

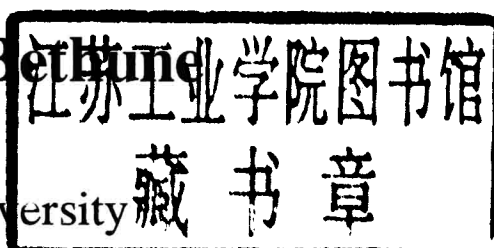
A Visual Introduction
to AutoCAD® & 3D Designing

James D. Bethune

A Visual Introduction to AutoCAD® and 3D Designing

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Preface

This book is divided into three parts. Chapters 1 through 9 introduce the fundamentals of AutoCAD Release 13 for Windows, Chapters 10 through 15 explain many of AutoCAD's three-dimensional capabilities, and Chapters 16 through 18 show how to apply these three-dimensional capabilities to design problems.

The fundamentals of AutoCAD are introduced using a tutorial approach, accompanied by many screen captures and other illustrations. This will help guide the reader through each example by using both text and visual instructions.

Each command, in a toolbar, is explained using a short tutorial that is independent of other command tutorials. This was done to avoid long, complicated tutorials that are sometimes difficult to complete. It also allows the text to be used to reference and review individual commands.

Chapters 1, 2, and 3 present an introduction to the drawing screen and the procedures used to set up, define, and create an AutoCAD drawing. Chapters 4, 5, and 6 demonstrate the commands of the Draw, Object, and Modify toolbars.

Chapter 7 includes three fairly long tutorials that show how commands can be used together to create more complicated shapes. Chapter 8 discusses the Dimensioning toolbar and the general conventions associated with dimensioning a drawing. Chapter 9 demonstrates how to create blocks, layers, and attributes.

Chapter 10 introduces the fundamentals of 3D drawing using AutoCAD, followed by Chapters 11 and 12 on surface and solid modeling. Again, each command in the appropriate toolbars is explained, and short tutorials at the end of the chapters show how to combine commands to form objects. Rendering and viewpoints are covered in Chapters 13 and 14 to complete the understanding of how to create and present 3D drawings.

The last three chapters concentrate on 3D design concepts. Chapter 16 serves to develop 3D perception by showing how to design clips and brackets between specified 3D locations. This requires the reader to work with different planes while creating a single 3D object. Chapter 17 defines how to represent and use standard fasteners, and Chapter 18 culminates the design section by showing how to set up a family of working drawings, including assembly drawings and parts lists. This chapter includes an extensive tutorial that walks through the complete creation of a set of working drawings.

Thanks again to Steve Helba for his encouragement; Kimberly Gundling, associate editor; Norma F. Nelson, copy editor; Patricia S. Kelly, production editor; and David, Maria, Randy, Lisa, and Hannah for their support.

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C H A P T E R

1

Looking Around the Drawing Screen

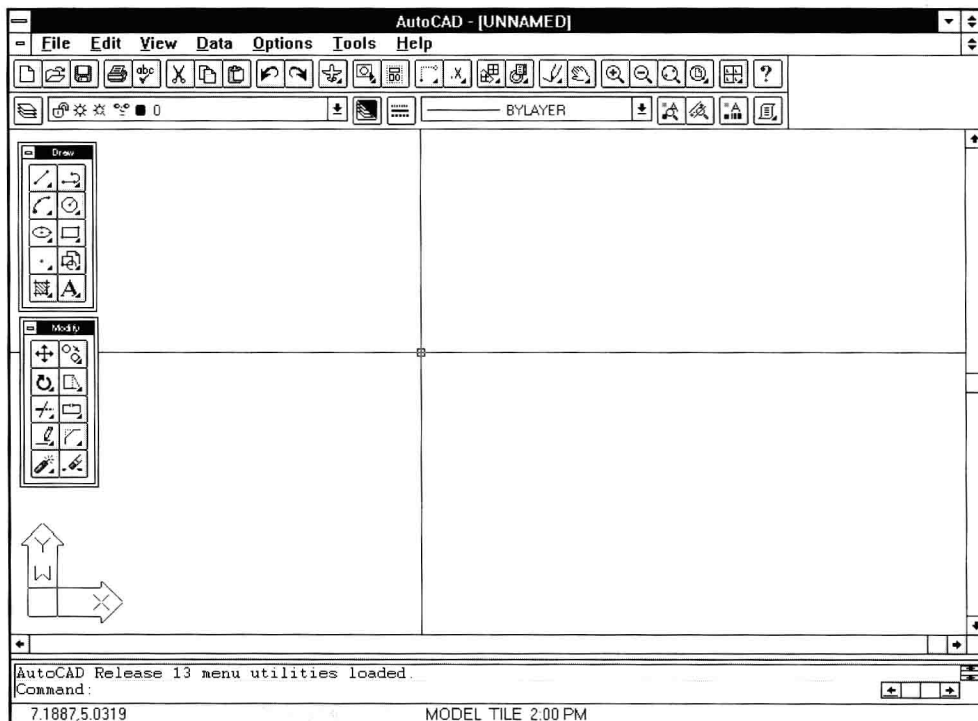


Figure 1-1

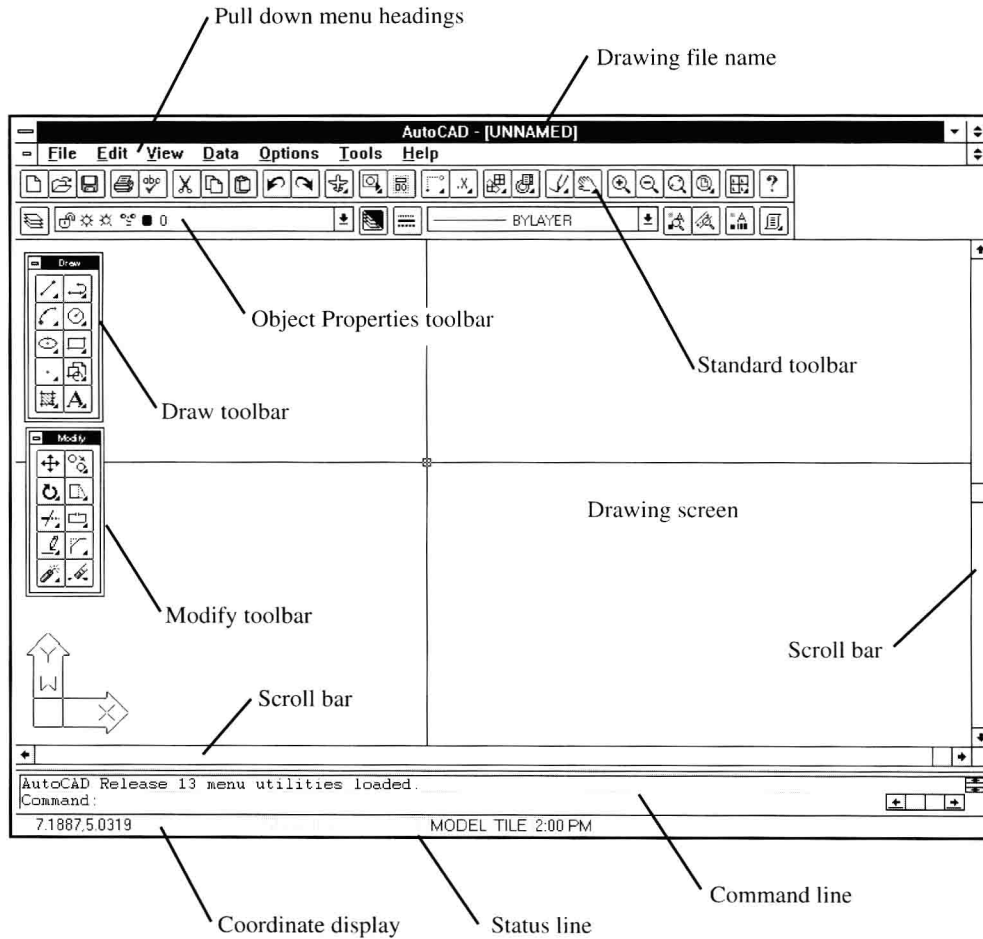


Figure 1-1

1-1 INTRODUCTION

This chapter explains the various aspects of AutoCAD's Windows drawing screen and shows how they can be manipulated. Figure 1-1 shows the initial AutoCAD Windows screen. Your screen may look slightly different because of your selected screen resolution values.

The top line on the screen

AutoCAD-[UNNAMED]

displays the name of the current drawing. As no drawing has been named, the line reads "unnamed". Once a drawing name has been defined, it will appear at the top of the screen.

The top line also displays the Windows icons for exiting a program and changing a program. It is assumed that the reader is familiar with basic Windows operations.

The third line is the Standard toolbar and contains a group of the most commonly used commands.

The fourth line contains some command icons and an area that shows the current or docked object properties that are active.

The bottom left corner of the screen shows the coordinate display position of the horizontal and vertical crosshairs in terms of an X,Y coordinate value, whose origin is the lower left corner of the drawing screen.

The commands listed on the bottom line are displayed in light gray when they are off and black when they are on.

The horizontal and vertical scroll bars can be used to move around the drawing screen; they function as they do with other Windows applications.

The large open area in the center of the screen is called the drawing screen or drawing editor. The two rec-

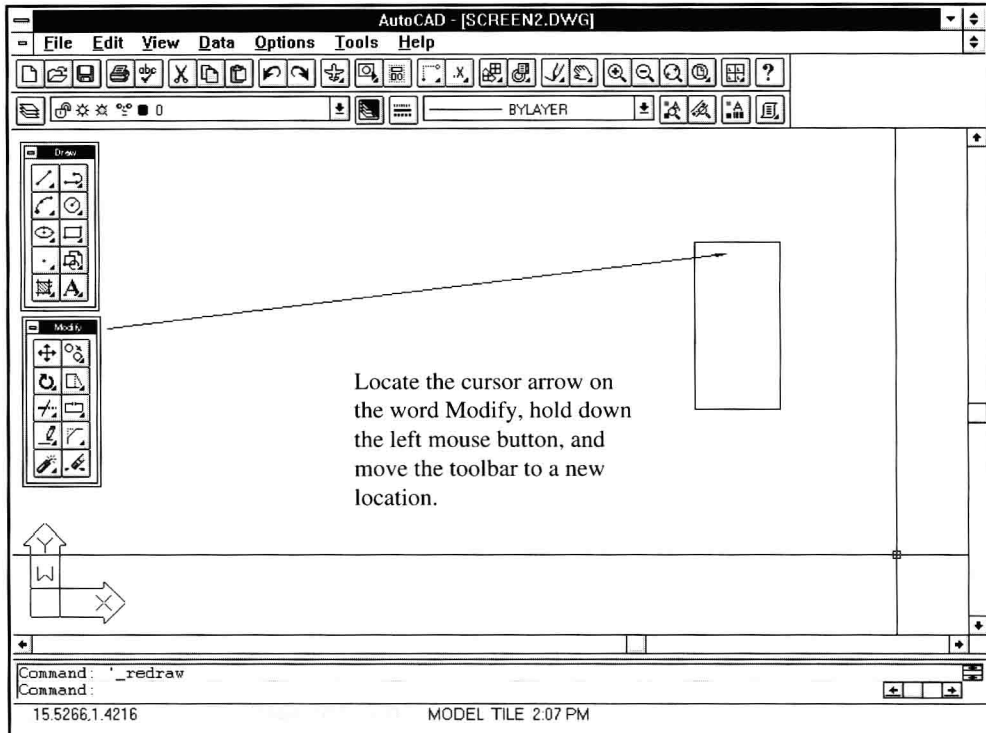


Figure 1-2

tangular boxes of command icons, located along the left edge of the drawing screen, are the Draw and Modify toolbars. They can be moved around the screen as shown in Figure 1-2.

1-2 TOOLBARS

An AutoCAD toolbar is a group of command icons located under a common heading. The initial AutoCAD screen contains four toolbars: Standard, Objects Properties, Draw, and Modify. There are 13 additional predefined toolbars and you can create your own user-specific toolbars as needed.

To move a toolbar

See Figure 1-2.

1. Locate the cursor arrow on the heading **Modify**.
2. Press and hold down the left mouse button.

A light gray broken line box will appear around the edge of the toolbox.

3. Still holding the left mouse button down, move the gray outline box to a new location on the screen.
4. Release the left button.

The toolbox will appear in the new location.

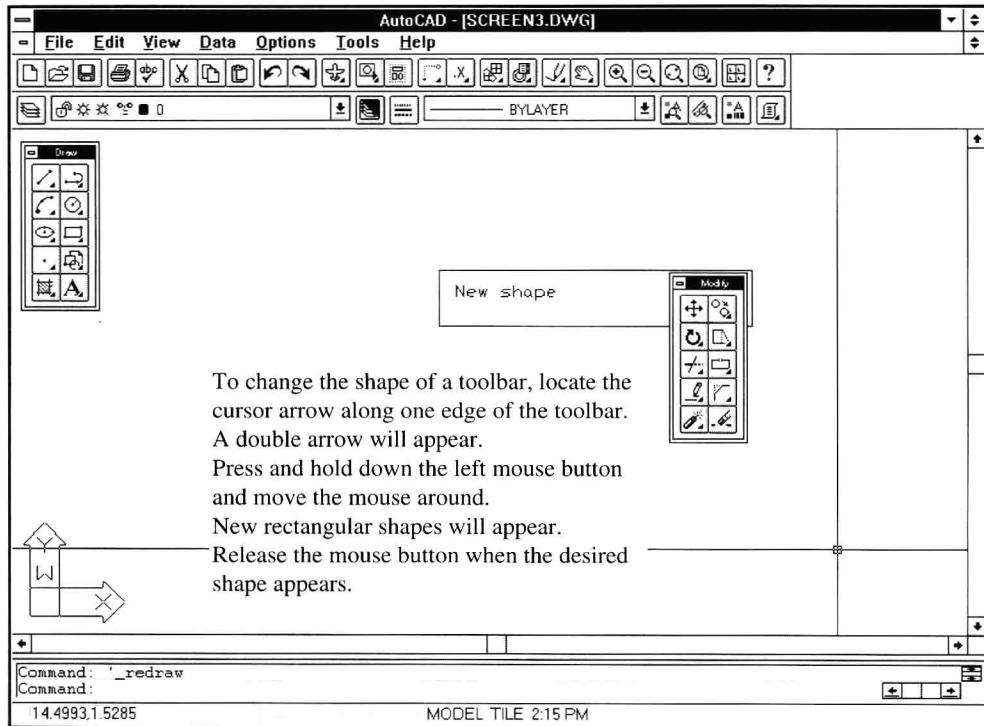


Figure 1-3

To change the shape of a toolbar

See Figure 1-3.

1. Locate the cursor arrow along the right edge of the Modify toolbar.

A double opposing arrowhead will appear.

2. Press and hold the left mouse button.

A light gray broken line box will appear around the outside of the toolbox.

3. Still holding the left mouse button down, move the mouse around and watch how the gray box changes shape.
4. When the gray toolbox shape is a long vertical rectangle, release the left mouse button.

A reshaped toolbox will appear.

To return the toolbar to its original location and shape

1. Locate the cursor arrow along the bottom or

edge lines of the toolbox and return the toolbox to its original shape using the procedure outlined in Figure 1-3.

2. Move the reshaped toolbox to its original location along the left side of the drawing screen using the procedure outlined in Figure 1-2.

To add a new toolbar to the screen

See Figures 1-4 and 1-5.

1. Locate the cursor arrow on the Tools pull down menu heading and press the left mouse button.
2. Select (locate the cursor arrow on the word Toolbar and press the left mouse button) the item Toolbars.

A second pull down will appear. This is a list of available toolbars. See Figure 1-4.

3. Select Dimensioning.

The Dimensioning toolbar will appear. See Figure 1-5. Any toolbar can be moved or have its shape changed as described in Figures 1-2 and 1-3.

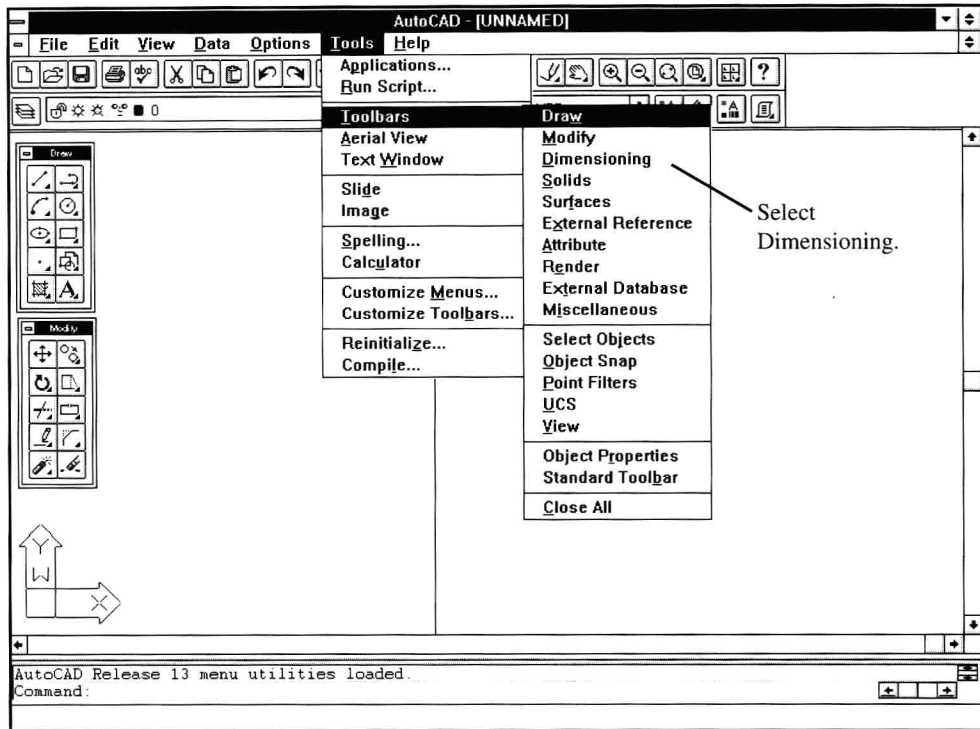


Figure 1-4

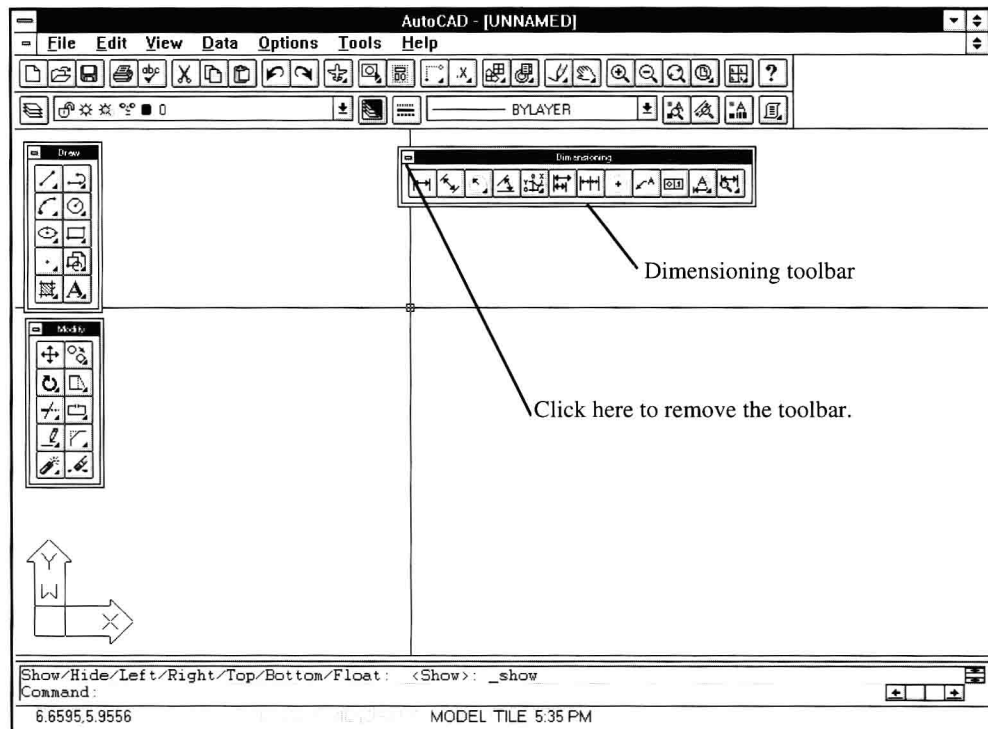


Figure 1-5

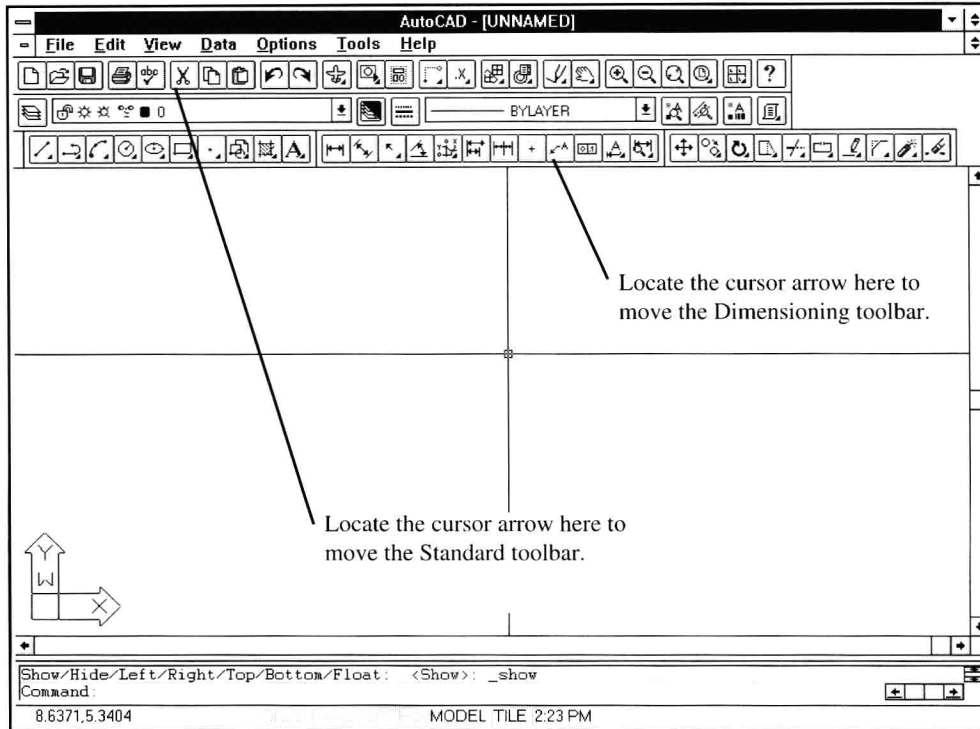


Figure 1-6

To remove a toolbar from the screen

1. Locate the cursor arrow on the short horizontal line located in the upper right corner of the toolbar and press the left mouse button.

Figure 1-6 shows the Draw and Modify toolbars docked horizontally at the top of the drawing screen. The Dimensioning toolbar has been located between them. To relocate the toolbars from the positions shown, locate the cursor arrow above the icons but still below the horizontal line that defines the toolbar area and press and hold down the left mouse button. A gray box will appear around the toolbars that will move with the cursor arrow.

Note:

The standard toolbar may be moved and reshaped using the same procedure described above to undock the Draw and Modify toolbars.

Figure 1-7 shows the Draw, Modify, and Dimensioning toolbars docked on the right side of the

drawing screen. Note that the toolbars are arranged with three columns of icons and not two columns as they were on the initial screen.

1-3 THE COMMAND LINE BOX

The size of the command window, located at the bottom of the screen, may be changed to display more or fewer command lines. It is recommended that at least two command lines be visible at all times.

To move and resize the Command Line box

See Figure 1-8.

1. Locate the cursor arrow along the far left edge of the command line box and press and hold down the left mouse button.
2. Still holding the left mouse button down, move the cursor arrow to a new location on the drawing screen.

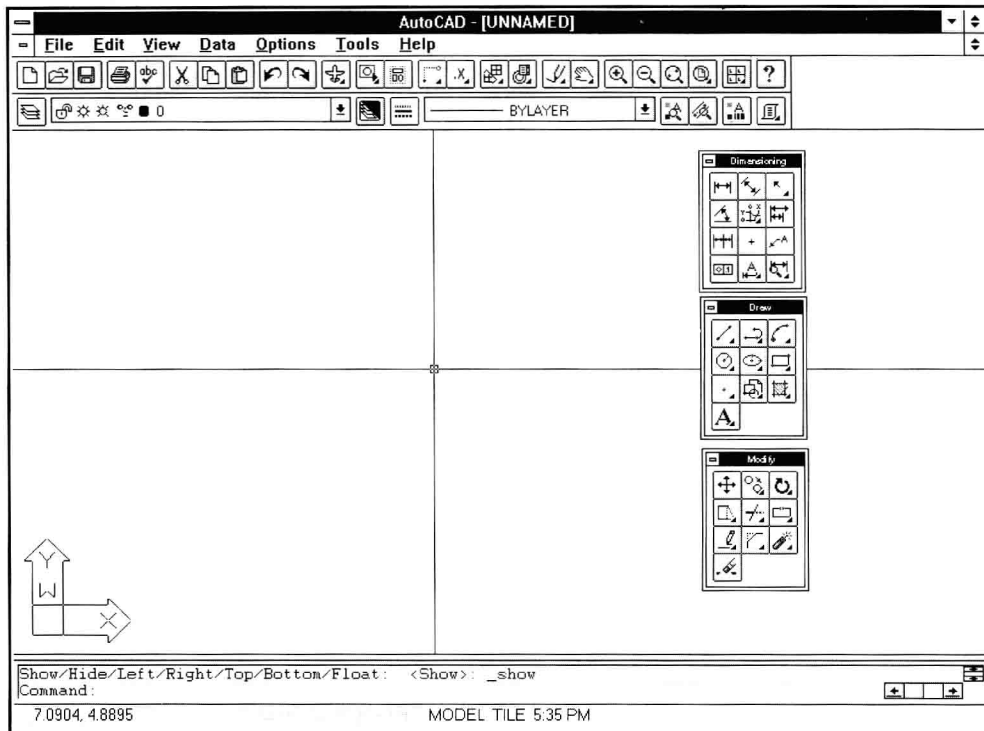


Figure 1-7

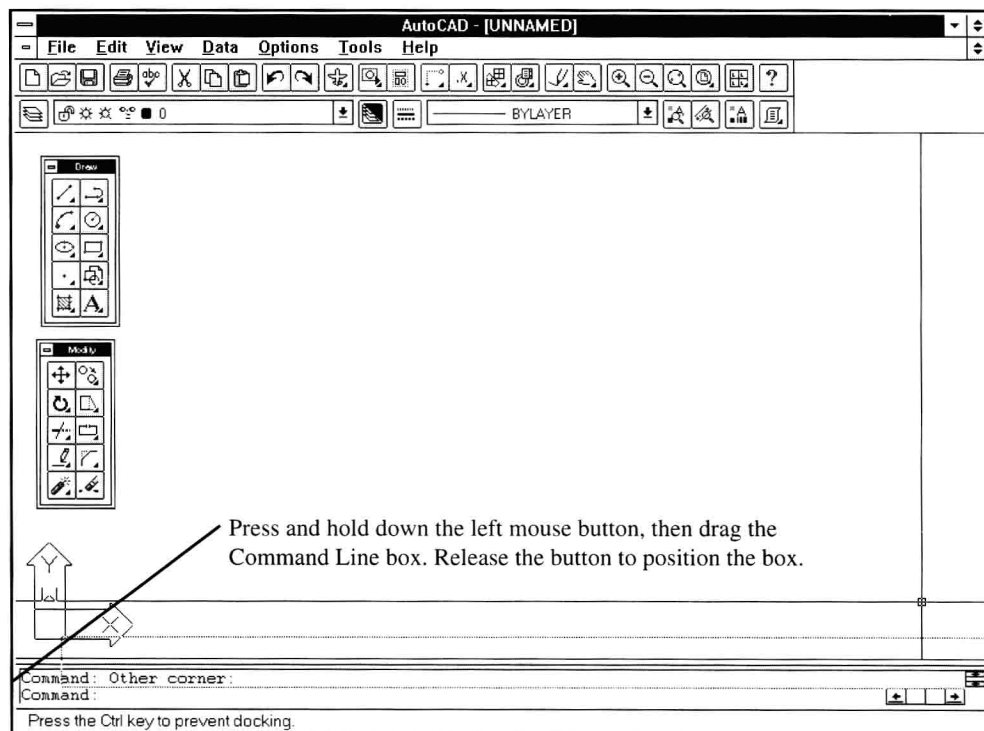


Figure 1-8

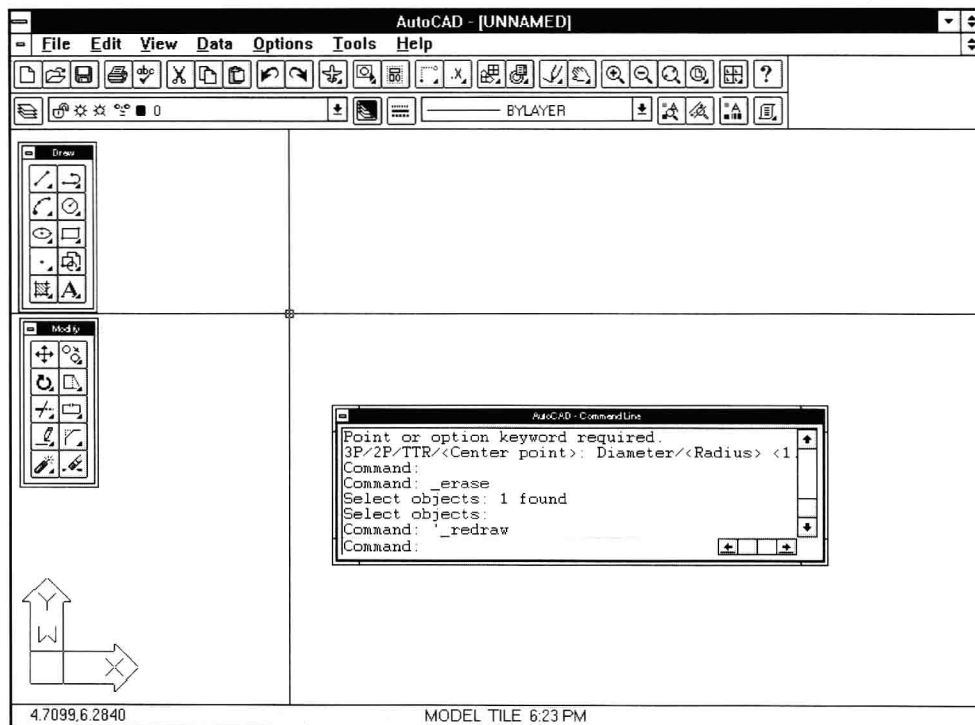


Figure 1-9

A gray, broken line box will move with the cursor arrow and serves to display the new Command Line box location and shape.

3. Release the left mouse button to relocate the Command Line box.

The Command Line box may now be moved and reshaped just as a toolbar is moved. Figure 1-9 shows the Command Line box shortened and moved to the right side of the drawing screen. The Command Line box may be returned to its original position using the same procedure.

1-4 COMMAND ICONS (TOOLS)

An icon is a picture that represents an AutoCAD command. Most commands have equivalent icons. Command icons are called "tools." A toolbox contains several tools.

To determine the command an icon (tool) represents

See Figure 1-10.

1. Locate the cursor arrow on the selected icon (tool).

In the example shown, the Circle, Center, Radius command tool within the Draw toolbar was selected.

2. Hold the arrow still without pressing any mouse button.

The command name will appear below the tool. This is referred to as a "tooltip."

A small solid right triangle in the lower right corner of a tool means there are other related tools, called "fly-outs," under the tool.

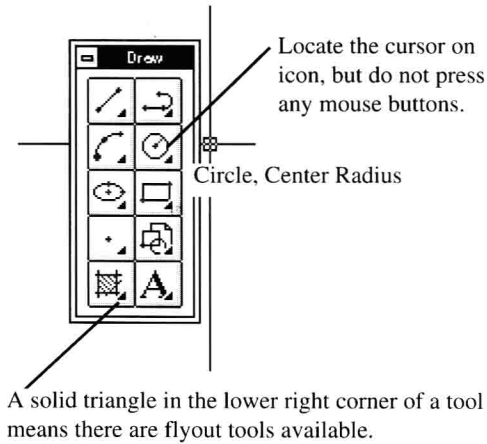


Figure 1-10

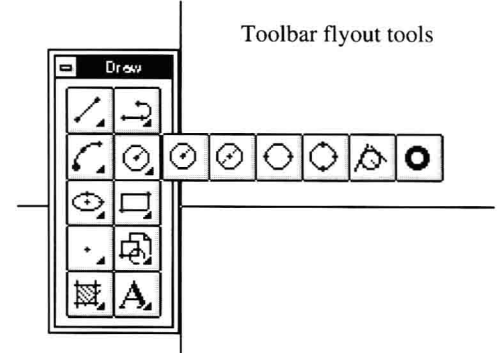


Figure 1-11

To activate and select a tool's subcommands (flyouts)

See Figures 1-11, 1-12, and 1-13.

1. Locate the cursor arrow on a tool and press and hold down the left mouse button.

Additional tools will fly out. See Figure 1-11. In the example shown, the Circle, Center, Radius command tool within the Draw toolbar was selected. Figure 1-12 shows the Arc command flyout tools.

2. Still holding the left button down, move the cursor arrow to the desired tool (Donut) and release the button.

The new command will be activated and the selected tool will replace the previous tool in the toolbar. In the example shown, the Donut command was selected, and replaced the original circle tool. See Figure 1-13.

The Circle, Center, Radius tool can be returned to the Draw toolbar by using the same procedure.

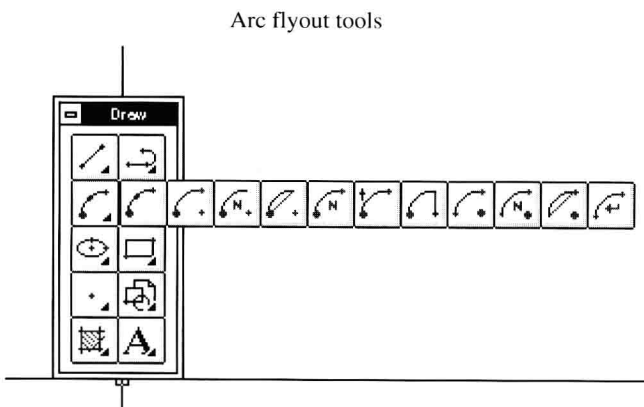


Figure 1-12

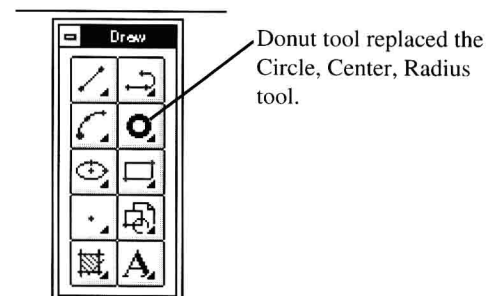


Figure 1-13