

Chapter 3 Disk Operating System (MS DOS 5.0)

Operating System Interface with PPT 41XX

An operating system is a set of instructions that tell computer hardware what to do. The operating system loaded on a computer is the primary software interface between the user and the computer hardware. Users also interact with their computers through application software like word processors and database management systems. As indicated by the dashed line in Figure 3-1, application programs can interact directly with hardware. However, when applications need to interact with computer hardware, they usually do so by means of services that are provided by the operating system or by the BIOS (Basic Input/Output System).

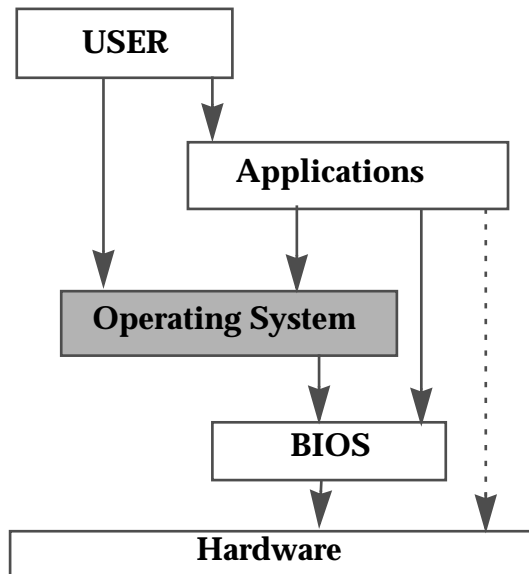


Figure 3-1. User and Application Interfaces with Hardware

These services are often referred to as an application programming interface (API).

The BIOS contains the software interfaces (drivers) for hardware devices like the keyboard and display (console), a generic printer, the serial port, the clock, and the disk devices. Refer to Chapter 1 for detailed descriptions of BIOS services.

Symbol Technologies has chosen Microsoft MS-DOS Version 5.0 as the operating system to provide the primary interface between the PPT 41XX hand-held computer, its users, and applications written for it. MS-DOS consists of three software layers that function both to isolate users and application programs from PPT 41XX hardware and to provide the interface between users/applications and the terminal. These layers are:

- **the MS-DOS Kernel**
This provides hardware-independent services, called *system functions*, accessed through a software interrupt. These services include file and directory management, memory management, character device input/output, and time and date support. Application programs interact with the MS-DOS kernel to access MS-DOS services and the API. These services are listed in the *MS-DOS 5.0 Application Support Services* section of this chapter. For more detailed descriptions of these services, refer to *The Peter Norton PC Programmer's Bible, Third Edition*, 1993, specifically, *Chapters 10-12* and *Appendix B*.
- **Device Drivers**
These are software interfaces between the kernel and specific hardware devices.
- **the Command Processor**
This is the software that controls program execution. It functions as a command interpreter, processing user commands entered at the command prompt. It supports batch file processing and startup configuration. It provides the main interface between the user, application programs, and the system. A list of MS-DOS commands that can be executed by the Command Processor is given in *Standard MS-DOS 5.0 Commands and Utilities*. For more detailed descriptions, refer to the *MS-DOS User's Guide and Reference* supplied with PPT 41XX hand-held computers.

MS-DOS 5.0 Features

Microsoft Corporation Disk Operating System Version 5.0 (MS-DOS 5.0) is the operating system released with the PPT 41XX. MS-DOS 5.0 offers a wide variety of new features and enhancements. It is widely accepted as the standard for “DOS compatibility” and is the most widely installed version of DOS.

Two of the new features of MS-DOS 5.0 that have been released with the PPT 41XX hand-held computer are:

- the ability to run MS-DOS in the high memory area (1024-1088K) instead of in

conventional memory, making more conventional memory available for application programs and enabling them to run faster and more efficiently

- enhanced data security with the new command, **UNDELETE**

Standard References on MS-DOS Commands, Utilities, and Application Support Services

In addition to the *Microsoft MS-DOS Operating System Version 5.0 User's Guide and Reference* that comes with the PPT 41XX hand-held computer, there are many publications that provide detailed information on the use of MS-DOS commands, utilities, and application program support services.

Probably the most comprehensive of these publications is *The Peter Norton PC Programmer's Bible, Third Edition*, 1993, by Peter Norton, Peter Aitken, and Richard Wilton, published by Microsoft Press.

Another useful reference is *Inside the IBM PC and PS/2*, 1991, written by Peter Norton and published by Brady Publishing Co.

MS-DOS 5.0 Application Support Services

MS-DOS 5.0 provides many support services (functions) for programmers writing applications for the PPT 41XX hand-held computer. These services are accessed through the appropriate MS-DOS interrupts in Table 3-1.

Table 3-1. MS-DOS Function Call Interrupts

Interrupt (Hex)	Description
0x21	General MS-DOS Functions
0x25	Absolute Disk Read
0x26	Absolute Disk Write

Interrupt 0x21 provides access to almost all MS-DOS functions. Interrupts 0x25 and 0x26 may be used occasionally to bypass the usual MS-DOS file interface. However, the largest number of application support services available in MS-DOS 5.0 are accessed by specifying a function code in the AH register at the time the application calls Interrupt 0x21.

For a complete list of MS-DOS Interrupt 0x21 services (functions) and a description of each service (along with input and output register values), refer to Appendix B in *The Peter Norton PC Programmer's Bible, Third Edition*, 1993, published by Microsoft Press, One Microsoft Way, Redmond, Washington 98052-6399. Chapters 10 through 12 of the same reference also provide program examples of Interrupt 0x21 calls.

Standard MS-DOS 5.0 Commands and Utilities

MS-DOS Version 5.0 commands that can be issued at a command prompt (e.g., `c:\>`) may be characterized as *internal* or *external*.

Internal Commands lists the internal commands available on the MS-DOS 5.0 released with the PPT 41XX.

External Commands (Utilities) lists MS-DOS 5.0 external commands available on the PPT 41XX.

Internal Commands

Internal commands are stored in the COMMAND.COM file, which is loaded into memory when the system is booted. These are simple and commonly used commands (like **DIR**, **DEL**, **RENAME**, etc.) that are invoked on a regular basis. Because they are part of the **COMMAND.COM** utility, internal commands are *not* listed as files in a directory listing.

Table 3-2 lists the internal MS-DOS 5.0 commands available on the PPT 41XX hand-held computer and provides a short description of each. Valid abbreviations are given in parentheses. The *Microsoft MS-DOS 5.0 User's Guide and Reference* supplied with the PPT 41XX provides more detailed descriptions of these commands.

Table 3-2. MS-DOS 5.0 Internal Commands

Command	Description
CHDIR (CD)	Displays the name of the current directory, or changes the current directory to the one specified with the command.
CLS	Clears the screen.
COPY	Copies one or more files to another location.
CTTY	Changes the terminal device used to control the system, e.g., another device to enter commands.
DATE	Displays the current date or allows the user to change the date from the terminal or from a batch (.BAT) program.
DEL	Deletes the specified files.
DIR	Displays a list of files and subdirectories in the current directory.
ERASE	Deletes the specified files.

Table 3-2. MS-DOS 5.0 Internal Commands (Continued)

Command	Description
EXIT	Quits the COMMAND.COM program and returns to the program (if any) that started COMMAND.COM.
MKDIR (MD)	Creates a directory with the specified name.
PATH	Displays the current search path, or sets a search path for executable files (.BAT, .COM, .EXE) in the specified directories.
PROMPT	Modifies the MS-DOS command prompt to display the specified text.
RENAME (REN)	Changes the name(s) of file(s) in the current or specified directory to new names in the same directory.
RMDIR (RD)	Deletes (removes) the specified directory, from which all files and subdirectories have been deleted.
SET	Displays, sets, or removes the specified MS-DOS environment variables.
TIME	Displays the system time or sets the internal clock of the computer.
TYPE	Displays the contents of the specified text file.
VER	Displays the MS-DOS version number.
VERIFY	Tells MS-DOS whether or not (i.e., ON or OFF, respectively) to check that files are written correctly to a disk.
VOL	Displays the disk volume label and serial number, if they exist.

External Commands (Utilities)

External commands (also called *utilities*) exist as separate files and their names appear in directory listings. The filename of an external command has a **.COM** or an **.EXE** extension. To use an external command in the PPT 41XX, the file associated with the command must be loaded in the terminal. See the *System Administration Manual* for the PPT 41XX for the loading procedure.

To invoke an MS-DOS external command type its filename on the command line along with required and optional parameter values and switches. Table 3-3 lists the MS-DOS 5.0 external commands available on the PPT 41XX hand-held computer along with the extension (.COM or .EXE) used with each filename and a brief description of each command. The *Microsoft MS-DOS 5.0 User's Guide and Reference* supplied with the PPT 41XX provides more detailed descriptions of the utilities in Table 3-3.

Table 3-3. MS-DOS 5.0 External Commands (Utilities)

Command (Utility)	Extension	Description
APPEND	EXE	Enables programs to open files in specified directories as if those files were in the current directory.
ASSIGN	COM	Redirects requests for disk operations on one drive to a different drive.
ATTRIB	EXE	Displays or modifies file attributes.
CHKDSK	EXE	Creates and displays a status report for the specified disk.
COMMAND	COM	Starts a new instance of the MS-DOS command interpreter.
COMP	EXE	Compares the contents of two files or sets of files byte-by-byte.
DEBUG	EXE	Invokes a program for testing and debugging executable files.
EDLIN	EXE	Starts a line-oriented text editor to create or modify an ASCII text file.
FASTOPEN	EXE	Invokes a program that decreases the amount of time needed to open frequently used files.
FC	EXE	Compares two files and displays the difference between them.
FIND	EXE	Searches for a specified string of text in a file or files.
JOIN	EXE	Joins a disk drive to a directory on another disk drive.
MEM	EXE	Displays the current amounts of used and free memory in the system.
MODE	COM	Displays system status, modifies system settings, or reconfigures ports or devices.
PRINT	EXE	Prints a text file in the background while other MS-DOS commands are being executed.

Table 3-3. MS-DOS 5.0 External Commands (Utilities) (Continued)

Command (Utility)	Extension	Description
SETVER	EXE	Set the MS-DOS version number that MS-DOS 5.0 reports to a program (Note: To activate SETVER reporting, the SETVER.EXE device driver must be loaded in the CONFIG.SYS file).
SHARE	EXE	Invokes a program that installs file sharing and locking capabilities on the hard disk.
SORT	EXE	Reads input, sorts data, and writes results to the screen, to a file, or to another device.
SUBST	EXE	Associates a path with a drive letter.
SYS	COM	Copies MS-DOS system files (IO.SYS and MSDOS.SYS) and the MS-DOS command interpreter (COMMAND.COM) to the disk in the specified drive.
UNDELETE	EXE	Restores files previously deleted with a DEL or ERASE command.
XCOPY	EXE	Copies files (except hidden or system files) and directories (including their subdirectories) from the specified source drive or path to the destination drive, directory, or filename.

Standard MS-DOS 5.0 Device Drivers

Table 3-4 lists the standard MS-DOS 5.0 device drivers released with the PPT 41XX hand-held computer. To be activated at boot time, any device driver in this list must first be installed in the CONFIG.SYS file.

Table 3-4. MS-DOS 5.0 Device Drivers for the PPT 41XX

Driver	Description
ANSI.SYS	Defines functions that change display graphics, control cursor movements, and reassign keys.
COUNTRY.SYS	Allows the setting of country-specific information, like date format, line format, and currency symbol.
RAMDRIVE.SYS	Creates a virtual disk drive in random access memory (RAM) to simulate a hard disk drive.