

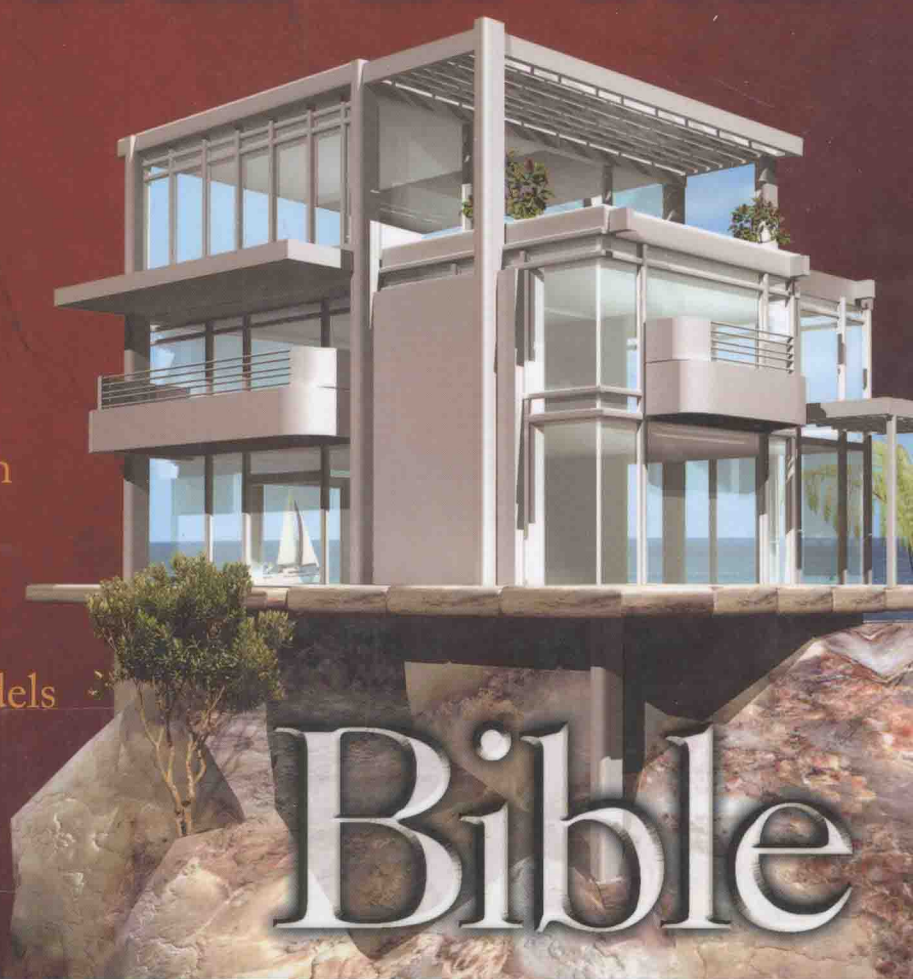


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# AutoCAD® 2012 & AutoCAD LT® 2012



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# Bible

**The book you need to succeed!**

# AutoCAD® 2012 & AutoCAD LT® 2012 Bible



Ellen Finkelstein



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**AutoCAD® 2012 & AutoCAD LT® 2012 Bible**

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## About the Author

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**Ellen Finkelstein** learned AutoCAD in Israel, where she always got to pore over the manual because it was in English. After returning to the United States, she started consulting and teaching AutoCAD as well as other computer programs, including Microsoft Word, Excel, and PowerPoint. She has also taught courses on Web writing and usability. Her Web site, [www.ellenfinkelstein.com](http://www.ellenfinkelstein.com), contains tips and techniques for AutoCAD, PowerPoint, and presenting, and she publishes the AutoCAD Tips Blog and the AutoCAD Tips Newsletter. Ellen has written extensively on AutoCAD, including articles for Autodesk's Web site and features for AutoCAD's Help system. Ellen's first book was *AutoCAD For Dummies Quick Reference*. Since then, she has written books on PowerPoint, OpenOffice.org (*OpenOffice.org For Dummies*), Flash (including *Flash CS5 For Dummies*), and Web technologies (*Syndicating Web Sites with RSS Feeds For Dummies*). You're holding the twelfth edition (wow!) of this book, which previously appeared for AutoCAD releases 14, 2000, 2002, 2004, 2005, 2006, 2007, 2008, 2009, 2010, and 2011.



*To MMY, for teaching me that there's more to life than meets the eye and that the deeper levels of life are the most intelligent, powerful, and blissful.*

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# Foreword

Welcome!

**W**hether you are an experienced AutoCAD user or a newer member of the community, you have just made a great investment with the *AutoCAD 2012 & AutoCAD LT 2012 Bible*. This book will be a valuable reference and guide that we expect you to use on a regular basis to help you become more proficient and more productive with AutoCAD.

The *AutoCAD Bible* is an excellent, comprehensive guide for getting up to speed quickly on the power of AutoCAD 2012. Everything from the basics of AutoCAD drafting and documentation tools to 3D modeling and design to customization and programming is covered in this book. You will have access to real-world examples and AutoCAD drawings that will help you understand and apply new concepts through hands-on exercises. With the step-by-step examples, you will be able to follow along easily and continue learning at your own pace, at any time.

Ellen has been writing books about AutoCAD and participating in the AutoCAD community for many years, and has established herself as a passionate AutoCAD contributor. She is an active member of the AutoCAD beta community and is helping to shape the future of AutoCAD. You can be assured that you are getting guidance from one of the most experienced professionals in this field.

Now that you have access to the wealth of information in this *AutoCAD Bible*, you can jump right in. Pick out a topic or tool you want to learn about, and discover new ways to take advantage of the power of AutoCAD 2012. Expand your knowledge and find new ways to work with AutoCAD for design and documentation.

Thank you, Ellen, for delivering another terrific edition of the *AutoCAD Bible*. I know our AutoCAD community will appreciate your guidance and benefit greatly from your expertise.

Diane Li  
Senior Product Manager, AutoCAD  
Autodesk, Inc.

# Introduction

**W**elcome to the *AutoCAD 2012 & AutoCAD LT 2012 Bible*. Whether you use AutoCAD or AutoCAD LT, you'll find complete explanations of all the powerful features that you need to know about to design and draw anything. This book is intended to be your comprehensive guide to both the AutoCAD and AutoCAD LT programs.

This book covers every significant AutoCAD and AutoCAD LT feature. If you're a beginning user, you'll find everything you need to start out; if you're already using AutoCAD or AutoCAD LT regularly, the book covers advanced material as well. Although you can use this book as a tutorial if you're just starting out or learning a new set of features, it also provides a solid reference base to come back to again and again. The short tutorials on almost every topic will quickly have you creating professional-level drawings. The DVD is chock-full of drawings, a trial version of both AutoCAD 2012 and AutoCAD LT 2012, and add-in programs (which are for AutoCAD only). This book contains all that you need to make full use of either program.

AutoCAD 2012 offers a wide range of new features, including expanded arrays, a way to store and open drawings online (AutoCAD WS), faster creation of groups, a new interface to access drawing content (the Content Explorer), and many small additions to improve your efficiency in both 2D and 3D drawings.

## Is This Book for You?

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The *AutoCAD 2012 & AutoCAD LT 2012 Bible* covers all of the essential features of AutoCAD and AutoCAD LT and includes clear, real-life examples and tutorials that you can adapt to your needs.

Although I fully cover the basics, I have also included material on the many advanced features, such as AutoLISP, 3D modeling, rendering, and customization. (Most of the advanced features apply to AutoCAD only.) The following categories should help you decide whether this book is for you.

### **If you are a new AutoCAD or AutoCAD LT user**

If you are new to AutoCAD or AutoCAD LT, the *AutoCAD 2012 & AutoCAD LT 2012 Bible* guides you through all that you need to know to start drawing effectively, whatever your field. Just start at the beginning.

### **If you are upgrading to AutoCAD 2012 or AutoCAD LT 2012**

This book highlights all of the new features and helps you to make the upgrade transition as seamless as possible. Look for the New Feature icons.

### **If you are switching from another CAD program**

You already know what CAD is all about. This book clearly explains the AutoCAD and AutoCAD LT way of drawing the models that you have already been drawing. In addition, you'll find a great deal of essential information about transferring files and data from other formats.

## **How This Book Is Organized**

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This book is divided into eight parts and also includes a DVD.

### **Part I: Introducing AutoCAD and AutoCAD LT Basics**

Part I provides the background information that you need to start drawing. It starts with a “quick tour” that has you drawing right away and then covers how to start a drawing, use commands, specify coordinates, and set up a drawing.

### **Part II: Drawing in Two Dimensions**

Part II covers all of the commands and procedures for drawing and editing in two dimensions. In addition, I discuss how to control the drawing process with layers, zooming, and panning. This part also includes information about dimensioning, plotting, and printing.

### **Part III: Working with Data**

Part III covers many ways to organize and share data, including using blocks, attributes, and external references.

### **Part IV: Drawing in Three Dimensions**

Part IV explains everything that you need to know to draw in three dimensions. It also discusses how to present 3D drawings using shading and rendering techniques.

### **Part V: Organizing and Managing Drawings**

Part V helps you to incorporate AutoCAD and AutoCAD LT into your workflow by explaining how to set standards, manage drawings, and work with other applications. It concludes with a chapter on creating electronic output.

### **Part VI: Customizing AutoCAD and AutoCAD LT**

Part VI introduces the tools that you need to customize commands, toolbars, linetypes, hatch patterns, shapes, fonts, and the ribbon. You'll also find a chapter on creating macros with script files as well as the Action Recorder.

### **Part VII: Programming AutoCAD**

Part VII introduces you to programming AutoCAD. It includes three chapters on AutoLISP and Visual LISP, and one chapter on VB.net. This part applies to AutoCAD only.



### Part VIII: Appendixes

Part VIII provides additional information for AutoCAD and AutoCAD LT users. Appendix A gives instructions for installing and configuring AutoCAD and AutoCAD LT. Appendix B covers additional resources for AutoCAD and AutoCAD LT users. Appendix C explains what you'll find on the DVD.

#### The DVD

The DVD contains all of the drawings that you need to do the exercises in this book. These drawings are a great resource to help you learn using real-world examples. In addition, the DVD includes the drawings that result after you finish an exercise or tutorial. In this way, you can check whether you have done an exercise correctly. If you lose the DVD or have an electronic version of this book, you can download the drawings at [www.wiley.com/go/autocad2012bible](http://www.wiley.com/go/autocad2012bible).

The DVD also contains many add-on programs that I hope you will find useful. I am especially pleased to include 30-day trial versions of AutoCAD 2012 and AutoCAD LT 2012 on the DVD. In addition, I have created some video tutorials to help you visualize some of the exercises. There's even a Bonus Chapter on connecting to external databases. For more information, read Appendix C.

### How to Use This Book

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You can use this book in two ways: as a tutorial and learning tool, or as a reference.

#### As a tutorial

The overall organization of the book goes from simple to complex, and each chapter has several step-by-step exercises. This enables you to use the book as a tutorial, from beginning to end. You can always go back and redo any exercise when you need to refresh your memory on a particular feature. I've taught AutoCAD using this book and it makes a great textbook!

For newcomers to AutoCAD or AutoCAD LT, Parts I (Introducing AutoCAD and AutoCAD LT Basics) and II (Drawing in Two Dimensions) are essential. After that, you can refer to chapters that interest you. Parts III (Working with Data) and V (Organizing and Managing Drawings) are also useful for beginners. Intermediate users will probably be familiar with most of the material in Part I and will be more likely to skip around, looking for the specific topics that they need. However, don't forget that many new features are introduced in Part I. Enough material appears in this book to bring intermediate users up to an advanced level.

I have designed this book to be comprehensive and to include every significant feature of AutoCAD and AutoCAD LT. Therefore, do not be concerned if some of the material seems too advanced. It will be there when you are ready for it.

#### As a reference

The *AutoCAD 2012 & AutoCAD LT 2012 Bible* is organized as a reference that you can use whenever you are stuck, or when you try to do something for the first time. Each chapter covers a topic completely, making it easy to find what you're looking for. You can do each Steps exercise (with a few exceptions) on its own without doing the other exercises in the chapter. You can easily look up a topic and complete a related exercise without having to go through the entire chapter. A complete index at the back of the book can also help you to find features and topics.

### Using the Kindle version

The *AutoCAD 2012 & AutoCAD LT 2012 Bible* is available in a Kindle version. Unfortunately, the DVD doesn't come with this version. Therefore, you need to access the drawings from [www.wiley.com/go/autocad2012bible](http://www.wiley.com/go/autocad2012bible). In addition, you can download a 30-day trial of AutoCAD from [www.autodesk.com/autocad-trial](http://www.autodesk.com/autocad-trial). For AutoCAD LT, go to [www.autodesk.com/autocadlt-trial](http://www.autodesk.com/autocadlt-trial).

## Doing the Exercises

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I recommend that you do the exercises from the beginning. These earlier exercises include important instructions that may affect your system later. For example, one of the first exercises is to create a new folder to hold the drawings for other exercises. This folder keeps your exercise drawings separate from other drawings that have been created in your office. However, most exercises stand on their own so that you can go back and do only the exercises that you need.

AutoCAD is a very customizable program. AutoCAD LT can also be customized in many ways, although to a lesser extent. This book assumes that you are working with the default setup. However, a number of changes may have been made to your system that could result in the user interface and drawings appearing or even functioning differently from those shown in this book. If you installed AutoCAD or AutoCAD LT yourself and made some adjustments, you know what changes you have made. However, if you are using a computer that was set up by someone else, it may help to talk to that person first, to see what changes they made. In addition, as you work through some of the exercises in this book, you will make certain changes in the program's setup. Most of these are minor changes that any user would make while drawing. For safety, Cautions and Tips accompany all changes that could have serious consequences, such as customizing the menu. For example, when customizing the menu, you will be instructed to copy the menu file under a new name, and you will then work with the new menu file, not the original one. Nevertheless, if you are working on a network or sharing your computer with someone else, it is important to consult with others who may be affected by the changes that you make.

## Cross-Reference

**You can create your own configuration to help ensure that certain changes that you make will not affect others. Instructions for doing this appear in Appendix A under the heading "Creating Multiple Configurations." ■**

The exercises in the *AutoCAD 2012 & AutoCAD LT 2012 Bible* have been carefully checked by a technical editor to ensure accuracy. However, we cannot anticipate all situations, due to either varying hardware and software configurations or customization. If you have a problem with an exercise, contact me at the e-mail address listed at the end of this Introduction so that I can correct the problem in the book's next edition. I will also try to give you the information that you need to complete the exercise.

## Conventions Used in This Book

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Given all the ways in which you can execute a command in AutoCAD and AutoCAD LT, you'll find it useful to read this section, which describes this book's typographical conventions. You will find this section helpful for doing the step-by-step exercises as well.

## Using commands

AutoCAD and AutoCAD LT offer workspaces (covered fully in Appendix A) that provide very different ways of executing commands. The default workspace, Drafting & Annotation, uses the ribbon and Application menu, whereas the Classic workspace uses more traditional menus and toolbars. I use the default workspace (or the 3D Modeling workspace for 3D drawing in AutoCAD) throughout the book. All workspaces offer a command line, where you can execute a command by entering its name.

When I explain how to execute a command, I give the instructions for doing so on the ribbon. In addition, I almost always provide the name of the command so that you can enter it on the command line.

The new ribbon created a quandary for me, because I know that some people, especially those upgrading from earlier releases, don't use it; instead, they will prefer to use the Classic workspace with its familiar menus and toolbars. However, I felt that explaining how to execute each command in three ways (the ribbon, the menu/toolbar, and the command line) would be awkward, perhaps confusing, and space-consuming.

So what should you do if you are using this book with the Classic workspace? In many cases, especially if you're upgrading, you'll already know where to find familiar commands. For new commands, it's easy to find their location in the Classic workspace by going to the Help system. Follow these steps:

1. Type the name of the command on the command line or in the Dynamic Input box.
2. Press F1 to open the Help window of Autodesk Exchange.
3. Look at the top of the right-hand pane, where you'll find instructions for all the available methods of executing the command.

When referring to the ribbon, I might say, "Choose Home tab↪Draw panel↪Line," which means to click the Home tab if it's not already displayed, look for the Draw control panel, and click the Line button in that panel. If you're not sure which button to click, hover the mouse cursor over a button to see its tooltip, which provides more information. You can expand many control panels by clicking their title at the bottom of the ribbon; if a command is on the expanded section, I indicate that in the instruction.

A few of the ribbon panels have drop-down lists, which are equivalent to sub-menus. Therefore, to indicate which button to click, I may need to tell you to choose View tab↪Navigation panel↪Zoom drop-down list↪Zoom Extents. Although I haven't found a good alternative, this is not completely satisfactory for two reasons. First, it's a mouthful! Second, the drop-down lists' names do not appear, making it hard to know which is the Zoom drop-down list. However, in most cases, the button icon will make it obvious which drop-down list I'm talking about.

To indicate that you should choose a command from the Application menu, for example, I say, "Choose Application Button↪Save," which means that you should click the Application Button at the upper-left corner of the application window (which opens the Application menu), and then click the Save item.

Every command also has a command name that you can type on the command line, which appears at the bottom of your screen. Command names are shown in capital letters, as in CIRCLE. AutoLISP functions (which apply to AutoCAD only) are shown in small capital letters, as in COMMAND.

### Figures

In order to create clear, legible figures, I have used a white background in AutoCAD. However, many people use a black or dark gray drawing area. In Appendix A, I explain how to change this color. As you read through the book, you should be aware that you may see on your screen a negative image of what I show in the figures — a dark background and light-colored objects. Once you get used to this difference, you'll easily recognize what you see in the figures.

In AutoCAD, the 3D environment further changes what you see on your screen. The default 3D background is gray. Again, I have sometimes changed the background color to white for the purpose of creating a clear figure.

### Prompts, your input, and instructions

In the step-by-step exercises, most instructions are presented in the same font and style that you are reading now. However, when I reproduce the command line, the prompts appear in a nonproportional font. Other instructions (such as "*Type the first coordinate*") are shown in italic. In any context, input that you need to type appears in **bold**.

The Dynamic Input feature shows prompts near your cursor, but additional options only appear if you click the down arrow on your keyboard. To make clear all of the available options, I use the command line format of prompts.

I often refer to specific elements in a drawing. References to these elements appear in the text as numbers in circles, such as ①, ②, ③, and so on. You'll find the corresponding number in the figure to which the text refers.

### Mouse and keyboard terms

You can draw using a mouse or a puck. The mouse is familiar to all users. A puck (or sometimes a stylus) is used with a digitizing tablet. Because most users do not have a digitizing tablet, I do not directly refer to it in this book. If you have one, follow the instructions for using the mouse in the same way but using your puck.

A mouse can have two or more buttons. Many users like using a mouse with at least three buttons because you can customize the buttons to suit your needs. However, because many mice have only two buttons, I assume only two plus a wheel. The left mouse button is used to choose commands and toolbar buttons and to pick points in your drawing. For this reason, it is sometimes called the *pick button*. The right button usually opens a shortcut menu.

The time-sensitive right-clicking feature enables you to use the right button either to open a shortcut menu or as the equivalent of pressing Enter. Because this feature is not on by default, I do not assume that you have turned it on. I use the term *right-click* when you need to access a shortcut menu. If you have time-sensitive right-clicking turned on, you need to hold down the right mouse button for more than 250 milliseconds (by default) to display the shortcut menu. See Chapter 3 and Appendix A for more details.

If I say one of the following

- Choose Application Button↔Options
- Choose Home tab↔Draw control panel↔Line
- Select the circle in your drawing

it means you need to use the left button on your mouse.



When I say to press Enter, it means that you need to press the key that is marked Enter, Return, or ↵ on your keyboard. Often I use the bent arrow symbol ↵ that you see on your Enter key to indicate that you should press Enter.

I also use the mouse terms listed in the following table.

---

### Mouse Terms

Term	Description
Cursor	The shape on your screen that shows you where the mouse is pointed. It can take a number of forms, such as crosshairs, a pickbox, or an arrow. It is also known as the mouse pointer.
Pickbox	A type of cursor consisting of a small box, used to select drawing objects.
Crosshairs	A type of cursor consisting of intersecting lines, sometimes with a pickbox at their center.
Pick	Point to a drawing object and click the left mouse button.
Click	Press the left mouse button once and release it.
Double-click	Press the left mouse button twice in rapid succession.
Click and drag	Click the left mouse button and hold it down while you move the mouse, dragging an object on your screen with it.
Choose	Click a ribbon item, menu item, toolbar button, or dialog box item. You can sometimes choose an item using the keyboard, as well. I also use this word when you need to choose a command option, which you can do by choosing from a shortcut menu with a mouse, as well as by typing the option's abbreviation on the keyboard.
Right-click	Press the right mouse button once and release it. If you have turned on time-sensitive right-clicking, hold the right mouse button for at least 250 milliseconds (by default) before releasing it.
Shift and click	While holding down the Shift key, press the left mouse button once and release it.
Shift and right-click	While holding down the Shift key, press the right mouse button once and release it.
Shift and mouse wheel	Press the Shift key and hold down the mouse wheel, using it like a button.
Select	Highlight an object in a drawing by picking it or by using another object selection method, or highlight text in a dialog box or text document.

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## What the Icons Mean

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The *AutoCAD 2012 & AutoCAD LT 2012 Bible* is liberally sprinkled with icons — symbols in the left margin that call your attention to noteworthy points.

### AutoCAD Only

This icon means that the feature that I am discussing is not available in AutoCAD LT. ■

### Caution

The Caution icon means that you should pay special attention to the information or instructions because you could cause a problem otherwise. ■

## Introduction

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### Cross-Reference

Cross-references refer you to a related topic elsewhere in the book. Because you may not read this book straight through from cover to cover, you can use cross-references to quickly find just the information you need. ■

### New Feature

The New Feature icon means that a feature is new to AutoCAD 2012 or AutoCAD LT 2012 or has been significantly changed. ■

### Note

A Note icon alerts you to some important point that requires special attention, or additional information that may be helpful. ■

### On the DVD

The On the DVD icon highlights references to related material on the DVD. ■

### Tip

A Tip shows you a way to accomplish a task more efficiently or quickly. You'll find plenty of practical advice here. ■

## Other Information

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This book assumes that you know the basics of Windows, although the instructions that you'll read here are usually detailed enough to get you through any task.

The *AutoCAD 2012 & AutoCAD LT 2012 Bible* covers AutoCAD 2012 and AutoCAD LT 2012. However, most of the information also applies to the 2011 release of both programs. I have used AutoCAD in Windows 7, but almost everything also applies to Windows XP and Windows Vista, although some of the screens will look different. If you are using AutoCAD LT 2012, again, some of the screens will look different. Where there is a significant difference between AutoCAD and AutoCAD LT, I explain the difference.

## Contacting the Author

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I would be happy to hear any comments that you have about this book. The best way to contact me is by e-mail at [ellen@ellenfinkelstein.com](mailto:ellen@ellenfinkelstein.com). You can also use the United States Postal Service (a.k.a. snail mail) and write to me in care of Wiley. Please note that I can't provide technical support for my readers. The publisher maintains a page on its site that includes the drawings used in the exercises (in case you lose your DVD) and any errata at [www.wiley.com/go/autocad2012bible](http://www.wiley.com/go/autocad2012bible). I have my own Web site at [www.ellenfinkelstein.com](http://www.ellenfinkelstein.com) that contains information on my books, errata (at [www.ellenfinkelstein.com/autocAD.html#errata](http://www.ellenfinkelstein.com/autocAD.html#errata)), and AutoCAD, including many AutoCAD tips. I invite you to sign up there for my free AutoCAD Tips Newsletter, so that you can continue the learning process. Go to [www.ellenfinkelstein.com/acad\\_submit.html](http://www.ellenfinkelstein.com/acad_submit.html).

# Acknowledgments

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My thanks to Lee Ambrosius ([www.hyperpics.com](http://www.hyperpics.com)), the highly knowledgeable technical editor for most of the book. Lee's comments improved the book throughout. In addition, Lee also took on about one-third of the chapters to update; his expert help made this huge project a lot easier. He completely rewrote Chapter 37 to cover programming AutoCAD with VB.NET. James Murphy did the technical editing for Lee's chapters. They are both AutoCAD authorities and you, the reader, benefit.

I especially want to give credit to Grahame Ede, an AutoCAD teacher and consultant in Australia, for "metricating" three of the exercises in this book. His expertise was invaluable. And Thanks to Pan Yue (Mimi) for taking some of the screen captures of the dialog boxes.

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