

# Contents at a Glance

*Introduction* ..... xxiii

**Part 1 • VBA Macros and the Visual Basic Editor** ..... 1

**Chapter 1 • Developing a Simple VBA Application** ..... 3

**Chapter 2 • Creating VBA Macros** ..... 29

**Chapter 3 • Quick Tour of the IDE** ..... 53

**Chapter 4 • VBA Programming Concepts** ..... 79

**Part 2 • Drawing Lines and Solid Areas Using VBA Macros** ..... 129

**Chapter 5 • The AutoCAD Object Model** ..... 131

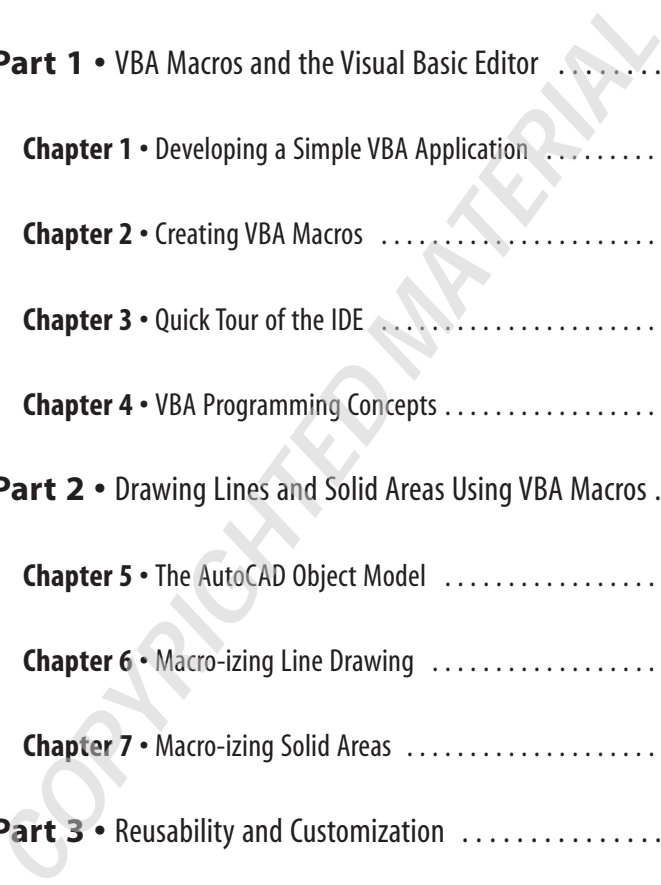
**Chapter 6 • Macro-izing Line Drawing** ..... 167

**Chapter 7 • Macro-izing Solid Areas** ..... 221

**Part 3 • Reusability and Customization** ..... 267

**Chapter 8 • Templates and Reusability** ..... 269

**Chapter 9 • Creating Drawings with Text** ..... 305



<b>Chapter 10</b> • Debugging Your Code .....	355
<b>Chapter 11</b> • Dimensioning Drawings from Your Own Menus and Toolbars .....	375
<b>Chapter 12</b> • File Input and Output .....	419
<b>Part 4</b> • 2D Drawing Techniques .....	447
<b>Chapter 13</b> • Working with 2D Drawing Techniques .....	449
<b>Chapter 14</b> • Grouping Objects .....	471
<b>Part 5</b> • 3D Drawing Techniques .....	511
<b>Chapter 15</b> • Creating and Drawing 3D Solids .....	513
<b>Chapter 16</b> • ActiveX Controls .....	565
<b>Chapter 17</b> • AutoCAD and the Internet .....	597
<b>Appendix A</b> • Object Models .....	619
<b>Appendix B</b> • ASCII Character Set .....	631
<i>Index</i> .....	637

# Contents

*Introduction* ..... xxiii

## **Part 1 • VBA Macros and the Visual Basic Editor** ..... 1

### **Chapter 1 • Developing a Simple VBA Application** ..... 3

Advantages of Using VBA with AutoCAD ..... 5

The AutoCAD VBA Environment ..... 6

    Creating UserForm Modules ..... 7

    Puttering around in the Toolbox ..... 8

Developing Your First Application ..... 14

    Creating the GUI ..... 14

    Setting Captions in the Properties Window ..... 17

    The VBA Code Window ..... 19

    Running Your Application ..... 24

    Saving Your Application ..... 25

    Returning to AutoCAD ..... 26

    Summary ..... 27

### **Chapter 2 • Creating VBA Macros** ..... 29

What Is a Macro? ..... 31

    ThisDrawing Object ..... 31

    Standard Modules ..... 32

Creating a Macro to Add Text to a Drawing ..... 34

    Using the IDE's Editing Features to Enter Code ..... 34

    Saving a Macro ..... 41

    Running a Macro ..... 42

Using VBA's Date and Time Functions ..... 45

    Updating Your DrawText Macro ..... 45

Loading VBA Project Files ..... 46

    Loading a Project Manually ..... 46

    Loading a Project Each Time a Drawing Object Is Opened ..... 48

    Loading a Project When AutoCAD Starts Up ..... 48

    Canceling the Loading of a Project at Startup ..... 50

Starting an Application from a Macro .....	50
Summary .....	51
<b>Chapter 3 • Quick Tour of the IDE .....</b>	<b>53</b>
VBA IDE Components .....	55
Exploring the Menu Bar .....	56
Setting Your IDE Options .....	58
The IDE's Toolbars .....	62
Printing UserForms .....	70
Overview of the Code Commands .....	71
Commands for Editing Code .....	71
Commands for Debugging Code .....	72
Commands for Running Code .....	73
Getting Help .....	74
Context-Sensitive Help .....	77
Summary .....	77
<b>Chapter 4 • VBA Programming Concepts .....</b>	<b>79</b>
How Code Instructs the Computer .....	81
Statements and Expressions .....	81
All about Variables .....	82
Declaring Variables Using the Dim Statement .....	84
To Declare or Not to Declare? .....	85
Handling Arrays of Variables .....	86
Creating an Array .....	87
Accessing Array Elements .....	87
All About Constants .....	89
Declaring Symbolic Constants .....	89
Viewing Built-in Constants in the Object Browser .....	90
Scope of Constants and Variables .....	94
Public vs. Private .....	94
Scope at the Procedure Level .....	95
UserForm and Module-Level Scope .....	95
Static Statements and the Static Keyword .....	96
Defining Your Own Types .....	99
Using Conditions to Control Code Execution .....	100
If...Then...Block .....	100
If...Then...Else... .....	102
Select Case Statement .....	103

## CONTENTS

Using Loops to Repeat Code .....	104
Repeating Code a Set Number of Times .....	105
Repeating Code an Unknown Number of Times .....	106
Overview of Objects, Properties, Methods, and Events .....	107
All about Objects .....	107
AutoCAD Drawing Objects .....	109
The Microsoft Forms Object Model .....	111
All about Properties .....	113
All about Methods .....	119
All about Events .....	120
Comparing VBA Programming Constructs .....	121
Macros .....	121
Procedures .....	122
Setting the Tab Order for Controls .....	125
Functions .....	126
Parameters and Arguments .....	127
Programs .....	127
Applications .....	128
Summary .....	128
<b>Part 2 • Drawing Lines and Solid Areas Using VBA Macros .....</b>	<b>129</b>
<b>Chapter 5 • The AutoCAD Object Model .....</b>	<b>131</b>
AutoCAD Application Object .....	133
AutoCAD Document Objects .....	134
Coding the Finding Name Application .....	136
Running an Application from a Macro .....	140
Loading Your Application .....	142
Communicating with Message Boxes .....	142
The MsgBox Function .....	142
Graphical Object Spaces .....	147
ModelSpace Collection .....	147
PaperSpace Collection .....	147
Block Objects .....	150
Adding Graphical Objects .....	150
Accessing Graphical Objects .....	152
Preferences Object .....	154
Sending Text to the AutoCAD Command Line .....	159

VB's String-Handling Functions .....	161
Summary .....	166
<b>Chapter 6 • Macro-izing Line Drawing .....</b>	<b>167</b>
Drawing a Line .....	169
A Control's TabIndex and TabStop Properties .....	176
The With Statement .....	176
Setting Linetypes .....	177
Running Your Line Drawing Application .....	186
Highlighting a Line from a Macro .....	188
Highlighting and Coloring All Lines .....	192
Identifying Lines Selected by the User .....	198
Scales and Weights for Lines .....	200
Scaling Using a Transformation Matrix .....	206
Scaling a Line with Respect to the Origin .....	207
Scaling with Respect to a Fixed Point .....	210
Multiple Parallel Lines .....	214
Using Arc Objects .....	215
Lots of Arcs .....	217
Summary .....	219
<b>Chapter 7 • Macro-izing Solid Areas .....</b>	<b>221</b>
Drawing Circles .....	223
Drawing Filled Circles .....	225
Circle of Bricks Application .....	229
Drawing Freeform Shapes .....	236
Calculating Areas of Shapes .....	249
Filling with Inner and Outer Loops .....	250
Working with Input Boxes .....	258
Multiple-Line Prompts .....	259
Drawing a Range Top from a Macro .....	260
Summary .....	265
<b>Part 3 • Reusability and Customization .....</b>	<b>267</b>
<b>Chapter 8 • Templates and Reusability .....</b>	<b>269</b>
Templates for Reusability .....	271
Setting the Drawing Units .....	272
Setting Drawing Units from VBA Code .....	273

## CONTENTS

All about Grids .....	278
Displaying Grid Points .....	278
Setting Grid Limits .....	280
Displaying the Whole Grid .....	281
Setting the Spacing for Grid Points .....	283
All about Snapping .....	285
Setting the Snap Spacing .....	285
Changing All the Environment Settings from a Macro .....	287
Creating the Floor Plan from a Macro .....	288
Creating a Template .....	292
Creating a New Drawing from a Template .....	293
Macros vs. Templates .....	295
Working with a User Coordinate System .....	295
Creating a UCS from a Macro .....	296
Viewing the UCS Matrix .....	297
Toggling the USC Icon On and Off .....	300
Copying Objects Using a Macro .....	302
Summary .....	304
<b>Chapter 9 • Creating Drawings with Text .....</b>	<b>305</b>
Creating New Drawing Documents from a Macro .....	307
Creating Arrays of Objects .....	310
Polar Arrays .....	310
Rectangular Arrays .....	316
Setting Text Attributes .....	320
Setting Text Attributes in AutoCAD .....	320
Setting Text Attributes from a Macro .....	322
Formatting Text from a Macro .....	324
Formatting Numbers, Times, and Dates .....	340
Formatting Numbers .....	340
Formatting Times and Dates .....	341
Validating Input .....	342
Adding Text to Arrows .....	343
Summary .....	353
<b>Chapter 10 • Debugging Your Code .....</b>	<b>355</b>
Types of Errors .....	357
Logic Errors .....	357
Compiler Errors .....	359
Run-Time Errors .....	361

Debug Menu Commands .....	362
Using Breakpoints .....	363
Stepping Through Code .....	365
Using the IDE's Debugging Windows .....	366
The Immediate Window .....	366
The Watches Window .....	368
The Locals Window .....	369
Which Debugging Aid to Use? .....	372
The Call Stack .....	372
Summary .....	374
<b>Chapter 11 • Dimensioning Drawings from Your Own Menus and Toolbars .....</b>	<b>375</b>
AutoCAD's Dimensioning Styles .....	377
Dimensioning Drawings from an Application .....	379
The Aligned Dimensioning Style .....	380
The Angular Dimensioning Style .....	381
The Diametric Dimensioning Style .....	382
The Ordinate Dimensioning Style .....	383
The Radial Dimensioning Style .....	384
The Rotated Dimensioning Style .....	386
The 3 Point Angular Dimensioning Style .....	386
A Dimensioning Application .....	387
Saving Your Dimension Styles .....	400
Using Your Own Dimension Style .....	403
Customizing Menu Commands .....	405
Creating a New Menu to Run Macros .....	406
Creating Your Own Toolbar .....	411
Adding Preprogrammed Toolbar Buttons .....	416
Summary .....	418
<b>Chapter 12 • File Input and Output .....</b>	<b>419</b>
Handling Drawing Files in Your Code .....	421
Creating a New Drawing from a Macro .....	421
Saving a Drawing to a File .....	425
Verifying That a File Exists .....	427
Copying Files .....	429
Displaying Open and Save As Dialog Boxes .....	430
Using the CommonDialog Control .....	432

## CONTENTS

Writing Data to a File from Code . . . . .	437
Input and Output Modes for Opening Files . . . . .	441
The Application Path Property . . . . .	442
Using the Input Statement to Read Data from a File . . . . .	443
Closing Files . . . . .	445
Summary . . . . .	446
<b>Part 4 • 2D Drawing Techniques . . . . .</b>	<b>447</b>
<b>Chapter 13 • Working with 2D Drawing Techniques . . . . .</b>	<b>449</b>
Interactive Drawing Techniques for Precision . . . . .	451
Changing Grid and Snap Angles . . . . .	451
Controlling Polar Tracking . . . . .	453
Drawing Splines . . . . .	456
Adding and Loading Shapes . . . . .	461
Loading and Adding Shapes from a Macro . . . . .	462
Moving a Drawing Object from within Code . . . . .	465
Summary . . . . .	469
<b>Chapter 14 • Grouping Objects . . . . .</b>	<b>471</b>
Collecting Objects into Layers . . . . .	473
Creating Layers from the AutoCAD Window . . . . .	473
Creating Layers from a Macro . . . . .	474
Changing Settings in the Layer Properties Manager . . . . .	483
The On, Freeze, and Lock Options . . . . .	485
Locking and Unlocking Layers in Code . . . . .	485
Freezing and Thawing Layers in Code . . . . .	486
Turning Layers On and Off in Code . . . . .	488
Accessing All Layers from a Macro . . . . .	488
Grouping Objects into Blocks . . . . .	490
Creating a Simple Block . . . . .	490
Adding a Block to a Drawing . . . . .	492
Referencing External Blocks . . . . .	494
Moving Blocks . . . . .	496
Using Selection Sets . . . . .	496
Selection Modes . . . . .	504
InitializeUserInput Method . . . . .	504

Using Groups .....	505
Creating a New Group .....	505
Accessing Individual Drawing Objects from a Group .....	509
Summary .....	509
<b>Part 5 • 3D Drawing Techniques .....</b>	<b>511</b>
<b>Chapter 15 • Creating and Drawing 3D Solids .....</b>	<b>513</b>
Creating 3D Solids .....	515
Creating a Box .....	521
Creating a Wedge .....	524
Creating a Sphere .....	526
Creating a Torus .....	529
Creating a Cone .....	532
Creating a Cylinder .....	535
Constructing Complex Solids .....	543
Determining Whether Two Solids Intersect .....	547
Grow Your Own Solids .....	547
Creating Solids by Extrusion .....	547
Creating Solids by Revolution .....	551
Chamfered and Filleted Edges .....	554
Chamfering and Filleting Edges from a Macro .....	554
Cross-Sectioning 3D Solids .....	560
Summary .....	564
<b>Chapter 16 • ActiveX Controls .....</b>	<b>565</b>
ActiveX and COM .....	567
Using AutoCAD with Other Applications .....	567
Dragging Objects into AutoCAD .....	567
Using ActiveX Controls in Macros .....	569
Exchange between AutoCAD and Excel .....	569
Saving Line Data to an Excel Spreadsheet .....	570
Drawing an AutoCAD Line from Excel .....	573
Exchange between AutoCAD and Word .....	575
Sending Data to Word from an AutoCAD Macro .....	575
Drawing an AutoCAD Line from Word .....	578

## CONTENTS

Exchange between AutoCAD and a Database .....	580
Saving Line Data in a Database .....	583
Creating an Access Module from a VBA Macro .....	588
Displaying Data in Access Forms .....	591
Summary .....	596
<b>Chapter 17 • AutoCAD and the Internet .....</b>	<b>597</b>
URL Paths of Files on the Web .....	599
Browsing the Web for Files .....	599
Downloading a Web File Using Macros .....	600
Getting the URL Using a Macro .....	601
Launching the Browser from a Macro .....	603
The Code for Getting a Web File .....	605
The Code for Sending a File to the Web .....	606
Putting It All Together .....	608
Preparing Drawings for Publishing on the Web .....	609
Adding Hyperlinks to a Drawing .....	614
Adding Hyperlinks from the AutoCAD Window .....	615
Adding Hyperlinks from a Macro .....	616
Summary .....	618
<b>Appendix A • Object Models .....</b>	<b>619</b>
AutoCAD Object Model .....	621
Microsoft Office Object Model .....	624
Microsoft Excel Object Model .....	626
Microsoft Access Object Model .....	628
Microsoft Word Object Model .....	629
<b>Appendix B • ASCII Character Set .....</b>	<b>631</b>
<i>Index</i> .....	637