

James A. Leach

AutoCAD[®] 2007 **INSTRUCTOR**

A Student Guide to
Complete Coverage of AutoCAD's
Commands and Features

Autodesk[®]
Authorized Author



AutoCAD® 2007 INSTRUCTOR

A Student Guide to
Complete Coverage of AutoCAD's
Commands and Features

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AUTOCAD® 2007 INSTRUCTOR: A STUDENT GUIDE TO COMPLETE COVERAGE OF AUTOCAD'S
COMMANDS AND FEATURES

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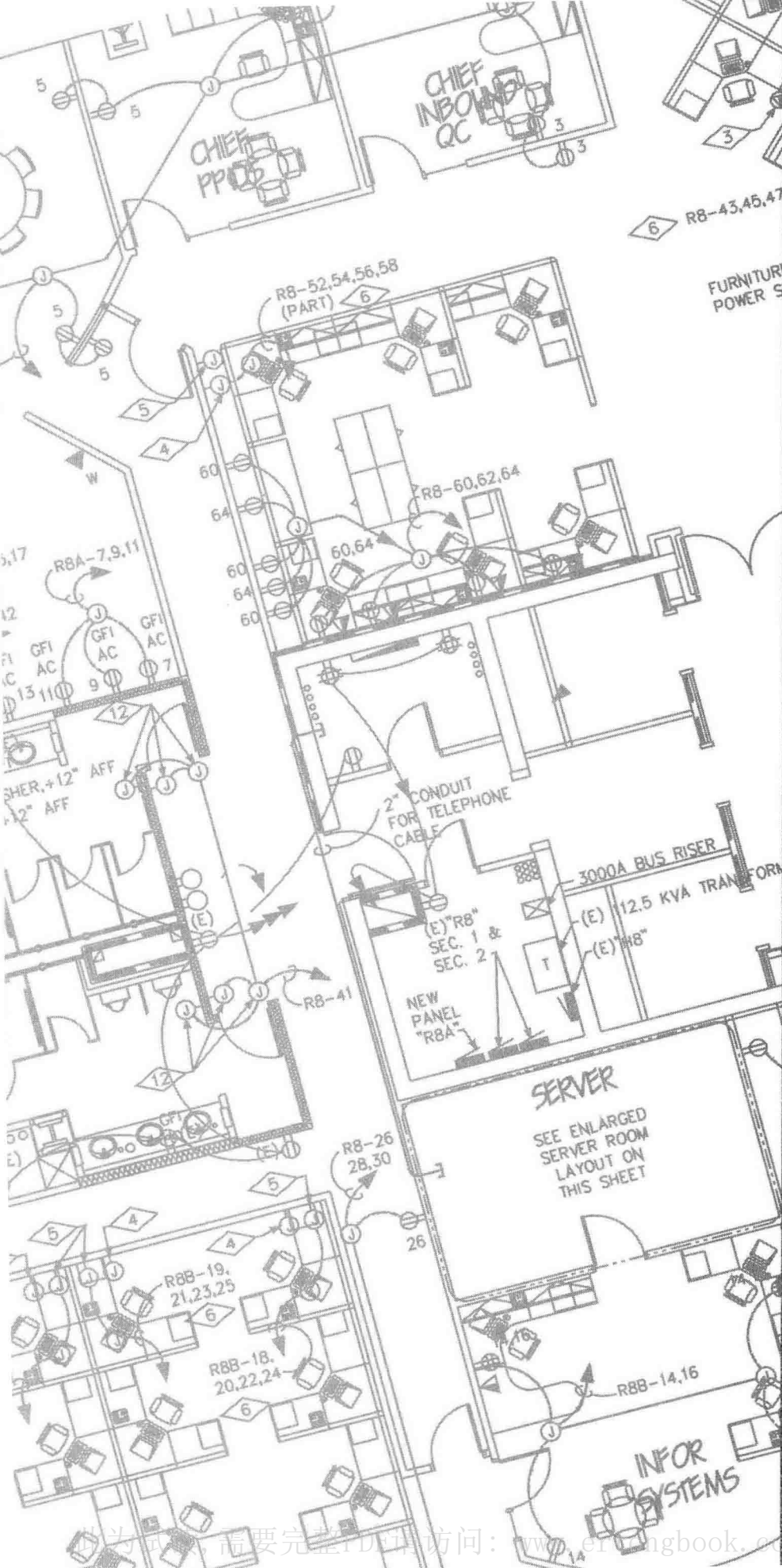
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This book is dedicated to my best pal, Sam,
a black lab. He has been beside me since
I wrote the first book, thirteen years ago.
It looks like this book will be his last.

DEDICATION



GUIDED TOUR

GUIDED TOUR

Welcome to AutoCAD 2007 Instructor. Here are some features you will find in this book to help you learn AutoCAD 2007.

Chapter Objectives

Each chapter opens with a list of new concepts you can expect to learn. Having objectives in mind helps you focus on the important ideas as you move through each chapter.

CHAPTER

9

MODIFY COMMANDS I

CHAPTER OBJECTIVES

After completing this chapter you should:

1. be able to Erase objects;
2. be able to Move objects from a base point to a second point;
3. know how to Rotate objects about a base point;
4. be able to enlarge or reduce objects with Scale;
5. be able to Stretch objects and change the length of Lines and Arcs with Lengthen;
6. be able to Trim away parts of objects at cutting edges and Extend objects to boundary edges;
7. know how to use the four Break options;
8. be able to Copy objects and make Mirror images of selected objects;
9. know how to create parallel copies of objects with Offset;
10. be able to make rectangular and Polar Arrays of objects;
11. be able to create a Fill and a Chamfer between two objects.

74 Chapter 4

Begin a New drawing to complete the selection set practice exercises. If the Startup dialog box appears, select *Start from Scratch*, choose *Imperial* as the default setting, and click the OK button. The *Erase*, *Move*, and *Copy* commands can be activated by any one of the methods shown in the command tables that follow.

Using Erase

Erase is the simplest editing command. *Erase* removes objects from the drawing. The only action required is the selection of objects to be erased.

Erase



Pull-down Menu	Command (Type)	Alias (Type)	Shortcut	Screen (side) Menu	Tablet Menu
Modify Erase	Erase	E	(Edit Model) Erase	MODIFY Erase	V:14

1. Draw several Lines and Circles. Practice using the object selection options with the *Erase* command. The following sequence uses the pickbox, *Window*, and *Crossing Window*.

STEPS	COMMAND/PROMPT	PERFORM ACTION	COMMENTS
1.	Command:	type <i>E</i> and press Spacebar	<i>E</i> is the alias for <i>Erase</i> , Spacebar can be used like Enter
2.	ERASE Select objects:	use pickbox to select one or two objects	objects are highlighted
3.	Select objects:	type <i>W</i> to use a <i>Window</i> , then select more objects	objects are highlighted
4.	Select objects:	type <i>C</i> to use a <i>Crossing Window</i> , then select objects	objects are highlighted
5.	Select objects:	press Enter	objects are erased

2. Draw several more Lines and Circles. Practice using the *Erase* command with the *Allto Window* and *Allto Crossing Window* options as indicated below.

STEPS	COMMAND/PROMPT	PERFORM ACTION	COMMENTS
1.	Command:	select the <i>Modify</i> pull-down, then <i>Erase</i>	
2.	ERASE Select objects:	use pickbox to PICK an open area, drag <i>Window</i> to the right to select objects	objects inside <i>Window</i> are highlighted
3.	Select objects:	PICK an open area, drag <i>Crossing Window</i> to the left to select objects	objects inside and crossing through <i>Window</i> are highlighted
4.	Select objects:	press Enter	objects are erased

Practice Tables

Step-by-step practice exercises in the early chapters help you systematically tackle fundamental skills.

Stretch

Pull-down Menu	Command (Type)	Alias (Type)	Short-cut	Screen (side) Menu	Tablet Menu
Modify Stretch	Stretch	S	---	MODIFY2 Stretch	V,22

Objects can be made longer or shorter with *Stretch*. The power of this command lies in the ability to *Stretch* groups of objects while retaining the connectivity of the group (Fig. 9-9). When *Stretched*, *Lines* and *Planes* become longer or shorter and *Arcs* change radius to become longer or shorter. *Circles* do not stretch; rather, they move if the center is selected within the Crossing Window.

Objects to *Stretch* should be selected by a *Crossing Window* or *Crossing Polygon* only. The *Crossing Window* or *Polygon* should be created so the objects to *Stretch* cross through the window. *Stretch* actually moves the object endpoints that are located within the *Crossing Window*.

Command: stretch

Select objects to stretch by crossing-window or crossing-polygon...

Select objects: **PICK**

Specify opposite corner: **PICK**

Select objects: **Enter**

Specify base point or [Displacement] <Displacement>: (Select a point to stretch from.)

Specify second point or <use first point as displacement>: (Select a point to stretch to.)



TIP *Stretch* can be used to lengthen one object while shortening another. Application of this ability would be repositioning a door or window on a wall (Fig. 9-10).

In summary, the *Stretch* command stretches objects that cross the selection Window and moves objects that are completely within the selection Window, as shown in Figure 9-10.

The *Stretch* command allows you to select objects with other selection methods, such as a pickbox or normal (non-crossing) Window. Doing so, however, results in a *Move* since only objects crossing through a crossing window get stretched.

FIGURE 9-9

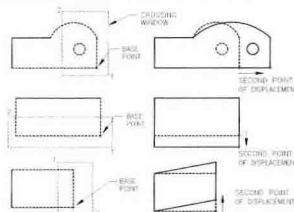
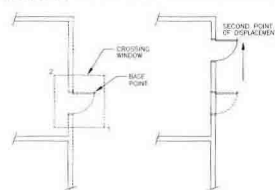


FIGURE 9-10

**Command Tables**

Whenever an AutoCAD command is introduced in the book, this table indicates all the methods you can use to call up the command.

“2007” and “2006” Bars

These vertical bars in the page margins allow you to quickly identify the commands and options that are new in AutoCAD 2007 and in AutoCAD 2006. This feature is especially helpful for readers updating from either AutoCAD 2006 or 2005.

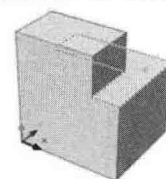
However, if you always want to select faces, edges, and vertices within composite solids without first selecting the individual primitive, you can change the solid's *History* setting to *None* using the *Properties* palette (Fig. 39-47). With this setting, you can select any face, edge, or vertex without having to select the primitive first. For example, you could directly select the top face on the large *Box* primitive without having to first select the *Box* itself. Remember that using the *Properties* palette allows you to change properties for the selected object(s) only.

FIGURE 39-47



For example, assume the *History* setting for the composite solid shown in Figure 39-48 was changed to *None*. Selection of the L-shaped face would be possible only with this setting. Otherwise, with a *History* setting of *Record*, the entire faces of the *Box* primitives would be selected and highlighted.

FIGURE 39-48



NOTE: Once *History* is set to *None*, the history of the composite solid's construction is deleted and cannot be retrieved. Setting the *History* back to *Record* begins a new record.

SOLIDHIST

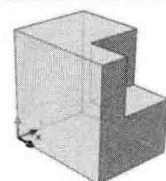
The *SOLIDHIST* system variable sets the history for all solids, both new and existing. This setting overrides the *History* setting in an individual solid's *Properties* palette. When *SOLIDHIST* is set to the default of 1, composite solids retain the history of the original objects contained in the composite.

- 0 Sets the *History* property to *None* for all solids. No history is retained.
- 1 Sets the *History* property to *Record* for all solids. All solids retain a history of their original objects.

Show History

A composite solid is created by using multiple primitives combined by Boolean operations. For example, assume a composite solid was created by using *Subtract* to remove a small *Box* primitive from a large *Box* primitive as shown in Figure 39-49. Normally, all of the individual primitives are not visible unless you select them as subobjects. In our example, the small *Box* primitive is not visible.

FIGURE 39-49



“TIP” Icons

“TIP” icons point out time-saving tricks and tips that otherwise might be discovered only after much experience with AutoCAD.

672 Chapter 27

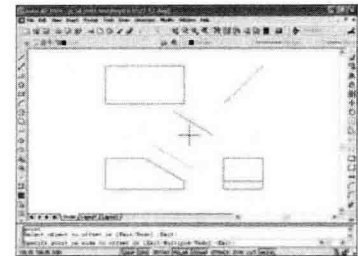
Offset



Pull-down Menu	Command (Type)	Alias (Type)	Short-cut	Screen (Iside) Menu	Tabbed Menu
Modify Offset	Offset	O	---	MODIFY1 Offset	V,17

Invoke the *Offset* command and specify a distance. The first distance is arbitrary. Specify an appropriate value between the front view inclined plane and the nearest edge of the auxiliary view (20 for the example). Offset the new *Line* at a distance of 50 (for the example) or *PICK* two points (equal to the depth of the view).

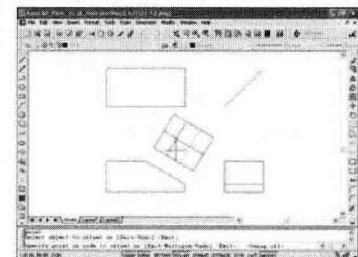
FIGURE 27-12



Note that the *Offset* lines have lengths equal to the original and therefore require no additional editing (Fig. 27-12).

Next, two *Lines* would be drawn between *Endpoints* of the existing offset lines to complete the rectangle. *Offset* could be used again to construct additional lines to facilitate the construction of the two circles in the partial auxiliary view (Fig. 27-13).

FIGURE 27-13



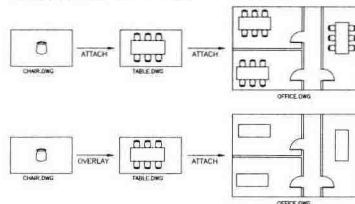
From this point forward, the construction process would be similar to the example given previously (Figs. 27-5 through 27-8). Even though *Offset* does not require that the *SNAP* be *Rotated*, the complete construction of the auxiliary view could be simplified by using the rotated *SNAP* and *GRID* in conjunction with *Offset*.

792 Chapter 30

Overlay

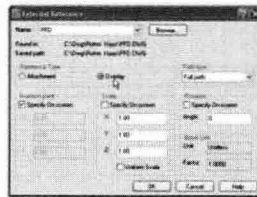
An *Xref Overlay* is similar to an *Attached Xref* with one main difference—an *Overlay* cannot be nested. In other words, if you *Attach* a drawing that (itself) has an *Overlay*, the *Overlay* does not appear in your drawing. On the other hand, if the first drawing is *Attached*, it appears when the parent drawing is *Attached* to another drawing (Fig. 30-18).

FIGURE 30-18



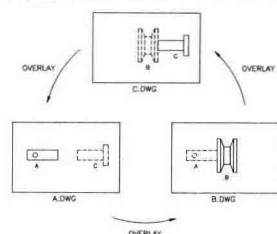
To produce an *Overlay* using the *Xref Manager*, you must first select the *Attach* button to produce the *Select File* dialog box. After selecting the desired file to overlay, press the *Overlay* button in the *External Reference* dialog box that appears (Fig. 30-19). If you type the *-Xref* command, simply use the *Overlay* option and the standard *Select File* dialog box appears.

FIGURE 30-19



The *Overlay* option prevents “circular” *Xrefs* from appearing by preventing unwanted nested *Xrefs*. This is helpful in a networking environment where many drawings *Xref* other drawings. For example, assume drawing B has drawing A as an *Overlay*. As you work on drawing C, you *Xref* and view only drawing B without drawing B’s overlays—namely drawing A. This occurs because drawing A is an *Overlay* to B, not *Attached*. If all drawings are *Overlays*, no nesting occurs (Fig. 30-20).

FIGURE 30-20



Graphically Driven Page Layout

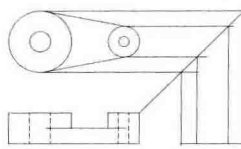
Approximately 2000 illustrations are given in the book. Explanatory text is located directly next to the related figure.

CHAPTER EXERCISES

1. Open the **PIVOTARM.CH16** drawing.

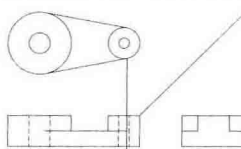
A. Create the right side view. Use **OSNAP** and **ORTHO** or **Polar Tracking** to create **Lines** or **Rays** to the miter line and down to the right side view as shown in Figure 24-34. **Offset** may be used effectively for this purpose instead. Use **Extend**, **Offset**, or **Ray** to create the projection lines from the front view to the right side view. Use **Object Snap Tracking** when appropriate.

FIGURE 24-34



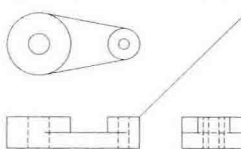
B. **Trim** or **Erase** the unwanted projection lines, as shown in Figure 24-35. Draw a **Line** or **Ray** from the **Endpoint** of the diagonal **Line** in the top view down to the front to supply the boundary edge for **Trimming** the horizontal **Line** in the front view as shown.

FIGURE 24-35



C. Next, create the hidden lines for the holes by the same fashion as before (Fig. 24-36). Use previously created **Layers** to achieve the desired **Linetypes**. Complete the side view by adding the horizontal hidden **Line** in the center of the view.

Figure 24-36



Chapter Exercises

Exercises help you try out the commands discussed in each chapter. Exercises begin with simple, step-by-step use of commands and progress to more advanced drawings based on synthesis of earlier ideas.

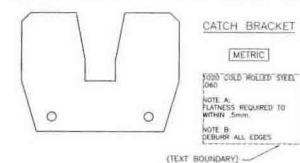
Multi-chapter "Reuse" Exercises

Exercise drawings that are used again in other chapters are designated with this "Reuse" icon. The associated drawing file names are printed in a reversed font. Using these multi-chapter exercises maximizes the student's efforts, creates connections between concepts, and makes the most of the natural pedagogical progression of the material.

5. **Text, Mtext**

Open the **CBRACKET** drawing from Chapter 9 Exercises. Using **romans.shx** font, use **Text** to place the part name and **METRIC** annotation (Fig. 18-71). Use a **Height** of 5 and 4, respectively, and the **Center Justification** option. For the notes, use **Mtext** to create the boundary as shown. Use the default **Justify** method (**T**) and a **Height** of 3. Use **Ddedit**, **Mdedit**, or **Properties** if necessary. **SaveAs CBRACKET**.

FIGURE 18-71



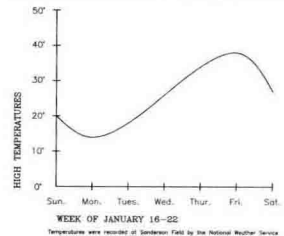
6. **Style**

Create two new styles for each of your template drawings: **ASHEET**, **BSHEET**, and **CD-SHEET**. Use the **romans.shx** style with the default options for engineering applications or **CityBlueprint** (.TTF) for architectural applications. Next, design a style of your choosing to use for larger text as in title blocks or large notes.

7. **Import Text, Ddedit, Properties**

Use a text editor such as Windows Wordpad or Notepad to create a text file containing words similar to "Temperatures were recorded at Sanderson Field by the National Weather Service." Then **Open** the **TEMPGRPH** drawing and use the **Import Text...** option of **Mtext** to bring the text into the drawing as a note in the graph as shown in Figure 18-72. Use **Ddedit** to edit the text if desired or use **Properties** to change the text style or height.

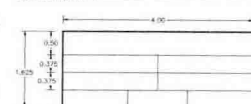
FIGURE 18-72



8. **Create a Title Block**

A. Begin a **New** drawing and assign the name **FIGURE 18-73**. Create the title block as shown in Figure 18-73 or design your own, allowing space for eight text entries. The dimensions are set for an A size sheet. Draw on **Layer 0**. Use a **Pline** with **.02** width for the boundary and **Lines** for the interior divisions. (No **Lines** are needed on the right side and bottom because the title block will fit against the border lines.)

FIGURE 18-73



Reference Material

Useful for self study or classroom use, tabbed pages help you quickly locate the Command Table Index, Shortcut Keys, Dimension Variables, System Variables, Tables of Limits Settings, Template Drawings and more.

McGraw-Hill's ARIS—Assessment, Review, and Instruction System

A vast amount of material is available from www.mhhe.com/leach for both students and instructors.

- A course management system for creating assignments and maintaining course communication
- Test or review questions for each chapter with automatic grading
- Architecture-specific exercises for each chapter
- Mechanical engineering-specific exercises for each chapter
- Civil engineering-specific exercises for each chapter
- Chapter 45, Customize User Interface
- Chapter 46, CAD Management
- Chapter 47, Express Tools
- Solution drawings for chapter exercises (instructors only)

1330 Appendix E

Command Name (type)	Button	Pull-down Menu	Alias (type)	Short Cut	Screen (side) Menu	Tablet Menu	Chapter in this Text
DIMALIGNED		Dimension Aligned	DAL	...	DIMENSION Aligned	W,4	28
DIMANGULAR		Dimension Angular	DAN	...	DIMENSION Angular	X,3	28
DIMARC		Dimension Arc Length	DAR	...	...	...	28
DIMBASELINE		Dimension Baseline	DBA	...	DIMENSION Baseline	...	28
DIMCENTER		Dimension Center Mark	DCE	...	DIMENSION Center	X,2	28
DIMCONTINUE		Dimension Continue	DCO	...	DIMENSION Continue	...	28
DIMDIAMETER		Dimension Diameter	DDI	...	DIMENSION Diameter	X,4	28
DIMDISASSOCIATE		...	DDA	...	...	...	28
DIMEDIT		Dimension Oblique	DED	...	DIMENSION Dimedit	Y,1	28, 29
DIMJOG		Dimension Jogged	DJO	...	...	...	28
DIMLINEAR		Dimension Linear	DLI	...	DIMENSION Linear	W,5	28
DIMORDINATE		Dimension Ordinate	DOR	...	DIMENSION Ordinate	W,3	28
DIMOVERRIDE		Dimension Override	DOV	...	...	Y,4	29
DIMRADIUS		Dimension Radius	DRA	...	DIMENSION Radius	X,5	28
DIMREASSOCIATE		Dimension Reassociate Dimensions	DRE	...	...	...	28
DIMREGEN		28
DIMSTYLE		Dimension Style...	D, DST	...	DIMENSION Ddim	Y,5	29
-DIMSTYLE		Dimension Update	...	...	DIMENSION Dimstyle	Y,3	29
DIMTEDIT		Dimension Align Text >	DIMTED	...	DIMENSION Dimtedit	Y,2	28, 29
DIST		Tools Inquiry > Distance	DI	...	TOOLS 1 Dist	T,8	17
DIVIDE		Draw Point > Divide	DIV	...	DRAW 2 Divide	V,13	15
DONUT		Draw Donut	DO	...	DRAW 1 Donut	K,9	15
DRAWINGRECOVERY		Drawing Utilities Recovery	DRM	2

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AutoCAD 2007 INSTRUCTOR

Information Center

Table of Contents
Book Preface
Feature Summary
What's New
About the Author

AutoCAD 2007 Instructor: A Student Guide to Complete Coverage of AutoCAD's Commands and Features

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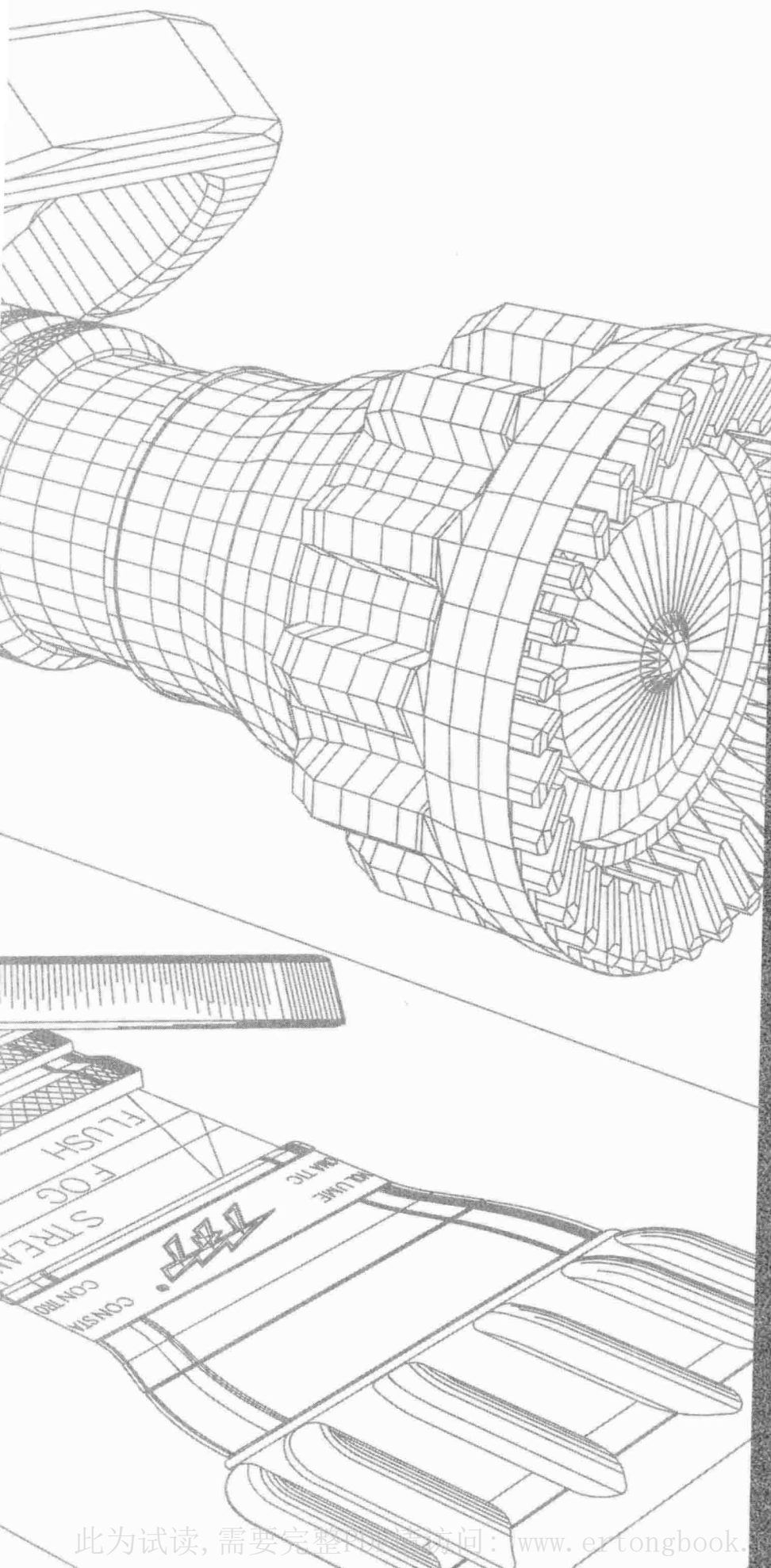
AutoCAD 2007 Instructor is intended for instructor-lead instruction and self-instruction in AutoCAD software. AutoCAD is the market leader for all CAD software and is used by nearly two million students and professionals in architecture, engineering, construction, and design. AutoCAD 2007 Instructor makes it easy to upgrade from previous versions of AutoCAD by the use of a 2007 bar in the margin that highlights the new features.

Developed from teaching techniques used in an authorized AutoCAD Training Center and in instruction for engineering colleges, AutoCAD 2007 Instructor covers all features and capabilities of AutoCAD. The text is command-oriented so chapters are centered around groups of related commands, making the text very effective as a reference. The chapters are structured in a practical pedagogical sequence beginning with instruction in general procedures for using the computer interface, setting up and creating drawings, and then progressing to advanced features such as dimensioning, special drawing applications and AutoCAD features, three-dimensional modeling and rendering, and software customization.

McGraw-Hill is proud to be one of the first and few publishers to have a text on AutoCAD 2007.

Students: A registration code is required in order to gain access to your instructor's ARIS course. If you not receive a registration code with your text, please use the following: DDUU-WFQ3-9TDD-3R4H-GHQN

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PREFACE

ABOUT THIS BOOK

This Book Is Your AutoCAD 2007 Instructor

The objective of *AutoCAD 2007 Instructor* is to provide you the best possible printed medium for learning AutoCAD, whether you are a professional or student learning AutoCAD on your own or whether you are attending an instructor-led course.

Complete Coverage

AutoCAD 2007 Instructor is written to instruct you in the full range of AutoCAD 2007 features. All commands, system variables, and features within AutoCAD are covered. This text can be used for a two-, three-, or four-course sequence.

Graphically Oriented

Because *AutoCAD 2007 Instructor* discusses concepts that are graphical by nature, many illustrations (approximately 2000) are used to communicate the concepts, commands, and applications.

Easy Update from AutoCAD 2005 and AutoCAD 2006

AutoCAD 2007 Instructor is helpful if you are already an AutoCAD user but are updating from AutoCAD 2005 or 2006. All new commands, concepts, features, and variables are denoted on the edges of the pages by a vertical “2006” bar (denoting an update since 2005) or a “2007” bar (denoting an update since 2006).

Pedagogical Progression

AutoCAD 2007 Instructor is presented in a pedagogical format by delivering the fundamental concepts first, then moving toward the more advanced and specialized features of AutoCAD. The book begins with small pieces of information explained in a simple form and then builds on that experience to deliver more complex ideas, requiring a synthesis of earlier concepts. The chapter exercises follow the same progression, beginning with a simple tutorial approach and ending with more challenging problems requiring a synthesis of earlier exercises.

Multi-chapter “Reuse” Exercises

About half of the Chapter Exercises are used again later in subsequent chapters. This concept emphasizes the natural pedagogical progression of the text, creates connections between concepts, and maximizes the student's efforts. Reuse Exercises are denoted with a “Reuse” (diskette) icon and the related drawing file names are printed in a reversed font.

Important “Tips”

Tips, reminders, notes, and cautions are given in the book and denoted by a “TIP” marker in the margin. This feature helps you identify and remember important concepts, commands, procedures, and tricks used by professionals that would otherwise be discovered only after much experience.

Valuable Reference Guide

AutoCAD 2007 Instructor is structured to be used as a reference guide to AutoCAD. Several important tables, lists, and variable settings are “tabbed” on the edge of the page for easy access. Every command throughout the book is given with a “command table” listing the possible methods of invoking the command. A complete index gives an alphabetical listing of all AutoCAD commands, command options, system variables, and concepts discussed.

For Professionals and Students in Diverse Areas

AutoCAD 2007 Instructor is written for professionals and students in the fields of engineering, architecture, design, construction, manufacturing, and any other field that has a use for AutoCAD. Applications and examples from many fields are given throughout the text. The applications and examples are not intended to have an inclination toward one particular field. Instead, applications to a particular field are used when they best explain an idea or use of a command.

McGraw-Hill's ARIS—Assessment Review and Instruction System

Please visit our web page at www.mhhe.com/leach to access a complete homework and course management system for AutoCAD 2007 Instructor. Ancillary materials are available for reading or download and can be assigned using ARIS. Questions for each chapter (true-false, multiple choice, and written answer) are available for homework, review, and testing. Over 400 drawing problems specifically for architectural, mechanical engineering, and civil/electrical applications are available. Solutions for drawing problems and questions can be downloaded by requesting a password from your McGraw-Hill representative.

Additional Chapters

Chapter 45, Customize User Interface, Chapter 46, CAD Management, and Chapter 47, Express Tools, are available free at www.mhhe.com/leach.

Have Fun

I predict you will have a positive experience learning AutoCAD. Although learning AutoCAD is not a trivial endeavor, you will have fun learning this exciting technology. In fact, I predict that more than once in your learning experience you will say to yourself, "Sweet!" (or something to that effect).

James A. Leach

ABOUT THE AUTHOR

James A. Leach (B.I.D., M.Ed.) is Professor of Engineering Graphics at the University of Louisville. He began teaching AutoCAD at Auburn University early in 1984 using Version 1.4, the first version of AutoCAD to operate on IBM personal computers. Jim is currently Director of the AutoCAD Training Center established at the University of Louisville in 1985, one of the first fifteen centers to be authorized by Autodesk.

In his 30 years of teaching Engineering Graphics and AutoCAD courses, Jim has published numerous journal and magazine articles, drawing workbooks, and textbooks about Autodesk and engineering graphics instruction. He has designed CAD facilities and written AutoCAD-related course materials for Auburn University, University of Louisville, the AutoCAD Training Center at the University of Louisville, and several two-year and community colleges. Jim is the author of 15 AutoCAD textbooks published by Richard D. Irwin and McGraw-Hill.

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The following special treatment of characters and fonts in the textual content is intended to assist you in translating the meaning of words or sentences in *AutoCAD 2007 Instructor*.

<u>Underline</u>	Emphasis of a word or an idea.
Helvetica font	An AutoCAD prompt appearing on the <u>screen</u> at the command line or in a text window.
<i>Italic (Upper and Lower)</i>	An AutoCAD command, option, menu, toolbar, or dialog box name.
UPPER CASE	A file name.
UPPER CASE ITALIC	An AutoCAD system variable or a drawing aid (<i>OSNAP</i> , <i>SNAP</i> , <i>GRID</i> , <i>ORTHO</i>).
Anything in Bold represents user input:	
Bold	What you should <u>type</u> or press on the keyboard.
Bold Italic	An AutoCAD <u>command</u> that you should type or <u>menu item</u> that you should select.
BOLD UPPER CASE	A <u>file name</u> that you should type.
BOLD UPPER CASE ITALIC	A <u>system variable</u> that you should type.
PICK	Move the cursor to the indicated position on the screen and press the <u>select</u> button (button #1 or left mouse button).



INTRODUCTION