# *7*          *Setting Up Non-Windows Applications*

This chapter presents details about how to set up and run non-Windows applications under Microsoft Windows 3.1. For information about creating program information files, see Chapter 8, "PIFs and PIF Editor." For information about specific problems with running non-Windows applications, see Chapter 13, "Troubleshooting Windows 3.1."

*Related information*

- *Windows User's Guide:*  Chapter 7, "Non-Windows Applications," and Chapter 8, "PIF Editor"; see also the background information on creating program groups and managing files in Chapter 3, "Program Manager," and Chapter 4, "File Manager"

- *Windows Resource Kit:*  "APPS.INF" in Chapter 2, "The Windows Setup Information Files"; Part 2, "Configuring Windows 3.1"

- *Glossary terms:*  application, expanded memory, extended memory, grabber, PIF, virtual memory

### *Contents of this chapter*

## *About Applications*

You are likely to encounter two basic types of applications while running Microsoft Windows 3.1:  Windows applications and non-Windows applications.

Windows applications are any applications that are designed to run with Windows and that do not run without Windows.  All Windows applications follow similar conventions for arrangement of menus, style of dialog boxes, and keyboard and mouse use. You might encounter these types of Windows applications:

- **Applications designed for Windows 3.1.**

- **Applications designed for Windows 3.0 or later versions.** Windows applications can take advantage of Windows 3.0 features and interact with other Windows applications.

- **Applications designed for older Windows versions.** Applications designed for Windows 2.x or earlier cannot run under Windows 3.1. When you attempt to run such an application, Windows displays a message advising you to get an updated version of that application. Your application manufacturers will be able to tell you if a Windows 3.x version of their software is available.

"Non-Windows application" is used in the *Windows Resource Kit* as a shorthand term to refer to an application that is designed to run with MS-DOS but not specifically with Windows. Such applications may not be able to take full advantage of all Windows features (such as memory management). There are two basic kinds of non-Windows applications that you might encounter under Windows 3.1:

- **Application software.** Applications such as Lotus 1-2-3 and WordPerfect can be run under Windows in either standard or 386 enhanced mode. A program information file (PIF) gives Windows the information it needs to run a non-Windows application.

- **TSRs and other memory-resident software.** Memory-resident programs such as mouse drivers, network software, or pop-up programs like Borland Sidekick are loaded into memory when you start them and are available while other applications are running. You can start memory-resident programs before you start Windows or while Windows is running. Such non-Windows programs also use a PIF if you run them under Windows.

The next section of this chapter contains details about setting up non-Windows applications that you want to run under Windows 3.1.

# Setting Up PIFs and Program Items

To run a non-Windows application, Windows uses a program information file (PIF) to run the application in the most efficient way. Windows needs to refer to PIF information because non-Windows applications don't use memory cooperatively in the ways that Windows applications do, which can lead to insufficient-memory problems.

A custom PIF contains specific information about running the application under Windows, including how much memory it needs and how it uses system components such as the communications ports. If there isn't a custom PIF for an application, Windows uses _DEFAULT.PIF.

You can set up a PIF for a non-Windows application in three ways:

- Install a PIF with Windows Setup.

- Use the PIF that came with your non-Windows application.

- Use PIF Editor to create a new PIF or to modify _DEFAULT.PIF, the default program information file. For details, see Chapter 8, "PIFs and PIF Editor."

## Setting Up a PIF

The Windows Setup program can install PIFs and icons for your non-Windows applications, either automatically during Windows setup or after Windows is installed. This is the best method for specifying a PIF, because Windows 3.1 includes data for creating a large variety of PIFs specially for popular non-Windows applications, as listed at the end of this chapter.

The Setup program gets the information it needs for a PIF by checking a file called APPS.INF, which is placed in the Windows SYSTEM subdirectory during installation. APPS.INF contains the recommended settings for many popular non-Windows applications. For details about the contents of APPS.INF, see Chapter 4, "The Windows Initialization Files."

If the APPS.INF file doesn't contain information about your application, then Windows uses the _DEFAULT.PIF file to run the application.

### To set up a PIF during Windows installation:

1.   Run Windows Setup from the command prompt.

2.   In the Windows Setup dialog box, select the Set Up Applications option.

3.   When the Set Up Applications dialog box appears, select the applications from the box on the left that you want to run under Windows. Then choose the Add button.

4.   When you have selected all the applications to be set up, choose the OK button.

Windows creates PIFs for the applications you choose, and adds a program-item icon for each to the Applications group in Program Manager.

### To set up a PIF after installing Windows:

1.   Run Setup by choosing the Windows Setup icon from the Main group in Program Manager.

2.   From the Options menu in Setup, choose Set Up Applications.

     If you don't want Setup to search your entire hard disk for non-Windows applications, choose the Ask You To Specify An Application option.

3.   Choose the OK button in the Set Up Applications dialog box. Windows Setup searches for applications and displays a list of those it finds.

4.   Select applications from the box on the left that you want to add.
     Then choose the Add button, and choose the OK button.

Windows Setup creates a PIF and adds a program-item icon for each application to the Applications group in Program Manager.

*Figure 7.1*

*Setup Applications
dialog box*

*To display this dialog,
choose Set Up
Applications from the
Options menu in
Windows Setup*
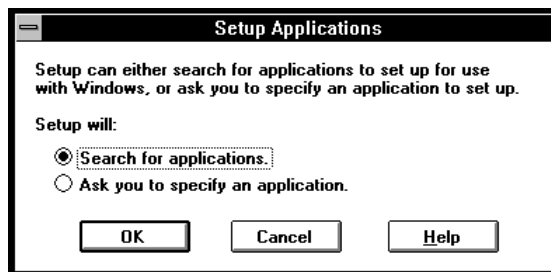
Some application manufacturers provide PIFs for their applications. To find out if your application has a PIF, contact the manufacturer or search the application disks for a file with a .PIF filename extension. If a PIF came with your application, copy the file to the WINDOWS directory on your hard disk.

If there is a PIF for your application available through Windows Setup and another that came from your application's manufacturer, use the PIF from the manufacturer.

## Setting Up Icons in Program Manager

When you use Setup to add PIFs for non-Windows applications, Setup automatically adds program-item icons to the Applications group in Program Manager. If you create or add a PIF for a non-Windows application, you can also add a program-item icon for the PIF to Program Manager. For more information about how to set up a program item, see Chapter 3, "Program Manager," in the *Windows User's Guide.*

### To add a PIF to a Program Manager group:

1. In Program Manager, select the program group where you want to add the icon for a PIF.

2. Choose New from the File menu. Select Program Item in the dialog box, and choose the OK button.

3. Type a description for the application in the Description box.

4. Specify the complete path and filename for the PIF in the Command Line box, including the .PIF extension. Then choose the OK button.

*Figure 7.2*

*Program Item Properties dialog box*

*To display this dialog, choose File Properties in Program Manager*
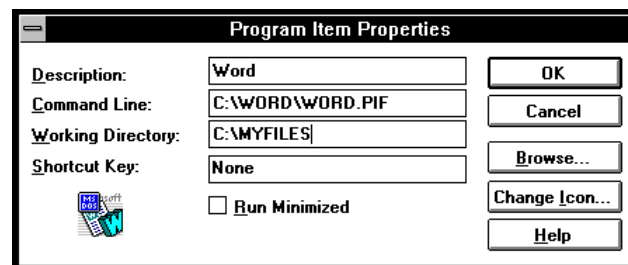


You can also create a new program item by dragging an application's .PIF or .EXE file from the File Manager window to the Program Manager window. The program item appears with the default MS-DOS Box icon. You must use the Properties command to change this icon.

***To alter the program-item icon for a PIF:***

1.  Select the PIF's icon and choose Properties from the File menu in Program Manager.

2.  Choose the Change Icon button in the Properties dialog box.

3.  Choose an icon in the Change Icon dialog box. Or choose Browse and select other file choices.

    For example, change the filename to PROGMAN.EXE to display the icons available in PROGMAN.EXE. (You can use icons from any Windows application by typing its executable filename in this field.)

    Windows 3.1 includes a wide range of icons, displayed through the MORICONS.DLL.

4.  Scroll the view box and select the icon you want, then choose the OK button.

*W*

*Figure 7.3*

*Change Icon dialog box*

*To display this dialog, click Change Icon in the Program Item Properties dialog box*
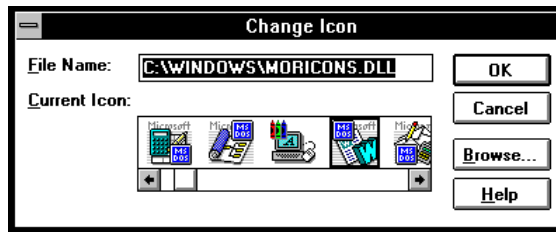


# Starting Non-Windows Applications with Windows

You can start a non-Windows application at the command prompt when you start Windows, or start the application using either Program Manager or File Manager.

## Starting an Application When Starting Windows

To start a non-Windows application when you run Windows, do one of the following:

*W*

*   Add an icon for the non-Windows application to the Startup group in Program Manager. All applications in this group start automatically with Windows.

- Or add the filename of the application or its PIF to the **run=** or **load=** entries in the **[Windows]** section of WIN.INI.

- Or, at the command prompt, type **win** with a command to run the application. For example, to start Windows and run Microsoft Word 5.5, at the command prompt type **win word** and press ENTER.

At the command prompt, you can use the program's .EXE command with any switches, or you can use a .BAT file that changes the environment or runs TSRs before executing the program command.

After Windows starts, it looks for a .PIF file with the same name as the executable program; if none is found, Windows uses _DEFAULT.PIF to run the non-Windows application.

## Starting an Application from the Desktop

If you add an icon for a non-Windows application to a Program Manager group, you can start a non-Windows application by choosing its icon, just as you start any application.

The program-item icon can represent an .EXE, .PIF, .COM, or .BAT file that runs the non-Windows application. To see what the icon represents, select it and choose Properties from the File menu in Program Manager.

You can also use File Manager to start a non-Windows application in the same way that you start a Windows application.

*Tip*   If you get an out-of-memory message when you start a non-Windows application, there are a number of things you can do to offset the problem:

- Close or minimize any other applications you are running.

- Clear or save the contents of Clipboard.

- Set the Wallpaper option to None for the desktop.

- If you are running Windows in 386 enhanced mode, try running the non-Windows application in full-screen display instead of in a window, and don't allow any applications to run in Background mode. To do this, edit the application's PIF to make sure that Full Screen is selected and the Execution Background box is not checked.

# Running Non-Windows Applications

Windows runs non-Windows applications differently in standard mode and 386 enhanced mode.

## Running Applications in Standard Mode

If you are running Windows in standard mode, a non-Windows application takes up the entire screen rather than running in a window. You can load more than one application at a time, but each application will run in full screen, and no application can process tasks in the background. This type of multitasking is called "task switching."

### How Standard Mode Works with MS-DOS

When you run Windows in standard mode, it loads most of itself into extended memory. Then it creates an emulated MS-DOS real-mode environment in extended memory, using DOSX.EXE. Because there can only be one DOSX environment at a time in standard mode, only one non-Windows application can run in it at a time.

The other files that support non-Windows applications in standard mode are the .2GR grabber file for your display adapter and WINOLDAPP.MOD (WinOldApp).

### Application Swap Files and Standard Mode

In standard mode, each time you start a non-Windows application, Windows creates a temporary application swap file for that application. When you switch away from the application, Windows moves some or all of that application from memory to the application swap file. When data is moved from memory to the swap file, the memory is then available for use by other applications. When you exit Windows, it deletes any application swap files created during that session.

The amount of hard disk space available determines how many application swap files Windows can create, and this in turn determines how many non-Windows applications you can start before running out of memory. For more information about application swap files, see Chapter 14, "Optimizing Windows," in the *Windows User's Guide.*

# *Running Applications in 386 Enhanced Mode*

In 386 enhanced mode, you can run and view more than one non-Windows application at the same time, because you can run most non-Windows applications in a window rather than being restricted to full screen as in standard mode. You can move and size the window, shrink the window to an icon, and share information with other applications by using the Clipboard.

When a non-Windows application is running under Windows in 386 enhanced mode, you can use its Options menu for several tasks:

- Choose Edit to use commands for copying and pasting with the Clipboard.

- Choose Fonts to select a display font for text in the window.

- Choose Settings to specify Multitasking and Display Options for this session.

- Choose other standard Option menu commands to maximize and minimize the window or to switch tasks.

## *How 386 Enhanced Mode Works with MS-DOS*

Each time you run a non-Windows application in 386 enhanced mode, Windows creates a virtual 8086 machine in which the application runs. This virtual machine is an emulation of a complete 8086 processor, including memory, I/O devices, and any TSRs, device drivers, and network software running when you started Windows.

In 386 enhanced mode, Windows remains in memory and active while running non-Windows applications. Each non-Windows application is treated as a multitasking "task" for timeslicing and device contention. Windows uses preemptive scheduling with non-Windows applications, and uses non-preemptive scheduling with Windows applications. Windows and all current Windows applications are treated as a single preemptive task, and you assign the priority for Windows in the 386 Enhanced dialog box in Control Panel. The non-Windows applications are each treated as separate tasks, and you assign their priorities in their PIFs. The percentage of time spent on an application is its assigned priority divided by the sum of all priorities for Windows and all non-Windows applications currently running.

The example in the following table shows how timeslicing is allocated between Windows and non-Windows applications.

| *Virtual machine* | *Setting* | *Processor time* |
|---|---|---|
| **Windows in the foreground, with two non-Windows applications running:** | | |
| System virtual machine | 100 | 50% |
| MS-DOS VM #1 | 50 | 25% |
| MS-DOS VM#2 | 50 | 25% |
| Total value: | 200 | 100% |
| | | |
| **Windows in the foreground, with four non-Windows applications running:** | | |
| System virtual machine | 100 | 32% |
| MS-DOS VM #1 | 50 | 17% |
| MS-DOS VM#2 | 50 | 17% |
| MS-DOS VM #3 | 50 | 17% |
| MS-DOS VM #4 | 50 | 17% |
| Total value: | 300 | 100% |
| | | |
| **Non-Windows application in foreground,** | | |
| **with Windows and another non-Windows application running in the background:** | | |
| System virtual machine | 50 | 25% |
| MS-DOS VM #1 | 100 | 50% |
| MS-DOS VM #2 | 50 | 25% |
| Total value: | 200 | 100% |

The files that support non-Windows applications in 386 enhanced mode are the .3GR grabber file for your display device and WINOA386.MOD (WinOldApp).

For information about virtual memory in 386 enhanced mode, see Chapter 5, "Windows 3.1 and Memory Management." For information about how Windows handles concurrent requests for devices in 386 enhanced mode, see Chapter 5, "Control Panel," in the *Windows User's Guide.*

## Running Applications in a Window

You can only run non-Windows applications in a window if you run Windows in 386 enhanced mode. To get non-Windows applications to run in a window in 386 enhanced mode:

- Set the PIF's Display Usage option to Windowed (not Full Screen), and set the Display Options correctly in the Advanced dialog box.

- Or choose Settings from the Options menu while the application is running, and specify Windowed for Display Usage. This will work only for this session.

- Or press ALT+ENTER while the application is running in full screen. This will work only for this session.

However, some non-Windows applications can't run in a window, because they perform screen actions that are incompatible with the Windows display management features. Most of these applications can run successfully in the Windows environment as long as they run in a full-screen display.

## SYSTEM.INI Entries for Non-Windows Applications

Several entries in SYSTEM.INI affect how non-Windows applications run. For details, see the descriptions of the specific entries in Chapter 4, "The Windows Initialization Files."

| Section | Entries related to non-Windows applications | |
| --- | --- | --- |
| **[Boot]** | **286grabber=** | **386grabber=** |
| **[Standard]** | **Int28Filter=** | **Stacks=** |
| **[NonWindowsApps]** | **CommandEnvSize=** | **NetAsynchSwitching=** |
| | **DisablePositionSave=** | **ScreenLines=** |
| | **FontChangeEnable=** | **SwapDisk=** |
| | **MouseInDosBox=** | |

The **[386enh]** section contains many entries that control how memory is allocated for virtual machines, and other memory management issues related to running non-Windows applications. The following entries will also affect performance and behavior for non-Windows applications, sometimes overriding settings in application PIFs.

These entries in **[386enh]** control video memory and system memory: **AllEMSLocked=**, **AllXMSLocked=**, **ReserveVideoROM=**, and **ReservePageFrame=**.

These entries in **[386enh]** control fonts in windows displaying non-Windows applications: *WOA.FON= entries, **UseROMFont=**, and **WOAFont=**.

These entries in **[386enh]** control devices: **COM*x*AutoAssign=** and **MouseSoftInit=**.

These entries in **[386enh]** control multitasking: **WinExclusive=** and **WinTimeSlice=**.

These entries in **[386enh]** control screen refreshing and the display of warning messages:

| | | |
| --- | --- | --- |
| **AutoRestoreScreen=** | **BkGndNotifyAtPFault=** | **VideoBackgroundMsg=** |
| | **FileSysChange=** | **WindowUpdateTime=** |

## Tips for Running Non-Windows Applications

This section contains tips for running non-Windows applications, in response to frequently asked questions directed to Microsoft product support specialists.

### General Tips

Here are some general tips for running non-Windows applications and PIFs:

- Make sure you have properly configured the memory in your system, following the recommendations in Chapter 6, "Tips for Configuring Windows 3.1."

- If you can't start a non-Windows application, first check to make sure the application runs under MS-DOS without Windows. If it can't start or run under MS-DOS, it won't run under Windows.

- If the application doesn't access resources directly, use the _DEFAULT.PIF settings for the application's PIF.

- If the application is resource-intensive due to graphics or memory requirements, make the following settings in the application's PIF:

  | | |
  |---|---|
  | Full Screen: | Checked |
  | Exclusive: | Checked |
  | Display Options/Video Memory: | High Graphics |
  | Retain Video Memory: | Checked |

- If you get a not-enough-memory error while running Windows in 386 enhanced mode, try changing the PIF settings for both the KB Required and KB Desired to **-1**. This will allocate all available conventional memory to your application.

| |
|---|
| *Flowchart Series 5 Windows Operation and Memory Problems* |

- Check Flowcharts 5.3, 5.4, and 5.5 for troubleshooting tips if you experience application execution errors, general protection faults, or other serious problems while running a non-Windows application.

### Rebooting a Non-Windows Application

*W* If you can't quit or complete other actions while running a non-Windows application, you can quit by pressing CTRL+ALT+DEL for a local reboot. This has the same effect as choosing the Settings Terminate command from the Control menu and, hence, can be risky.

Do not use a local reboot or the Settings Terminate command as a normal way to quit non-Windows applications. Use local reboot only in one of the circumstances described below.

If you press CTRL+ALT+DEL when an application is not responding to Windows commands to close or when the application is hung, an error message appears with options for closing the application. These are the four cases:

1.  For a hung Windows application, you can press the ESC key to return to Windows, press ENTER to close the application, or press CTRL+ALT+DEL to reboot the system.

2.  If a non-Windows application is hung and you press CTRL+ALT+DEL, you can then press the ESC key to cancel and return to the application, press ENTER to quit the application, or press CTRL+ALT+DEL to reboot the system.

3.  If a non-Windows application is hung while running in the background and a Windows application is running in the foreground, you can press CTRL+ALT+DEL, then press any key to activate the non-Windows application or press CTRL+ALT+DEL to reboot the system.

    If you press a key to activate the hung non-Windows application, the hung application appears in full screen. If you press CTRL+ALT+DEL again to quit this application, then you will see the error message described in case #2 above.

4.  If you receive a message that the application is not responding to Windows commands to close (so that you must reboot the system), you can press any key or press CTRL+ALT+DEL again to reboot the system.

If you press CTRL+ALT+DEL when the current application is active (not hung), you will get a message warning you that the application is still running and asking if you want to proceed with rebooting.

# Notes on Running Non-Windows Applications

## DPMI vs. VCPI for Non-Windows Applications

Windows 3.1 uses the DPMI specification to allow non-Windows applications to access extended memory on 80286 and 80386 machines.

Some non-Windows programs use the Virtual Control Program Interface (VCPI) specification to access extended memory on 80386 machines. The performance of such applications depends on how closely the application follows the VCPI specification. Most programs that use the VCPI specification can run under Windows 3.1.

For more details about DPMI and VCPI, see Chapter 5, "Windows 3.1 and Memory Management."

### *Running Applications That Require Expanded Memory*

If your computer has an 80286 processor, you need an expanded memory board for applications that use expanded memory. Your CONFIG.SYS file must also contain a command line for the expanded memory manager that comes with the board.

If your computer has an 80386 or higher processor, you can use EMM386.EXE to simulate expanded memory for non-Windows applications when you run Windows in 386 enhanced mode. In the application's PIF, you must also specify the amount of expanded memory the application requires.

For information about using expanded memory to run non-Windows applications under Windows 3.1, see Chapter 5, "Windows 3.1 and Memory Management."

### *Using a Mouse with Non-Windows Applications*

*W*

To use a mouse with non-Windows applications, you must have an MS-DOS mouse driver that is loaded before you run Windows.

*Flowchart 2.8
Mouse Doesn't Work
in Non-Windows
Applications*

If your mouse doesn't work for non-Windows applications, check CONFIG.SYS and AUTOEXEC.BAT to be sure the MS-DOS mouse driver is installed properly. Windows 3.1 has its own mouse driver that must be installed if you want to use the mouse with Windows and with Windows applications.

### *Applications with PIF Data in APPS.INF*

The applications listed in the following tables have entries in the **[pif]** section of APPS.INF. Windows Setup can use the information about these applications in **[pif]** to create custom PIFs for running the applications under Windows 3.1.

## *Applications with PIF data in APPS.INF*

| | | | |
|---|---|---|---|
| Access for MS-DOS | HotWire | Microsoft Quick C | Reflection 1 |
| ACCPAC BPI | IBM Filing Assistant | Microsoft Quick Pascal | Reflection 2 |
| ACCPAC Plus | IBM Graphics Assistant | Microsoft QuickBasic | Reflection 4 |
| APPLAUSE II 1.5 | IBM Personal Editor | Microsoft QuickBasic Ext. | Reflection 7 |
| Ashton Tate dBase IV | IBM Professional Editor | Microsoft Spell | Reflection 8 |
| AutoCAD | IBM Writing Assistant 2.0 | Microsoft Word 4.0 | Reflex 2.0 |
| AutoCAD (Batch File) | Insight | Microsoft Word 5.x | Relay Gold |
| Autosketch 3.0 | Interleaf 5 for MS-DOS | Microsoft Works 2.0 | Remote 2 call |
| | Kid Pix | MultiMate 4.0 | RightWriter |
| Borland C++ | KnowledgePro (MS-DOS) | Network Control Program | RLOGINVT Utility |
| BRIEF 3.1 | Lap-Link Pro | Norton Utilities 4.5 | RSH Utility |
| Close-Up 4.0 | Learning Microsoft Works | Norton Utilities 5/6.0 | SAS 604 |
| Crosstalk-XVI 3.71 | Learning MS-DOS 3.0 | Now! | Scheduler |
| DataEase | Learning MS-DOS Quick Ref | OPTune | SEDT Editor |
| | LetterPerfect | Paradox | Sethost Terminal Emulator |
| DataPerfect | Lotus 1-2-3 3.1 | Paradox 3.0 | SideKick 1.0 |
| DECnet Job Spawner | Lotus 1-2-3form | Paradox 3.5 | SideKick 2.0 |
| DisplayWrite 3 | Lotus Access System | PC Paintbrush IV Plus | SideKick Plus |
| DisplayWrite 4 | Lotus Agenda | PC3270 | SideKick Plus |
| DisplayWrite 5 | LotusWorks 1.0 | PCMAIL Utility | Smartcom II |
| DisplayWrite Assistant | LPQ Utility | PC Tools - FileFind | Soft Kicker |
| DM - Directory Maintenance | LPR Utility | PC Tools - View | |
| DrawPerfect | Magellan 2.0 | PC Tools Desktop 5.5l | SPSS/PC+ |
| DWDOS286 | Managing Your Money | PC Tools PCShell 5.5 | SuperCalc 4.0 |
| DWDOS386 | Manifest | PFS: Access | SuperCalc 5.0 |
| DWINFO2 | Microrim R:Base 3.0 | PFS: First Choice 3.0 | Symphony 2.2 |
| DWINFO3 | Microrim R:Base 5000 | PFS: First Choice 3.1 | TeleMate |
| Extra! for MS-DOS | Microrim R:Base Clout | PFS: First Graphics | TN Utility |
| Flight Simulator 3.0 | Microsoft Adv. Basic | PFS: First Publisher | Turbo Pascal 6.0 |
| Flight Simulator 4.0 | Microsoft Basic | PFS: Plan | TurboTax |
| Formtool | Microsoft Bookshelf | PFS: Professional Network | Ventura Publisher |
| Foxbase+ | Microsoft C Compiler 5.1/6 | PING Utility | VMAIL Utility |
| FoxPro (Max. Cfg.) | Microsoft Chart | Procomm | Volkswriter 3.0 |
| FTP Utility | Microsoft Fortran Compiler 5.1 | Procomm Plus 1.1B | WordPerfect |
| Framework III | Microsoft Game Shop | Prodigy | WordPerfect Office |
| Freelance Plus 4.0 | Microsoft Macro Assembler | Professional File | WordStar 2000 |
| FTPSRV Utility | Microsoft Mail | Professional Write | WordStar Professional |
| Generic CADD | Microsoft Mail-Admin | Programmer's WorkBench | WPOffice Calculator |
| Graphwriter | Microsoft Make Utility | Q & A Report Writer | WPOffice Editor |
| GW BASIC | Microsoft Multiplan | Q-DOS 3 | WPOffice File Manager |
| Harvard GeoGraphics | Microsoft Multiplan | QModem | WPOffice NoteBook |
| Harvard Graphics 2.3 | Microsoft Online 1.0 | Quick Verse 2.0 | Writer Rabbit |
| Harvard Graphics 3.0 | Microsoft Pascal Compiler | Quicken | XTree Gold |
| Harvard Project Manager | Microsoft Project | Ready! | XyWrite |
| Harvard Total Project Manager | Microsoft QBasic | | |

More applications are listed in the *ambiguous exe* sections of APPS.INF. If you specify the executable filename for any of these applications, Setup will prompt you to specify which of these applications you want to install. Setup can also create custom PIFs for these applications.

### *Applications with ambiguous filenames listed in APPS.INF*

| | | |
|---|---|---|
| Ashton Tate dBase III | Microrim R:Base System V | Quattro Pro 1.0 |
| Autosketch 2.0 | Microsoft Basic Compiler | Quattro Pro 2.0/3.0 |
| Brief 2.1/3.0 | Microsoft Macro Assembler | Symphony (Access) |
| cc:Mail for MS-DOS | Microsoft QuickC w/ QASM | PCTools Desktop 6.0 |
| Crosstalk Mark 4 | Microsoft Works 1.x | PCTools Desktop 7.0 |
| Framework II | MS Quick Pascal Express | PCTools PCShell 6.0 |
| Freelance Plus 3.0 | PFS: Professional Plan | Turbo Pascal 5.0 |
| Harvard Graphics 2.0 | PlanPerfect | WPOffice Calendar |
| Harvard Graphics 2.1 | Procomm Plus | XcelleNet X/Mail-MS-DOS |
| Learning MS-Word 5.0 | Multimate | OfficeWriter 6.2 |
| Learning MS-Word 5.5 | Norton Line Printer | Paradox SE |
| Lotus 1-2-3 2.3 | OfficeWriter | PCSA Mail |