DOS disk drive prompts.
- Load AutoCAD from the Windows Desktop.
- Describe the AutoCAD screen layout and user interface.
- Describe the function of dialog boxes.
- Use the keyboard and an input device to select commands, enter text, and pick locations on the screen.
- Use the **HELP** command for on-line assistance.
- Define the use of function, control, and shortcut keys.

The Tools of CAD

The computer and software are the principal components of the present-day design and drafting workstation. These tools make up a *system* referred to as CAD—Computer-Aided Design, or Computer-Aided Drafting. CAD is used by drafters, designers, and engineers to develop designs and drawings, and to plot them on paper or film. Additionally, drawings and designs can be displayed as 3D models and animations, or used in analysis and testing.

CAD has surpassed the use of manual drafting techniques because of its speed, power, accuracy, and flexibility, but is not totally without its attendant problems and trade-offs. Although the uses of CAD designs are limited only by the imagination, it should be remembered that the computer hardware is sensitive to the slightest electrical impulses, and the human body is sensitive to the repetitive motions required when using the tools.

The AutoCAD Toolbox

Drawings and models are constructed in AutoCAD using XYZ coordinates. The *Cartesian (rectangular)* coordinate system is used most often, and is discussed in Chapter 4. Angular layouts are created by measuring angles in a counterclockwise direction. Drawings can be annotated with text and described with a variety of dimensioning techniques. In addition, objects can be given colors, patterns, and textures. The tool you will use the most often is the ability to view the entire drawing or model, or its smallest feature from any direction. AutoCAD also provides you with the tools to create basic pictorial drawings called *isometrics*, and powerful 3D surface models and solids.

The Applications of AutoCAD

Using AutoCAD software and this text, you will learn how to construct, lay out, dimension, and annotate two-dimensional drawings. Should you wish to continue your study into 3D rendering and customization, *AutoCAD and its Applications—Advanced, Release 14* provides you with detailed instruction. Your studies will enable you to create a wide variety of drawings, designs, and 3D models in any of the drafting, design, and engineering disciplines.

The drawings can have hundreds of colors, and *layers* that contain different kinds of information. Objects can also be shown as exploded assemblies or displayed in 3D. See Figure 1-1.

In addition, objects in the drawing can be given “intelligence” in the form of *attributes*. These attributes are various kinds of data that turn a drawing into a graphical database. You can then ask questions of your drawing and receive a variety of information.

Using AutoCAD, you have the ability to construct 3D models that appear as wireframes or have surface colors and textures. The creation of solid models that have mass properties and can be analyzed is also possible with AutoCAD. The display in Figure 1-2 is an example of a solid model created in AutoCAD. 3D drawings and models can be viewed in several ways. These models can also be colored and shaded, or *rendered*, to appear in a realistic format.

Figure 1-1.
A nozzle shown as a
2D drawing and as
a 3D model.
(Autodesk, Inc.)

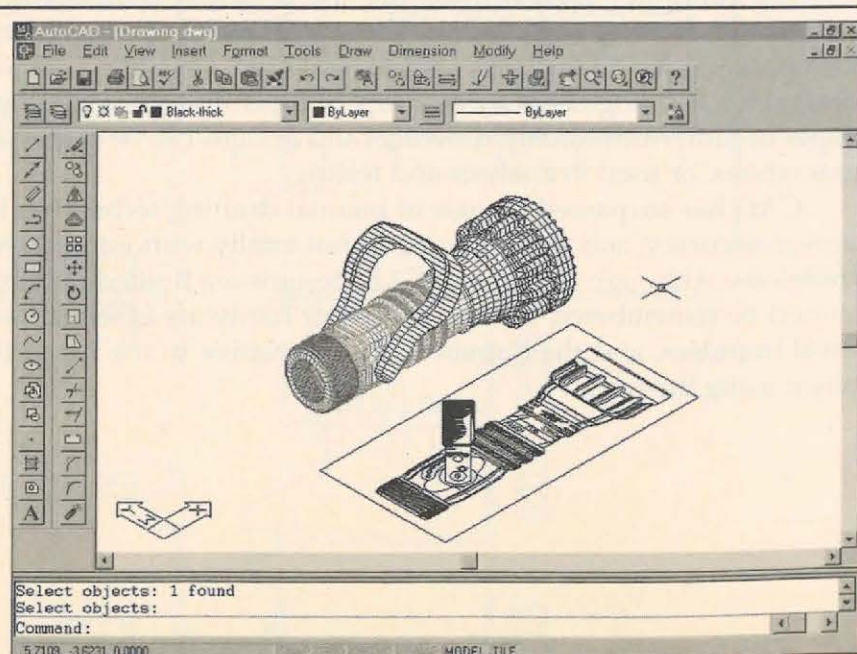
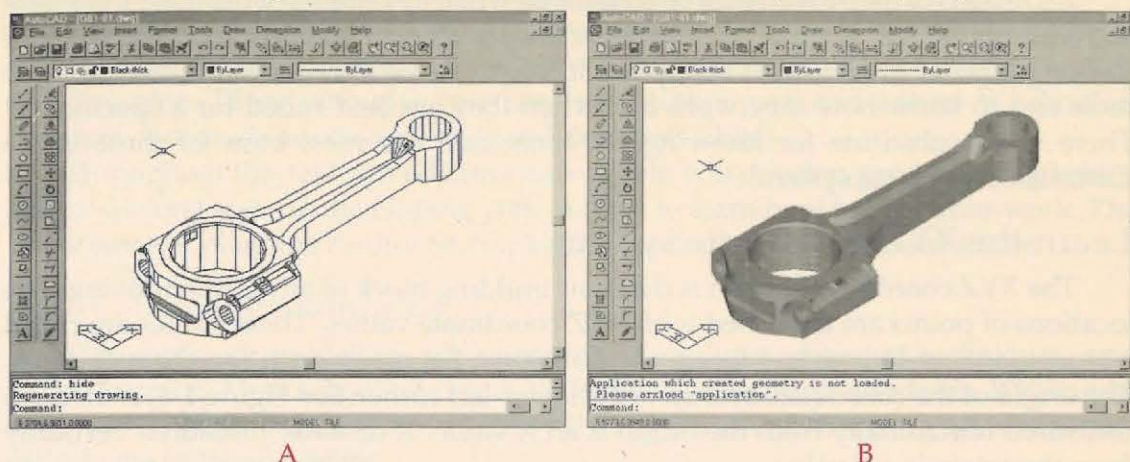


Figure 1-2.

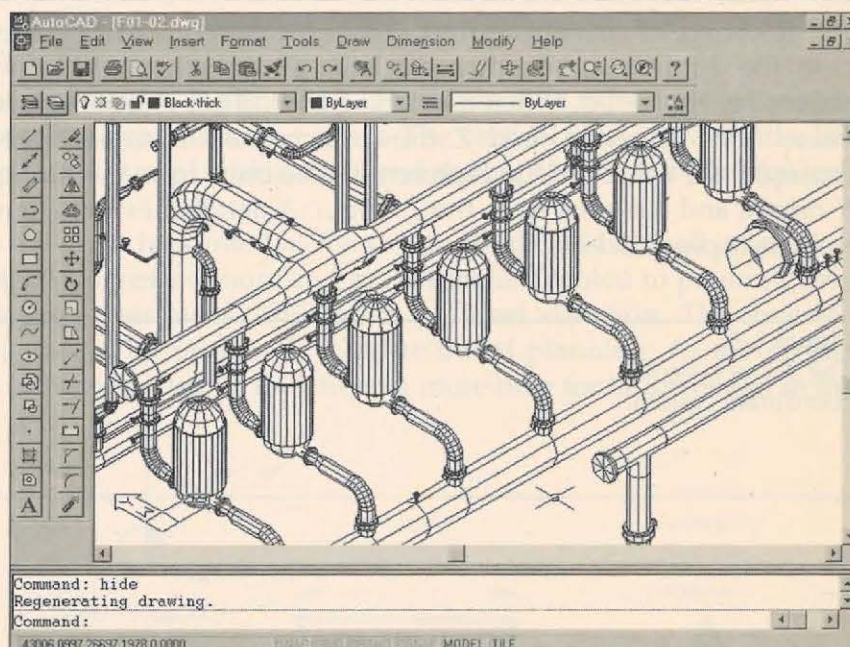
A 3D model of a control rod. A—Model shown as a wireframe, with edges marked by lines. B—Color and shading are added when the model is rendered. (Autodesk, Inc.)



A powerful application of CAD software and 3D models is animation. The simplest form of animation is to dynamically rotate the model in order to view it from any direction. See Figure 1-3. Drawings and models can also be animated so that the model appears to move, rotate, and even explode into its individual components. An extremely useful form of animation is called a *walkthrough*. Using specialized software, you can plot a path through or around a model and replay it just like a movie. The logical next step in viewing the model is to actually be inside it and have the ability to manipulate and change the objects in it. This is called *virtual reality*, and is achieved through the use of 3D models and highly specialized software and hardware.

Figure 1-3.

This 3D piping model can be rotated and viewed from any location in 3D space. (Autodesk, Inc.)



Graphics cards called *accelerator boards* may allow 1600×1200 resolution and up to 16.7 million colors. Older computers may have VGA (Video Graphics Array) resolution that supports only 16 colors. However, the most common resolution is Super VGA, which supports up to 16.7 million colors. Also, many industrial applications now need high-end graphics accelerator boards because of the complexity of the models, renderings, and animations.

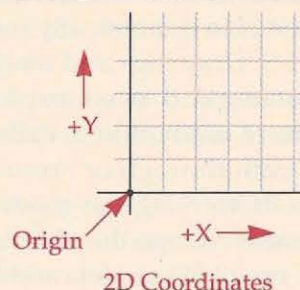
Establishing an AutoCAD Drawing Method

All aspects of the project must be considered when developing a drawing plan. This requires careful use of the CAD system and detailed standards for the planning and drawing process. Therefore, it is important for you to be familiar with the AutoCAD tools and to know how they work and when they are best suited for a specific job. There is no substitute for knowing the tools, and the most basic of these is the Cartesian coordinate system.

Learn the XYZ coordinate system

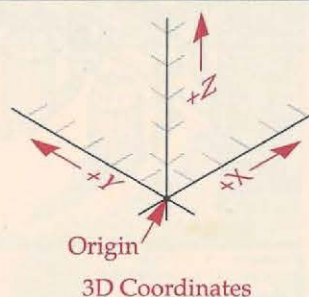
The XYZ coordinate system is the basic building block of any CAD drawing. The locations of points are described with XYZ coordinate values. These values are called *rectangular coordinates* and locate any point on a flat plane, such as a sheet of paper. The *origin* of the coordinate system is the lower-left corner. See Figure 1-4. A distance measured horizontally from the origin is an X value. A distance measured vertically from the origin is a Y value.

Figure 1-4.
The 2D rectangular
coordinate system.



Rectangular coordinates can also be measured in three-dimensional space. In this case, the third dimension rises up from the surface of the paper and is given the Z value. See Figure 1-5. When describing coordinate locations, it is proper to give the X value first, Y second, and Z third. Each number is separated by a comma. For example, the value of 3,1,6 represents three units from the X origin, one unit from the Y origin, and six units from the Z origin. A detailed explanation of rectangular coordinates is provided in Chapter 4.

Figure 1-5.
The 3D rectangular
coordinate system.



Planning your drawing

Drawing planning involves looking at the entire process or project that you are involved in. A plan determines how a project is going to be approached. It includes the drawings to be created, how they will be titled and numbered, the information to be presented, and the types of symbols needed to show the information.

More specifically, drawing planning applies to how you create and manage a drawing or set of drawings. This includes which view or feature you draw first and the coordinates and AutoCAD commands you use to draw it.

Drafters who begin constructing a drawing from the seat of their pants—creating symbols and naming objects, shapes, and views as they go—do not possess a good drawing plan. Those who plan, use consistent techniques, and adhere to school or company standards are developing good drawing habits.

Throughout this text you will find aids to help you develop good drawing habits. One of the first steps in developing your skills is to learn how to plan your work. The importance of planning cannot be emphasized enough. There is no substitute.

Using drawing standards

Standards are guidelines for operating procedures, drawing techniques, and record keeping. Most schools and companies have established standards. It is important that standards exist and are used by all CAD personnel. Drawing standards may include the following items:

- Methods of file storage: location and name.
- Dimensioning techniques.
- File naming conventions.
- Text styles.
- Drawing sheet sizes and title blocks to be used.
- Linetypes.
- Drawing symbols.
- Color schemes for plotting.
- File backup methods and times.

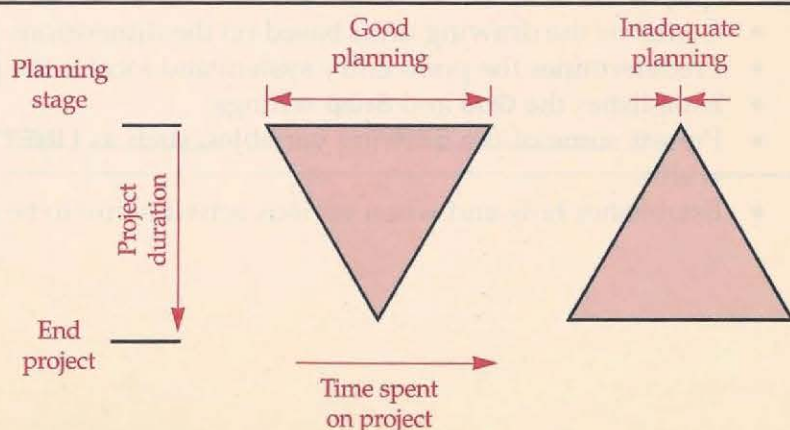
Your standards may vary in content, but the most important aspect of standards is that they are used. When standards are used, your drawings are consistent, you become more productive, and the classroom or office functions more efficiently.

Planning your work

Study the planning pyramids in Figure 1-6. The horizontal axes of the pyramids represent the amount of time spent on the project. The vertical axes represent the life of the project. The top level is the planning stage and the bottom level is the final execution of the project.

The pyramid on the right is pointed at the top and indicates a small amount of planning. As the project progresses, more and more time is devoted to planning and less time is available for other tasks. This is *not* an ideal situation. The inverted pyramid on the left shows a lot of time devoted to initial planning. As the project advances, less planning time is needed, thus freeing more time for tasks related to the completion of the project.

Figure 1-6.
Planning pyramids illustrate time required for well-planned and poorly-planned projects.



As you begin your CAD training, plan your drawing sessions thoroughly to organize your thoughts. Sketch the problem or design, noting size and locations of features. List the drawing commands needed in the order they are to be used. Schedule a regular time to use the computer and adhere to that time. Follow the standards set by your school or firm. These might include specific drawing names, project planning sheets, project logs, drawing layout procedures, special title blocks, and a location for drawing storage. Standards and procedures must be followed by everyone using the computers in your school or company. Confusion may result if your drawings do not have the proper name, are stored in the wrong place, or have the wrong title block.

Develop the habit of saving your work regularly—at least every 10 to 15 minutes. The **SAVETIME** system variable can be set to automatically save your drawings at predetermined intervals. **SAVETIME** is covered in detail in Chapter 3. Drawings may be lost due to a software error, hardware malfunction, power failure, or your own mistakes. This is not common, but you should still be prepared for such an event.

You should develop methods of managing your work. This is critical to computer drafting and is discussed throughout the text. Keep the following points in mind as you begin your AutoCAD training.

- ✓ Plan your work and organize your thoughts.
- ✓ Learn and use your classroom or office standards.
- ✓ Save your work often.

If you remember to follow these three points, your grasp of the tools and methods of CAD will be easier. In addition, your experiences with the computer will be more enjoyable.

Remember the planning pyramids as you begin your study of AutoCAD. When you feel the need to dive blindly into a drawing or project, restrain yourself. Take the time needed for development of the project goals. Then proceed with the confidence of knowing where you are heading.

During your early stages of AutoCAD training, write down all of the instructions needed to construct your drawing. Do this especially for your first few assignments. This means documenting every command and every coordinate point (dimension) needed. Develop a planning sheet for your drawings or use an example shown below. Your time spent at the computer with AutoCAD will be more productive and enjoyable.

Using drawing plan sheets

A good work plan can save drawing time. Planning should include sketches and drawing plan sheets. A rough preliminary sketch and completed drawing plan sheet help in the following ways:

- Determines the drawing layout.
- Sets the overall size of the drawing by laying out the views and required free space.
- Confirms the drawing units based on the dimensions provided.
- Predetermines the point entry system and locates the points.
- Establishes the **Grid** and **Snap** settings.
- Presets some of the drawing variables, such as **LINETYPE**, **FILL**, and polyline width.
- Establishes how and when various activities are to be performed.

- Determines the best use of AutoCAD.
- Results in an even work load.
- Provides maximum use of equipment.

Drawing plan sheets range in content, depending on the nature of the drafting project. One basic drawing plan sheet is shown in Figure 1-7.

Figure 1-7.

A drawing plan sheet and project log combination. They are generally printed on the front and back of one piece of paper. (Courtesy of Harlton Terrie Gaines; Palmer, Alaska)

DRAWING PLANNING SHEET		Page 1 of 2
The following information is to be furnished by the Assigned Project Engineer requesting design support:		
PROJECT TITLE: _____ DISCIPLINE: _____ PROJECT NO.: _____ PROJECT ENGINEER: _____ CLIENT: _____ DRAWING SCOPE OF WORK: _____ _____ _____	A.F.E. NO.: _____ PHONE NO.: _____ _____ _____	
The following information will be furnished by the assigned Lead Designer:		
LEAD DESIGNER: _____ DISK NAME: _____ FILE NAME: _____ DWG. GHOST (SIZE & FORMAT): _____ _____ DRAFTER: _____ DATE ASSIGNED: _____ DATE I.F.A.: _____ ESTIMATED M.H.: _____ DRAWING STANDARD: _____ AFFECTED TAG NO'S: _____ _____ _____	PHONE NO.: _____ DRAWING NO.: _____ _____ PHONE NO.: _____ DATE REQUIRED: _____ DATE I.F.C.: _____ ACTUAL M.H.: _____ MAT'L SPEC.: _____ REFERENCE SHEETS _____ _____	
Freehand sketch by drafter:		
Approved by: _____ Date: _____		

Figure 1-7.
(Continued)

DRAWING PLANNING SHEET				Page 2 of 2
Drafters notes: _____ _____ _____ _____ _____ _____ _____ _____				
Commands used by the drafter:				
	<u>Commands</u>	<u>Values</u>	<u>Commands</u>	<u>Values</u>
1.			34.	
2.			35.	
3.			36.	
4.			37.	
5.			38.	
6.			39.	
7.			40.	
8.			41.	
9.			42.	
10.			43.	
11.			44.	
12.			45.	
13.			46.	
14.			47.	
15.			48.	
16.			49.	
17.			50.	
18.			51.	
19.			52.	
20.			53.	
21.			54.	
22.			55.	
23.			56.	
24.			57.	
25.			58.	
26.			59.	
27.			60.	
28.			61.	
29.			62.	
30.			63.	
31.			64.	
32.			65.	
33.			66.	

Planning checklist

In the early stages of your AutoCAD training, it is best to plan your drawing projects carefully. There is a tendency to want things to happen immediately—for things to be “automatic”. But if you hurry and do little or no planning, you will become more frustrated. Therefore, as you begin each new project, step through the following planning checklist so that the execution of your project goes smoothly.

- ✓ Analyze the problem.
- ✓ Study all engineering sketches.
- ✓ Locate all available resources and list for future use.
- ✓ Determine the applicable standards for the project.
- ✓ Sketch the problem.
- ✓ Decide on the number and kind of views required.

- ✓ Determine the final plotted scale of the drawing, and of all views.
- ✓ Determine the drawing sequence (lines, features, dimensions, notes, etc.).
- ✓ List the AutoCAD commands to be used.
- ✓ Follow the standards and refer to resources as you work.

PROFESSIONAL TIP



AutoCAD is designed so that you can construct drawings and models using the actual dimensions of the object. Therefore, *always draw in full scale*. The proper text and dimension size is set using scale factors. This is covered in detail in later chapters. The final scale of the drawing should be planned early, and is shown on the plot. Always plot the drawing to a specific scale if plotting a model space layout. Always plot the drawing at a scale of 1:1 if plotting a paper space layout.

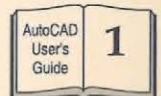
Working procedures checklist

As you begin learning AutoCAD, you will realize that several skills are required to become a proficient CAD user. The following list provides you with some hints to help you become comfortable with AutoCAD. They will also allow you to work quickly and efficiently. The following items are discussed in detail in later chapters.

- ✓ Plan all work with pencil and paper before using the computer.
- ✓ Check the **Object Properties** toolbar at the top of the display screen and the status bar at the bottom to see which layer(s) and drawing aid(s) are in effect.
- ✓ Read the command line at the bottom of the display screen. Constantly check for the correct command, instructions, or proper keyboard entry of data.
- ✓ Read the command line after keyboard entry of data before pressing the [Enter] or [Return] key. Backspacing to erase incorrect typing is quicker than redoing the command.
- ✓ If using a multibutton puck, develop a good hand position that allows easy movement. Your button-pressing finger should move without readjusting your grip of the puck.
- ✓ Learn the meanings of all the buttons on your puck or mouse and use them regularly.
- ✓ Watch the disk drive lights to see when the disks are being accessed. Some disk access may take a few seconds. Knowing what is happening will lessen frustration and impatience.
- ✓ Think ahead. Know your next move.
- ✓ Learn new commands every day. Don't rely on just a few that seem to work. Find commands that can speed your work and do it more efficiently.
- ✓ Save your work every 10 to 15 minutes in case a power failure or system crash deletes the drawing held in computer memory.
- ✓ If you're stumped, ask the computer for help. Use the on-line help to display valuable information about each command on the screen. Using AutoCAD's on-line help is discussed in detail later in this chapter.

Starting AutoCAD

AutoCAD Release 14 is designed to operate with Windows 95 or Windows NT. With the introduction of Windows NT version 4.0, the two interfaces are nearly identical. Therefore, if you see illustrations in this text that appear to be NT, do not be concerned, for the 95 version of the AutoCAD feature is the same.



When AutoCAD is first installed, Windows creates a *program icon* that is displayed on the desktop. An *icon* is a small picture that represents an application, accessory, file, or command. In addition to the icon, the program name is listed as an item in the Start menu under the Programs item.

NOTE

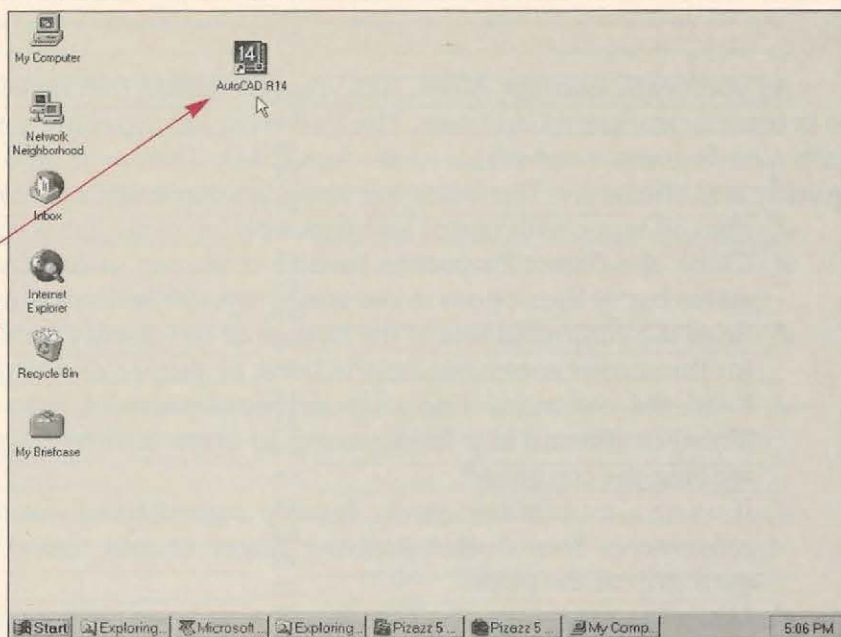


AutoCAD must first be installed properly on the computer before it can be used. Refer to *Appendix C* for detailed instructions on AutoCAD installation and configuration of peripheral devices such as plotters, printers, and digitizers.

AutoCAD can be started using three different techniques. The quickest way to start AutoCAD is to double-click on the AutoCAD R14 icon on the Windows desktop. See Figure 1-8.

Figure 1-8.
Double-click the AutoCAD R14 icon on the Windows desktop to start AutoCAD.

Double-click on AutoCAD R14 icon to start AutoCAD



PROFESSIONAL TIP

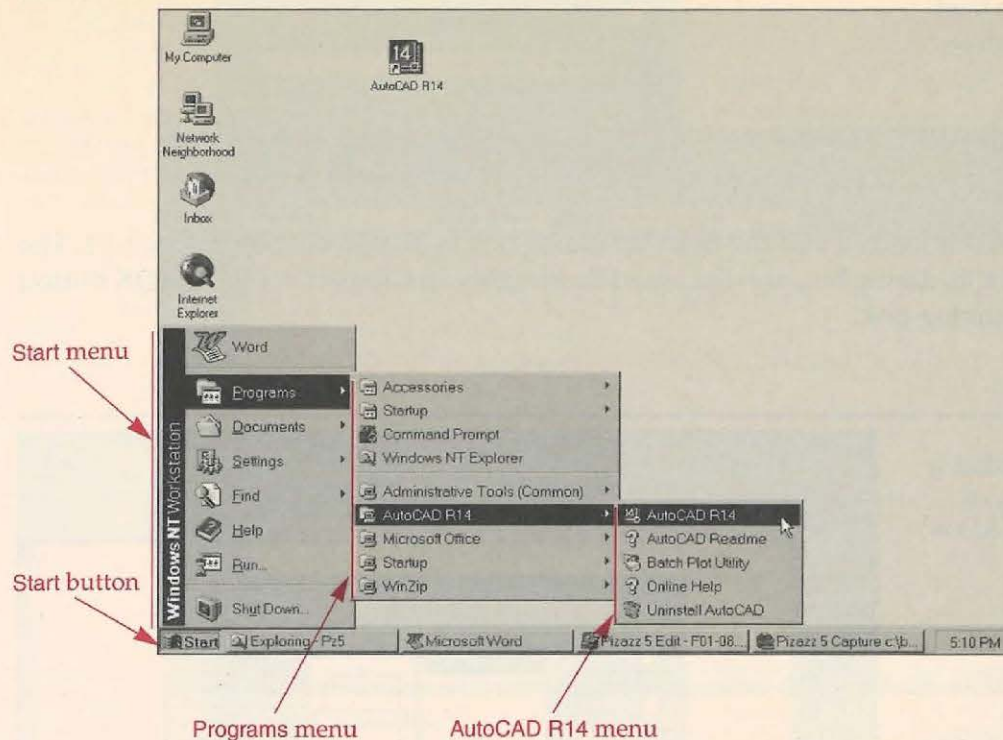


When AutoCAD is installed using unaltered settings, the label for the AutoCAD icon is AutoCAD R14. The name can be quickly changed by picking the label, typing a new name, and pressing [Enter].

The second method for starting AutoCAD is to pick the Start button at the lower-left of the Windows screen. This displays the Start menu. Next, move the pointer to Programs and either hold it there or pick to display the Programs menu. Now move the pointer to the AutoCAD R14 item and click. This displays all of the items in the AutoCAD R14 program group. Pick on AutoCAD R14 to load the software. See Figure 1-9.

Figure 1-9.

Pick AutoCAD R14 in the Programs menu to load AutoCAD.



Five items are listed in the AutoCAD R14 menu.

- **AutoCAD R14.** Loads AutoCAD.
- **AutoCAD Readme.** Opens a text file that gives information on important items that may not be covered in the printed documentation or the on-line help files. Also provides links to other topics such as "What's New in AutoCAD Release 14".

NOTE



A Windows *link* is identified by green, underlined text. The pointer changes to a hand icon when it is moved over link text. A new page of information is displayed when you pick a link.

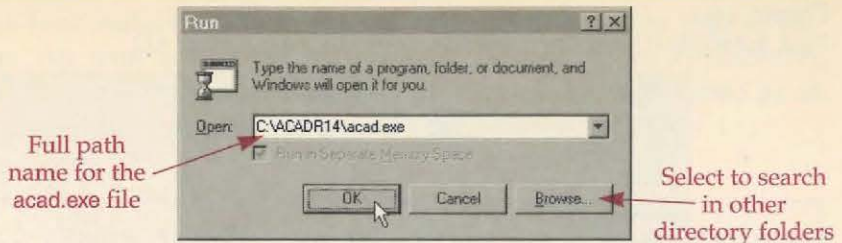
▶ [To access help topics](#)

- **Batch Plot Utility.** This temporarily loads AutoCAD and enables you to plot a group of files at one time. You cannot edit drawings with this utility. It can run in the background while you do other work. This is discussed in Chapter 10.
- **On-line Help.** This provides access to all of the documentation for AutoCAD R14. It is discussed later in this chapter.
- **Uninstall AutoCAD.** Enables you to remove AutoCAD from your computer.

The third method for loading AutoCAD is the most cumbersome, and is the same process used to install software. Using this method you must locate and run the acad.exe file. To begin this process as follows:

1. Pick the Start button then pick Run... to display the Run dialog box. See Figure 1-10.
2. Enter the drive and directory location of the acad.exe file in the Open: text box.
3. Pick the OK button or press [Enter]. If you do not know the exact location of the acad.exe file, use the Browse... button. The acad.exe file is always located in the main AutoCAD directory folder. If the defaults were used during installation, this folder should be named AutoCAD R14.

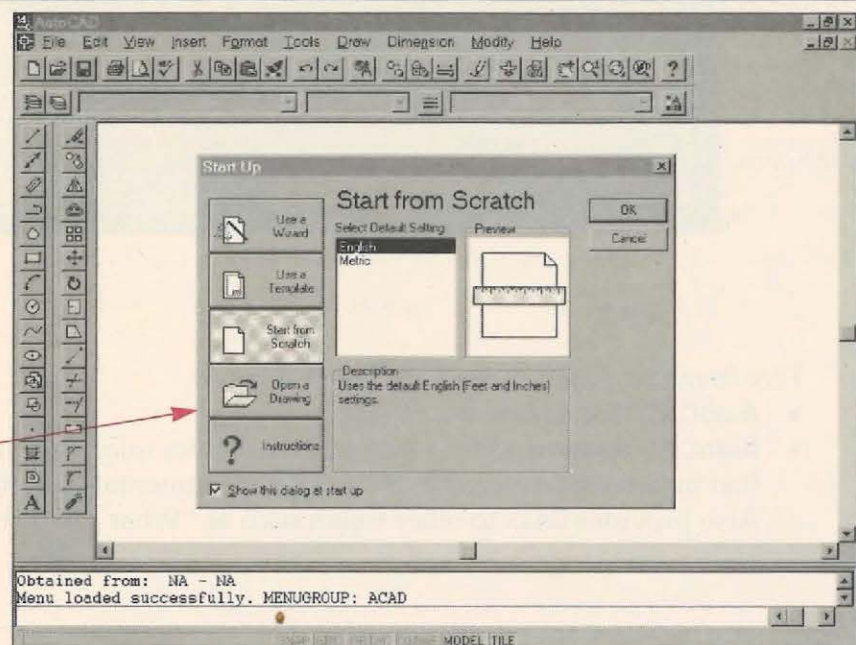
Figure 1-10.
The Run dialog box allows you to load programs such as AutoCAD.



AutoCAD is loaded and the **Start Up** dialog box is displayed. See Figure 1-11. The functions of this dialog box are discussed thoroughly in Chapter 2. Pick the **OK** button to clear the dialog box.

Figure 1-11.
The **Start Up** dialog box is displayed when AutoCAD is loaded.

The **Start Up** dialog box is open when AutoCAD is started



The AutoCAD Graphics Window

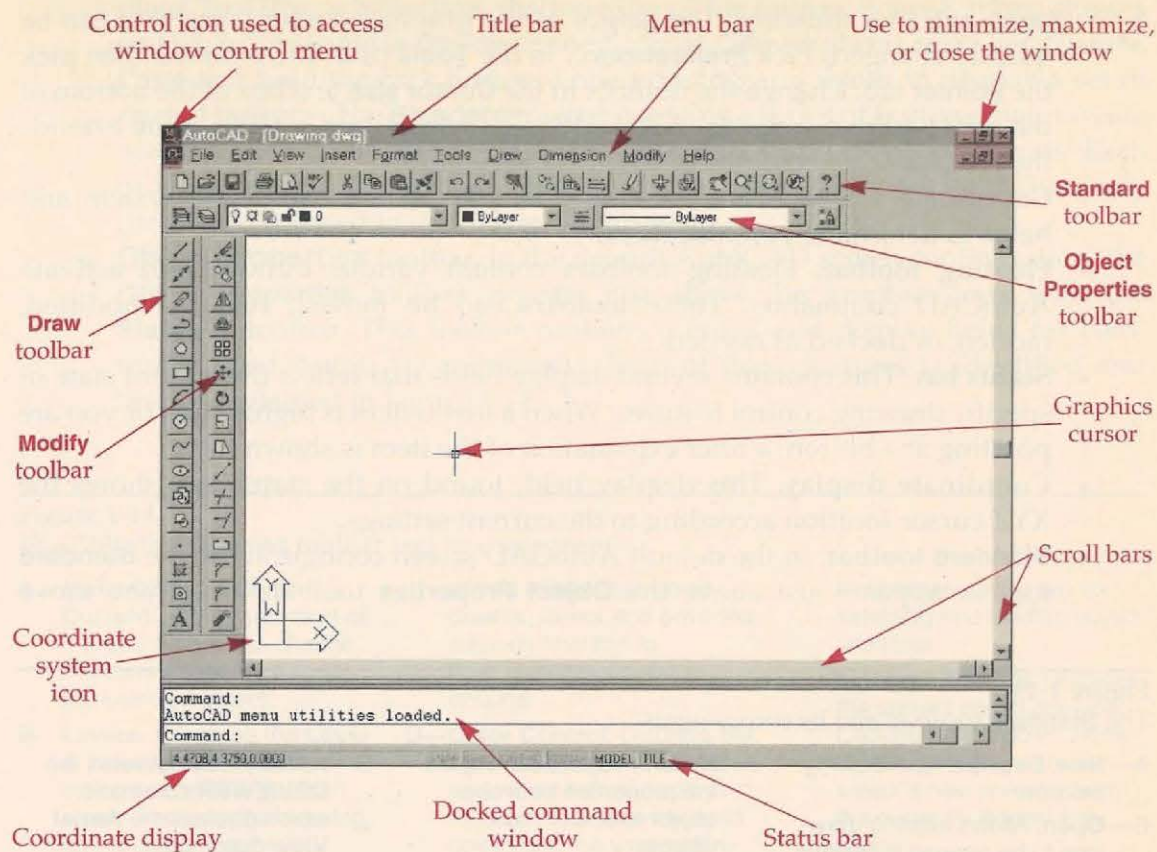
The AutoCAD graphics window is similar to any other window within the Windows operating system. Picking the small control icon in the upper-left corner displays a standard window control menu, and the icons in the upper-right corner are used for minimizing, maximizing, and closing the window. See Figure 1-12.

Window sizing operations are done as with any other window. AutoCAD uses the familiar Windows style interface, with buttons, pull-down menus, and dialog boxes. Each of these items are discussed in detail in this chapter. Learning the layout, appearance, and proper use of these features allows you to master AutoCAD quickly.

Standard screen layout

The standard screen layout provides a large graphics, or drawing, area. The drawing area is bordered by the *toolbar* at the top and the *command line* at the bottom. Look at your screen now and study the illustration in Figure 1-12. Note that the proportional size of the AutoCAD graphics window features may vary depending on the display resolution of your computer system.

Figure 1-12.
The standard AutoCAD graphics window.



Many of the elements of the AutoCAD graphics window are referred to as *floating*. This means that the item can be freely moved about the screen into new positions. When an item is floating, it has a standard Windows border and title bar. Floating windows are moved and adjusted for size in the same manner as any other window. Items that are floating can also be *docked* around the edges of the graphics window. To dock an item, drag it to the edge of the graphics window (top, bottom, left, or right). When an item is docked, it loses its border and title bar and becomes a part of the graphics window. Moving a docked item away from the edge of the graphics window restores its title bar and border. Objects may be moved or docked at any time as needed.

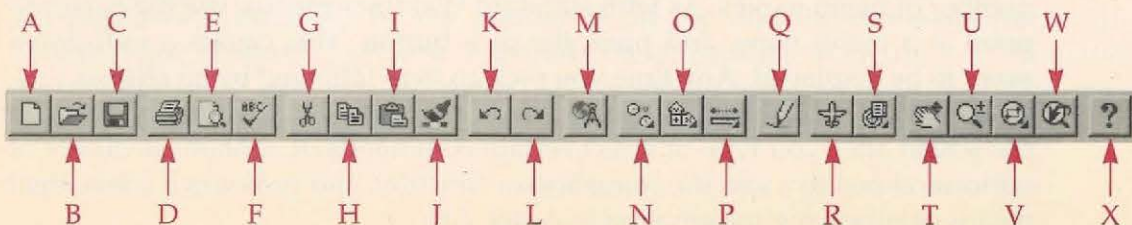
Become familiar with these unique areas of the graphics window and the information provided by each. The following list describes the function of each area. Each of these features will be discussed in detail later in this text.

- **Floating command window.** In its default position, this window is docked at the bottom of the graphics window. It displays the Command: prompt and reflects any command entries you make. It also displays prompts that supply information to you or request input. This is where your primary communications with AutoCAD are displayed, so watch for any information shown on this line.
- **Menu bar.** The menu bar appears just below the title bar and displays a number of menu names. As with standard Windows menus, use the cursor to point at a menu name and press the pick button. This causes a *pull-down menu* to be displayed. Any time you pick an item followed by an *ellipsis (...)*, a dialog box is displayed. A *dialog box* is a rectangular area that appears on the screen after you type or select certain commands. It contains a variety of options related to a specific command or function, and provides a convenient means of supplying information to AutoCAD.

- **Scroll bars.** The scroll bars allow you to adjust your view of the drawing area.
- **Graphics cursor.** This is your primary means of pointing to objects or locations within a drawing. The length of the graphics cursor crosshairs can be quickly changed. Pick **Preferences...** in the **Tools** pull-down menu, then pick the **Pointer** tab. Change the number in the **Cursor size** text box at the bottom of the tab to suit your needs. A 5% setting is default, and a 100% value extends the crosshairs to the limits of the graphics window.
- **Coordinate system icon.** This indicates the current coordinate system and helps to determine point locations.
- **Floating toolbar.** Floating toolbars contain various buttons that activate AutoCAD commands. These toolbars can be moved, resized, modified, hidden, or docked as needed.
- **Status bar.** This contains several display fields that reflect the current state of specific drawing control features. When a menu item is highlighted or you are pointing at a button, a brief explanation of the item is shown here.
- **Coordinate display.** This display field, found on the status bar, shows the XYZ cursor location according to the current settings.
- **Standard toolbar.** In the default AutoCAD screen configuration, the **Standard** toolbar appears just above the **Object Properties** toolbar. When you move

Figure 1-13.
The **Standard** toolbar and its components.

- | | | |
|--|---|---|
| A— New. Begins a new drawing session. | J— Match Properties. Copies the properties from one object to one or more objects. | R— Aerial View. Activates the DSVIEWER command, which displays the Aerial View dialog box. |
| B— Open. Allows existing drawings to be opened for editing and revision. | K— Undo. Cancels the effect of the last command or operation. | S— Named Views Flyout. Various options for changing the current view of your drawings are presented by this flyout. |
| C— Save. Writes the drawing information currently in memory to a file. | L— Redo. Can be used after Undo to redo the previously canceled operation. | T— Pan Realtime. Displays the hand icon cursor and moves the display in the current viewport dynamically in real time. |
| D— Print. Sends drawing information to a hardcopy device, such as a printer or plotter. | M— Launch Browser. Launches the Internet browser software that is defined in your Windows system registry. | U— Zoom Realtime. Displays the zoom icon and increases or decreases the displayed size of objects in the current viewport. |
| E— Print Preview. Displays a preview of the drawing layout prior to printing. | N— Object Snap Flyout. Presents a series of buttons that activate the tracking and object snap tools for accessing specific geometric points within a drawing. | V— Zoom Flyout. Displays a series of buttons that activate ZOOM command options. |
| F— Spelling. Performs a spell-check of the text in your drawing. | O— UCS Flyout. Presents a series of buttons that activate various coordinate system options. | W— Zoom Previous. Returns the previous display to the graphics area. |
| G— Cut to Clipboard. "Cuts" a specified portion of your drawing geometry, storing it on the Windows clipboard. | P— Inquiry Flyout. Presents a series of buttons that activate various drawing inquiry commands. | X— Help. Activates AutoCAD's online help facility. |
| H— Copy to Clipboard. Copies a specified portion of your drawing geometry, storing it on the Windows Clipboard. | Q— Redraw All. Redraws the display in all viewports. | |
| I— Paste from Clipboard. "Pastes" the contents of the Clipboard to a specified location in your drawing. | | |

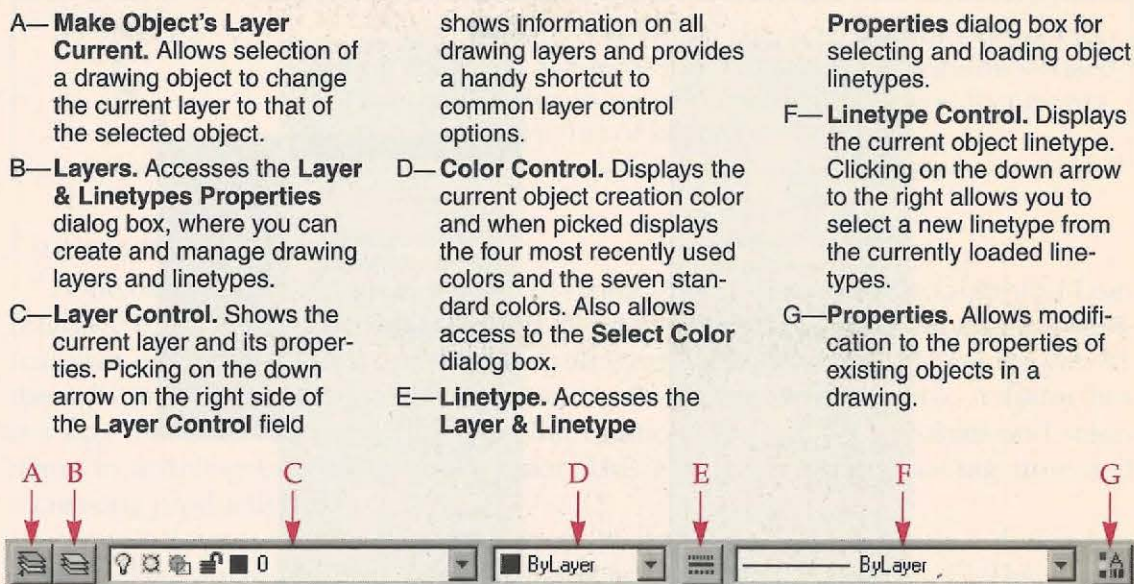


your pointing device to the toolbar, the crosshairs change to the familiar Windows arrow pointer. Holding the cursor over a button for a moment displays ToolTips, which show the function of the button. Some buttons show a small black triangle in the lower-right corner. These buttons are called *flyouts*. Press and hold the pick button while pointing at a flyout to display a set of related buttons. The **Standard** toolbar contains a series of buttons that provide access to several of AutoCAD's drawing setup and control commands. Each of these features is identified and briefly described in Figure 1-13. These features are discussed in detail later in this text.

- **Object Properties toolbar.** In the default AutoCAD screen configuration, the **Object Properties** toolbar appears just above the graphics area with the **Standard** toolbar. This toolbar contains buttons and display fields for commonly used AutoCAD commands. Each of these features is identified and briefly explained in Figure 1-14.

Figure 1-14.

The **Objects Properties** toolbar and its components.

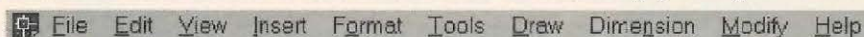


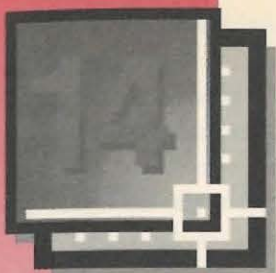
Pull-down menus

The AutoCAD pull-down menus are located on the menu bar at the top of the screen. As with a toolbar, when you move your pointing device to the menu bar, the crosshairs change to the arrow pointer. From Figure 1-15, you can see that the default menu bar has ten pull-down menu items: **File**, **Edit**, **View**, **Insert**, **Format**, **Tools**, **Draw**, **Dimension**, **Modify**, and **Help**.

Figure 1-15.

The AutoCAD menu bar. Pull-down menus are accessed by picking the words in this bar.





Chapter 15

Working with AutoCAD Files

Learning Objectives

After completing this chapter, you will be able to:

- ☐ Explain the meaning and use of DOS file extensions.
- ☐ List files using Windows Explorer.
- ☐ Copy, move, delete, and rename files using Windows Explorer.
- ☐ Manage critical files using the **Preferences** dialog box.
- ☐ Create user profiles using the **Preferences** dialog box.
- ☐ Import and export a variety of file types in AutoCAD.
- ☐ Define DOS file extensions.

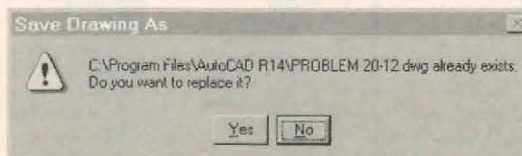
AutoCAD works with several types of computer files. The files are identified by a three-letter file extension at the end of the file name.

The AutoCAD drawing file format is compatible with a variety of other software applications. You can export the industry standard .dxf file for use with other CAD packages, or specific applications. Files can also be exported for use in the design and animation software 3D Studio, or for use in the stereolithography process. In addition, you can import several different file types into AutoCAD. Working with files in this fashion is easier than using the Windows Explorer, discussed in Chapter 30.

Types of File Names

Drawing file names can be up to 255 characters long. They can contain letters, numbers, spaces, dollar signs (\$), hyphens (-), and underscores (_). When you begin a new drawing, AutoCAD adds a file extension to the end of the file name. This extension is .dwg. If you name a drawing Building 340, AutoCAD creates the file as Building 340.dwg. When you open the drawing to edit, you only have to type Building 340. AutoCAD knows to look for that file, plus the .dwg extension. File names are not case-sensitive. This means that you can name a drawing PROBLEM 20-12, but Windows interprets Problem 20-12 as the same file name. See Figure 15-1.

Figure 15-1.
File names are not case sensitive. This alert box appears when you attempt to save as an already existing file.



After you edit the Building 340.dwg file and save it again, the original is converted to a backup file. Its file extension is automatically changed to .bak (backup). AutoCAD maintains a current .dwg file and one .bak file. If you revise the Building 340 drawing again, the .bak file is erased and the previous .dwg copy becomes the backup. Only a newly revised drawing is given the .dwg file extension.

Some common file extensions used by AutoCAD and Windows include the following:

AutoCAD	
.bak	Backup copy of a drawing file.
.dcl	Dialog control language description file.
.dwg	Drawing file.
.dwt	Drawing template file.
.lin	File containing the linetypes used by AutoCAD.
.mnu	Menu source file.
.pat	Hatch patterns file.
.plt	Plot file.
Windows	
.bmp	Bitmap file.
.clp	Windows Clipboard file.
.com	Command file.
.dll	Dynamic-link library file.
.exe	Executable file.
.ini	Initialization file.
.wmf	Windows metafile.

14

Introduction to Windows Explorer

The Windows Explorer is a program that allows you to manage and display folders and files. It is activated by picking **Programs** from the Start menu, then selecting **Windows Explorer**. This chapter discusses how to list, select, copy, move, delete, and rename files. If you need detailed information on the features of Windows Explorer, see Chapter 30.

Listing folders and files

The Windows Explorer window is labeled **Exploring - C:** in the title bar. The directory label **C:** reflects the name of the currently selected storage device and folder. See Figure 15-2. The window is composed of the title bar, a menu bar of five pull-down menus, the **All Folders** list box, the **Contents** list box, and a status bar at the bottom of the window.

Figure 15-2.

The Windows Explorer window is labeled with the name of the currently selected storage device and folder.

