The Visual Basic Coursebook

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THE VISUAL BASIC 5 COURSEBOOK

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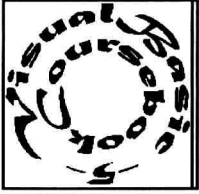The Access Guidebook: Short Course
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Introduction

This book provides a comprehensive coverage of Visual Basic 5 (VB5). It covers most of the features in the Learning (formerly Standard) Edition and some additional features available in the Professional Edition. As its predecessor (*The Visual Basic 4 Coursebook*), it attempts to be all things to all people. You can use it even if you have no experience in Basic or Windows. If you have some experience in these, you can quickly master the materials in the first few chapters and proceed to later chapters to do more sophisticated things. You should become quite proficient in Visual Basic by the time you complete the book.

The book is based on the Professional Edition and uses it for examples (some screen pictures may differ minutely from those in the Learning Edition) and covers some additional Professional features. Quite a few users of the previous edition of this book have suggested an expanded coverage of the most popular features available in the Professional Edition, particularly database and the additional custom controls. Since then VB5 Pro has included many more new features, most of which are related to the Internet. Including these features in this book will make it huge and unwieldy. So a decision was made to package them in a separate book, *The Visual Basic 5 Coursebook: Advanced*. It should be available in the near future.

VISUAL BASIC AS A RAD TOOL

Before we proceed to discuss more about this book, it may be useful for beginners to know where Visual Basic (VB) came from and where it is headed.

When Microsoft Windows 3.x began to dominate the PC world, there was a tremendous need for a rapid application development (RAD) tool so that programmers could quickly develop programs to run in the Windows environment. The traditional character-based languages like Basic or C was not suited for creating programs for Windows' graphical environment. As part of its effort to promote Windows, Microsoft released Visual Basic version 1 (VB1) as a Windows RAD tool.

VB1 and VB2, like Windows 1 and 2, gained some but not many adherents. It was VB3, like Windows 3.x, that became wildly popular. Programmers began to use VB to develop commercial applications. Businesses began to hire VB programmers to develop applications for internal use. Colleges began to offer classes to train VB programmers. This momentum continues to gain speed. While rival vendors offer some sophisticated RAD tools that attract some users, VB continues to hold the lion's share of this vast and expanding market.

Learning VB will not only increase your chances for employment, but also ensure that what you learn will not become obsolete in the foreseeable future. The language you learn here has been added to other popular applications marketed by Microsoft, such as Word, Excel, and Access. Visual Basic for Applications (VBA), the language component of Visual Basic, is now available in those applications—replacing their original macro languages. What you learn here can thus be applied to many other places. Other major software vendors are also beginning to bundle a similar and compatible language with their popular applications; many even license VBA from Microsoft to be included in their applications. If this trend continues, Basic may become the universal programming language, the only one most computer users will ever need to learn.

Visual Basic Script (VBScript), a subset (slimmed-down version) of VBA, has entered the Internet, the ubiquitous Information Superhighway. After you master Visual Basic, you should have no trouble making Internet objects come alive with some simple programming tricks.

All these points should convince you to dedicate more time and effort to mastering Visual Basic. A bright future awaits you if you become a Visual Basic master.

If you need more incentive, consider this: Visual Basic is fun to use. I can personally vow for this. In all the scores of PC programs and languages I have used, none can match the amusement value that Visual Basic can provide. Some of the Fun and Game programs at the end of each chapter in this book can serve as examples of this point. So enjoy yourself as you learn something useful.

EDITIONS OF VISUAL BASIC 5

There are now three or four editions of Visual Basic, depending on how you count them. The following three paragraphs are quoted from *Mastering Microsoft Visual Basic 5*:

Learning Edition The Visual Basic Learning Edition enables you to create powerful applications for Microsoft Windows 95 and Windows NT. It includes all intrinsic Visual Basic controls, along with grid, tab, and data-bound controls.

Professional Edition The Professional Edition provides a full-featured set of tools for developing solutions for others. It includes all of the features of the Learning Edition, along with additional ActiveX controls, including Internet controls and the Crystal Reports for Visual Basic.

Enterprise Edition The Enterprise Edition enables you to create robust distributed applications in a team setting. It provides all of the features of the Professional Edition, and also includes features such as the Automation Manager, Component Manager, database management tools, and the Microsoft Visual SourceSafe project-oriented version control system.

The **Learning Edition** comes with a tutorial CD. A promotional flyer from Microsoft has this to say:

> Jump-start the learning process with a self-paced, instructional CD-ROM that includes multimedia video lessons, narrated demonstrations, and hands-on lab exercises.

Don't expect much depth from this CD. If you want more depth, try *Mastering Visual Basic 5*, a separate CD marketed by Microsoft for about $50. This CD is included in the other editions.

Of all these editions, the most widely used is the **Professional Edition**. If you are interested in owning a copy, this is the one to buy. The full version retails for about $500. The upgrade version (contains the same thing as the full version) for owners of previous VB versions or competitive products, the price is $250 (Microsoft used to charge $90 for previous upgrade versions). The Enterprise Edition costs about twice as much.

There is good news for people in academia. Microsoft is giving you a offer which you cannot refuse—if you are a full-time instructor or student. A Professional Edition marked with an "Academic Price" label sells for about $100 in a campus store. Some national mail-order retailers sell it for $80 and the Standard Edition for about half of that.

The academic package that I bought contains lots of software but few hard copies. The soft part includes four CDs: Visual Basic Professional Edition, Mastering Visual Basic 5, Microsoft Developer Network, and Windows NT 4.0 Workstation. The hard part includes three little booklets, one of which contains nothing but advertisements from numerous vendors of VB-related products. There is a coupon which you can send to Microsoft to get three books, but you have to pay

$7.50 shipping cost. If you want to order two other books that used to come with previous versions, you'll have to shell out another 65 bucks. Fortunately, most of that stuff can be found in the online help.

Finally, some Microsoft flyers list still another edition: **Control Creation Edition**. This edition is used to create **ActiveX controls**, but not standalone executables. It was first released on the Internet for anybody to download free of charge; it's still available on Microsoft's Web site. It is also integrated into the Professional and Enterprise editions.

BOOK ORGANIZATION

The book contains 12 chapters (not counting Chapter 0, which briefly covers Windows 95). They are organized in a logical and progressive manner. Elementary and common features are covered in earlier chapters and the more complex and less common ones in later chapters. You gain a basic understanding early. As you progress to later chapters, you will learn to do more complex and impressive things with Visual Basic.

Chapter 1 gives you a quick tour through the Visual Basic environment. You get the overall picture and learn to use some simple features. Besides introducing the Visual Basic environment, the chapter walks you through the steps of creating a couple of simple applications. You get a general idea of how to actually write a Visual Basic program.

Chapter 2 explains how to use the Code window where you enter and edit program code lines. It also covers some nitty-gritty chores such as printing text to the printer and creating and saving simple text files. The last two sections briefly introduce simple debugging techniques.

Chapter 3 explains the role played by forms, which turn into windows when a program runs. You learn how to set form properties at design time and run time, and to maneuver multiple forms. The last two sections explore various techniques of outputting text to a form.

Chapter 4 deals with the most commonly used controls. These are the objects you see in a window when a Windows program runs. Nearly half of the standard controls available in the Standard Edition are covered here.

Chapter 5 introduces the Basic component of Visual Basic. This language component resembles an earlier version of Basic such as QBasic or Quick Basic. Here you get familiar with elementary programming concepts and techniques.

Chapter 6 continues to cover the Basic component. You learn various commands and techniques to control program flow—away from the typical top to bottom manner.

Chapter 7 handles the numerous built-in functions that come with Visual Basic. These can do lots of work with little or no programming from you.

Chapter 8 teaches you how to create your own functions and other types of subroutines. These devices can make your programs shorter and sweeter—and run faster as well.

Chapter 9 gets into some of the most technical aspects of programming, including arrays, control arrays, user-defined types, and collections. These allow you to do fancy things, but they also require considerable programming savvy.

Chapter 10 covers a variety of controls and commands to manage permanent data, the stuff that you want to save to disk.

Chapter 11 is partly for fun and partly for serious work. You learn to use a number of controls and commands to embellish a user interface and to create entertaining graphics.

Chapter 12 contains the less commonly used features. Some of these are treated with less depth than they deserve. Should you decide to explore them further, ways are provided for you to proceed on your own.

As you can see from the above, the two components of Visual Basic—namely Visual (the graphical component) and Basic (the language component)—are blended together. First, you learn the graphical component to design screen user interfaces. Then you learn to use the language component to maneuver the screen objects. Eventually, you learn to integrate the two to create useful applications.

Some people favor covering Basic before Visual. If you belong to this group, you might want to move Chapters 5 and 6 before 3 and 4, thus following the chapters in this sequence: 1, 2, 5, 6, 3, 4, 7....

The first few chapters also shallowly cover some topics that are more fully explained in later chapters. Some reviewers argue that more features should be introduced early. These sections are marked as "a first look at an advanced topic." These can mostly be ignored without interrupting the flow of material.

The book is feature oriented. The primary objective is to help you learn and use Visual Basic's available features. The text explains many intricate points and rules. Numerous short examples help illustrate these points and rules. Some

sample programs are longer and have practical use. These are available on the accompanying disk.

Some books follow the project-oriented approach. Each chapter simulates a project. You are told how to assemble various Visual Basic tools and how to put them together to accomplish the project. Although that approach is not suitable for beginners, it does mimic the way professional programmers do their work in real life. To add this aspect to this book, I initially planned to have a last chapter totally devoted to this approach. This Advanced Applications chapter would include a series of projects and you would be shown the steps of accomplishing them. The problem with that arrangement is that these projects would be detached from the Visual Basic features covered in previous chapters. A reasonable solution for this dilemma is to integrate these projects into the previous chapters. So the projects originally intended for a separate chapter have now been modified and attached to the end of appropriate chapters as chapter projects.

A few chapter projects span several chapters. They begin in small scales and expand or are modified as they reappear. These are intended to simulate real-life scenarios where programmers continue to modify and expand existing programs.

CHAPTER ACCESSORIES

Each chapter contains a number of auxiliary items intended to provide heuristic aid or convenient reference for the user, including the following:

• **Key Terms** Each chapter starts with a glossary of the special terms that you will encounter in the chapter. These are placed at the beginning for easy reference; you can more quickly look up something at the beginning of the chapter. These items are also gathered together and put in Appendix A (Glossary). The terms in both places are arranged in alphabetic order. These terms are also bolded when they first appear in the text.

• **Drill** Each chapter contains 30 drill (true-false, multiple-choice, matching, and fill-in) questions. A few of them are placed after a few sections in the text. As you try to answer these objective questions, you can look up pertinent information in the preceding sections in the text. If you need feedback (computer-fed) instructions, try the disk version explained later.

• **Practice** Each chapter includes about 30 questions that require you to do something. Some ask you to write essay answers. Others require you to design user interfaces and write program code to perform tasks.

• **Chapter Project**   Each chapter contains about half a dozen chapter projects. Compared to those found in Practice, these are more involved and challenging problems. You need to utilize the knowledge accumulated from the current and previous chapters to complete such projects. Since you need considerable expertise on Visual Basic to tackle these problems, more of them are placed in later chapters than in earlier ones.

• **Fun and Game**   Included at the end of each chapter are two programs mostly for fun. All work and no play makes Bob a boring boy. With that in mind, I decided to add one short (so as not to take up too much precious book space) and entertaining program at the end of each chapter. Reviewers unanimously endorsed the idea. So I decided to double the fun by doubling the original number. (I thoroughly enjoyed writing and playing with these programs. I hope you do too. Who says programming is boring?) These programs all involve colors, graphics, and/or animation. The shorter and simpler ones are placed in earlier chapters. The techniques used in these programs may not be explained in the relevant chapter. The copious comments, however, provide some crude clues as to what's going on. When you learn more in later chapters, you can come back and dissect or tinker with these programs. In the meantime, you can run them as they are and have fun. See the next section about disk files.

INCLUDED SOFTWARE

A 3.5-inch floppy disk accompanies this book. It contains 200-300 files stored in the following directories:

Root Directory   The root directory contains the **DRILL.EXE** program and a database file named **DrillVB5.mdb**. The former is the CAI (computer-assisted instruction) engine that drives the database to provide an interactive tutorial. The database contains the same drill questions found in the text. The main difference is that if you supply a wrong answer here, the program will display a corrective instruction. See the next section for more details.

PROGRAM Directory   This directory contains files with the FRM (form) or VBP (project) extensions. They are the disk version of the relatively lengthy source code files found in the text. Code listings in the text will show the names, if available, of their disk files.

PRACTICE Directory   This directory also contains files with the FRM or VBP extensions. These are the answers for some of the practice questions. Appendix D contains the answers for all the practice questions. Sometimes you may find file names instead of explanatory text or code lines. These file names indicate the availability of disk files.

PROJECT Directory   This directory is available only on the Professor (not Student) disk. It contains the answers for all the chapter projects.

TEXTFILE Directory   Some projects require data for demonstration. If you wish, you can enter the displayed data from the keyboard. To save you the trouble, I've included an Open button in some projects. Clicking it at run time leads the program to open the specified file from the TEXTFILE directory in drive A. If the file is not found there, an error message appears. So make sure to insert the included disk before clicking this button. If the disk must be placed in drive B, then change A to B in the source code before running the program.

FUN Directory   The Fun and Game programs shown at the end of each chapter are all stored here. The beginning of each program listing in the text shows the file name for the program. Open the pertinent form or VBP file, press F5 to run, and just sit back and enjoy it; on the other hand, you may have to do something if you want to play a game.

The FRM and VBP files can be retrieved to Visual Basic to save you the trouble of having to type lengthy code lines or design complex user interfaces. These file names contain two parts, chapter number and file purpose. Each file name starts with a number. It signifies the chapter number. So a file name starting with 11 belongs in Chapter 11. A file name may also end with a number, which signifies a slight variation of another file of the same name but with a different number. Consider the following two examples. Both files are stored in the PROGRAM directory and they belong to Chapter 7. They are slightly different from each other.

> \PROGRAM\7MORT1.FRM
> \PROGRAM\7MORT2.FRM

If you cannot find a file from the accompanying disk, try another directory. Reread the preceding paragraphs to make sure you are in the right directory.

Opening a FRM file retrieves a single form file; opening a VBP file retrieves two or more associated files.

When you want to open a project, Visual Basic automatically shows all the files matching the *.VBP, *.MAK, or *.VBG patterns. If you intend to retrieve a form file, change the mask to *.FRM to show all the form files. You can also choose a screen option to show all the files, those matching the *.* pattern.

To retrieve one of the disk files to Visual Basic, insert the provided disk in drive A or B. Choose Open Project from the File menu (or click the Open Project icon). Choose drive A or B from the Look-in list. If necessary, change the file mask to *.FRM or *.* in the File-name box. When a desired file is displayed,

double-click it to open. If necessary, open the Project window by clicking the Project Explorer button on the Standard toolbar. Then click the form name in this window and click View Form or View Code to load the item.

RUNNING THE CAI PROGRAM

The **DRILL.EXE** program is written in Visual Basic. It can be run like any Windows program. However, there is a major difference. This program, like any program written in Visual Basic, requires the presence of the MSVBVM50.DLL (more than 1.3MB) run-time module that comes with the Visual Basic package. If your system contains this file (in the WINDOWS\SYSTEM directory), which is the case after VB5 has been installed, then there should be no problem. If you want to run it in another system which contains no Visual Basic, then the run-time module must be supplied. If you ask Windows to run DRILL.EXE, it will try to find the run-time module first; failing to do that will result in an error.

Since the DRILL program drives a database file, it also needs another file named VB5DB.DLL (77KB). This file is also stored in the same directory as described above. Since this file is relatively short, you can store it in drive A if you intend to run the DRILL program from drive A.
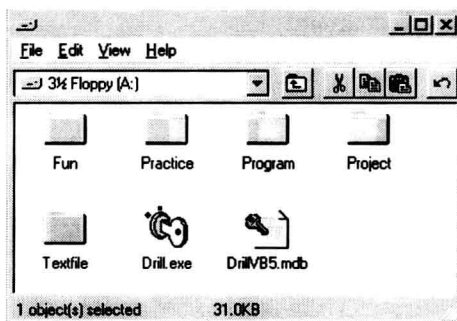

Figure 1   My Computer window showing Drive A's root directory

To run DRILL.EXE, use the numerous options explained in Chapter 0. Figure 1 shows the items in drive A displayed in the My Computer window. You can just double-click the program to start it.

The initial screen instructions tell you to click the Start button. (These instructions are also available after you've started a lesson—just press F1 and a message box

will pop up.) An input box appears, showing the current directory (where the DRILL program is stored) and the name of the database. If you press Enter or click OK, a combo box appears at the top-right corner. Click the down arrow, and all the chapter titles appear. Click a chapter name, and the first question appears.
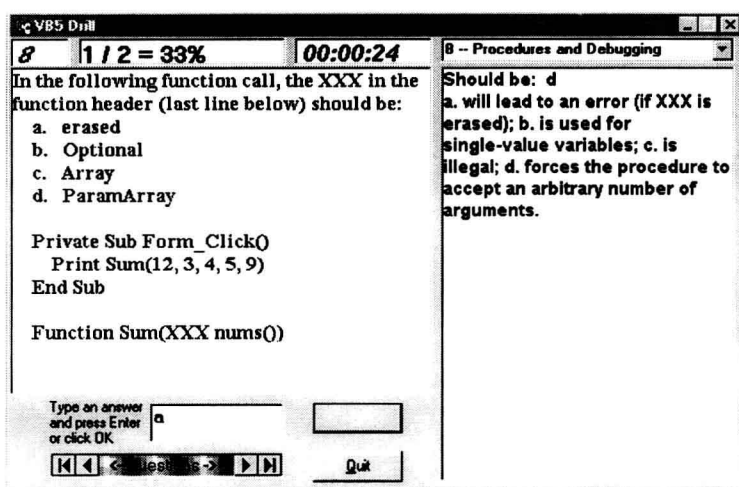
Figure 2   A sample display of the DRILL program

You can now scroll to each of the 30 available questions by pressing the PgUp or PgDn key or clicking one of the buttons on the data control (these buttons serve the same purposes as those found on your VCR). To answer a displayed question, type something in the bottom-left text box and press Enter or click OK. The right-side box shows a message in response, telling you that you're right or why you're wrong. If you scroll back to a question to which you already supplied an answer, your original answer to that question will reappear in the text box where you typed it and the original response by the program will reappear in the right-side box. So you can answer the questions in any order and go back to any question to review what you have done.

Three top-left boxes keep some scores. The first (leftmost) shows the current question's number. The second tracks the numbers of right/wrong answers and the percentage (correct number divided by total). The third box shows the elapsed time since the beginning of the current chapter.

To move on to another chapter, use the combo box to navigate to any of the 12 available chapters. If you have at least one correct answer, the program will

prompt you with Yes/No to abandon the previous chapter. The same thing happens if you click X or Quit.

The most convenient way for multiple users is to copy DRILL.EXE and the database file to a hard disk directory. Then add a shortcut to the desktop. A user can then double-click the shortcut to run the program. The techniques of creating shortcuts are explained in Chapter 0.

The DRILL program will go to the directory where it is stored to open the companion database file. If the file is not there, you'll be prompted to supply a different path. This may or may not work. So try to put the two files in the same directory.

THE AUTHOR

Dr. Forest Lin is an author, professor, and programmer. He has taught at several colleges; currently he teaches at Tulsa Community College. He has published a dozen computer books, some college texts and some advanced trade books.

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Chapter 0
Opening *Windows* 95

This chapter tries to accommodate the complete novice who knows little or nothing about computers. Think of the 0 in the chapter number as a non-credit remedial course you have to take before you can enroll in a credit course. You need to know what is covered here before you can effectively learn to use Visual Basic. If you already know this stuff, you can simply ignore this chapter and move on to the next.

When you turn on your **PC** (personal computer), **DOS** (disk operating system) is booted (started). Windows then runs on top of DOS. A Windows-compliant program like Visual Basic then runs on top of Windows. As a Visual Basic user, you need to know a little about what lies underneath it. This chapter will concentrate mostly on Windows because you are likely to have more interaction with it than the layers below.

PERSONAL COMPUTER

A PC consists of the main parts shown in Figure 0.1 The **system unit** contains a **CPU** (central processing unit, the electronic brain), **RAM** (random-access memory) for temporary storage of data, a motherboard to integrate all the parts, controller cards (boards) with electronic circuitry to connect to peripherals such as modem (for sending and receiving electronic messages), printer, keyboard, and so on. Inside the system unit, there is usually a hard disk (also known as a hard drive), and one or two floppy drives, which have openings for you to insert floppy disks (diskettes) to save data. A more recently manufactured PC may also have a CD-ROM drive and a sound card connected to internal or external speakers.
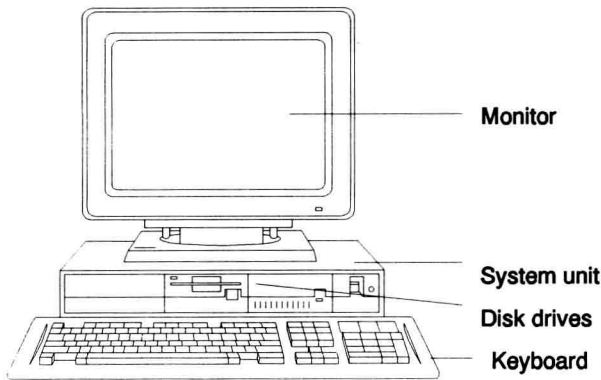
Figure 0.1   **A personal computer**

The **keyboard** is an input device. You type something and press Enter to give an instruction to the PC. The PC keyboard has a row of 12 function keys marked F1-F12. These keys are used by different programs for different purposes. The Caps Lock key turns on/off uppercase letters. The Num Lock key turns on/off the numeric keypad on the right side of the keyboard. When on, pressing a key here displays a number on the screen; when off, the arrow (cursor-control) keys are activated. The Shift, Ctrl, and Alt keys are combined with other keys for a variety of purposes.

The **monitor** is an output device. It displays what you have done and what the PC is doing in response. In a graphical program, the objects on the screen can be maneuvered with a **mouse**, which is another input device like a keyboard.

To store your own data, you need to be equipped with floppy disks. These come in two sizes, 5.25 inch (Figure 0.2) and 3.5 inch (Figure 0.3). These are not compatible; a 3.5-inch disk cannot be used by a 5.25-inch drive. If your PC has two different floppy drives, you can use either type of disks. If it has only one drive, you must have the exact matching type of floppy disks.

Each floppy disk has a write-protect device, shown at the top right of the two figures. On a 5.25-inch disk, you cover this hole with an adhesive tape to prevent writing data to the disk or erasing the existing data. On a 3.5-inch disk, you slide the built-in tab to the edge to show a see-through hole to write-protect the disk.