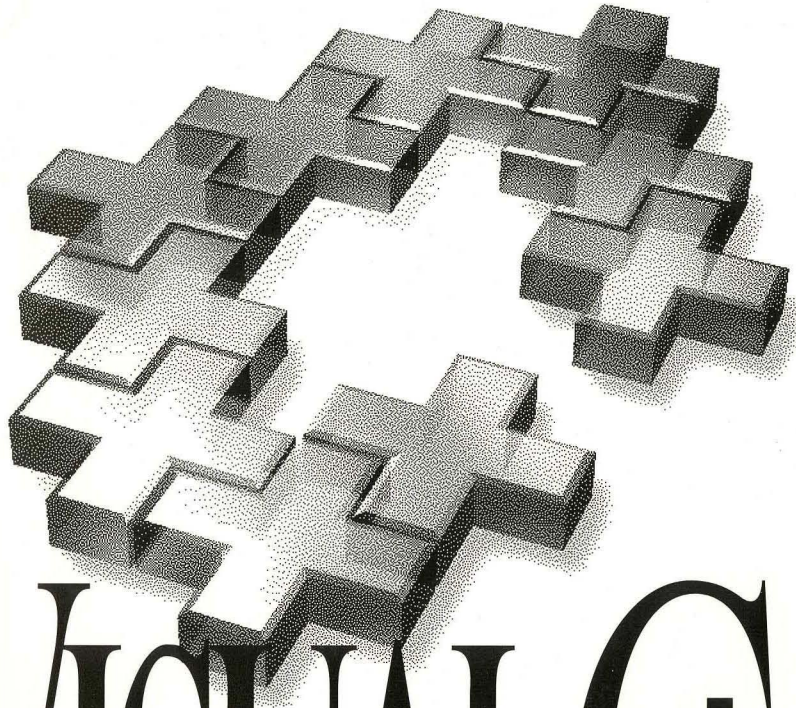


Getting Started



Microsoft
VISUAL C++

Power Tools for MS-DOS™ and Windows™

Getting Started

Microsoft® Visual C++™

**Professional Edition
Development System for Windows™
Version 1.5**

Microsoft Corporation

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Introduction

Welcome to the Microsoft® Visual C++™ Professional Edition Development System for Windows™ version 1.5. The Microsoft team is proud to bring you the most advanced C/C++ 16-bit application development environment available. We think you'll discover that Visual C++ is the solution to your complex application development challenges.

The *Getting Started* guide is organized as follows:

- Chapter 1 outlines what's new in this Microsoft Visual C++ version 1.5 release.
- Chapter 2 defines the system requirements for Visual C++ and describes the Visual C++ installation procedure. It explains how to reinstall specific components later, and defines configuration requirements for running Visual C++ from the command line.
- Chapter 3 provides an overview of the entire development environment and offers a few tips on debugging.
- Chapters 4 and 5 give you a quick guide through building and running two sample programs: a Microsoft Foundation Class Library sample application and a simple QuickWin C++ application. You can use these short chapters to verify that your installation is working and to become familiar with Visual Workbench.
- Appendix A provides information on Microsoft Support Services.
- Appendix B provides information on Microsoft products and services for people with disabilities.

Document Conventions

This book uses the following typographic conventions:

Example	Description
STDIO.H	Uppercase letters indicate filenames, segment names, registers, and terms used at the operating-system command level.
char , _setcolor , __far	<p>Bold type indicates C and C++ keywords, operators, language-specific characters, and library routines. Within discussions of syntax, bold type indicates that the text must be entered exactly as shown.</p> <p>Many functions and constants begin with either a single or double underscore. These are part of the name and are mandatory. For example, to have the __cplusplus manifest constant be recognized by the compiler, you must enter the leading double underscore.</p>

Example	Description
<i>expression</i>	Words in italics indicate placeholders for information you must supply, such as a filename. Italic type is also used occasionally for emphasis in the text.
[[<i>option</i>]]	Items inside double square brackets are optional.
# pragma pack {1 2}	Braces and a vertical bar indicate a choice among two or more items. You must choose one of these items unless double square brackets ([[]]) surround the braces.
#include <io.h>	This font is used for examples, user input, program output, and error messages in text.
CL [[<i>option...</i>]] <i>file...</i>	Three dots (an ellipsis) following an item indicate that more items having the same form may appear.
while() { . . . }	A column or row of three dots tells you that part of an example program has been intentionally omitted.
CTRL+ENTER	Small capital letters are used to indicate the names of keys on the keyboard. When you see a plus sign (+) between two key names, you should hold down the first key while pressing the second.
"argument"	The carriage-return key, sometimes marked as a bent arrow on the keyboard, is called ENTER. Quotation marks enclose a new term the first time it is defined in text.
"C string"	Some C constructs, such as strings, require quotation marks. Quotation marks required by the language have the form " " and ' ' rather than "" and ''.
Color Graphics Adapter (CGA)	The first time an acronym is used, it is usually spelled out.

CHAPTER 1

What's New?

Microsoft Visual C++ Professional Edition Development System for Windows version 1.5 represents an evolutionary step in the progress of high-performance program development tools for the Microsoft Windows and Microsoft Windows NT™ operating systems. It replaces Visual C++ version 1.0 for creating 16-bit applications. You can now develop your 16-bit applications under Windows 3.1 or Windows NT.

This release of Microsoft Visual C++ contains many new features, including version 2.5 of the industry-standard Microsoft Foundation Class Library with OLE and database class enhancements. Enhanced support for OLE 2 application development extends functionality and dramatically reduces development time. Refinements to AppWizard and ClassWizard make it even easier to work efficiently and produce applications quickly.

Additionally, the new Visual C++ development environment provides not only searchable and context-sensitive help, but our new Books Online feature gives you quick access to the details of all the new features, as well as many other Visual C++ programming topics.

The rest of this chapter summarizes the new features in Microsoft Visual C++ version 1.5.

Support for OLE 2 Application Development

OLE development time is dramatically reduced with new OLE 2 classes and by enhanced functionality in both AppWizard and ClassWizard.

OLE 2 Visual Editing Classes

OLE 2 Visual Editing classes now support in-place editing, fully opened editing (compatible with OLE 1 support in version 1.0), Clipboard Copy, Paste, and Paste Link of OLE objects, and drag and drop Visual Editing. The Visual Editing classes help you build Visual Editing servers, containers, or both. There is additional container-specific support for Object Verb menu initialization, management of lists

of embedded and linked objects, and a graphical user interface for OLE client items. The new classes provide automatic OLE registration on start-up of the server application.

OLE 2 Automation Classes

You can now easily add classes that support OLE automation. Base functionality includes exposing member functions and member variables of a C++ class to other applications via OLE automation. You can also add methods and properties to your own classes that support OLE automation.

AppWizard Support for OLE 2 Applications

AppWizard now lets you create the skeleton of a new OLE 2 application whose application, document, view, and frame window classes are tailored for OLE. OLE-specific options for the new application include container, mini-server, full-server, combination container/server, and automation server.

ClassWizard Support for OLE 2 Applications

ClassWizard can be used to add new classes that expose their member functions and member variables. New member functions exposed via automation can support various function return types, multiple parameters, and multiple parameter types. In addition, ClassWizard can create C++ classes for the objects exposed by other OLE automation servers. Automation client support relies on the type library provided by the automation server.

OLE 2 SDK

The OLE 2 SDK, including headers, libraries, samples, and online documentation, is also included in Visual C++ version 1.5.

Support for Database Application Development

New classes and enhancements to AppWizard and ClassWizard simplify creation of database applications for entering, displaying, and updating an ODBC data source.

Classes for Accessing ODBC Data Sources

Similar to the data access objects defined in Microsoft® Access® and Microsoft® Visual Basic®, Microsoft Foundation classes are now provided for accessing ODBC data sources. Class support is provided for automatically exchanging data between a C++ recordset object and columns of a table or query result. Both dynamic recordsets (dynasets) and snapshot recordsets (snapshots) are supported. Database transactions such as commit and rollback are supported, as well as common access functions such as adding, changing, and deleting records.

A Class for Database Forms

The new **CRecordView** class lets you quickly design a database form in App Studio as a dialog template with text fields and other controls. Dialog Data Exchange (DDX) and Record Field Exchange (RFX) are then used to exchange data between the form and a record in the database.

Easy-to-Create Form-based Applications

Enhancements to AppWizard and ClassWizard let you quickly create an application that provides a form whose controls contain data from a database table. You simply select a data source and a table, and AppWizard creates members in the recordset class corresponding to columns in the table. Use App Studio to design the form, and then use ClassWizard to map the controls in the form to recordset data members. The resulting application selects and views records one at a time.

Redistributable ODBC Driver Manager and Drivers

ODBC drivers are supplied for Access, FoxPro, dBASE, Paradox, Btrieve, Microsoft Excel, text, Microsoft SQL Server, and ORACLE. Microsoft grants you the nonexclusive royalty-free right to redistribute these ODBC desktop drivers with your software program created using Microsoft Visual C++.

MS Query

MS Query is a convenient tool that lets you examine, add, or modify data in a table or in the result of a query. When developing a database application, MS Query can be used to create new tables in an easy to use user interface.

Other Features

Development of 16-bit Applications Under Windows NT

In addition to running on Microsoft Windows 3.1, Microsoft Visual C++ can now run as a Microsoft Windows NT Windows-On-Windows (WOW) application. While running under Windows NT, you can create 16-bit applications that can run under either Windows 3.1 or Windows NT. Detailed information on using Visual C++ under WOW is contained in the help file labeled "Windows NT" in the Microsoft Visual C++ program group installed by Setup.

Important Visual C++ version 1.5 targets 16-bit application development. To develop 32-bit applications for Windows NT or Win32s, use Visual C++ version 1.0, 32-bit edition. To develop 16-bit applications for Windows 3.1, use Visual C++ version 1.5.

Shortcut for Creating Member Variables

There is a convenient shortcut for creating class member variables. While using the App Studio Dialog Editor, just CTRL+Double-click on a control to display ClassWizard's Add Member Variable dialog box.

Automatic Creation of Command Handlers

ClassWizard can automatically create a message handler in a class associated with a dialog box. When you are using the App Studio Dialog Editor, CTRL+Double-click on a button and ClassWizard creates the new message handler and jumps to the newly created function in the source code so you can implement it.

Convenient Tab Dialog Pages in ClassWizard

The ClassWizard user interface now features tab dialog pages for easier navigation through the options. Each tab displays a different dialog page of associated ClassWizard information.

Double Byte Character Support (DBCS)

The Microsoft Foundation Class Library version 2.5 is DBCS-enabled when running under DBCS versions of Windows.

Documentation

New Tutorials

The tutorial examples have been extended to include many of the new Visual C++ version 1.5 product features. The Scribble tutorial application has been enhanced to show how to convert a non-OLE MFC 2.0 application into a full-featured OLE visual editing server. A general-purpose OLE container application, Contain, is also presented. OLE automation is demonstrated in a simple mouse-click (Autoclik) application. A student registration application, Enroll, demonstrates important features of the new database classes.

New and Expanded Source Code Samples

Even more source code samples are provided. These include an object drawing application (Drawcli) that is an OLE container, advanced OLE 2 versions of the OClient container and Hiersvr server applications introduced in Visual C++ 1.0, and additional code samples that illustrate advanced database programming features.

New User References

Two new user guides, *OLE 2 Classes* and *Database Classes*, cover the new OLE 2 classes and database classes. In addition to the class reference material, both books

include encyclopedia articles to help you use these new, powerful classes, as well as the tutorials described above. The class references and encyclopedia articles are available to you in both help and online books.

Books Online

The entire set of technical documentation is now available in Books Online, a CD-based format that provides fast access and complete reference to the entire product.

Installing Microsoft Visual C++

This chapter describes how to install Microsoft Visual C++ Professional Edition Development System for Windows version 1.5.

System Requirements

Visual C++ requires the following minimum configuration:

- An IBM® Personal Computer or 100 percent compatible.
- A VGA monitor.
- An 80386 or later processor.
- 4 MB of available memory (8 MB recommended) for Windows 3.1, or 16 MB for Windows NT.
- A hard disk with enough disk space to install the options you need.
- A Windows 3.1 or Windows NT compatible CD-ROM drive.
- Microsoft Windows 3.1 running in enhanced mode, Microsoft Windows NT, or Microsoft Windows for Workgroups version 3.1. Some command-line utilities run outside Windows, but you need Windows to install Visual C++.

Installation Overview

The Setup program provided by Microsoft Visual C++ installs all the necessary components. You can install Visual C++ in one of the following ways:

- **Typical Installation.** This installs on the hard disk those files that you most likely will want to access from the disk instead of from the CD-ROM drive. Most development tools—including the compiler, the linker, and the Microsoft Visual Workbench—will be installed on the hard disk. The Microsoft Foundation Class Library files and sample files, and the run-time libraries will be installed on the hard disk. Help files, on the other hand, will not be installed on the hard disk. Context-sensitive help for the Microsoft Visual Workbench and other tools will search for help on your CD-ROM.

- **Custom Installation.** This opens the Custom Installation dialog box. You can select just the components you want now and add other components at a later time. For example, you can choose on which drive you want the files installed and which sample files and help files you want installed.
- **Minimum Installation.** This installs a minimum set of files on your hard disk. The compiler, libraries, tools, samples, and Help files are configured to run from the CD-ROM drive. Certain features, like Books Online and prebuilt samples, are only available from the CD-ROM.

Installation Procedure

For extensive help on any of the dialog boxes presented by the Setup program during the installation, press the F1 key or choose the Help button in the dialog box.

► To run Setup for installation of Visual C++

1. Place the Visual C++ disc in the CD-ROM drive running under Windows 3.1 or Windows NT.
2. Use the File Manager to run SETUP.EXE, located in the \MSVC directory of the CD-ROM drive.

Setup prompts you with a Welcome dialog box that describes the program and lets you continue or exit.

3. Choose Continue. The Installation Options dialog box appears (Figure 2.1)

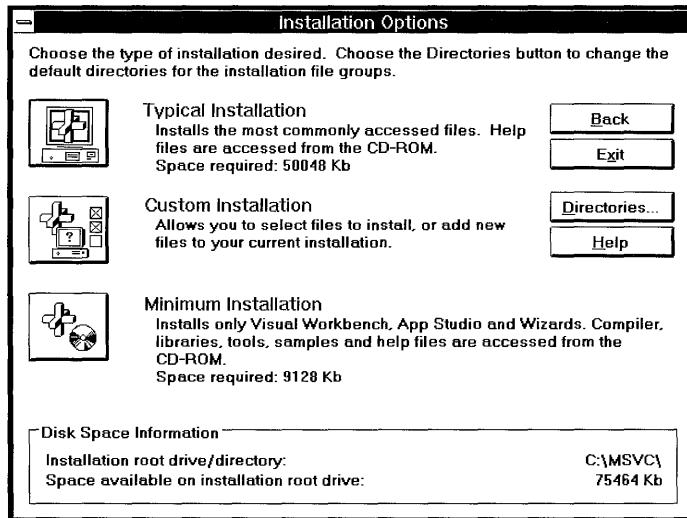


Figure 2.1 The Installation Options Dialog Box

4. Each installation option indicates its required disk space. Compare the required disk space with the total disk space available (listed at the bottom of the dialog

box). Verify that the installation drive has enough space for the selected options. The Setup program warns you of insufficient disk space. (Remember, the space requirement for a second installation can be safely ignored. See “Dual Operating System Installation” later in this chapter.)

5. If you want to change the installation disk drive, choose the Directories button to display the Directory Options dialog box. Specify the intended installation drive by modifying the first selection (Install Directory).

Choose OK and all of the remaining installation directories are altered to the specified installation drive. You may specify any valid drive for any of the installation directories.

6. To perform a default installation without customization, choose Typical Installation or Minimum Installation. Or, if you want to customize the installation, choose Custom Installation, select the options you want to install, and choose Continue.

With the Custom Installation, you may compare the amount of disk space required by the components you select with the total amount of disk space available. You may need to free up some disk space before continuing, or install fewer components initially and add components later.

Before copying files from the CD-ROM drive to your hard drive, Setup checks for sufficient disk space and prompts you for registration information.

Note If you are using VC++ 1.5 under Windows 3.1, then you will need to call SHARE.EXE from your AUTOEXEC.BAT file if your environment does not already support file locking. The call to SHARE.EXE must be made after the PATH statement in AUTOEXEC.BAT, but before any statement that starts Windows or otherwise prevents SHARE.EXE from being executed.

The minimum SHARE.EXE settings should be 500 locks (/L:500) and 5100 bytes allocation for the MS-DOS storage area used to record file sharing information (/F:5100):

```
SHARE /L:500 /F:5100
```

These SHARE settings are required for VC++ 1.5 command line tools, especially LINK.EXE, as well as OLE 2 compound file support, which are used by the MFC framework support for OLE 2.

Do not include SHARE.EXE in your AUTOEXEC.BAT if you are running any operating system or network that has built-in file-locking. Operating systems and networks that include built-in file-locking include:

- Windows for Workgroups (file locking is provided by VSHARE.386).
 - Windows-On-Windows under Windows NT.
 - Novell Netware 3.x or greater.
-

Reinstalling Visual C++

After you have installed Visual C++, you can use Setup to install additional libraries or any other files you didn't install the first time. The following procedure explains how to reinstall a specific part of Visual C++. It adds the Compact Memory Model library to your existing Visual C++ configuration as an example.

► **To reinstall a specific part of Visual C++**

1. Follow steps 1 through 4 as described in "Installation Procedure."
2. Choose the Custom Installation dialog box.
Clear all check boxes except the category you want to install. For this example, clear all check boxes except Run-Time Libraries.
3. Choose the command button that corresponds to your category.
For this example, choose Libraries. The dialog box for the category you chose appears.
4. Clear all default options and select the new option or options.
For this example, in the Memory Models group, clear Small/Tiny, Medium, and Large/Huge, and select Compact.
5. Choose OK to close the option category dialog box.
6. Choose Continue to proceed with the installation.

Before copying files from the CD-ROM drive to your hard drive, Setup checks for sufficient disk space.

Note If you have a dual-boot environment and are adding any significant components (for example, database support), you will have to follow the Dual Operating System Installation procedure described later in this chapter to make these changes in both Windows 3.1 and Windows NT.

Configuration of Command Line Tools

Since Visual C++ is designed to be used primarily with Visual Workbench, the Setup program doesn't configure your system to run Visual C++ components from MS-DOS® or inside a Windows NT DOS box. However, Visual C++ does provide many command-line tools. Consequently, if you want to use the compiler, linker, NMAKE, or any of the other Visual C++ components from the command line, you need to either make changes to your AUTOEXEC.BAT file or run the batch file `MSVC\BIN\MSVCVARS.BAT` to temporarily set your environment variables. `MSVCVARS.BAT` works equally well in MS-DOS or in the console mode of Windows NT.

Note Under Windows NT, use the System applet in the Control Panel to modify your default environment. The changes immediately become effective.

For MS-DOS, use a text editor to modify your AUTOEXEC.BAT. You must then exit Windows and reboot your system to make the changes effective.

To update your AUTOEXEC.BAT file for command-line tools, use the following procedure. This procedure assumes that Visual C++ is installed on drive C in a directory called MSVC. Substitute any differences in the drive or directory for your installation of Visual C++.

► **To change AUTOEXEC.BAT to run tools from the command line**

1. Add the following to the PATH environment variable (separated from the previous path by a semicolon):

```
C:\MSVC\BIN
```

2. Add the following line:

```
SET INCLUDE=C:\MSVC\INCLUDE;C:\MSVC\MFC\INCLUDE
```

Or, if there is already an INCLUDE environment variable for use elsewhere on your system, add the following to your INCLUDE statement (separated by a semicolon):

```
C:\MSVC\INCLUDE;C:\MSVC\MFC\INCLUDE
```

3. Add the following line:

```
SET LIB=C:\MSVC\LIB;C:\MSVC\MFC\LIB
```

Or, if there is already a LIB environment variable for use elsewhere on your system, add the following to your LIB statement (separated by a semicolon):

```
C:\MSVC\LIB;C:\MSVC\MFC\LIB
```

Dual Operating System Installation

If you have a dual-boot configuration, with both Windows 3.1 and Windows NT running on the same machine, Visual C++ can be installed for both operating systems. To perform certain registration functions specific to each operating system you must run Setup twice, once in each operating system.

This two-phase installation process starts out with a normal installation under one system. After completing this first installation, the optimal next step is to reboot your computer under the other operating system. You then run Setup exactly as you did before, selecting the same options:

- Directories
- Kind of installation (if you specified a Minimum Installation under Windows 3.1, then it's best to specify a Minimum Installation under Windows NT)
- Database and OLE options
- ODBC drivers

Setup will copy VC++ files on top of your existing installation. These will be exactly the same files as were installed during the first pass. The reason you should select the same options for the second installation is to ensure proper registration of these files under the second OS, such as for Program Manager groups, ODBC registration, and .INI files. To achieve a safe, correct installation of components, we recommend running Setup exactly the same way under both operating systems.

Note The Setup program will calculate the disk space required, but will not take into account the fact that you already have most of these files installed on your disk. This can cause Setup to report an excessively large disk-space requirement. For the second installation, you can safely ignore this report, as you have already successfully installed the product.

The Setup program has the responsibility for not only copying the files, but also for accomplishing many other important tasks involved in setting up Microsoft Visual C++. To achieve a safe, correct installation of components, we recommend running Setup exactly the same way under both operating systems.

Microsoft Visual C++ Overview

This chapter presents an overview of the Microsoft Visual C++ Professional Edition Development System for Windows version 1.5 and its integrated development environment. It discusses each of the major components and provides a brief look at debugging options.

What Is Visual C++?

Microsoft Visual C++ is a tool for building and debugging Windows-based applications and libraries in an integrated Windows environment. Visual C++ makes it much easier to tackle the complex job of developing applications for Windows by incorporating high-level C++ application framework classes with integrated Windows-hosted development tools.

The development tools used in Visual C++ include Visual Workbench, App Studio, AppWizard, ClassWizard, and several other utilities accessed from, or used by, Visual Workbench.

During the development process, you use AppWizard to create the C++ Microsoft Foundation Class Library source files for your project. Then, to create and edit resources such as dialog boxes, forms, menus, toolbars, and controls, you use App Studio. You use ClassWizard to create new classes and to add C++ framework code for message maps, data binding, and other features added to your classes.

The Microsoft Visual C++ Development System for Windows contains the following major components:

- Microsoft Visual Workbench
- Microsoft C/C++ Compilation System
- Microsoft Foundation Class Library
- Microsoft App Studio Resource Editor
- Run-Time Libraries
- Sample Source Code
- Online Help Files

- Books Online
- Tools
- Debugging Solutions

Microsoft Visual Workbench

Microsoft Visual Workbench is the cornerstone of the Visual C++ development platform. It contains a syntax-sensitive color text editor, a graphical browser, a compiler, a linker, a debugger, a make utility, and integrated online help. Visual Workbench also fits into a larger development strategy by acting as the central point from which all other development activities are performed. From Visual Workbench menus you can:

- Use the text editor to develop application source files or use it to supplement or modify ClassWizard-created code.
- Run the Visual C++ build tools, such as the compiler and linker.
- Run the App Studio resource editor to develop user-interface components.
- Run AppWizard to create the full-featured skeleton of your C++ application.
- Run ClassWizard to create, browse, or modify features of your class.
- Browse base classes and derived classes to find related symbols and show relationships.
- Run your own tools, which can be installed on the Tools menu.

Visual Workbench strikes the balance of giving you the tools you need most and, at the same time, making them easy to use by keeping things simple.

Microsoft C/C++ Compilation System

The Microsoft C/C++ compiler and linker provide a multitude of build customization options. Various settings, easily changed within Visual Workbench, affect the actual code generation. As always, detailed information on this topic is available by choosing the help command button.

Microsoft Foundation Class Library

The Microsoft Foundation Class Library enables C++ programmers to develop applications for Microsoft Windows 3.1 and for Microsoft Windows NT. It encourages a standard application architecture using a proven application program interface to Windows. Additionally, the class library supplies many new features such as support for Object Linking and Embedding (OLE) version 2 and database support in conformance with the Open Database Connectivity (ODBC) standard.

The full source code for the MFC is supplied on your distribution disk in the `\MSVC\MFC\SRC` subdirectory. You'll find the source code useful in a number of ways:

- As an aid in debugging your own code when a failure is revealed, say, with an `ASSERT` inside a class in the class library.
- As the ultimate reference if the documents don't answer all of your questions.
- In very rare cases, you may want to modify the library class implementations (although this is not recommended).

Microsoft App Studio Resource Editor

App Studio is used to create new resource files and to open and edit existing resource files. With App Studio, you can edit both the appearance and behavior of common user-interface objects, easily include database functionality or VBX custom controls in your dialog boxes or forms, and quickly design and edit bitmaps, cursors, icons, and toolbars.

Run-Time Library

The Microsoft run-time library contains more than 550 functions and macros designed for use in C and C++ programs. Designed primarily for compatibility with the ANSI C standard, these run-time library routines provide many functions not available in the C and C++ languages themselves. These functions include input and output, memory allocation, math support, process control, graphics, and many others.

Sample Source Code

Included in this version are sample programs that provide many examples of how to write Visual C++ applications. These sample programs are found in the `\MFC\SAMPLES` subdirectory. You'll find it instructive to compile and run them and to examine their source code for useful techniques.

For a helpful overview of the sample programs and what they illustrate, see `MFC\SAMP.HLP`, which you can reach through the Program Manager icon "MFC Tech Notes."

Online Help Files

Help provides rapid answers to questions on most any subject dealing with the development process. It provides information on Visual Workbench, the C/C++ language, MFC, pen and multimedia functions, the ODBC SDK, the OLE 2 SDK, the Windows 3.1 SDK, and obtaining product support.

Technical notes that discuss porting issues and the architecture and advanced features of the Microsoft Foundation Class Library are available as Help. For easy access to the technical notes, double-click the Program Manager icon “MFC Samples Help.”

Books Online

All user’s guides and reference volumes for Microsoft Visual C++ are provided on CD-ROM. This provides quick and easy online access to all Visual C++ application topics. For a helpful overview of how to use the Books Online feature, see CONTENTS.HLP in the \MSVC\HELP subdirectory. Use the Help button in the Contents window to access this help.

Tools

Both Windows- and MS-DOS-hosted tools are provided with this version of Visual C++. Among these are various debugging solutions (see discussion following), an application profiler, a font editor, a Help compiler, and additional methods for monitoring and analyzing application processes.

Debugging Solutions

Microsoft Visual C++ offers you several debugging solutions. A brief explanation follows each one. These solutions are:

- **Soft-Mode Debugging**—This mode is available in the integrated debugger, no matter which environment you are using and allows task switching while debugging. The advantage of soft mode debugging is that it allows the user to access help while in the middle of a debug session. The drawback of soft-mode debugging is that, when more than one process is involved, it allows all but the current debuggee to run at full speed.
- **Hard-Mode Debugging**—This mode is sometimes called a “blocking debugger,” and it is available using the integrated debugger under Windows 3.1 or when using CodeView. Enable hard-mode debugging by choosing the menu item Options, Debug, and then selecting Hard in the Debug dialog box. Hard mode blocks all processes in the system from running, which is essential for debugging complicated client-server applications, OLE servers (although not always the containers), applications that use DDE, and, in general, any application that relies on synchronizing multiple processes or exchanging data between processes using interprocess communication (IPC).
- **CodeView for Windows**—CodeView for Windows (CVW) is available only under Windows 3.1 because it requires a VxD to run. It is also a blocking debugger and can be preferable to the integrated debugger for some tasks that require minimal interference with the Windows environment.

Which debugger you choose is application specific, but you should consider these recommendations:

- Any code that is platform specific should be debugged on that platform before you consider it correct. For example, if your application is targeted to run on Windows 3.1, you should complete all debugging on a Windows 3.1 platform.
- To debug an OLE 2 or DDE application, you typically need hard-mode debugging. We recommend that you do not debug OLE 2 applications under Windows NT WOW.

Building a Sample Application for Windows

The first thing many programmers want to do after installing a new language and development environment is to perform a test build to make sure everything is installed correctly and to see how the build process works. A “test drive” gives you confidence in your setup and helps you get acquainted with the new development environment.

This chapter takes you directly through a build of a Microsoft Foundation Class Library sample program, after a short introduction to projects. It assumes that you have installed the MFC library and sample programs and that the samples reside in a directory called `\MSVCMFC\SAMPLES` on the hard disk drive on which Microsoft Visual C++ is installed.

Introducing Projects

Projects are the cornerstone of Microsoft Visual Workbench. A project references all the source files and libraries that make up a program, as well as the compiler and linker commands that build the program. It is composed of a makefile (.MAK), which is compatible with the Microsoft Program Maintenance Utility (NMAKE), and a status file (.VCW), which contains Visual Workbench information. A project is identified by its makefile; the makefile has the same base name as the project with a .MAK extension.

All sample programs have project files associated with them. To learn how to create your own projects, see “Using Projects” in Chapter 5 of the *Visual Workbench User’s Guide*.

Project files from Microsoft Programmer’s WorkBench (PWB) can be used from within Visual Workbench by loading them as external projects. This does not give you access to compiler and linker options (other than Release versus Debug mode), but it does let you migrate quickly from PWB or other development tools to Visual C++ and build, run, and debug your PWB applications from within Visual Workbench. To learn more about using external projects, see “Using External Projects” in Chapter 5 of the *Visual Workbench User’s Guide*.

A Sample Windows-Based C++ Application

To familiarize yourself with the steps of building any program that already has a Visual Workbench project, you can use any of the sample projects in the \MFC\SAMPLES directory. The HELLO program is used in this example.

► **To build and run a sample Windows-based C++ program:**

1. From the Project menu, choose Open.

The Open Project dialog box appears.

2. Select the HELLO.MAK project file (see Figure 4.1).

This file is in the \MSVC\MFC\SAMPLES\HELLO directory.

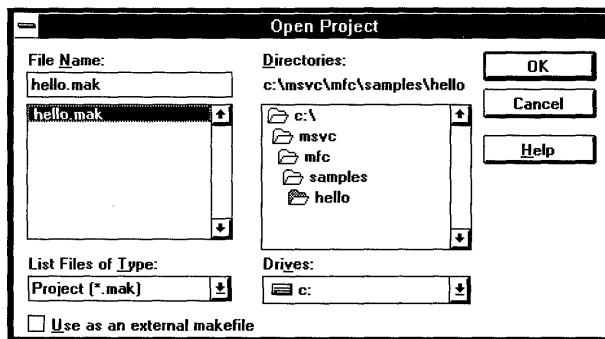


Figure 4.1 The Open Project Dialog Box

3. Choose OK.
4. From the Options menu, choose Project.
The Project Options dialog box appears (see Figure 4.2).
5. From the Build Mode options, select Release or Debug (select Debug for this example for a faster build).

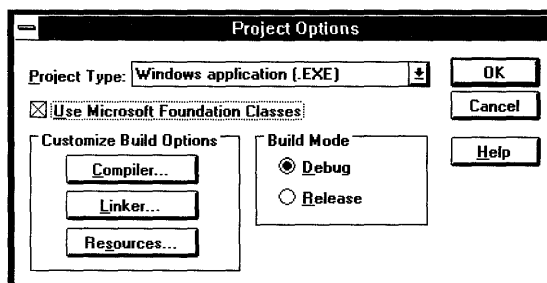


Figure 4.2 The Project Options Dialog Box

6. Choose OK to close the Project Options dialog box.

7. From the Project menu, choose Build HELLO.EXE.

The build occurs entirely in the background, so you are free to continue working in Visual Workbench (although some menu commands are disabled). During the build, output from each of the build utilities, such as the compiler and linker, appears in Visual Workbench's Output window.

When the build is complete, Visual Workbench displays the final results on its status bar. In this case, the status bar should indicate 0 errors and 0 warnings.

8. To run the program without invoking the internal debugger, choose Execute HELLO.EXE from the Project menu.

To run the program in the debugger, choose Go from the Debug menu.

Choose Exit from the program's File menu to quit the program and return to Visual Workbench when you finish experimenting with the program.



Building a Sample QuickWin Program

Most programmers learn to write C or C++ programs using standard input/output (I/O) functions like **printf()** and **scanf()** (or the C++ iostream objects **cin** and **cout**) to communicate with users of their programs. Hence, many programmers are more comfortable using the standard I/O model than the Windows API programming model. There are lots of reasons why programmers still rely on the MS-DOS I/O model, even when programming in Windows. It is convenient for prototyping code and for quick jobs that don't justify the development of a full-blown Windows interface.

The QuickWin library is the fastest and easiest way to merge MS-DOS programming with Windows. You can write standard I/O programs and have them run in a multiple document interface (MDI) QuickWin window. You can even use all the functions in the MS-DOS GRAPHICS.LIB library. You can use the QuickWin library to port many of your existing MS-DOS programs to Windows without incurring the development overhead associated with Windows.

This chapter shows you the quickest way to use Microsoft Visual Workbench to write, build, and run a QuickWin program.

What Is QuickWin?

A QuickWin application is a standard I/O program with a Windows shell. It runs only with the Windows operating system. You build your program as a QuickWin project type; then when you run the program from Windows, a QuickWin MDI window appears with a window dedicated to all your program output functions. This window is like a video monitor; you can write to the window and perform input and output operations with standard MS-DOS input/output routines.

The following "A Sample QuickWin Program" section walks you through a simple QuickWin C++ example. The QuickWin library, however, is capable of handling most well-behaved standard I/O programs, including programs that use the Microsoft GRAPHICS.LIB library. Of course, QuickWin cannot interpret programs that use hardware-specific functions such as BIOS interrupts or functions that directly manipulate video memory.

For a complete description of the QuickWin library, see Chapter 7 of *Programming Techniques*.

A Sample QuickWin Program

To see how easy it is to use QuickWin, try typing a small sample program in a source window and then building it as a QuickWin program. Or, if you would prefer to try out the sample QuickWin program provided on disk, open the file named QWGDemo.CPP located in the \MSVC\SAMPLES\QWGDemo directory and follow the instructions in this chapter titled “To build and run a QuickWin program.”

► To write a QuickWin program

1. If you have a project open, close it by choosing Close from the Project menu.
2. From the File menu, choose New.

An empty source window opens.

3. Type the following code in the source window:

```
#include <iostream.h>
void main()
{
    cout << "Hello C++ world\n";
}
```

If you need help using the editor, see “Using the Editor” in Chapter 4 of the *Visual Workbench User’s Guide*. Figure 5.1 shows the source window with the sample code.

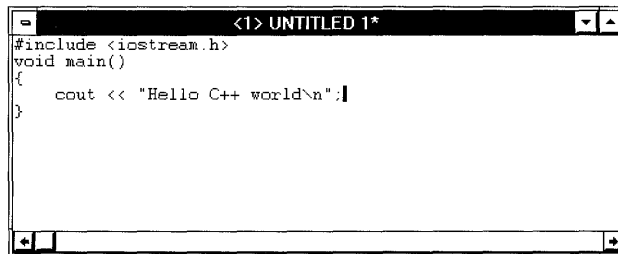


Figure 5.1 QuickWin C++ Program Code

4. From the File menu, choose Save As.
The Save As dialog box appears.
5. Type the name for the file, QWINTEST.CPP, in the File Name box and choose OK.

Note Use the extension .CPP or .CXX, so the compiler recognizes the program as a C++ program.

Now that you've entered the program, you can build an executable program. For the next procedure, use either the QWINTTEST.CPP program from the previous procedure or the QWGDemo.CPP program (which you must open first). Note that this procedure builds the QuickWin program without creating or using a project. If you plan to develop extensive QuickWin applications, it is suggested that you create and use projects (see "Using Projects" in Chapter 5 of the *Visual Workbench User's Guide* for more information).

► **To build and run a QuickWin program**

1. Click in the source window containing the QuickWin program to make it the active window.

2. From the Options menu, choose Project.

The Project Options dialog box appears (see Figure 5.2).

3. In the Project Type list box, select QuickWin application (.EXE).

4. From the Build Mode options, select Debug or Release (for this example, select Debug).

5. Choose OK to close the Project Options dialog box.

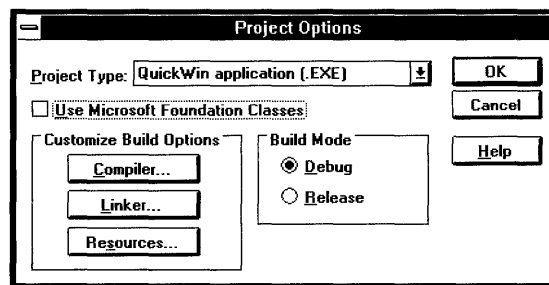


Figure 5.2 The Project Options Dialog Box

6. From the Project menu, choose Build *Targetname* (where *Targetname* is either QWINTTEST.EXE or QWGDemo.EXE in this example depending on the program you are building).

The build process automatically generates the module-definition file required for a QuickWin program.

When the build is finished, there should be 0 errors and 0 warnings reported on the status bar. If there are any errors (probably created by typing errors), correct them and repeat the build. If there are link or include-file errors, make sure the

paths for the library files and include files are correctly shown in the Directories dialog box (opened from the Options menu).

7. From the Project menu, choose Execute *Targetname* (where *Targetname* is either QWINTTEST.EXE or QWGDEMO.EXE).

The QuickWin window should appear with your program's output in one of its MDI windows (see Figure 5.3).

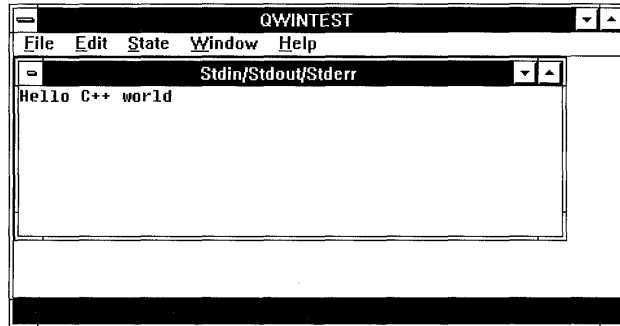


Figure 5.3 QWINTTEST Output

After you have experimented with the program, you can close the QuickWin application by choosing Exit from its File menu or by pressing CTRL+C. This will return you to Visual Workbench.

Microsoft Support Services

Visual C++ has many resources to help answer developer's questions. Sources of documentation include the online Help, Books Online, README.WRI, technical notes, and samples. Help is also available through the Microsoft Support Network, which provides technical support through a variety of services.

Troubleshooting Guide

Most problems can be solved using the information provided with Visual C++. Here are some steps which can help you take advantage of the Visual C++ resources and help you isolate the problem if you need to call technical support.

Check the Product Documentation

This is one of the most productive ways to find answers to questions, and it can save you time and money. You can consult several types of documentation:

- **Books Online.** By clicking the Books Online icon, you have access to over 5000 pages of Visual C++ documentation. You can scan for information in the Contents browser, use Search to search for a keyword, or use Search Plus to do a full-text search on a subject.
- **Help.** This includes procedural and reference information on common features, functions, and error messages. You can access Help through the Help menu, or by pressing F1 on a function in your source code.
- **README.WRI.** This file contains late-breaking information about configuration problems, new features, and known bugs. You can also open README.WRI by clicking the icon in the Visual C++ program group.
- **Samples.** Two online books, MFC Samples, and Samples, include sample programs that illustrate common programming tasks. You can open these by clicking the books online icon.
- **Microsoft Knowledge Base.** The Microsoft Knowledge Base contains thousands of articles on known problems and programming issues. It is available through the Help menu or on the Microsoft Developer's Network CD-ROM, and it can also be accessed from CompuServe or Internet.

Reproduce the Problem

Reproducing the problem is the first step in solving it. Once you can reproduce the problem, you can start finding solutions. The following questions may give you more insight on the problem:

- Does the problem occur with just this one program? You may want to try one of the samples to see if you can reproduce the problem with it. If you cannot reproduce the problem with other programs, think about what's specific about the program.
- Does the problem occur on just your machine? If so, the problem may be related to your system configuration. Try using a different Windows video driver or modify your system configuration to see if the problem still occurs. It's a good idea to try to make your machine as much like the average machine as possible.
- What versions of the tools are you using? Knowing the version of the compiler, linker, and other tools makes it easier to reproduce (or avoid) the problem in the future.
- Under what circumstances does the problem occur? Does it only occur when you build from the command line, or within Visual C++? Does the amount of available memory affect the problem? How about other programs that are running in the system?

Isolate the Problem

After seeing what circumstances cause the problem, you may be able to isolate it. Once a problem is isolated, it's much easier and quicker to fix or work around.

- Try isolating the component that's causing the problem. You can use the information about what conditions it reproduces to help isolate the component. For example, if a problem occurs when compiling both inside the development environment and using NMAKE from the command line, the problem probably isn't with the development environment.
- If the problem is with the compiler, you may be able to create a small example. The compiler generates code on a per-function basis, and you might be able to isolate it to a particular module or function. A useful way to comment out large blocks of code is to use `#if 0`.
- Sometimes you can isolate a problem by breaking things in half. For example, if a particular module is causing a LINK error, separating the module into two modules will help isolate the problem.

Product Support Within the United States and Canada

In the United States and Canada, the following support services are available through the Microsoft Support Network:

- Electronic services
- Standard support
- Priority support
- Text telephone
- Product training and consultation
- Other support options

Electronic Services

These services are available 24 hours a day, 7 days a week, including holidays.

Microsoft FastTips (800) 936-4300 on a touch-tone telephone. Receive automated answers to common questions and access a library of technical notes, all delivered by recording or fax. After you reach FastTips, use the following keys to move through the automated system:

- To advance to the next message, press the ASTERISK (*) key.
- To repeat the current message, press 7.
- To return to the beginning of FastTips, press the POUND SIGN (#) key.

CompuServe Interact with other users and Microsoft support engineers, or access the Microsoft Knowledge Base to get product information. At any ! prompt, type **go microsoft** to access all Microsoft forums, or type **go mskb** to access the Microsoft Knowledge Base. Type **go mslang** to access the Microsoft Languages forum and Visual C++ sections, or **go msmfc**, to access the Microsoft Foundation Class forum. For an introductory CompuServe membership kit specifically for Microsoft users, dial (800) 848-8199 and ask for operator 524.

Microsoft Download Service Access, via modem, the Driver Library and the most current technical notes (1200, 2400, or 9600 baud; no parity; 8 data bits; 1 stop bit.) In the United States, call (206) 936-6735. In Canada, call (905) 507-3022.

Internet Access the Driver Library and the Microsoft Knowledge Base. The Microsoft Internet FTP archive host, <ftp.microsoft.com>, supports anonymous login. When logging in as anonymous, you should type your complete electronic mail names as your password.

Standard Support

In the United States, no-charge support from Microsoft support engineers is available via a toll call between 6:00 A.M. and 6:00 P.M. Pacific time, Monday through Friday, excluding holidays. This support is available for 30 days after you make your first call.

- For technical support for Visual C++, call (206) 635-7007.

In Canada, support engineers are available via a toll call between 8:00 A.M. and 8:00 P.M. Eastern time, Monday through Friday, excluding holidays. Call (905) 568-3503. This support is available for 30 days after you make your first call.

When you call, you should be at your computer with Microsoft Visual C++ running and the product documentation at hand. Be prepared to give the following information:

- The version of Microsoft Visual C++ you are using.
- Your product identification number (choose About from the Help menu to find this).
- The type of hardware you are using, including network hardware, if applicable.
- The operating system you are using.
- The exact wording of any messages that appeared on your screen and the error number, if any.
- A description of what happened and what you were trying to do when the problem occurred.
- A description of how you tried to solve the problem.

Priority Support

The Microsoft Support Network offers priority telephone access to Microsoft support engineers 24 hours a day, 7 days a week, except holidays.

- In the United States, call (900) 555-2300; \$2 (U.S.) per minute; \$95 (U.S.) maximum. Charges appear on your telephone bill.
- In the United States, call (800) 936-5800; \$95 (U.S.) per incident, billed to your VISA card, MasterCard, or American Express card.
- In Canada, call (800) 668-7975 for more information.

Text Telephone

Microsoft text telephone (TT/TDD) services are available for the deaf or hard-of-hearing. In the United States, using a TT/TDD modem, dial (206) 635-4948 between 6:00 A.M. and 6:00 P.M. Pacific time, Monday through Friday, excluding holidays. In Canada, using a TT/TDD modem, dial (905) 568-9641 between 8:00 A.M. and 8:00 P.M. Eastern time, Monday through Friday, excluding holidays.

Other Support Options

The Microsoft Support Network offers annual and multiple incident support plans. For information, in the United States, contact the Microsoft Support Network Sales and Information group at (800) 936-3500 between 6:00 A.M. and 6:00 P.M. Pacific time, Monday through Friday, excluding holidays. In Canada, call (800) 668-7975 between 8:00 A.M. and 8:00 P.M. Eastern time, Monday through Friday, excluding holidays.

Product Training and Consultation

Microsoft Solution Providers are independent organizations that provide consulting, integration, customization, development, technical support and training, and other services for Microsoft products. These companies are called Solution Providers because they apply technology and provide services to help solve real-world problems.

In the United States, for more information about the Microsoft Solution Providers program or the Microsoft Solution Provider nearest to you, please call (800) 426-9400 between 6:30 A.M. and 5:30 P.M. Pacific time, Monday through Friday, excluding holidays. In Canada, call (800) 563-9048 between 8:00 A.M. and 8:00 P.M. Eastern time, Monday through Friday, excluding holidays.

Product Support Worldwide

If you are outside the United States and have a question about a Microsoft product, first:

- Consult the documentation and other printed information included with your product.
- Check online Help.

- Check the README files that come with your product disks. These files provide general information that became available after the books in the product package were published.
- Consult electronic options such as CompuServe forums or bulletin boards, if available.

If you cannot find a solution, you can receive information on how to obtain product support by contacting the Microsoft subsidiary office that serves your country.

The Microsoft Support Network

The Microsoft Support Network, where available, offers you a wide range of choices and access to high quality, responsive technical support. Microsoft recognizes that support needs vary from user to user; the Microsoft Support Network allows you to choose the type of support that best meets your needs, with options ranging from electronic bulletin boards to annual support programs.

The Microsoft Support Network is subject to Microsoft's then-current prices, terms, and conditions in place in each country at the time the services are used and is subject to change without notice.

Calling a Microsoft Subsidiary Office

When you call, you should be at your computer and have the appropriate product documentation at hand. Be prepared to give the following information:

- The version number of Microsoft product that you are using.
- The type of hardware that you are using, including network hardware, if applicable.
- The operating system that you are using.
- The exact wording of any messages that appeared on your screen.
- A description of what happened and what you were doing when the problem occurred.
- A description of how you tried to solve the problem.

Microsoft subsidiary offices and the countries they serve are listed below.

If there is no Microsoft office in your country, please contact the establishment from which you purchased your Microsoft product.

Microsoft Subsidiary Offices

Area	Telephone Numbers
Argentina	<p>Microsoft de Argentina S.A. Customer Service: (54) (1) 814-5105 (54) (1) 814-4807 (54) (1) 814-4808 (54) (1) 811-7199 Fax: (54) (1) 814-0372 Technical Support: (54) (1) 815-1521</p>
Australia	<p>Microsoft Pty. Ltd. Fax: (61) (02) 805-0519 Sales Information Centre: (61) (02) 870-2100 Installation Support: (61) (02) 870-2870 Bulletin Board Service: (61) (02) 878-5200 Technical Support: (61) (02) 870-2131</p>
Austria	<p>Microsoft Ges.m.b.H. Phone: 0222-68 76 07 Fax: 0222-68 16 2710 Information: 0660-6520 Prices, updates, etc.: 0660-6520 CompuServe: GO MSEURO (Microsoft Central Europe) Technical support: C/C++, FORTRAN, Macro Assembler PDS: 0660-6515</p>
Belgium	<p>Microsoft NV Phone: 02-7303911 Customer Service: 02-7303922 CompuServe: 02-2150530 (GO MSBEN) Bulletin Board: 02-7350045 (1200/2400/9600 bd, 8N1, ANSI) Technical Support: 02-5133274 (Dutch speaking) 02-5023432 (English speaking) 02-5132268 (French speaking)</p>
Bolivia	See Argentina
Brazil	<p>Microsoft Informatica Ltda. Phone: (55) (11) 530-4455 Fax: (55) (11) 240-2205 Technical Support Phone: (55) (11) 871-0090 Technical Support Fax: (55) (11) 241-1157 Technical Support Bulletin Board Service: (55) (11) 872-4106</p>

Area	Telephone Numbers
Canada	Microsoft Canada Inc. Head Office Phone: 1 (905) 568-0434 Customer Support Centre: 1 (800) 563-9048 Microsoft Support Network: Standard Technical Support Phone: 1 (905) 568-3503 Priority Support Information: 1 (800) 668-7975 Text Telephone (TT/TDD) 1 (905) 568-9641 Technical Support Bulletin Board Service: 1 (905) 507-3022
Caribbean	Microsoft Caribbean, Inc. Phone: (809) 273-3600 Fax: (809) 273-3636 Technical Support: (214) 714-9100
Chile	Microsoft Chile S.A. Phone: 56 2 218 5771 56 2 218 5711 56 2 218 7524 Fax: 56 2 218 5747
Colombia	Microsoft Colombia Phone: (571) 618 2245 Fax: (571) 618 2269 Technical Support: (571) 618 2255
Denmark	Microsoft Denmark AS Phone: (45) (44) 89 01 00 Microsoft Sales Support: (45) (44) 89 01 90 Microsoft FaxSvar: (45) (44) 89 01 44 Microsoft BBS: (45) (44) 66 90 46 (Document 303030 in FaxSvar contains detailed instructions) Technical Support: (45) (44) 89 01 11
Dubai	Microsoft Middle East Phone: (971) 4 513 888 Fax: (971) 4 527 444
England	see United Kingdom
Finland	Microsoft OY Phone: (358) (0)9 0 525 501 Microsoft FaxSvar: (46) (0)8 752 29 00 (Information in Swedish and English) Microsoft BBS: (46) (0) 8 750 47 42 (Information in Swedish and English) For Technical Support, please contact your local dealer.

Area	Telephone Numbers
France	Microsoft France Phone: (33) (1) 69-86-46-46 Fax: (33) (1) 64-46-06-60 Telex: MSPARIS 604322 Technical Support Phone: (33) (1) 69-86-10-20 Technical Support Fax: (33) (1) 69-28-00-28 Fax Information Service: (33) (1) 69-29-11-55
French Polynesia	See France
Germany	Microsoft GmbH Phone: 089-3176-0 Fax: 089-3176-1000 Telex: (17) 89 83 28 MS GMBH D Information: 089-3176 1199 Prices, updates, etc.: 089-3176 1199 CompuServe: GO MSEURO (Microsoft Central Europe) Bulletin board, device drivers, tech notes: Btx: microsoft# or *610808000# Technical support: C/C++, FORTRAN, Macro Assembler PDS: 089/3176-1150
Greece	Microsoft Hellas, S.A. Phone: (30) (1) 6893 631 through (30) 1 6893 635 Fax: (30) (1) 6893 636
Hong Kong	Microsoft Hong Kong Limited Fax: (852) 560-2217 Technical Support: (852) 804-4222
Ireland	See United Kingdom
Israel	Microsoft Israel Ltd. Phone: 972-3-575-7034 Fax: 972-3-575-7065
Italy	Microsoft SpA Phone: (39) (2) 269121 Fax: (39) (2) 21072020 Telex: 340321 I Customer Service (Prices, new product info, product literature): (39) (2) 26901359 Bulletin Board: (39) (2) 21072051 Technical Support: (39) (2) 26901351

Area	Telephone Numbers
Japan	Microsoft Company Ltd. Phone: (81) (3) 5454-8000 Fax: (81) (3) 5454-7972 Channel Marketing (Pre-sales Product Support) Information Center Phone: (81) (3) 5454-2300 Fax: (81) (3) 5454-7951 Customer Service Phone (Version upgrade/Registration) Phone: (81) (3) 5454-2305 Fax: (81) (3) 5454-7952 Languages: Visual C ++: (81) (3) 5454-2364 Fortran: (81) (3) 5454-2353 Masm: (81) (3) 5454-2360 C: (81) (3) 5454-2361 Quick C: (81) (3) 5454-2362
Korea	Microsoft CH Phone: (82) (2) 531-4500 Fax: (82) (2) 531-1724 Technical Support: (82) (2) 531-4800 Technical Support Fax: (82) (2) 563-5194 Technical Support Bulletin Board Service: (82) (2) 538-3256
Liechtenstein	See Switzerland (German speaking)
Luxembourg	Microsoft NV Phone: (32) 2-7303911 Customer Service: (32) 2-7303922 CompuServe: (32) 2-2150530 (GO MSBEN) Bulletin Board: (32) 2-7350045 (1200/2400/9600 bd, 8N1, ANSI) Technical Support: (32) 2-5133274 (Dutch speaking) (32) 2-5023432 (English speaking) (32) 2-5132268 (French speaking)
México	Microsoft México, S.A. de C.V. Phone: (52) (5) 325-0910 Fax: (52) (5) 280-7940 Customer Service: (52) (5) 325-0911 Bulletin Board Service: (52) (5) 590-5988 (1200/2400 baud, 8 bits, No parity, 1 stop bit, ANSI terminal emulation) Technical Support: Desktop & OS: (52) (5) 325-0912 Developers & Advanced Systems: (52) (5) 237-4800

Area	Telephone Numbers
Netherlands	Microsoft BV Phone: 02503-89189 Customer Service: 02503-77700 CompuServe: 020-6880085 (GO MSBEN) Bulletin Board: 02503-34221 (1200/2400/9600 bd, 8N1, ANSI) Technical Support: 02503-77877 (Dutch speaking) 02503-77853 (English speaking)
New Zealand	Microsoft New Zealand Ltd Phone: 64 (9) 358-3724 Fax: 64 (9) 358-3726 Technology Link Centre (Technical Support) Phone: 64 (9) 357-5575 Fax: 64 (9) 358-0092
Northern Ireland	See United Kingdom
Norway	Microsoft Norway AS Phone: (47) (22) 18 302 25 00 Microsoft Sales Support: (47) 22 02 25 80 Microsoft BBS: (47) 22 18 22 09 (Document 404040 in FaxSvar contains detailed instructions) Microsoft FaxSvar: (47) 22 02 25 70 Technical Support: (47) (22) 02 25 50
Papua New Guinea	See Australia
Paraguay	See Argentina
Portugal	MSFT, Lda. Phone: (351) 1 4412205 Fax: (351) 1 4412101
Republic of China	Microsoft Taiwan Corp. Phone: (886) (2) 504-3122 Fax: (886) (2) 504-3121 Technical Support: (886) (2) 508-9501
Republic of Ireland	See United Kingdom
Scotland	See United Kingdom
South Africa	Microsoft South Africa Phone: (27) 11 444 0520 Fax: (27) 11 444 0536
Spain	Microsoft Iberica SRL Phone: (34) (1) 804-0000 Fax: (34) (1) 803-8310 Technical Support: (34) (1) 803-9960

Area	Telephone Numbers
Sweden	Microsoft AB Phone: (46) (8) 752 56 00 Sales Support: (46) (8) 752 56 30 Microsoft FaxSvar: (46) (0)8 752 29 00 Microsoft BBS: (46) (8) 750 47 42 (Document 202020 in FaxSvar contains detailed instructions) Information on Technical Support: (46) (8) 752 09 29
Switzerland	Microsoft AG Phone: 01-839 61 11 Fax: 01-831 08 69 Prices, updates, etc.: 01/839 61 11 CompuServe: GO MSEURO(Microsoft Central Europe) Documentation: Phone: 155 59 00 Fax: 064-224294, Microsoft Info-Service, Postfach, 8099 Zürich Technical support: C/C++, FORTRAN, Macro Assembler PDS: 01/342-4036 Technical support (French speaking): 022-738 96 88
Turkey	Microsoft Turkey Phone: (90) 212 2585998 Fax: (90) 212 2585954 Works for MS-DOS, Works for Windo, FORTRAN, Macro Assembler: 01-342-4036 BASIC, Visual Basic: 01-342-4086
United Kingdom	Microsoft Limited Phone: (44) (734) 270000 Fax: (44) (734) 270002 Upgrades & Registration: (44) (81) 614 8000 Technical Support: Main Line (All Products): (44) (734) 271000 Fax Information Service: (44) (734) 270080 Bulletin Board Service: (44) (734) 270065 (2400 Baud) (44) (734) 270060 (9600 Baud) MSDOS 90 day F.O.C. Support: (44) (734) 271900 MSDOS Charged Support: (44) (891) 315500
Uruguay	See Argentina

Area	Telephone Numbers
Venezuela	Corporation MS 90 de Venezuela S.A. Other information: 58.2.910008 58.2.914739 58.2.913342 Fax: 58.2.923835 Technical Support: 58.2.910046 58.2.910510
Wales	See United Kingdom

Microsoft TechNet, Technical Information Network

Microsoft TechNet is an annual information service created for those who support or educate end users, administer networks or databases, create automated solutions and recommend or evaluate information technology solutions. Microsoft TechNet gives you the answers you need, when you need them by providing timely, comprehensive and in-depth information on Microsoft products and on supporting and administering Microsoft-based solutions.

TechNet members receive twelve monthly TechNet CDs containing the complete Microsoft Knowledge Base, Resource Kits, products facts and features, educational materials, conference session notes, and other technical information. Members also receive four quarterly updates of the Microsoft Drivers and Patches CD containing drivers and patches for most Microsoft applications. Other membership benefits include a dedicated TechNet CompuServe forum (GO TECHNET), and the on-line Microsoft Services Directory.

Availability and the services of Microsoft TechNet may vary by country. To join Microsoft TechNet outside the U.S. and Canada, call the appropriate number listed below:

Country	Telephone Number
Australia	61 2 870 2100
Argentina	54-1-814-5105/54-1-814-4807/54-1-814-4808
Brazil	(55) 011-542-4781
Caribbean Region	(1) (800) 344-2121 or (1) (402) 691-0173
Canada	(1) (800) 344-2121
Chile	65-2-2048257
Colombia	(57) (1) 618-2245
Europe	+31 10 258 88 64
France	05 90 59 04 (toll-free)
Germany	0130 81 02 11 (toll-free)

Country	Telephone Number
Hong Kong	(852) 756-5560
India	91-11-646 0694
Israel	(972) (3) 575-7034
Japan	03-5600-5036
Mexico	(525) 325-09-11
Netherlands, The	06 022 24 80 (toll-free)
New Zealand	64 9 308 9318
Russia	7-095-244-3474
Singapore	(65) 220-7380
South Africa	27 11 445 0000
South Korea	82 2 531 4500
Turkey	90-212-258 59 98
United Arab Emirates	971 4 513888
United States	(1) (800) 344-2121
Venezuela	58-2-910008
All Other Countries	(1) (402) 691-0173

A P P E N D I X B

Accessibility for People with Disabilities

Microsoft is committed to making its products and services easier for everyone to use. This appendix provides information about the following products and services, which make Microsoft Windows more accessible for people with disabilities:

- Microsoft support services for people who are deaf or hard-of-hearing.
- Access Pack for Microsoft Windows, a software utility that makes using Microsoft Windows easier for people with motion or hearing disabilities.
- Keyboard layouts designed for people who type with one hand or a wand.
- Microsoft software documentation on audio cassettes and floppy disks.
- Products for people who are blind or have low vision.
- Hints for customizing Microsoft Windows.
- Information about other products and services for people with disabilities.

Note The information in this section applies only to users who purchased Windows in the United States. If you purchased Windows outside the United States, your Windows package contains a subsidiary information card listing Microsoft support services telephone numbers and addresses. You can contact your subsidiary to find out whether the type of products and services described in this appendix are available in your area.

Microsoft Services for People Who Are Deaf or Hard-of-Hearing

Through a text telephone (TT/TDD) service, Microsoft provides people who are deaf or hard-of-hearing with complete access to Microsoft product and customer services.

You can contact Microsoft Sales and Service on a text telephone by dialing (800) 892-5234 between 6:30 A.M. and 5:30 P.M. Pacific time. For technical assistance you can contact Microsoft Product Support Services on a text telephone at (206)

635-4948 between 6:00 A.M. and 6:00 P.M. Pacific time. Microsoft support services are subject to Microsoft prices, terms, and conditions in place at the time the service is used.

Access Pack for Microsoft Windows

Microsoft distributes Access Pack for Microsoft Windows, which provides people with motion or hearing disabilities better access to computers running Microsoft Windows. Access Pack for Microsoft Windows contains several features that:

- Allow single-finger typing of SHIFT, CTRL, and ALT key combinations.
- Ignore accidental keystrokes.
- Adjust the rate at which a character is repeated when you hold down a key, or turn off character repeating entirely.
- Prevent extra characters if you unintentionally press a key more than once.
- Enable you to control the mouse cursor by using the keyboard.
- Enable you to control the computer keyboard and mouse by using an alternate input device.
- Provide a visual cue when the computer beeps or makes other sounds.

Access Pack for Microsoft Windows is included on the Microsoft Windows Driver Library in the file ACCESS.EXE. If you have a modem, you can download Microsoft Windows Driver Library components, including the following, from network services:

- CompuServe®
- GENie™
- Microsoft OnLine
- Microsoft Download Service (MSDL), which you can reach by calling (206) 936-MSDL (936-6735) any time except between 1:00 A.M. and 2:30 A.M. Pacific time. Use the following communications settings:

For this setting	Specify
Baud rate	1200, 2400, or 9600
Parity	None
Data bits	8
Stop bits	1

- Various user-group bulletin boards (such as the bulletin-board services on the Association of PC User Groups network)

People within the United States who do not have a modem can order the Access Pack for Microsoft Windows on disks by calling Microsoft Product Support Services at (206) 637-7098 or (206) 635-4948 (text telephone).

Keyboard Layouts for Single-Handed Users

Microsoft distributes Dvorak keyboard layouts that make the most frequently typed characters on a keyboard more accessible to people who have difficulty using the standard “QWERTY” layout. There are three Dvorak layouts: one for two-handed users, one for people who type with their left hand only, and one for people who type with their right hand only. The left-handed or right-handed keyboard layouts can also be used by people who type with a single finger or a wand. You do not need to purchase any special equipment in order to use these features.

Microsoft Windows already supports the two-handed Dvorak layout, which can be useful for coping with or avoiding types of repetitive-motion injuries associated with typing. To get this layout, choose International from the Windows Control Panel. The two layouts for people who type with one hand are distributed as Microsoft Application Note GA0650. It is also contained in file GA0650.ZIP on most network services or GA0650.EXE on the Microsoft Download Service. For instructions on obtaining this application note see the preceding section, “Access Pack for Microsoft Windows.”

Microsoft Documentation on Audio Cassettes and Floppy Disks

People who have difficulty reading or handling printed documentation can obtain most Microsoft publications from Recording for the Blind, Inc. Recording for the Blind distributes these documents to registered members of their distribution service either on audio cassettes or on floppy disks. The Recording for the Blind collection contains more than 80,000 titles, including Microsoft product documentation and books from Microsoft Press. You can contact Recording for the Blind at the following address or phone numbers:

Recording for the Blind, Inc.
20 Roszel Road
Princeton, NJ 08540

Phone: (800) 221-4792
Phone outside the U.S.: (609) 452-0606
Fax: (609) 987-8116

Products for People Who Are Blind or Have Low Vision

There are numerous products available to help people who are blind or have low vision use Microsoft Windows. For people with low vision there are screen-enlargement utilities, and for people who cannot use visual information there are screen readers that provide alternative output by synthesized voice or refreshable

Braille displays. In addition, people with low vision can customize the Microsoft Windows display to suit their needs.

For more information on the various products available, see “Getting More Information” later in this appendix. For more information about customizing Microsoft Windows for people with low vision, see the next section, “Customizing Windows.”

Customizing Windows

There are many ways you can adjust the appearance and behavior of Microsoft Windows to suit varying vision and motor abilities without requiring any additional software or hardware. These include ways to adjust the appearance as well as the behavior of the mouse and keyboard. The specific methods available depend on which operating system you are using. Application notes are available describing the specific methods available for each operating system.

For information relating to customizing Windows 3.0 for people with disabilities, see Application Note WW0786; for Windows 3.1, Application Note WW0787; for Windows for Workgroups NT 3.1, Application Note WG0788; for Windows NT 3.1, Application Note WN0789. For information on obtaining application notes, see “Access Pack for Microsoft Windows,” earlier in this appendix.

Getting More Information

For more information on Microsoft products and services for people with disabilities, contact Microsoft Sales and Service at (800) 426-9400 (voice) or (800) 892-5234 (text telephone).

The Trace R&D Center at the University of Wisconsin–Madison produces a book and a compact disc that describe products that help people with disabilities use computers. The book, titled *Trace ResourceBook*, provides descriptions and photographs of about 2,000 products. The compact disc, titled *CO-NET CD*, provides a database of more than 17,000 products and other information for people with disabilities. It is issued twice a year.

You can contact the Trace R&D Center at the following address or telephone numbers:

Trace R&D Center
S-151 Waisman Center
1500 Highland Avenue
Madison, WI 53705-2280

Voice telephone: (608) 263-2309
Text telephone: (608) 263-5408
FAX: (608) 262-8848

For general information and recommendations on how computers can help specific people, you should consult a trained evaluator who can best match your needs with the available solutions. An assistive technology program in your area will provide referrals to programs and services that are available to you. To locate the assistive technology program nearest you, you can contact:

National Information System Center for Developmental Disabilities
Benson Building
University of South Carolina
Columbia, SC 29208

Voice/text telephone outside South Carolina: (800) 922-9234, ext. 301

Voice/text telephone inside South Carolina: (800) 922-1107

Voice/text telephone outside the U.S.: (803) 777-6222

Fax: (803) 777-6058

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