



IBM PC 1, PC/XT & Portable PC Personal Computers

■ PROFILE

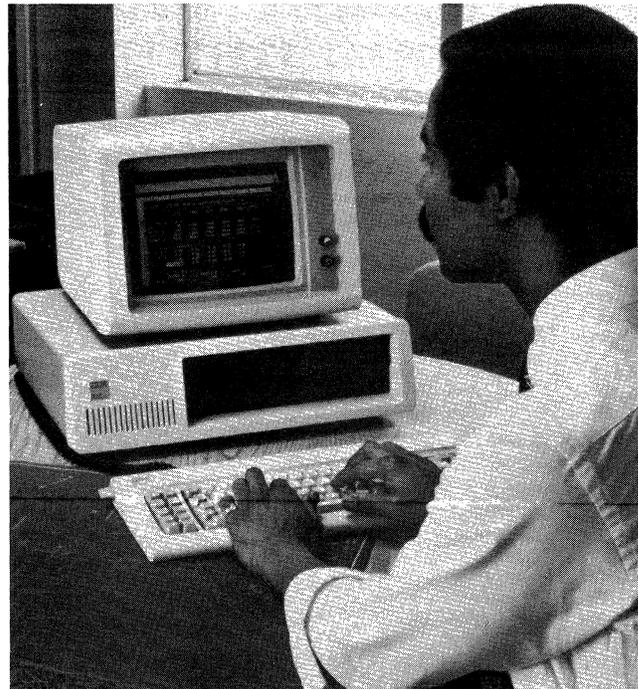
Operating Systems • DOS 1.1, DOS 2, and DOS 2.1 • DOS 1.1 is single-user interactive/batch processing in standalone environments or as intelligent workstation; supported by ROM-based Cassette Level BASIC interpreter for configurations with diskette or cassette-tape ancillary storage, DOS 2.0 and DOS 2.1 are hard disk based • CP/M-86, or UCSD p-System for configurations with diskette storage only • PC/IX (Personal Computer Interactive Executive); version of UNIX.

Data Management • pfs:File, an information management system; pfs:Report, a report generator; File Command file management system.

Communications/Networks • TTY-terminal emulation and file-transfer operations supported by communications utility under IBM DOS • 5250, 3270 terminal emulation; SDLC and BSC protocols • cluster configurations.

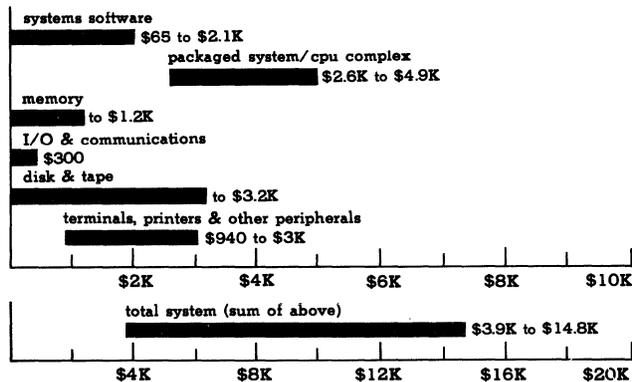
Languages • ROM-based Cassette Level BASIC interpreter standard; diskette-based Disk/Advanced Level BASIC interpreter and compiler extensions, APL, Logo, Pascal, FORTRAN, and COBOL compilers, and macro assembler optional under IBM DOS • Pascal hybrid compiler, FORTRAN-77 hybrid compiler, and macro assembler optional under UCSD p-System.

Models • PC 1 includes 5150-104, -114, -164, -174, -X14, -X64,



PURCHASE PRICE RANGE

hardware & software



IBM PERSONAL COMPUTER PURCHASE PRICING bar graphs illustrate price ranges for small to large systems, with solid bars reflecting software/hardware purchase pricing • **SMALL SYSTEM** is based on 5150-174 packaged system (includes CPU, 64K-byte main memory, 40K-byte ROM containing Cassette Level BASIC interpreter, cassette-tape interface, keyboard, 2 double-sided diskette drives and adapter) and the following options: DOS 2.1 operating system with BASIC-2 interpreter; display and printer adapter; monochrome monitor and graphics printer • **LARGE SYSTEM** is based on 5160-087 packaged system (includes CPU, 128K-byte main memory, 40K-byte ROM containing Cassette Level BASIC interpreter, keyboard, single double-sided diskette drive and adapter, 10M-byte hard disk and adapter, and asynchronous communications adapter) and the following options: DOS 2.1 operating system with BASIC-2 interpreter, UCSD p-System with Pascal, asynchronous communications support, SNA 3270 emulation, word processing and spreadsheet software; additional 384K bytes of memory; SDLC communications interface; expansion unit with additional 10M-byte hard disk, additional diskette drive; color graphics monitor and adapter; color printer and adapter.

and -X74; PC/XT is model 5160-87; Portable PC is model 5155-068.

CPU • all are based on Intel 8088 microprocessor.

Memory • 5150 PC 1 has 64K- to 640K-byte main memory • 5160 PC/XT has 128K- to 640K-byte main memory • 5155 Portable PC has 256K- to 512K-byte main memory • 40K-byte ROM on all units.

Chassis Slots • 5 slots for PC 1 with 3 open after the monitor/printer interface and diskette adapter are added • 8 expansion slots for PC/XT with 4 open after required adapters are added • 8 expansion slots for Portable PC with 5 open after required adapters are added • expansion units with 8 open slots are also available.

Ports • all are an extra-cost option on PC 1 and Portable PC; 1 RS-232C port standard on PC/XT.

Mass Storage • up to 2 5.25-inch, 160K-byte, 320K-byte, or 360K-byte diskette drives for a maximum diskette capacity of 720K bytes; up to 2 10M-byte 5.25-inch Winchester hard disk drives for a maximum capacity of 20M bytes.

Terminals/Workstations • all are single-user systems.

Printers • single printer typically; matrix-impact or letter-quality model.

First Delivery • October 1981 (PC 1); March 1983 (PC/XT); March 1984 (Portable PC).

Systems Delivered • 1,000,000 estimated by December 1983.

Comparable Systems • several desktop and portable vendors



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TABLE 1: MODEL DIFFERENCES

DESCRIPTION	PCjr	PC 1	PC 1-3270	3270 PC	PC/XT	XT/370	Portable PC
CPU/SYSTEM							
Primary Type	Standalone	Standalone	3270 Slave	3270 Slave	Standalone	Standalone	Portable
System Unit Model	4860	5150	5150	5271	5160	5160	5155
System Unit Submodels	4/67	104/114/164/174	X14/X64/X74	2/4/6	87	568/588	68
Switchable Sessions	—	—	—	7	—	4	—
Required Display Types	IBM or TV	IBM or TV	3278 or 3279	5151 or 5272	IBM or TV	IBM or TV	Integral
Keyboard	+ Cord	Standard	On 327X	3270-PC	Standard	Standard	Standard
CPU Microprocessors							
Intel 8088	CPU	CPU	CPU	CPU	CPU	1 for DOS	CPU
Intel 8087	—	Option	Option	—	Option	1 for VM	Option
Motorola 68000	—	—	—	—	—	2 for VM	—
Clustered System, Via 5520	No	Yes	No	No	Yes	No (VM)	Yes
MEMORY							
RAM, bytes							
Minimum	64K	64K	64K	256K	128K	256K	256K
Maximum	128K	640K	640K	640K	640K	640K	640K
ROM, bytes	64K	40K	40K	40K	40K	40K	40K
I/O							
Standard System							
Dedicated Interfaces	10	3	3	0	2	2	3
Basic Slots	—	5	5	8	8	8	8
Maximum Slots	—	13	13	8	16	16	16
Program Cartridge Slots	2	0	0	0	0	0	0
Cassette Drives	0-1	0-1	0-1	—	—	—	—
Diskette Drives	0-1	0-2	0-2	1-2	1-2	1-2	1-2
Hard Disk Drives	—	0-2	0-2	0-1	1-2	1-2	0-2
3274/4300 Direct Attachment	No	Yes	No: 3278/79	Yes	Yes	Yes	Yes
SOFTWARE							
Current DOS Level	2.1	1.1, 2.1	1.1, 2.1	2.1	2.1	2.1	2.1
UCSD p-System	—	Yes	Yes	—	Yes	—	Yes
CP-M-86	—	Yes	Yes	—	Yes	—	Yes
Concurrent CP-M	—	Yes	Yes	—	Yes	—	Yes
PC/IX	—	Yes	Yes	—	Yes	—	Yes
Other	—	—	—	3270 CP	—	VM/PC	—

claim partial or full IBM PC compatibility while other vendors have produced systems with comparable capabilities targeted at the same market • operationally compatible systems include Columbia Data MPC, Compaq, Corona PC, Bytec Hyperion, Seequa Chameleon, and Eagle PC.

Vendor • International Business Machines (IBM) Corporation, Information Systems and Communications Group, Entry Systems Division; P.O. Box 1328, Boca Raton, FL 33432 • 305-998-6007.

Canada • IBM Canada Ltd; Markham, 3500 Steeles Avenue East, Markham, ON L3R 2Z1 • 416-474-2111 • offices located in other cities in Canada.

Distribution • sold nationally through IBM local sales offices; IBM Product Centers; Sears, Roebuck and Co Business Machine stores; participating ComputerLand, Inc, and other independent dealers • Product/Service Centers located in San Francisco, CA; Baltimore, MD; and Philadelphia, PA; other service locations in Los Angeles, CA; Washington, DC; Chicago, IL; Boston, MA; Detroit, MI; New York, NY; Dallas, TX; Houston, TX; and Seattle, WA; National Support Center located in Greencastle, IN.

■ ANALYSIS

The initial announcement of IBM's lowest-cost computer system represented a departure from long-standing company traditions for IBM as well as a major development within the microcomputer marketplace itself. The IBM Personal Computer basic systems are all single-user micros largely based on software and hardware provided by outside companies and marketed by IBM, as well as by outside distributors. Components are

also manufactured outside IBM. The CPU microprocessor, for example, is an Intel 8088, a chip that combines a 16-bit word with 8-bit data paths yielding a microprocessor of moderate power.

Judging from its overwhelming success, the IBM PC product line is the strongest microcomputer line in the market. Although it was introduced as late as 1981, it passed the leading microcomputer vendor, Apple, by 1983, and accounted for more than a quarter of micro installations by the end of that year.

During the past year, IBM has added a multitude of new features and capabilities to the PC product line, the most recent being the introduction of the PC/XT/370, the 3270-PC, the PCjr, and the Portable PC, as well as 3270 personal computer attachments and a UNIX operating environment. Equally important, IBM has developed a multitude of ways to attach the PC to mainframes or into terminal system clusters, as well as clustering PCs to each other. Most of these attachments permit file transfers and, in some cases, exchanges of format from DOS to another file format and back. These features give the PC a uniquely versatile identity in the micro-mainframe environment.

The most recent family member, the Portable PC, is a diskette-based system that incorporates a 9-inch CRT,



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detached keyboard, and color/graphics adapter. Even though the system uses slimline drives and not the full-height drive in the PC 1 and PC/XT, it will run the diskettes from these systems. It can handle a hard disk by adding the PC 1's expansion unit, but, by doing so, loses its transportability. The portable system runs all IBM PC software except for those products that have been designed to work in conjunction with the monochrome display adapter. Also, it presents both graphics and text on its integral CRT, something the PC 1 and PC/XT do not do with their monochrome monitor.

The PC 1 models fall into three categories: cassette-based standalone models, diskette-based standalone models, and models designed specifically for attachment to 3270 communications systems. Standalone models use an IBM or IBM-compatible monitor or a TV as a display. Standalone models become nearly the equivalent of a PC/XT when a hard disk is added; all peripherals and software can be moved up.

Since the introduction of the PC product line, IBM has unveiled versions that replace older models. Three PC 1 models—114, 164, and 174—serve as replacements for earlier PC 1 Models 14, 64, and 74. Actually, the only difference in the systems is in the memory capacity of the system board; it was increased to accommodate 256K bytes without adding memory expansion options. This increase is accomplished by using the same 64K-bit RAM chip sets as are used on the PC/XT. A fourth PC 1 model, the 104, was introduced to replace the previously withdrawn Model 1. The 104 serves as the base system for all other configurations of the PC 1, and consists of just the system unit and keyboard. Overall memory capacity of the PC 1 was increased to 640K bytes, the same as the XT.

Around 1,200 independent vendors have begun to provide compatible software and about 700 supply hardware products for the IBM Personal Computer. The attractiveness of the IBM PC continues to increase as more and more compatible products reach the market, both from IBM and independent vendors.

□ Strengths

There are comparably priced microcomputer systems on the market with more powerful processors, greater I/O extensibility, better graphics, and more flexibility for expansion into efficient, compatible clustered file sharing systems. There are systems with a better price/performance ratio. It is clear that the PC is an adequate microcomputer but there are "better mousetraps" to be had. So where lies the PC's strength?

The secret of the popularity of the PC is the way IBM approached the third-party market. By choosing an open architecture and by providing assists for third parties to develop hardware as well as software, IBM allowed an unprecedented market development activity. Behind this was the solidity of the IBM logo, the support of IBM sales and marketing, and IBM's reputation for standing behind its products. The result was that in 2 years, IBM's product became a de facto standard, with an enormous variety of hardware and software available.

In addition to the vast amount of third-party products for

the PC, the system's other major strength lies in its communications facilities. IBM presently offers some type of PC-link to all of its mainframes and minicomputers. Its most recent introduction, the PC clustering capability, provides a low-cost way of hooking PCs and PCjr's together in a local area networking environment.

If you ask someone why they bought the PC, you will get a variety of answers: IBM support; IBM dependability; large software base; huge selection of third-party peripherals; extensive system capabilities; and continual system enhancements.

□ Limitations

The most common complaint about the PC is its keyboard layout. When IBM introduced the PC, the company did not utilize its famous Selectric-type keyboard but went instead with a different format. The net result is a quality keyboard but with 2 shortcomings. First, the Shift key, which is usually larger than the other keys, is only a regular-size key. Additionally, it is not positioned in the usual place beside the "Z" key. The second drawback is the integration of the cursor keys with the numeric keys, resulting in an either-or situation. One uses either the cursor keys or the numeric keys and must employ a special shift key to switch from one mode to another.

The IBM PC is one of the few micros on the market where no interfaces are included with the system—even the monitor adapter is an option. For this reason, the system's expansion slots fill up fast—one for the diskette adapter, one for the monitor and printer, one for the graphics card. On the PC 1, this leaves a user with only 2 slots remaining. If he/she wants to increase memory to 640K, there goes the 2 other slots. For any other attachments, a modem for example, the expansion unit has to be added. This means more money and a hard disk whether it's needed or not. The PC/XT isn't much better even though it comes with 8 slots. Using the same cards cited for the PC 1 plus adding the hard disk adapter leaves a user with 2 open slots. Putting a modem in one leaves 1 slot for future expansion. Here again, adding an expansion unit means more money expended. As for the Portable PC, 4 of the open slots are half-size, which means searching for vendors that provide half-size cards. There aren't too many around—yet.

Users can rectify this problem of slot shortage and spending extra money on an expansion unit by obtaining products from third-party vendors rather than IBM. There are multifunction cards on the market that incorporate many features on 1 board, thereby eliminating the need to use an individual expansion slot for each feature.

As mentioned under the Strengths section, the IBM PC family is strong in communications facilities. However, in all cases, IBM-supplied micro-to-mainframe or micro-to-mini connections that involve a data communications link require that the user buy an additional piece of equipment over and above the adapter plugged into the PC. In other words, the adapter card does not allow the PC to be directly connected to a modem. If the PC user is transmitting to a Series/1, or System/34, 36, or 38, the cable from the adapter card is connected to a 5251-12 master display/controller or freestanding controller before communications in 5251-11 emulation mode can



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begin. If the PC user wants to transmit to a System/370, 3030, 3080, or 4300 mainframe, the PC is cable connected to a 3274 controller in order to transmit as a 3278-2 display (or 3277 in the case of the 3270 PC). If the PC user wants to transmit to an 8100 he/she has a choice between the 8100-specific adapter, in which case the PC must attach to a Loop Control Unit or the general-purpose 3278/79 emulation board that allows the PC to be connected to the 3274.

Direct, local workstation-type attachments are less expensive, since they involve workstation interfaces or loops that are either a standard part of the system or are added for attachment of a variety of terminals, not for the PC. Although low-cost or no-cost connectors are supplied on System/34, 36, 38, 4321, 4331, 4361, and the 8100, there are none for the Series/1 and none for local attachment of the 4341 or 4381, or for any 3030 or 3080 series mainframes. In order to locally connect with these systems, IBM expects users to either obtain terminal controllers like the 3274 or small systems like the System/36 to be used as concentrators.

■ SOFTWARE

□ Terms & Support

Terms • software products are available on a one-time license-fee basis; license permits the use of the licensed product on a single IBM Personal Computer system, the copying/modification of the licensed product (except for copy-protected products), and the transfer of the license and product to another party • quantity discounts are available under the Volume Licensing Agreement (VLA); users ordering program products in quantities of 20 or more are charged a one-time license fee per copy of program product less a volume discount; quantities of 20 to 49 program products are subject to a 5% discount; quantities of 50 to 149, a 10% discount; quantities of 150 or more, a 15% discount; VLA contract period is 12 months.

Support • program products are licensed as-is, without warranty; only diskettes are warranted against defects in materials and workmanship for a period of 3 months • telephone assistance is available for a period of 3 months after the date of installation from the ISD Personal Computer Assistance Center.

□ Software Overview

Systems software for the IBM PC includes the single-user IBM Disk Operating System (DOS), developed by Microsoft; the portable UCSD p-System; CP/M-86 from Digital Research, and Personal Computer Interactive Executive (PC/IX), a version of UNIX developed by Interactive Systems Corporation. Concurrent CP/M-86, the multitasking derivative of CP/M-86, is also available for the PC but is not supported by IBM as an IBM Logo program. IBM DOS, sometimes referred to as PC-DOS, is an adaptation of MS-DOS specifically designed for the PC. It is available in 3 versions—DOS 1.1 which can only run on the diskette-based systems and DOS 2 and 2.1 which can both handle hard disk configurations.

IBM Personal Computer BASIC, developed by Microsoft, comes in 2 versions representing 6 levels. The first is the cassette level, which is provided in a 40K-byte read-only memory (ROM) included in all packaged configurations. The standard ROM interpreter supports a display, keyboard, and printer, as well as editing, logic, math, and string functions. The diskette-version (third level) BASIC interpreter provides instructions, commands, and built-in functions to support IBM DOS and also adds date, time-of-day, and communications capabilities. The fourth level, the advanced BASIC interpreter, includes the diskette-level functions and supports display graphics. It also includes graphics and music macro languages. The fifth level is a compiler implementation of the advanced BASIC interpreter. The sixth level, called BASIC 2, provides for control of the hard fixed disk,

and is required if that feature is added.

An ISO Pascal compiler is also available for the IBM Personal Computer as well as a FORTRAN compiler, a COBOL compiler, and assembler. Languages running under the UCSD operating system include Pascal, FORTRAN-77, and macro assembler.

Besides those programs described in this report, most other major applications have been converted to run on the IBM PC and are listed in an IBM brochure as "non logo" programs. Some of these programs are sold by IBM direct through IBM Product Centers. Others are sold by IBM dealers only. Examples are dBase II, MicroPlus, Micro Link II, WordStar, Context MBA, and Lotus 1-2-3 to name a few. These "non logo" programs are not warranted by IBM.

Most PC software packages can run on all 3 systems. Software is available on 5.25-inch diskettes.

□ Packaged Software

Operating software packaged systems for the IBM Personal Computer includes the 6024001 DOS Diskette, 6024016 UCSD p-System with UCSD Pascal, and 6024017 UCSD p-System with FORTRAN-77. Each of these packages includes an operating system, language processors, and utilities. CP/M-86 is offered as an operating system only.

6024001 IBM Personal Computer Diskette Software (DOS Diskette) Version 1.1 • includes: IBM Disk Operating System (DOS); Disk and Advanced Level BASIC language extensions to read-only-memory-based Cassette Level BASIC; editor, debug, and linkage utilities: \$40 lcms

6024061 DOS Version 2 • includes BASIC 2 functions with higher memory capacities and hard disk • not available from IBM after December 1983; replaced by DOS 2.1: 60

6024120 DOS Version 2.1 • includes all DOS 2.0 functions plus extensions (see Operating Systems) • includes BASIC 2 functions: 65

6024016 UCSD p-System with UCSD Pascal • UCSD program development system includes: UCSD Operating System Version IV.0; hybrid Pascal compiler; macro assembler; linker; debugger; native code generator; file handler; graphics support; print spooler: 625

6024017 UCSD p-System with FORTRAN-77 • same as 6024016 package described above except with hybrid FORTRAN-77 compiler instead of Pascal compiler: 625

□ Operating Systems

IBM offers 3 operating systems for use with configurations using diskette storage: the IBM Disk Operating System (DOS) developed by Microsoft, Inc, CP/M-86 developed by Digital Research, and the UCSD p-System marketed under agreement with SofTech Microsystems. For hard disk systems, as well as diskette-based PC 1 models, the IBM Disk Operating System (DOS) Version 2.1, available in the first quarter of 1984, replaces the prior Version 2.0. Operating system services for IBM PC 1 Personal Computer configurations with cassette-tape storage are provided by the ROM-based Cassette Level BASIC (see Program Development/Languages section). IBM's latest operating system, the PC/IX, which is a version of UNIX, will run on the PC, PC/XT, and Portable PC with sufficient storage.

IBM Disk Operating System (DOS) Version 1.1 • general-purpose diskette operating system supports single-user interactive and batch processing; provides high-level interface between user software and associated hardware environment • supports up to two 5.25-inch diskette drives with sequential and random file access and dynamic space allocation • user-

LCNS: one-time license fee. RPO: request price quote. Software maintenance is not available. Prices effective as of November 1983.



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accessible functions include: diskette-directory display; file rename, erase, display, compare, and copy; chaining of diskette-based programs in predefined job streams; designation of single program or job stream for automatic execution after system startup • includes Linkage Editor, Editor, and Debug utilities • requires minimum of 32K-byte main memory and 1 diskette drive on 5150 diskette-based models • included in 6024001 or 6024061 IBM Personal Computer Diskette Software (DOS Diskette) packaged software (see Packaged Software section).

IBM Disk Operating System (DOS) Version 2.1 • like the Version 2.0 that it replaces, Version 2.1 includes all the features of DOS 1.1 plus additional features and enhancements • Versions 2.0 and 2.1 both have the capability of handling hard disk drives; format diskettes at 9 sectors per track increasing the capacity from 163,840 to 184,320 characters and from 327,680 to 368,640 characters; normally allocate 2 disk or diskette buffers at start-up time but will allow user to specify number of buffers to reserve • provide tree-structured directories; extended screen and keyboard control; redefine the keyboard; redirect I/O; provides piping functions and filters • includes such new commands as backup, RESTORE, RECOVER, VERIFY; enhanced commands for debug, erase, format functions, others • supports chaining of files in a predefined job stream with the whole job-stream or a single program being designated for automatic execution when the system is turned on; also can display a diskette directory, rename erase, display, compare, or copy files; includes line editor, debug, and linker utilities • requires minimum of 64K bytes on diskette-based systems; 128K bytes when using a hard disk system; DOS 2.1 (as well as DOS 2.0) resides in 24K bytes of memory (12K bytes more than DOS 1.1), so upgrades of DOS 1.1 systems may need to increase memory size.

PC/IX (Personal Computer Interactive Executive) • derivative of UNIX operating system; based on Interactive System Corporation's IS/3 which is based on Unix System III from AT&T • single-user multitasking system; executes sequential, asynchronous, and background processes; includes a full-screen editor, "C" programming language, utilities for file transfer to and from PC-DOS 2.0, and 8087 math co-processor support or emulation • PC/IX shell serves as an interactive command interpreter with high-level language constructs; features include use of programs as commands, with dynamic character-string arguments; redirection of standard I/O; piping; iteration of commands, and conditional execution • status inquiry commands are used to determine what processes are active, to obtain various system usage statistics, and to provide a disk usage summary by directory or for the entire file system • queuing system supports first-come/first-served, shortest-job-next, and priority-based scheduling, multicopy printing, and job status inquiry • PC/IX supports PC 1, PC/XT, and Portable PC with a fixed disk; requires 256K-byte memory, 1 dual-sided diskette drive, 10M-byte fixed disk drive • available April 1984.

\$900 lens

UCSD p-System • general-purpose disk/diskette operating system supports single-user interactive and batch processing; provides software framework for UCSD Pascal and FORTRAN program development/execution; manages UCSD Pascal and FORTRAN compilers; macro assembler; linker; file handler; and text editor • supports up to 2 5.25-inch diskette drives • features include: program chaining; input/output redirection; block-I/O service routines; dynamic overlays; dynamic memory allocation; runtime support routines; support for asynchronous processes; concurrency primitives for Pascal • requires 64K-byte main memory and 1 diskette drive • cannot be stored on fixed disk • marketed under agreement with SofTech Microsystems; available as part of 602401X UCSD p-System packages (see Packaged Software section).

6024040 UCSD p-System Runtime Support • operating system of the UCSD p-System product • enables a UCSD p-System program, written in UCSD Pascal, FORTRAN-77, or BASIC to be run on the IBM PC without requiring license of the full program-development version of the p-System:

50

6024035 CP/M-86 • general-purpose disk/diskette operating system supports single-user interactive and batch processing;

provides compatibility at source-language level with CP/M software base • consists of 3 modules: Command Console Processor (CCP) intercepts, interprets, and executes user commands; Basic Disk Operating System (BDOS) performs fundamental system services, including file management; Basic Input/Output System (BIOS) serves as interface between CCP/BDOS and hardware using system-dependent input/output device handlers • compatibility with 8080/8085 assembly language programs for CP/M-80 is provided by XLT86 Assembly (source) Code Translator utility; most CP/M-80 high-level language programs can be easily modified and recompiled to run under CP/M-86 • supports up to 2 5.25-inch diskette drives • standard I/O primitives include: console status; console in; console out; list out; select drive; set track; set sector; read sector; write sector; return memory descriptor table address • utilities include: PIP for file transfer, reformatting, and concatenation; ED for creation and modification of ASCII files; ASM-86 for assembly of 8088/8086 programs; DDT-86 for program testing and debugging; SUBMIT for batch submission of multiple parametrized, prototype commands; STAT for alteration and display of I/O device and file status; GENCMD for processing object files in standard Intel hexadecimal format; LMCMD for processing object files in standard Intel executable binary format • occupies 19K-byte main memory; relocatable; requires 32K-byte main memory and 1 diskette drive • cannot be stored on fixed disk • developed by Digital Research, Inc:

240

□ Utilities

Various utilities are inherent in each of the operating systems. Additionally, standalone packages are available for file organizing and cataloging.

6024111 Fixed Disk Organizer • development tool that uses simple menus to help the user organize the fixed disk; allows the user to create complex batch files and link current applications through user-defined menu options; can produce online help text; establishes passwords to prevent unauthorized access • requires DOS, 128K bytes of memory on PC 1 or PC/XT, 1 fixed disk, 1 diskette, display:

\$50 lens

6024050 Diskette Librarian • creates and maintains a catalog of file names over multiple diskettes • requires 64K-byte main memory, 1 diskette drive, DOS 1.1 or later:

45

□ Data Management

6024062 Personal Computer File Command • file management system using display of a file directory with a multiline command area to issue DOS commands and execute programs; directory can be sorted by file size, by alphabetical order, by date, or by drive or directory path; assigns commands to function keys • commands can be associated with file names allowing automatic subdirectory listings, single keystroke execution of frequently used programs, fast entry • requires 64K-byte memory, one diskette, DOS 1.1 or later:

\$35 lens

6024041 pfs:FILE V.1, 1.05 • information management system; enables the user to design a form and enter, retrieve, modify, and print information • requires 64K-byte main memory, 2 diskette drives, DOS 1.1 for diskette version; when program and/or its data files are stored on fixed disk, requires 128K-byte memory, DOS 2.1:

140

6024045 pfs:REPORT V.1, V.1.05 • produces reports from files created by pfs:FILE; handles up to 16-column reports • requires pfs:FILE, 64K-byte main memory, 2 diskette drives, DOS 1.1 for diskette version; when program and/or its data files are stored on fixed disk, requires 128K-byte memory, DOS 2.1:

125

□ Communications/Networks

The expansion of the communications environment for the PC has been one of its outstanding features. The PC 1 and PC/XT systems support asynchronous, BSC, and SDLC protocols, several 3270



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emulators, RJE, file transfers, 3101 emulation, and support of several types of interconnection with the 3270. The 3270 emulation supports both local and remote mainframe connection. When the PC is connected in a 5520 system cluster, both 5253 and 3270 emulation modes are supported. Local and remote connection to S/1/34/36/38 are supported by the 5250 Emulation package. A cluster configuration is available for attaching PCs and PCjr's in a network.

6024032 Asynchronous Communications Support • terminal-emulation and file-transfer utility manages communications with systems supporting TTY ASR 33/35 or equivalent data transmission procedures • user-/program-selectable communications parameters include: 75- to 2400-bps data rate; parity; number of stop bits; line-output turnaround characters; half- or full-duplex operation; XON/XOFF operation • tested for operation with VM/370 Release 6 and VM/Systems Product Release 1 on IBM System/370 Model 158 with IBM 3705 communications equipment • requires: DOS; 64K-byte main memory; 1 diskette drive; 1502074 Asynchronous Communications Adapter, and full-duplex modem; requires 128K-byte memory when used with fixed disk:

\$60 lcms

6024037 Binary Synchronous 3270 Emulation • supports 1502075 BSC Communications Adapter; modems operating at up to 9600 bps, half-duplex; emulates 3271 Model 2/3277 Model 2; 3274 Model 51C/3278 Model 2; 3275 Model 2; 3276 Model 2 • requires: BSC Communications Adapter and cable; 96K-byte memory and DOS 1.1 or 128K-byte memory and DOS 2.1; 1 single-sided diskette drive; sync modem; host computer system with compatible IBM 3270 support:

700

6024036 SNA 3270 Emulation & RJE • supports SNA 3270 or SNA 3770 RJE mode • requires 128K-byte user memory, 1 diskette drive, and DOS 1.1, when program and/or data files are stored on fixed disk, requires DOS 2.1; also requires SDLC Communications Adapter, Communications Adapter Cable, half-duplex modem up to 4800 bps:

700

6024042 3101 Emulation • emulates 3101-20; allows conversion of ASCII diskette files to and from binary format • requires: 64K-byte user memory, 1 diskette drive, asynchronous communications adapter, DOS 1.1; when program and/or its data files are on fixed disk, requires 128K-byte memory and DOS 2.1; also requires full-duplex modem or necessary cabling for direct connect to local host computer:

140

6024100 Personal Communications Manager • capabilities include mail-management, (scheduling, checking, reports) mail logging (time, sender, subject), mail review; mailbox address can be by alphanumeric name containing mailbox name addressee's name, telephone number and modem speed • communications features supported include both tone and pulse dialing, 300- or 1200-bps speed, guaranteed accurate transmission; selectable features for half-/full-duplex, parity, transmission rate, flow control, etc • provides for user-defined function keys; user-specified editor can be accessed • requires: 128K-byte memory; one dual-sided diskette drive; monitor and adapter, modem and appropriate adapter; the required portions of DOS are already on the diskette, so DOS is not required:

100

6428147 Batch Communication Program • allows users to transmit files of transactions on switched networks to host CICS and IMS applications; particularly useful for remote collection and distribution when host access is of short duration • SNA/SDLC communications; auto-answer, attended, or unattended operation; multiple sessions within one telephone call; automatic session recovery with message synchronization • requires a PC with DOS operating system, diskette drive; central service available until December 31, 1985:

350

2885 IBM 5250 Emulation Program • for connecting a PC to IBM System/34/36/38 either as a locally attached 5250 workstation or remotely using an IBM 5251-12 • the PC uses a hot

key sequence to switch back and forth between PC mode and 5250 display mode; can be used like a 5251-11, 5291, or 5292-1 display; when in 5250 mode the PC can sign on to a 3270 session using S/34/36/38 3270 emulation program supports • can be used as an alternate console but not the prime console • note that the user cannot access a file on the fixed disk while the 5250 EP is active; compatibility problems can occur with other programs that use the same DMA or channel or interrupt level; or which overlay the emulator; some display differences occur • requires 128K bytes of memory; requires 16K bytes (with monochrome display) or 28K bytes (with color graphics adapter) above DOS 2.1; also requires Feature #2887 emulation adapter:

164

5799-BNZ/Y/P File Support Utilities • provide additional support for the attachment of the PC/XT to a System/34/36/38 • allows the PC/XT user to create virtual diskettes on the host system • requires 5250 emulation program • price is for each PC system:

300

3270-PC Attachment (for 3279) • software is included as part of the 5322 hardware; comprised of 3270 PC Attachment Customization Program, PC-3278 Attachment Diagnostic Program, PC Attachment Interrupt Handler, PC Data Transfer Sample Program, VM/SP (CMS) File Transfer Sample Program, and TSO File Transfer Sample Program • control software provides for concurrent PC operations in host compute (file transfer) mode and for dedicated PC options in PC mode • during Host Compute Mode, 3279 operates in 3270 mode, but a bidirectional host-to-3274-to-3279-to-PC data transfer path is established (requires special microcode in the 3274); this path allows data from the 3279 screen to be captured as ASCII data on PC diskette or printers; is also allows file transfers between the PC and mainframes running under VM/SP (CMS) or under MVS/TSO with ACF VTAM Version 2 or Version 2 Release 4 • in Personal Compute Mode the 3279 becomes solely a PC monitor and keyboard so that keyboard input goes to the PC instead of to the host • most PC-DOS programs will operate in the 3270-PC Attachment environment unless they are written to overlay DOS 1.1 or 2.1; the 3279 must be attached to a 3274 for data transfers from the host; data transfers are not available on the 3276; some 3279 features are not supported; i.e., 6350/51/60 selector lightpen, 8750 video output, and 4999 magnetic reader control • requires PC with diskette, 64K-byte memory, color graphics monitor adapter, DOS 1.1 or 2.1; also requires 3274 or 3276 control unit with 3279 Model 2A, 3A, 2B, 3B, S2A, S2B, S3G, 2X, or 3X model • PC attachment interrupt handler occupies 5K memory, 12K diskette space • sample file programs require 128K-byte PC.

6024134 IBM 3278/79 Emulation Control Program • for control of a PC which is attached by coaxial cable to a 3274 control unit, to a Display/Printer Adapter on a 4321, 4331, or 4361 mainframe or to the 3101 Device Cluster Adapter on a 4701 Finance Communication Controller • the Emulation Control Program (ECP) provides 3278/79 emulation in a host-controlled session concurrently with a local PC-DOS session • host session can support file transfers in MVS or VM environments via the 3274 or the display/printer adapter, providing appropriate host software is supplied • most PC programs can operate concurrently provided they do not overlay the DOS or BIOS area of storage, do not use interrupt vectors X'50' through X'57, do not use adapter I/O port X'2D0' through X'2DF'; do not program the 8259 interrupt controller, do not use cassette interrupt X'15', do not use PC-DOS Version 2 or 2.1 print spooling and do not disable interrupts, fail to issue an end-of-interrupt or IRET on a hardware interrupt level, or mask selected interrupt levels for more than 100 milliseconds; VisiCalc, Multiplan, Mailing List Manager, EasyWriter, Peachtree Software, and psf:File/pfs:Report have been tested and are supported for concurrent operation • 3278/3279 Emulation Control Program requires PC with 128K bytes of storage, of which 108K bytes are available for concurrent DOS and application program operation; one diskette; display; PC keyboard; 3278/79 adapter kit; and appropriate 3270, 4300, or 4701 features:

235

5664-281 3270-PC File Transfer Program • allows transfer of files from IBM S/370, 4300, 303X, or 308X host to a PC coaxially



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attached to a 3274 control unit or to the display/printer adapter on the 4321, 4331, or 4361; also allows PC to host transfer, off-line data manipulation, updating, or correction on the PC • this program runs on the host, requires VM/SP R.2.1 operating environment • supports the PC running under the 3278/79 Emulation Control Program; in both environments the PC must be running DOS 2.1:

600

5665-311 3270-PC File Transfer Program • same functions and hardware requirements as 5664-281, but requires MVS/TSO (MVS/SP) operating environment in host:

600

5799-BRP 8100 DPPX/SP—3270-PC File Transfer PRPQ • for PCs with the 3270-PC Attachment attaching the PC to a 3278 or 3279 • allows programs and data files to be transferred back and forth between the PC and an 8100 can be shared with multiple PCs as well as being accessed by all 8100 terminal users; most (not all) PC files can be printed on the 8100 host • PCs can also operate in interactive mode through the 8100 (DPPX/SP Data Stream Capability or DPPX/SP Router) to an S/370-compatible host; the 3278 with the attached PC looks like an S/370-attached display; data stream compatibility also provides for file transfers between a host and the 8100:

RPQ

6113477 8100 PC Adapter—RLOOP Kit: Software Components • software supplied with the hardware kit; runs on the PC 1 and PC/XT with or without the 5799-WXJ 3270 Personal Computer Attachment File Transfer PRPQ on the 8100 host • the PC-resident software, when operating in conjunction with DPCX and DOSF R.4 operating systems on the 8100, allows the loop-attached PC to emulate the 3278-2, 8775-2, or 8775-12 basic display functions, and 3287 printer emulation, and permits up to 2 3270 sessions between the PC and DPCX/DOSF as well as a normal PC-DOS session; sessions can invoke data stream compatibility extended (DSC-E) in order to pass through the 8100 to an S/370 host; file transfer functions are supported by DOSF under DPCX, but if used in conjunction with DSC-E in order to communicate with a S/370 or related host, host-resident control software has to be written by the user • DOSF file transfer functions include exchange of files, printing of PC ASCII files on the 8100, conversion of PC files to DOSF do elements for DOSF storage and processing • the PC-resident software, when operating in conjunction with DPPX on the 8100, allows the same basic emulation functions as under DPCX including data streaming (DSC) to a host and (with the use of DPPX Router) simultaneous PC plus 2 3270 emulation sessions with ownership of the PC screen transferrable to any of these sessions; furthermore, use of the DPPX/SP Router and DTMS and other DPPX applications can share use of a printer session, but local copy is available only for the owning PC; file transfer under DPPX is described under 5799-WXJ 3270 Personal Computer Attachment File Transfer PRPQ • requires either DPPX or DPCX and DOSF on the 8100, and the hardware kit on the PC • see the Hardware section of this report for information about required PC hardware, kit components, mode establishment and switching, and prices.

6024107 PC Cluster Program • enables PCs and PCjr's to be used together in a clustered multiuser configuration, sharing a fixed disk and exchanging messages and data • provides a disk server with one public read-only volume for the cluster and one private read/write volume per computer in the cluster; the remaining area on the disk is assigned to the disk server stations; PC/XT or PC 1 with an expansion unit can be designated the disk server • provides the option to download DOS and an application program from the fixed disk; this capability enables the PCjr to operate in the cluster without drives • supports file transfer, message send/receive, and message broadcast whether or not a disk server is included in the cluster • used in conjunction with the cluster adapter and cluster cable kit (see I/O & Communications under HARDWARE) • requires DOS 2.1, 128K bytes of memory, 1 diskette drive; disk server unit requires 256K bytes of memory, hard disk, 1 double-sided diskette drive; cluster with 1 or more PCjr's must have a disk server:

92

6024182 PC Cluster Program 5-Pack • same descriptions as

above • permits use of the program on 5 machines only; allows customers to make up to 4 copies of the cluster program:

400

□ Program Development/Languages

Standalone Languages

The BASIC language described below runs independently of disk/diskette operating systems.

Cassette Level BASIC • interpreter supports subset implementation of Dartmouth BASIC; resident in 40K bytes of read-only memory (ROM) • provides driver and sequential-file facilities for cassette-tape ancillary storage; supports I/O functions for display, keyboard, printer, and customer-supplied lightpen and joystick • features include: 16-color-foreground/8-color-background graphic-display I/O; 17-digit numeric precision; integer, real, and string variables; single- and double-precision floating-point variables; variable names up to 40 characters in length; up to 250 characters per program line; multiple statements per program line; comments on program lines; automatic line numbering; full-screen editing; error trapping • 4K bytes of programmable main memory used as system workspace; maximum of 60K bytes of addressable user workspace • included in all packaged systems • developed by Microsoft, Inc.

IBM Disk Operating System Program Development

All of the program development utilities described below, except for the BASIC Programming Development System, are available as part of the 6024001 or 6024061 IBM Personal Computer Diskette Software (DOS Diskette) packaged software (see Packaged Software section). The utilities support program development using the 6024010 Pascal Compiler, 6024012 FORTRAN Compiler, 6024002 macro assembler, 6024011 COBOL compiler, and 6024003 BASIC compiler.

EDLIN Editor • supports creation/modification of source-language files.

Debug Utility • supports program testing and debugging at assembly language level.

Linkage Editor • supports conversion of compiler or assembler-produced relocatable modules to executable load modules.

6024046 BASIC Programming Development System V.1, V.1.05 • contains text file editor, Structured BASIC preprocessor, BASIC formatter, BASIC cross-reference • requires 96K-byte main memory, 2 diskette drives, DOS • V.1.05 for operation under DOS 2.1:

\$130 lens

IBM Disk Operating System Languages

Disk Level BASIC • diskette-based extension to Cassette Level BASIC described above • provides instructions, commands, and built-in functions to support IBM Disk Operating System (DOS); includes date, time-of-day, and communications capabilities • with default communications option, occupies 25.5K-byte main memory; without communications option, occupies 24K-byte main memory; requires 32K-byte main memory and 1 diskette drive • available as part of 6024001 IBM Personal Computer Diskette Software (DOS Diskette) packaged software (see Packaged Software section) • developed by Microsoft, Inc.

Advanced Level BASIC • diskette-based extension to Cassette Level BASIC described above • includes all Disk Level BASIC functions and also supports: display graphics; customer-supplied lightpen and joystick; interrupt handling for communications, function keys, lightpen, and game controllers; variety of external hardware devices • includes Graphics Macro Language and Music Macro Language • with default communications option, occupies 30.5K-byte main memory; without communications option, occupies 29K-byte main memory; requires 32K-byte main memory and 1 diskette drive • available as part of 6024001 IBM Personal Computer Diskette Software (DOS Diskette) packaged software (see Packaged Software section) • developed by Microsoft, Inc.

BASIC 2 • hard disk-based extension to Advanced Level BASIC



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• requires 64K bytes of memory, 1 diskette drive, and hard disk • available as part of 6024061 DOS 2 software package • developed by Microsoft, Inc.

6024003 BASIC Compiler • diskette-based compiler version of IBM Advanced Level BASIC • includes all Advanced Level BASIC functions • requires: DOS; 64K-byte main memory; and 1 diskette drive; when program and/or its data files are stored on fixed disk, requires 128K-byte memory and DOS 2.1 • developed by Microsoft, Inc:

_____ \$300 lcms

6024010 Pascal Compiler • compiler supports implementation of International Standards Organization (ISO) Working Draft #6 for Pascal language with the exception of conformant array parameters; super array parameters are provided instead • requires: DOS; 128K-byte main memory; and 2 diskette drives; program and/or its data files can also be stored on hard disk • developed by Microsoft, Inc:

_____ 300

6024012 FORTRAN Compiler • compiler supports implementation of ANSI standard X3.9-1978 (subset level) and features from ANSI X3.9-1978 (full level) • features include: combining object modules with subroutines in Pascal or macro assembler; 2-pass compilations; compiler metacommands; edit control • requires: DOS; 128K-byte main memory; and 2 diskette drives; program and/or its data files can also be stored on hard disk • developed by Microsoft, Inc:

_____ 350

6024077 APL, A Programming Language • general-purpose language used for mathematical and scientific computing:

_____ 195

6024076 LOGO • for developing problem-solving skills and introducing programming concepts to children and adults • marketed through Logo Computer Systems:

_____ 175

6024002 Macro Assembler • 8088 macro assembler generates relocatable code • features include: listings that include start and end addresses, line numbers, and alphabetic cross-reference; compatibility with BASIC, Pascal, and FORTRAN programs • package includes full and subset versions of macro assembler • requires: any PC; DOS; 96K-byte main memory for full version or 64K-byte main memory for subset version; and 1 diskette drive; when program and/or its data files are stored on fixed disk, requires 128K-byte memory, DOS 2.1 • developed by Microsoft, Inc:

_____ 100

6024011 COBOL Compiler • compiler supports ANSI X3.23-1974 COBOL standard • extensions support color and screen formatting • requires: IBM Disk Operating System; 64K-byte memory; and 2 diskette drives; when program and/or its data files are stored on fixed disk, requires 128K-byte memory, DOS 2.1 • developed by Microsoft, Inc:

_____ 700

UCSD Operating System Program Development

Program development utilities described below are available as part of the 602401X UCSD p-System packaged software (see Packaged Software section). The utilities support program development using UCSD Pascal, FORTRAN-77, and macro assembler.

Text Editor • features include: full-screen editing; cursor control; global search/replace; output formatting.

Linker • supports segmentation at pseudo-code level; processes pseudo- and machine code; link-edits assembly code into executable object-code modules.

File Handler • features include: manipulation of diskette files and directories; reporting of file locations and available storage.

UCSD Operating System Languages

6024033 UCSD Pascal • hybrid compiler supports subset implementation of International Standards Organization (ISO) Working Draft #6 for Pascal language; generates pseudo-code

which is interpreted at runtime • features include: overlays; optional separate compilation of functions and procedures; EXTERNAL routines; 36-digit integer operands; 32-bit floating-point operands; access to graphics/sound facilities through system library routines; checking for syntax, type, and range errors; compiler directives • requires: 64K-byte main memory; and 2 diskette drives • marketed under agreement with SofTech Microsystems; included in 6024016 UCSD p-System with UCSD Pascal packaged software (see Packaged Software section) or available separately • cannot be stored on fixed disk:

_____ \$175 lcms

6024034 UCSD FORTRAN-77 Compiler • hybrid compiler supports implementation of ANSI-1977 FORTRAN; generates pseudo-code which is interpreted at runtime • features include extensions for development and commercial programming • requires 64K-byte main memory and 2 diskette drives • included in 6024017 UCSD p-System with FORTRAN-77 packaged software (see Packaged Software section) or available separately • cannot be stored on fixed disk:

_____ 175

UCSD Macro Assembler • 8088 macro assembler generates relocatable code • features include: macro parameters; conditional assembly; production of code to be linked to UCSD Pascal, FORTRAN, and BASIC programs • included in 6024016 UCSD p-System with UCSD Pascal, and 6024017 UCSD p-System with FORTRAN-77 (see Packaged Software section).

□ Applications Packages

6024004 VisiCalc V.1.1, V.1.2 • Version 1.1 supports management-oriented planning, analysis, and reporting applications • data is arranged in spreadsheet grids each with up to 63 columns and 254 rows; grid elements can be numeric values, labels, or formulas; formulas can include standard functions such as summation, net present value, and trigonometric functions • VisiCalc 1.2 includes all the facilities of VisiCalc 1.1 plus extended addressing of worksheet storage to correspond to memory increases (up to 512K bytes); also provides for both VisiCalc program and data files to reside on and support a fixed disk; INSTALL utility allows unlimited copying of VisiCalc V.1.2 to the fixed disk and any of its directories • can run on any PC; either version requires 64K-byte main memory; DOS 1.1; and 1 diskette drive for diskette version; when the data files are stored on a fixed disk, requires 128K-byte memory and DOS 2.1; program itself cannot be stored on fixed disk • developed by Personal Software, Inc:

_____ \$200 lcms

6024108 Multiplan V.1, V.1.1 • spreadsheet analysis; Version 1.0 provides projections, what-ifs, sensitivity analysis, budget and resource planning, and scheduling • spreadsheet grid of 255 rows x 63 columns; online help text; natural language commands and variable names up to 8 display windows; automatic recalculation • Multiplan V.1.1 includes all the features of Multiplan V.1.0 plus extended addressing of worksheet storage to correspond to memory increases (up to 512K bytes); increased math precision up to 14 digits for transcendental math functions; increased print width up to 512 characters; optional disabling of window paint command of Multiplan 1.0 • V.1.1 also provides for both Multiplan program and data files to reside on and support a fixed disk; MPFD COPY utility in Multiplan 1.1 allows a one-time copy of Multiplan 1.0 program files to fixed disk, with backup/restore procedures; if program resides on diskette, DOS 1.1 users can load Multiplan 1.1 from the same disk but DOS 2.1 users must load from a separate diskette in a 2-stage operation since DOS 2.1 takes up more room • can run on any PC; • either version requires: 64K-byte memory, 1 diskette drive, DOS 1.1 or later for diskette version; when program and/or data files are stored on fixed disk, requires 128K-byte memory, DOS 2.1 • developed by Microsoft, Inc:

_____ 250

Upgrade Kit, Multiplan 1.0 to Multiplan 1.1 • program diskette, tutorial diskette, users' manual and upgrade kit information sheet for upgrading Multiplan instead of replacing it; available until April 30, 1984:

_____ 33



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6024026 BPI General Accounting System • includes general ledger, accounts payable, accounts receivable, payroll capabilities • system is self-contained and may be used independently or interfaced with BPI Inventory Control or Accounts Receivable packages • features include: chart of accounts; check register; invoice register; cash sales journal; merchandise purchased journal; cash receipts journal; menu queues for multiple requests with single entry; check writing capability • requires: 64K-byte main memory; DOS; and 2 diskette drives • neither the program nor the data files can be stored on hard disk • developed by BPI Systems, Inc:

425

6024030 BPI Inventory Control • perpetual inventory package • system is self-contained and may be used independently or interfaced with BPI Accounts Receivable or General Ledger packages • costs inventory by FIFO, LIFO, or Average methods; creates inventory records which detail vendor/product information and automatically adjusts inventory averages or declines; writes P.O.s; records merchandise into inventory; prepares sales invoices • requires: DOS; 64K-byte main memory; and 2 diskette drives • neither the program nor the data files can be stored on hard disk • developed by BPI Systems, Inc:

425

6024027 BPI Accounts Receivable • integrated menu-driven accounts receivable package used for statement preparation, aging reports, and credit analysis • system is self-contained and may be used independently or interfaced with BPI Inventory Control and General Accounting packages • requires: IBM Disk Operating System; 64K-byte main memory; and 2 diskette drives • neither the program nor the data files can be stored on hard disk • developed by BPI Systems, Inc:

425

6024028 BPI Payroll • writes checks and deducts current Federal payroll taxes plus state and local taxes • requires: 64K-byte main memory, 2 diskette drives, DOS • cannot be stored on fixed disk • developed by BPI Systems, Inc:

425

6024029 BPI Job Cost • for preparing individual bids for jobs and for keeping track of both labor and non-labor costs for each job • requires: 64K-byte main memory, 2 diskette drives, DOS • cannot be stored on fixed disk • developed by BPI Systems, Inc:

550

6024058 Peachtree General Ledger 1.1 • 16-module package performs creation, maintenance, updating, and report-generating functions for general ledger; maintains detailed records of financial transactions; generates balance sheets and income statements • end-of-period reports include: trial balance; transaction registers; balance sheet; and income statement • system is self-contained and may be used independently or interfaced with Peachtree Accounts Receivable, Accounts Payable, or Inventory Control packages • requires: DOS; Disk or Advanced Level BASIC; 64K-byte main memory; 2 diskette drives or a fixed disk with 1 diskette drive • developed by Peachtree Software, Inc:

595

6024056 Peachtree Accounts Receivable 1.1 • generates complete invoicing and monthly statements for accounts receivable • customer records include: customer number; address; credits; debits; discount; tax rate; balances; and year-to-date information • supports open-item and balance-forward methods; handles accounts receivable aging • system is self-contained and may be used independently or interfaced with Peachtree General Ledger, Accounts Payable, or Inventory Control packages • automatic interfacing to 6024008 General Ledger • requires: DOS; Disk or Advanced Level BASIC; 64K-byte main memory and 2 diskette drives or 1 fixed disk, 1 floppy diskette • developed by Peachtree Software, Inc:

595

6024059 Peachtree Accounts Payable 1.1 • maintains current and aged accounts payable; provides cash-requirements forecast based on due or discount dates; handles check printing with detailed stubs and automatic check register • automatic

interfacing to 6024008 General Ledger • system is self-contained and may be used independently or interfaced with Peachtree General Ledger, Accounts Receivable, or Inventory Control packages • requires: DOS; Disk or Advanced Level BASIC; 64K-byte main memory and 2 diskette drives or 1 fixed, 1 floppy disk drive • developed by Peachtree Software, Inc:

595

6024057 Peachtree Inventory Control 1.1 • inventory control package supports up to 3 pricing levels; up to 939 items per 160K-byte diskette • system is self-contained and may be used independently or interfaced with Peachtree General Ledger, Accounts Receivable, or Accounts Payable packages • features include online query; standard or average costing and tracking of sales items, returns, and receipts • requires: DOS; 64K-byte main memory; and 2 diskette drives or 1 fixed, 1 floppy drive (XT) • developed by Peachtree Software, Inc:

595

6024060 Peachtree Payroll 1.1 • handles weekly, biweekly, semimonthly, and monthly paid employees • automatic interfacing to 6024058 General Ledger • requires: DOS; Disk or Advanced Level BASIC; 64K-byte main memory; and 2 diskette drives or 1 floppy, 1 fixed disk drive:

595

6024052 Private Tutor • self-study computer-assisted instruction program:

50

6024068 Learning DOS 2.0 • teaches how to use DOS • requires Private Tutor:

30

6024053 BASIC Primer • computer-aided instruction program for teaching basic BASIC statements; provides practice using files, saving programs • requires 64K bytes of memory, DOS, diskette drive:

60

Personal Computer Instructional System (PC-IS) • by Computer Systems Research, Inc; coordinated menu-driven, prompter-assisted interactive training program, presents courses to students, allows user to develop their own materials and customize acquired materials, monitors student activity, provides for asynchronous communications and compatibility with IBM hosts so that development and presentation can occur either on the PC or the mainframe • requires 128K-byte PC with 2 diskette drives.

6428071 PC-IS Presentation • module which controls presentation of courses to students:

85

6428072 PC-IS Authoring • program development module:

525

6428087 PC-IS Administration • control, monitoring, and reporting module:

400

6024081 Learning to Program BASIC • teaches BASIC programming skills • requires Private Tutor:

35

602401X Typing Tutor • typing instruction and drill program • provides immediate and summary feedback, including typing speed in words per minute.

6024013 Typing Tutor • diskette version • requires: DOS; 48K-byte main memory; and 1 diskette drive:

25

6024018 Typing Tutor • cassette version • requires 32K-byte main memory and customer-supplied cassette tape recorder:

25

6024019 Time Manager V.1, V.1.05 • calendar and event-tracking program • records and displays both events and expenses; activities can be viewed on daily, monthly, or yearly basis; keyword and subject searching for retrieval of historical data • requires: 64K-byte main memory; DOS 1.1, and diskette



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drive • V.1.05 required for DOS 2.1; supported on all PCs • developed by Image Producers, Inc:

100

6024031 Dow Jones Reporter • stock market news and information package • supports access to Dow Jones Wire Service; Wall Street Journal; Barrons; New York, American, Mid West, and Pacific Stock Exchanges and Over-The-Counter market electronic databases • requires: any PC; DOS; 64K-byte main memory; diskette drive; Asynchronous Communications Adapter; and modem:

100

6024065 Insurance Agency Program • general-purpose management and accounting system for small to intermediate agencies • provides for maintenance of client records, for letter writing/word processing, invoicing, general ledger, accounts receivable/payable, also for profiling of clients and report production • requires: PC; 128K-byte memory; 2 diskette drives; DOS:

2,500

5520/Personal Computer Attachment • the attachment of the PC into the 5520 Administrative Office System not only provides the PC with office automation capabilities, but also can be used for establishing a shared resources clustered PC configuration.

7033703 IBM 5520/Personal Computer Attachment Program • for shared resources PC configuration by attaching the PC to a 5525 control unit in a 5520 Administrative System; PC emulates a 5253 Display Station, including text editing, document processing, and distribution functions • files can be converted from DOS to 5520 document format and back; 5253 emulation supports PC printers and disks as well as accessing resources on the 5525 • up to 35 PCs can be interconnected; the PC cannot be used as a master or alternative master display station; it also cannot emulate a 3270 through the 5520 but it can do so when operating in PC mode • requires PC 1 with 64K-byte memory, diskette, display, DOS 1.1 and 5520 Emulation Adapter hardware; designed to run with 5520 processing program numbers 5611-SS1 PTF5 level (or later) or 5611-SS2:

164

6109558 5520/PC Attachment Program V.2 • same features as Version 1 except supports PC/XT with or without 5161 expansion unit and DOS 2.1; also supports 3270 emulation through the 5520 as well as in PC mode; includes improved printer usability and mode switching enhancements:

284

6024005 Easy Writer 1.1 • integrated word processing system provides full-screen text editing and text formatting capabilities • features include: horizontal and vertical scrolling; global and selective search/replace; File Menu; Editor Menu; Additional Commands Menu • requires: DOS 1.1; 64K-byte main memory; and 1 diskette drive for diskette version; when the data files are stored on a fixed disk, requires 128K-byte memory and DOS 2.1; program itself cannot be stored on fixed disk • developed by Information Unlimited Software, Inc:

175

6024051 Personal Editor • full-screen full-function text editor • requires 64K-byte main memory, 1 diskette drive, DOS, 40- or 80-column monitor • runs on any PC:

100

6024048 Professional Editor • full-screen editor like the Personal Editor but is menu driven instead of command driven • includes more extensive search/replace facilities, right justification • file merging, insertion of character strings with single keystroke • runs on any PC:

130

6024039 PeachText Word Processing • allows preparation and revision on a document using the display before automatic printing of corrected text; includes online help functions, full-screen editor, displaying and/or merging of a second document while editing the first, automatic pauses in printing for keyboard entry of variables proportional printing (on appropriate third-party printers) global and selective search and replace, creation of DOS ASCII files, word wraparound, automatic

carriage return • paging from diskette for files available that are larger than memory creates equivalent of virtual memory system • requires 64K-byte memory, 1 diskette, and DOS 1.1 for PC 1 diskette version; when program and/or data files are stored on a fixed disk, requires 128K-byte memory and DOS 2.1 • by Peachtree Software, Inc:

400

6024049 Mailing List Manager • for entering, storing, retrieving, and updating names and addresses and printing mailing labels • requires 128K-byte memory, 2 diskette drives, or 1 diskette drive and fixed disk:

195

6024071 Word Proof • for checking spelling and providing synonyms; contains full-screen editor with multiple functions • can run on any PC:

60

6428092 ADRS/PC A Departmental Reporting System • subset of 5796-PLN mainframe ADRS-II that allows users to produce professional business reports; user can define, change, record, calculate, select sort format, display, print, and maintain reports • file transfer between host VM/CMS or MVS/TSO systems supported • requires PC with 128K-byte memory, one diskette drive, but 196K-byte memory, and 2 diskette drives recommended; also requires 80-character-wide display and matrix printer or equivalent; asynchronous communications must have host TTY-ASR 33-/35-type support; requires DOS 1.1 or 2.1:

325

Other Facilities

6025072 Hardware Maintenance & Service • fault-isolation program for hardware components, including System Unit, 5151-001 Monochrome Display, 1501100 Keyboard, and 5152001 80-cps Matrix Printer • requires Cassette or Disk/Advanced Level BASIC:

\$155 lens

HARDWARE

Terms, Support & Documentation

Terms • hardware products are available for purchase only and include a 90-day warranty • IBM Personal Computing Marketing Division sells the PC to both IBM's own retail outlets and to non-IBM retail outlets in any quantity; it will also directly sell to the end user in volume orders (VPA) of 20 or more, or in pilot orders leading to a VPA of 20 or more; VPA orders can be for the basic system or for packaged systems; non-VPA orders can only be for basic systems; PCs can also be sold by IBM's National Accounts Division and National Marketing Division • quantity discounts are available under the Volume Purchase Amendment (VPA); quantities of 20 to 49 systems are subject to a 5% discount; quantities of 50 to 149, a 10% discount; quantities of 150 or more, a 15% discount; VPA contract period is 12 months.

Support • on-site, courier pickup, carry-in, and mail-in maintenance contracts available; Warranty Extension Option provides pickup/delivery maintenance coverage for the entire first year at a lower cost than the usual carry-in/mail-in annual contract • annual option provides pickup/delivery maintenance coverage for subsequent years • carry-in and mail-in maintenance contracts for subsequent years are also available • on-site contracts are presently available in 38 of the cities having an IBM service/exchange center • to obtain maintenance service, user must provide IBM National Support Center with results of 6025072 Hardware Maintenance and Service fault-isolation procedures (see Software—Other Facilities section); malfunctioning units can then be sent to IBM Product/Service Centers, IBM Customer Service Division (CSD), designated service locations, authorized IBM Personal Computer Dealers, or the IBM National Support Center in Greencastle, IN; IBM will repair System Units within 2 days and replace 5151 Monochrome Displays, 5152 IBM 80 CPS Matrix Printers, and 1501100 Keyboards within 24 hours; all non-IBM devices must be removed from defective units prior to obtaining maintenance service • IBM provides training through 2 independent training organizations; classes are held at IBM Product Centers.



IBM PC 1, PC/XT & Portable PC

Personal Computers

Documentation • all systems include a BASIC Reference Manual and a Guide to Operations Manual • various other manuals are also available.

□ Physical Specifications (H x W x D); Weight

PC 1

System Unit • 5.5 x 19.6 x 16.1 inches; 25 pounds with 1 diskette, 28 pounds with 2 diskettes.

Display • 11 x 14.8 x 13.7 inches; 17 pounds.

Keyboard • 2 x 20 x 8 inches; 6 pounds.

PC/XT

System Unit • 5.5 x 19.6 x 16.1 inches; 32 pounds.

Display • 11 x 14.8 x 13.7 inches; 17 pounds (monochrome) • 11.5 x 15.5 x 17 inches; 26 pounds (color).

Keyboard • 2 x 20 x 8 inches; 6 pounds.

Portable PC

System Unit • 8 x 20 x 17 inches; 30 pounds with 1 diskette drive.

Display • integral part of the system unit.

Keyboard • included in the system unit specs; clips to front of unit for portability.

□ Systems Overview & Configurability

The IBM Personal Computer product line consists of 6 basic models and 14 packaged systems. The PCjr entry level, with 2 packaged systems; the original PC 1, with 7 packaged systems; the PC/XT, the Portable PC, and the 3270-PC, each with a single model, and the XT/370 with 2 packaged systems. All are basically single-user systems. All except the PCjr have interconnection features which allow them to be directly attached to clustered systems or an IBM host; some to the 3270 Communications Systems, some to 5520 Administrative Office Systems, some to System/34/36/38, 4300, or other mainframe systems. These features also allow remote attachment to S/1, 8100, and other mainframes. The 5520 attachment also provides the equivalent of a PC resource-sharing system cluster for PC 1 and PC/XT models.

This report examines the general-purpose mainstream PC 1, Portable PC, and PC/XT models. The PCjr, 3270-PC, and XT/370 models are covered in separate reports.

The basic PC systems are all packaged systems with memory, detached keyboard, and integrated for a number of attachments. Most also include diskette and/or hard disk storage in the basic system price. The display is separately priced, except in the Portable unit. IBM offers both monochrome and color display options, but the systems can also be attached to home TVs. Operating environments are dominated by DOS, a version of MS-DOS, but also include the UCSD p-System, CP/M-86, concurrent CP/M, and PC/IX.

The PC 1 systems are cassette- or diskette-based; all can be expanded to include 2 diskettes and 2 hard disks. One packaged system is supplied without diskette for users who want a cassette-based system. Three packaged systems are supplied without keyboards; these are particularly economical for users who want to attach a PC to an existing 3278 or 3279 in a 3270 clustered communication system. The other three packaged systems are diskette based. Fixed disks are added by adding an expansion unit which houses not only a disk but also 8 additional slots, for expansion beyond the basic 5.

The PC/XT, which comes in a single, expandable package with 8 slots includes both a diskette and a 10M-byte hard disk in the basic system package. Users who want to have 2 fixed disks must buy the expansion unit with the second disk and move the first fixed disk and its adapter from the basic system unit into the expansion unit. The PC/XT can also be expanded to an XT/370 by adding 3 processor boards into the basic system.

The newest family member, the Portable PC, is a self-contained unit consisting of a 9-inch CRT, detachable keyboard, and one diskette drive. One additional diskette drive can be integrated

into the unit and hard disks can be added through the same expansion unit that attaches to the PC 1. The system comes with 8 slots. Two are occupied by standard features and 1 is presently not supported, thereby leaving 5 open slots for expansion.

There are a few major differences between the Portable PC and the PC 1 and the PC/XT besides packaging. For instance, the Color Graphics adapter card that comes with the portable has a few different characteristics that differ from that of the adapter used with the PC 1 and PC/XT. The portable also provides a switchable power supply (115 volt 60 Hz or 230 volt 50 Hz) and uses slimline drives similar to those in the PCjr. All models have general-purpose I/O slots that make it easier to add foreign devices from outside vendors. On the PC 1, all slots are full size, and on the PC/XT 2, are half size and the rest full size. However, on the Portable, of the 5 open slots, only 1 is full size and the remaining 4 are short slots. Even though there are some differences, all systems have identical function and performance characteristics.

PC Cluster Systems Via 5520 Administrative System Attachment

The 5520 can act as a PC-clustered office system that attaches up to 35 Personal Computers. The 5525 System Unit is the cluster controller; it must attach at least one 5253 Display Station as the primary station, but the remainder of the terminals can be any mixture of 5520 and PC terminals. The PCs can share files with the other 5520 system terminals, can operate in a (disconnected) DOS mode or 5253 emulation (connected) DOS mode; and can operate in 3270 communications mode. The 5525 can convert files from DOS to 5520 format and back.

All of the PC models except X14, X64, and X74 can emulate a 5253 Display peripheral in a 5520 Administrative System. When functioning as a 5253 Display, the PC has access to all the word processing, records processing, storage, and distribution facilities of the 5520. The PC can also operate as a standalone personal computer in this environment. See the subsection on Office Systems under SOFTWARE for a description of the capabilities of this type of PC system, as well as environmental considerations. See the Terminals/Workstations section for a details on the connection features needed to turn the PC into the equivalent of an intelligent 5253 terminal.

3270 Terminal Cluster Attachment with Transmission to Mainframe Hosts

The PC can be an integral part of a 3270 Information Display system cluster in 4 different configurations. PC 1 models 5150-X14, X64, or X74, which have no keyboard, are designed to be attached to an existing 3278 or 3279 terminal in a 3274-controlled terminal cluster, so that the 3278 or 3279 becomes the display/keyboard for the PC. Other PC 1 or PC/XT models can also be attached to the 3278 or 3279 when the appropriate attachment features are added, but in these cases the existing PC keyboard is disabled and only the 3278/79 keyboard is functional; hence there is no environmental/compatibility differences with "X" models. The PC 1, PC/XT, and Portable PC can all be attached by coaxial cable directly to the 3274 control unit in a 3270 cluster; the PC "looks like" a 3278 or 3279 in this case, but uses its own display.

The PC models that attach to the 3278 or 3279 terminals allow the user to have almost all of the functions of the PC plus some (not all) additional 3270 display functions, as a result of attaching into the system as an intelligent adjunct to an existing dumb terminal. In the Personal Compute mode, PC/327X keyboard input is displayed on the screen and directed to the PC program for PC processing. In the Host Compute mode, keyboard input is directed to the remote host for processing; the PC may also locally capture data from the host onto magnetic media.

The PCs that attach to the 3274 control unit directly by coaxial cable operate as DOS 2.1 PC systems as well as emulating a 3278 or 3279. File sharing capabilities depend on programs in the host processor.

The software, and any environmental restrictions that apply, are discussed in the Data Communications subsection of the SOFTWARE section of this report. Hardware attachment features are located in the Terminals/Workstations section of this report, since these attachment features make the PC into a subordinate workstation.



IBM PC 1, PC/XT & Portable PC Personal Computers

8100 Attachment

The PC can be attached to the 8100 in two ways. Since 3270 systems can transmit or attach to the 8100, the PC can connect into a 3270 that, in turn, connects to an 8100. However, this method does not provide for an inexpensive local workstation cluster. The second method is to install an adapter to connect the PC to a local or remote R-loop. The loop-attached PCs are supported under both DPPX and DPCX/DOSF operating systems; in both environments there are provisions for file transfers and host 370 data streaming. Furthermore, DPCX/DOSF allows PC files to be converted and treated like DOSF documents.

Systems/34, 36 & 38 Attachment

PCs can communicate with Systems/34, 36, and 38 by means of the 5250 emulation program operating in conjunction with an emulation board. This combination allows the PC to emulate a 5251-11 terminal, using a twinax cable for the same type of connections as the 5251. Thus, like the 5251-11, the PC can attach locally to these 3 computer systems' workstation adapter. Also, like the 5251-11, the PC can communicate remotely by attaching to a 5251-12 master terminal (which includes both an integrated display and the control logic for remote communications handling) or to a controller (no integrated display). The emulation board is designed so that multiple PCs can be linked together on one workstation port by cabling the emulation boards together in a "daisy chain" or cable-through configuration similar to the one used when attaching multiple 5251-11s.

The 5250 emulation function can be expanded to include file upload/download and a virtual diskette capability on the host, as explained in the Communications Software section.

Series/1 Attachment

The Series/1 PC connection is identical to that used on the Systems/34, 36, and 38, but it results in a less comprehensive set of facilities for the PC user because of the character of S/1 and 5251-11 interconnections. The Series/1 has no integrated workstation adapter for the 5251-11 so it cannot locally connect a PC with 5251-11 emulation. Instead, the Series/1 transmits to a 5250 cluster with 5251-11 terminals, therefore it can transmit to a PC that replaces a 5251-11 in such a cluster. IBM, however, has not supplied a file transfer or virtual diskette facility for the Series/1 and is not likely to do so. This is because so many Series/1 customers are value-added remarketers who want to do this type of programming for themselves.

XT/370 Environment

The PC/XT model can be upgraded into a system with 3 switch-selectable identities. The system can operate as a standalone PC/XT system, as a 3277 terminal, or as a small VM 370-compatible system useful for applications like program development. Separate boards supply a fully compatible IBM instruction set, and thus can run many VM programs designed to operate in a VM/CMS single virtual environment, providing they can operate within the confines of XT/370 disk, peripheral, and memory restrictions. Since the primary application environment orientation of this "mainframe on a desk" is different from the personal computing environment, it is treated in a separate report.

4300, 4700 & Large IBM Mainframe System Attachment

All of the PC models, except the 5150-X14/X64/X74, can be attached by coaxial cable directly to the 4701 Finance Communications Controller or any 4300 mainframe model that supports a display/prINTER adapter. The PC emulates the 3278 or 3279 terminals that can also be attached to the display/prINTER adapters. Unlike a "dumb" 3278/79 terminal, the PC can also have a PC-DOS session running concurrently with a host-controlled 3270 session; the user can interact with either session alternately but cannot display both simultaneously on his screen. In addition, file transfer between host and PC is supported for 4300-attached systems but not for the 4700.

The specific 4300 mainframe models addressed by this capability are the 4321, 4331, and 4361 (since they attach the display/prINTER adapter) but not the 4341 or 4381 (which do not). The mainframe (or 4700) host does not require special software to

simply attach the PC, but a specific program (6024134 Personal Computer 3278/79 Emulation Control) and a specific hardware adapter (1602507 Personal Computer 3278/79 Emulation Adapter) is required in the PC. For the mainframe to PC file exchange capability, however, the host must run the 3270-PC File Transfer Program. This program can also be used for transferring files to PCs that are imbedded in local or remote 3270 system clusters that transmit directly to the host. A similar 8100 program allows transfers to the 8100, or passing through the 8100 to a host. See the remarks under 3270 Terminal Cluster Attachment in this report, as well as the separate report on the 3270-PC. These methods can be used by IBM mainframes for other coaxially attached PCs or 3270-attached PCs but would have to be used for 4341, 4381, and 30XX large mainframes that want to attach PCs and transfer files, since they support only channel-attached hardware.

File transfers to a directly attached PC are supported by different versions of the File Transfer program depending on the operating environment. The VM/SP environment, which is supported on any 4300, uses program number 5664-281. The MVS/TSO environment uses program number 5665-311. Since MVS/TSO does not run on systems with less than 8M bytes of memory, and since the display/prINTER adapters attach to the lower-performance 4300 models, only the 4361 might conceivably be running MVS. The MVS version of this program would, then, be primarily used on 4381 or 3080 series mainframes to send files to PCs imbedded in 3270 clusters, rather than to support a coaxially attached local PC on a 4361.

The omission of a DOS/VSE or SSX-compatible version of the file transfer program is striking since VSE and its SSX relative are the primary/native mode operating systems for the 4300 series and represent more than half of IBM's mainframe installations. This capability has not been implemented under ACP/TPF either. A recent update of MUSIC, a less well-known, IBM-supported operating system, does provide for PC-mainframe file transfers, however.

Attachment to the 4701 Controller requires the 3101 Device Cluster Adapter on the 4701. File transfers are not supported so no file transfer software is involved.

Maximum configurability is stated below; minimum configurations are discussed under Packaged Systems.

PC 1 System Maximums • 640K-byte main memory, 40K-byte ROM, 720K-byte diskette storage, 20M-byte hard disk storage with expansion unit, cassette tape drive, display-prINTER adapter or separate display and prINTER adapters • remaining I/O slots can attach communications lines and printers plus third-party devices.

PC/XT System Maximums • 640K-byte main memory, 40K-byte ROM, 720K-byte diskette storage, 20M-byte hard disk storage with expansion unit, RS-232C port, display-prINTER adapter or separate display and prINTER adapters • remaining I/O slots can attach additional communications lines and printers plus third-party devices.

Portable PC System Maximums • 512K-byte main memory, 40K-byte ROM, 720K-byte diskette storage, 20M-byte hard disk storage with expansion unit, and CRT and keyboard; remaining I/O slots can attach communications lines and printers plus third-party devices.

□ Packaged Systems

Personal Computer 1

The PC 1 submodels are all diskette-based systems. The differences in the submodels are in the number of diskette drives packaged with the units and whether or not they include a keyboard in the price. Systems without keyboards (X models) have adapters for using the 3278-2 display as the keyboard/display; they require DOS 1.1. All models except the "X" units can be expanded to include up to 2 fixed disk drives.

PC 1 System Unit • includes CPU, 64K-byte RAM, 40K-byte ROM containing Cassette Level BASIC interpreter, audio speaker, cassette-tape interface, 5 I/O slots, and power supply.



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Personal Computers

5150-104 PC 1 • system unit • keyboard:
 \$1,385 prch \$165/\$132/\$106/\$93 maint

5150-114 PC 1 • system unit • keyboard • diskette drive adapter, 1 single-sided integral drive:
 1,864 165/132/106/93

5150-X14 PC 1 • same as 5150-114 except no keyboard • includes adapter to be integrated into 3278 display subsystem; requires DOS 1.1:
 1,594 165/132/106/93

5150-164 PC 1 • system unit • keyboard • diskette drive adapter, 1 double-sided integral drive:
 2,104 165/132/106/93

5150-X64 PC 1 • same as 5150-164 except no keyboard • includes adapter to be integrated into 3278 display subsystem; requires DOS 1.1:
 1,834 165/132/106/93

5150-174 PC 1 • system unit • keyboard • diskette drive adapter, 2 double-sided integral drives:
 2,633 165/132/106/93

5150-X74 PC 1 • same as 5150-174 except no keyboard • includes adapter to be integrated into 3278 display subsystem; requires DOS 1.1:
 2,363 165/132/106/93

Personal Computer XT

The PC/XT, is an extended disk-based compatible version of the 5150 (PC 1) based on the Intel 8088 microprocessor. Although the XT includes an integrated hard disk, the same hard disk capacity is also available for the 5150 versions through the addition of the appropriate 5161 expansion unit. Since the 5150 can expand to the equivalent limits of the 5160, there are no upgrade options. Note that the 5160 PC/XT can be upgraded to the XT/370 but information on the upgrade boards as well as the XT/370 system and its environment is presented in a separate report.

5160-087 PC XT System Unit • includes CPU, keyboard, 128K-byte main memory expandable to 640K bytes, 40K-byte ROM containing Cassette Level BASIC interpreter, a single dual-sided 360K-byte diskette drive with adapter, a 10M-byte fixed disk drive with adapter, audio speaker, asynchronous communications adapter and 8 slots, with 5 available to the user • requires DOS 2.0 or DOS 2.1:
 \$4,995 prch \$275/\$220/\$175/\$155 maint

Portable Personal Computer

The Portable PC is a self-contained unit compatible with the PC 1 and PC/XT. It is a diskette-based system that can utilize a hard disk via an expansion unit.

5155-068 Portable PC • includes CPU, 256K-byte main memory expandable to 512K bytes, 40K-byte ROM containing Cassette Level BASIC interpreter, integral CRT, detachable keyboard, one 5.25-inch slimline diskette drive and adapter, color/graphics monitor adapter, 5 expansion slots, and protective carrying case:
 \$2,795 prch \$275/NA/\$175/NA maint

□ CPU

All versions of the IBM Personal Computer are based on the Intel 8088 microprocessor. For those users who need to perform floating-point arithmetic, logarithmic, and trigonometric functions, IBM also offers an 8087 math co-processor option.

Intel 8088 Processor • 8-bit data bus interface, 16-bit internal architecture, direct addressing to 1M bytes of memory, 16-bit register set with symmetrical operations, 24 operand addressing modes, 8-bit and 16-bit signed and unsigned arithmetic with binary and decimal operands • 210-nanosecond cycle time; 4.77-MHz clock speed.

Intel 8087 Math Co-Processor • provides extension of 8086 for 100 times faster hardware execution of number-crunching mathematics • 84-bit wide data paths; 80-bit wide working

registers • option kit contains an 8087 chip plus a current-level 8088 chip for ensuring that the high performance of the co-processor is maintained between the 2 chips:
 \$260 prch NA/NA/NA/NA maint

□ Memory

PC 1 Main Memory • 64K bytes on a system board capable of being expanded up to 256K bytes by the addition of 64K-byte plug-in modules; maximum memory of 640K bytes requires 2 memory expansion cards • standard and optional memory currently utilizes only 64K-bit chips with parity checking, 250-nanosecond access time; earlier PC models 5150-001 and 5150-813 utilized memories with 16K-bit chips.

PC/XT Main Memory • 128K bytes on the same type of board as the PC 1, except with two 64K-byte modules implemented; maximum memory of 640K bytes requires 2 memory expansion cards.

Portable PC Main Memory • 256K bytes on the same type of board as the PC 1, except with all 4 64K-byte modules implemented; maximum memory of 512K bytes requires 1 memory expansion card.

1501013 64K-/256K-Byte Expansion Option • allows PC 1, PC/XT, or Portable PC to be expanded beyond the 256K-byte capacity of the initial system board • single-circuit card capable of carrying four 1501003 64K-byte modules; one 64K-byte module is implemented • 2 expansion cards can be added to the PC 1 and PC/XT in addition to the initial memory card, but memory ceiling of 640K bytes means that last card can carry only 2 modules:
 \$325 prch \$38/\$30/\$24/\$21 maint

1501003 64K-Byte Module • provides 64K-byte plug-in module; attaches to PC 1 or PC/XT basic system board or to 1501013 Expansion Board:
 165 NC/NC/NC/NC

PC 1, PC/XT & Portable PC ROM • 40K bytes • includes BASIC-80 Interpreter and operating logic for cassette-level system, and built-in power-on diagnostic self-test.

□ I/O & Communications

The PC 1, PC/XT, and Portable PC have the same type of open-ended I/O attachment system, utilizing general-purpose feature slots that allow attachment of a variety of I/O devices by means of adapter cards.

The PC 1 units have three jacks in the system unit for interfacing the power supply, an audio speaker and a cassette drive. Five full-size, general-purpose attachment slots are used to interface other devices, including the required TV or monitor and, on diskette-based systems, the initial diskette drive. One of these slots can attach the 5161-1 Expansion Unit.

The Portable PC units come with 8 general-purpose attachment slots. Two slots are occupied by the floppy disk drive adapter and the color graphics adapter and one slot is not supported. Of the remaining 5 expansion slots, only 1 is a full-size slot, and the other 4 are all short slots. The back of the unit contains a socket for an external composite or RGB monitor. The 5161-1 Expansion Unit for the PC 1 is also supported on the Portable unit.

The PC/XT units have two jacks in the system unit, one for interfacing the power supply and one for an external audio speaker. There is no provision for the attachment of tape cassette drives. Of the 8 general-purpose attachment slots, 6 are full-size and 2 are short slots. These slots are used to interface other devices, including the standard disk adapter and its appended drive, the standard diskette adapter and its appended drive, the standard asynchronous communications adapter and the required TV or monitor. This leaves 4 slots for user options, but the

PRCH: purchase price. **MAINT:** first figure is annual charge for on-site maintenance; second figure is for annual pickup/delivery option; third figure is for carry in; and fourth figure is for annual charge for mail-in maintenance coverage. **NA:** not available. **NC:** no charge. Prices effective as of November 1983.



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number can be extended by the addition of the 5161-2 Expansion Unit.

5161-1 Expansion Unit • for PC 1 and Portable PC • includes one 10M-byte fixed disk drive, its adapter card, and 8 feature expansion slots • additional 10M-byte disk can be added (see Disks) • the system attachment card and disk adapter each require 1 slot, leaving 6 additional slots for user-selected features • requires DOS 2.0 or 2.1 operating system:

\$3,390 prch \$125/\$100/\$80/\$70 maint

5161-2 Expansion Unit • for PC/XT; same as 5161-1 but without adapter card; instead, both the standard XT disk adapter card and the XT integrated disk must be moved into the Expansion Unit to provide full 20M bytes:

2,695 125/100/80/70

All 3 systems can utilize the asynchronous, BSC, and SDLC interfaces allowing them to function as remote terminals in nearly any type of IBM network, including SNA. In addition, as noted in the Systems Overview the PC can be connected directly to 3270s, 5520, S/1, S/34, S/36, S/38, 4321, 4331, 4361, and 4700 systems as a workstation. Up to 64 PCs and PCjr's can also be configured in a cluster configuration (see below and Systems Overview for details).

1502074 Asynchronous Communications Adapter • single-port, asynchronous, half-/full-duplex interface module provides RS-232C or 20-mA current-loop signal levels; software-selectable data rates of 50 to 9600 bps; 5 to 8 data bits; 1 start bit; 1 or 2 stop bits; odd, even, or no parity; optional system-interrupt generation • tested for operation with IBM Series/1 with feature #1610, 2091/2092 attachment card • includes 25-pin, D-shell male connector and jumper block • requires system expansion slot • included in XT base system price; option price is for PC 1 and Portable PC:

120 NC/NC/NC/NC

1502067 Communications Adapter Cable:

75 NC/NC/NC/NC

1502090 SDLC Communications Adapter • allows SDLC protocol on switched or leased-line networks:

300 NC/NC/NC/NC

1502075 BSC Communications Adapter • allows binary synchronous communications protocol on switched or leased-line networks:

300 NC/NC/NC/NC

PC Cluster Configurations

The PC 1, PC/XT, Portable PC, and the PCjr can all be connected in a cluster configuration. To make this connection, a user needs a cluster adapter for each PC, a cluster cable kit for connecting 2 PCs, and the Cluster Software program. (See Communications section under SOFTWARE.) The cluster configuration utilizes baseband signaling and the CSMA/CA access protocol. The topology of the interconnection between 2 computers is a bus environment. Data transmission rate is 375K bps. Up to 64 computers can be supported in a cluster. The clustered configuration consists of a main coaxial cable bus with cable drops to the PC Cluster Adapter or the PCjr cluster attachment. The cable drop connects to the main coaxial cable with BNC T-connectors and to the Cluster Adapter with BNC connectors. PC 1 models 1, 13, 14, 64, and 74 may require updating of the BIOS. However, if these models have the IBM expansion unit attached to them, they do not need further updating.

1501206 Cluster Adapter • for attaching PCs in a clustered multiuser environment • contains a switch for specifying remote initial program load (IPL) • each PC must have its own cluster adapter • requires 1 full-size expansion slot:

\$340 prch NA/NA/NA/NA maint

1501207 Cluster Cable Kit • connects 2 PCs; each computer in the cluster beyond the first 2 PCs requires an additional kit • includes the main coaxial cable bus, 2 cable drops, 2 BNC T-connectors, and 2 terminating plugs; coaxial cable bus length is 32 feet; cable drop length is 9 feet:

140 NA/NA/NA/NA

1501005 BIOS Update Kit:

30 NA/NA/NA/NA

5520 Administrative System/Clustered PCs

The PC models can be interconnected into a clustered file sharing system by connecting them to a 5525 system controller. The master console terminal must be a 5253 terminal but the rest of the terminals can be any mix of PCs and 5520 terminals.

Software support is provided by either 7033703 5520-PC Attachment Version 1, which supports PC 1 and the Portable PC under DOS 1.1 or by 6109558 5520-PC Attachment Version 2, which supports PC/XT under DOS 2.0 or 2.1, as well as PC 1 and Portable PC.

Displaywriter terminals can be connected to this system.

6072534 IBM 5520 (5253) Convenience Kit V.1 • for attaching the PC to the 5520 Administrative Office System, to create a shared resources cluster system • kit includes the PC Emulation Adapter, 5520 (5253)-PC Display Station Emulation Program (512888), T-connector, twinaxial cable assembly; all can also be ordered separately:

\$893 prch NA/NA/NA/NA maint

2882 5253 Emulation Installation Convenience Kit V.2 • contains PC/Display Station Emulation Adapter, 5520 (5253)-PC Attachment Program Version 2, IBM T-connector and IBM TWINAX cable assembly:

1,013 NC/NC/NC/NC

5072534 Display Station Emulator Adapter • component of 5520 kit:

600 NC/NC/NC/NC

6851167 T-Connector:

85 NC/NC/NC/NC

7362267 Cable Assembly:

44 NC/NC/NC/NC

2893 IBM Terminator:

38 NC/NC/NC/NC

5525 System Unit • central processing unit for a shared logic system which supports electronic document distribution services and text and file processing • attachments are made to the 5525 System Unit, which acts as the heart of the 5520, processing information and storing active documents • the PC 1 can now be attached as a peripheral to the 5520 • 7 models offer integrated disk storage with up to 1M-byte-per-second data transfer rates, multiple integrates processors, diskette drive, and controllers: Models 20, 40, and 50 as supported by optional 5611-SS1 program; Models 21, 31, 32, and 51 are supported by optional 5611-SS2 program • special textures allow attachment of up to 12 printers; optional distribution controllers allow the 5520 Administrative System to function half-duplex mode over switched or non-switched communications lines at speeds of 4800 to 9600 bps.

5525-20 • up to 4 display station lines, 6 display stations attachable, 29M-byte disk storage capacity, 1 diskette, 2 printer/communications lines, 3 printers attachable, and 1 mag card unit • can be rented for \$1,048 monthly:

16,780 138/NA/NA/NA

5525-21 • same as 5525-30 but with 8 display stations, attachable, \$1,185 monthly rental:

18,780 149/NA/NA/NA

5525-31 • up to 4 display station lines, 12 display stations attachable, 29M-byte disk storage capacity, 1 diskette, 4 printer/communications lines, 6 printers attachable, and 1 mag card unit • can be rented for \$1,524 monthly:

31,260 181/NA/NA/NA

5525-32 • same as 5525-31 but with 15 display stations attachable, \$2,101 monthly rental:

39,740 215/NA/NA/NA

5525-40 • up to 8 display station lines, 18 display stations attachable, 65M-byte disk storage capacity, 1 diskette, 8



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printer/communications lines, 10 printers attachable, and 1 mag card unit • can be rented for \$2,216 monthly:

41,280 222/NA/NA/NA

5525-50 • up to 8 display station lines, 18 display stations attachable, 130M-byte disk storage capacity, 23 diskettes, 16 printer/communications lines, 12 printers attachable, and 1 mag card unit • can be rented for \$2,684 monthly:

50,170 275/NA/NA/NA

5525-51 • same as 5525-50 but with 36 display stations attachable, \$2,821 monthly rental:

52,170 287/NA/NA/NA

5253 Display Station • word processing terminal for the 5520 administrative system • displays up to 1920 characters with 24 lines of 80 characters each • 187 8x16 dot-matrix characters; non-display, keylock, blinking, underscore, cursor control standard • attaches to 5525 System Unit • \$128 monthly rental available:

2,995 22/NA/NA/NA

5219 Printer • 96-character bidirectional impact printer for 5520 administrative system • attaches to 5525 System Unit.

Model B1 • 40 cps • \$248 monthly rental available:

5,265 47/NA/NA/NA

Model B2 • 60 cps • \$269 monthly rental available:

5,680 52/NA/NA/NA

5229 Printer • 60-cps, 96-character bidirectional impact printer for 5520 Administrative System • attaches to 5525 System Unit

6,230 60/NA/NA/NA

5257 Printer • 55-cps, 96-character bidirectional impact printer for 5520 Administrative System • attaches to 5525 System Unit • \$397 monthly rental available:

NA 109/NA/NA/NA

5258 Printer • 92-cps ink-jet printer for 5520 Administrative System • automatic feed; attaches to 5525 System Unit • \$850 monthly rental available:

NA 240/NA/NA/NA

5321 Mag Card Unit • uses 50-track magnetic cards; attaches to 5525 System Unit • \$369 monthly rental available:

6,880 55/NA/NA/NA

3270 Communications & 4300 Mainframe System Attachment Components

The PC can be attached to the 3270 in two basic ways. The PC without a display can attach to either the 3278 or 3279 display, which is in turn attached to a 3274 or 3276 control unit, or the PC with its own display can emulate a 3278/79 and attach directly to a 3274 (as well as to a 4321/4331/4361 or a 4701). The adapter kits for each of these situations are different.

The 5150-X14, X64, and X74 models have no keyboards, and thus have been specifically designed for attachment to a 3278 or 3279. However, any PC 1 or PC/XT can also be connected; the PC keyboard is then disabled.

When the PC as an entire system emulates the 3278 or 3279, both the emulation adapter and the appropriate 3278/79 emulation program are needed. This configuration can attach not only to the 3274 but also to the display/printer adapter on the 4321, 4331, or 4361 or to the 3101 device cluster adapter on the 4701 Finance Controller. Concurrent operations with other PC applications is possible, with certain restrictions (see SOFTWARE—3278/79 Emulation Control Program). File transfers on all systems except the 4701 are supported by the 3270-PC file transfer program (see SOFTWARE).

Displaywriter terminals can also be connected into 3270 systems with PCs.

5325 3279 PC Attachment Kit • allows PC to be attached to the 3279, using the 3279 as a display/keyboard • consists of the 5322 3279-Attachment Option, which attaches to the PC, and the 5327 3279-Adapter portion, which attaches to the 3279 S3G and O3X models and all S2A, S2B, and O2X models with serial numbers below E000 • requires PC 1 or PC/XT with DOS 1.1, 2.0,

or 2.1, diskette, Color/Graphics Adapter, 3274 or 3276 and 3279 with keyboard:

\$1,950 prch \$36/\$30/\$24/\$80 maint

5326 3279 PC Attachment Kit • same as 5325, except uses model 5328 adapter, for attaching to 3279 models S2A, S2B, or O2X with serial numbers above E000:

1,950 36/30/24/80

5322 PC-3279 Attachment • PC portion of the 5325 or 5326 kit:

850 36/30/24/80

5327 PC-3279 Attachment • 3279 portion of the 5325 kit:

1,100 NC/NC/NC/NC

5328 PC 3279 Attachment • 3279 portion of the 5326 kit:

1,100 NC/NC/NC/NC

PC/3278 Attachment • the PC provides an adapter in the PC which resides in the I/O slot number 1 plus a 5-foot cable to physically connect the PC 1 to the 3278; also provides diskettes with an interrupt handler VM/SP(CMS) TSO and Data Transfer sample programs a PC/3270 customization program and diagnostic program • designed for PC models 5150-X14, X64, or X74 but can be used with other PCs • requires color/graphics display or display/printer adapter, a diskette-based PC system unit with 64K bytes of memory, also requires DOS 1.1 or later • corresponding 5315 or 5316 Adapter on the 3278-1, -2, -3, -4, or -5; the 3278 must be attached to a 3274 or 3276 controller • both adapters must be obtained.

8501206 Adapter on PC:

NA 36/NA/27/24

5315/5316 RPQ Adapter on 3278:

1,700 36/NA/24/24

1602507 3278/79 Emulation Adapter • circuit card that provides receptacle for attaching a user-supplied coaxial cable from a PC to IBM 3274 Control Units, to 4321, 4331, and 4361 Processor Display/Printer Adapters, or to 4701 Finance Communication Controllers • supports emulation for most but not all functions of a 3278 Model 2 or 3279 Model 2A or S2A; also supports file transfer with VM or VMS hosts if appropriate software is added • both host-controlled 3270 session and local PC-DOS session can be active concurrently • requires PC with 128K-byte memory, DOS software, 6024134 3278/79 Emulation Control Program:

905 NA/NA/NA/NA

5250 Communications (S/1, S/34, S/36, S/38 Attachment) Components

The PC is attached to S/1, S/34, S/36, and S/38 systems by means of 5251-11 terminal emulation, with the hardware emulator card and supporting software sold as a single package.

System/34/36/38 Local/Remote Attachment 2886 5250 Convenience Kit • for attaching a PC 1 to host S/34, S/36, or S/38 as a 5251, 5291, or 5292 terminal • includes PC emulator hardware, 5250 emulation program, T-connector, twinaxial cable assembly • components can be bought separately:

\$893 prch NC/NC/NC/NC maint

2887 PC-5250 Emulation Adapter • for PC; component of feature 2886 kit:

600 NC/NC/NC/NC

2892 Twinaxial Cable Assembly:

48 NC/NC/NC/NC

2891 T-Connector:

85 NC/NC/NC/NC

2894 Twinaxial Cable Adapter:

25 NC/NC/NC/NC

8100 System Attachment Components

PC attachment to the 8100 local and remote loops is provided by a non-IBM logo product, but like the other attachment features, provides hardware emulator card and supporting software for a single package price. Note that the 3270 cluster, with PCs



IBM PC 1, PC/XT & Portable PC Personal Computers

included as explained above, can also transmit to the 8100.

6113477 8100 PC Adapter—R-Loop Kit: Hardware Components • non-IBM logo product for PC 1 and PC/XT available from IBM's National Distribution Division; developed by Integrated Network Systems (INS) of Mobile, Alabama • consists of a plug-in circuit card, a diskette containing supporting 8100 PC adapter programs, a cable for attachment to an 8100 loop station, and supporting documentation • the adapter and cable allow the PC to be attached directly to a 9.6K- or 38.4K-bps R loop on a local 8100 or a 3843 Loop Control Unit transmitting to an 8100; these configurations allow the PC to emulate a 3270 display and a 3287 printer, and to do file transfers with the appropriate file transfer software on the host • 8100 PC adapter is activated by single command; this command can automatically initialize the PC 8100 attachment in 3270 emulation mode if it is included in the initial DOS AUTOEXEC batch file; this mode supports 24 3270 program function keys, 3 program attention keys, screen print key, hot keys between 3270 emulation session and from 3270 emulation to DOS, a 25th status line and screen copy to diskette • changing from 3270 display emulation to 3287 printer emulation is effected by hitting the select printer control key; printer can be designated for system use only or for local and system use • simultaneous printer and 3270 emulation sessions are supported by the multiple session capabilities of the adapter under both DPPX and DPCX; under DPCX, up to 10 single- or multiple-session devices can be attached to a remote loop, but local loops support 26 devices, only 5 of which can be multiple-session devices • see Data Communications in the Software section of this report for more information on the 8100 attachment and file transfer features • only one adapter can be added to any PC • requires a PC 1 or PC/XT, 128K-byte memory, diskette drive, IBM monochrome display and adapter, keyboard, and DOS 2.0 or later.

\$1,275 prch NA/NA/NA/NA maint

□ Mass Storage

The PC models can all optionally include diskette storage. The capability of attaching hard disk is model dependent.

Diskette Storage

The PC 1, PC/XT, and Portable PC models support a single adapter which in turn attaches 1 or 2 drives; either or both drives can be single-sided or double-sided. Diskettes can be exchanged between all PC models since the recording format is completely compatible. The Portable PC drive cannot be attached to the PC 1 or PC/XT, nor can PC 1 and PC/XT drives be attached to the Portable unit. The drives used on PC 1, however, can be interchanged with those used on the PC/XT.

Portable PC Diskette Drives:

Integral Drive • 360K-byte double-sided diskette drive; also reads and records on single-sided diskettes; slimline drive mounted in system unit; not supported on PC models other than the Portable • records on 5.25-inch diskettes with 40 tracks per side, 9 sectors per track, 512 bytes per sector; 48-track-per-inch density; 250K-bps transfer rate; 300-rpm 6-millisecond track-to-track access • requires diskette drive adapter which is packaged with the System Unit • included in system price.

5155-068-0300 Slimline Diskette Drive • second drive for the Portable PC • same characteristics as stated under the Integral Drive:

\$425 prch \$60/NA/\$33/NA maint

PC 1 & PC/XT Diskette Drives:

1503780 5.25-Inch Diskette Adapter • supports attachment of up to 2 5.25-inch diskette drives • maximum of 1 adapter per PC 1 or PC/XT system • requires system expansion slot • manufactured by Tandon Corporation:

220 NC/NC/NC/NC

1503800 5.25-Inch Single-Sided Diskette Drive • 5.25-inch, single-side, single-density, 160K-bytes when used with DOS 1.1; 180K bytes when used with DOS 2 or DOS 2.1; 40 tracks per diskette; 48 tracks per inch; 6-millisecond track-to-track access time; 20,480-byte-per-second transfer rate; 300 rpm • maximum of 2 drives per adapter; user installable in System Unit housing •

requires 1503780 5.25-Inch Diskette Adapter • manufactured by Tandon Corporation:

289 NA/NA/NA/NA

1503810 5.25-Inch Double-Sided Diskette Drive • 320K-/360K-byte double-sided version of 1503800 drive; features otherwise similar to 1503800 drive:

529 58/47/38/33

Hard Disk Storage

Fixed disk storage is a standard feature of the PC/XT and optional on the PC 1 and Portable PC.

A PC/XT system has the initial drive housed in the system unit. Expansion to 2 drives entails attachment of the 5161-2 expansion unit with one fixed disk already installed, and moving the standard disk from the main system unit to the expansion unit. Since the disk drive is integral to the expansion unit, it is not possible to expand the number of slots in the PC/XT system without adding a second drive.

The PC 1 and Portable PC can also attach 2 fixed disks, by means of the 5161-1 model expansion unit. Since the basic PC 1 and Portable PC systems contain diskettes rather than fixed disks, the expansion method is different. The first disk is attached by adding the 5161-1 expansion unit. Since these expansion units also provide additional I/O slots, they are described in the I/O section of this report. The second disk is added by attaching the separately priced drive and adapter described immediately below. The disk drives integral to the expansion units have the same functional and recording characteristics as the add-on disk.

1602500 Disk Drive • 10M bytes of fixed disk storage using same physical dimensions and mounting as diskette drive • 90-millisecond average access; 512 bytes per sector, 17 sectors per track, 306 cylinders/tracks per surface; 3,600 rpm; must be installed in the 5161 Expansion Unit for the PC to expand disk capacity from 10M to 20M bytes • requires DOS 2.0 and DOS 2.1 and 1602501 Adapter:

\$1,695 prch \$295/\$235/\$190/\$165 maint

1602501 Fixed Disk Drive Adapter • provides buffering, error detection/correction, and DMA data transfer control for 1 or 2 1602500 10M-byte fixed disks • located in the PC/XT or the expansion units • requires 1 full feature slot, DOS 2.0:

695 NC/NC/NC/NC

Tape

The PC 1 can be equipped with a standard audio cassette tape drive for program/data storage; a cassette-tape interface (standard audio-type jack) is included in all PC 1 packaged systems. It is not available on the PC/XT or Portable PC models.

□ Terminals/Workstations

All basic IBM Personal Computers are single-user systems featuring a detached, typewriter-style keyboard which is standard or optional, depending on the packaged system submodel. A separately available display, either a home TV or an IBM monitor, is needed for the PC 1 and PC/XT. The Portable PC comes with an integral CRT. All models can also attach a color monitor.

In addition to the single-user remote terminal personae, the PC can become a local intelligent workstation in a 3270 clustered communications system or in a shared resources 5520 Administrative Clustered System. It can also be attached directly to a 4321, 4331, or 4361 mainframe, a 4700 Series banking system controller, or communicate with a S/34, S/36, or S/38 as a 5250 terminal. See the Systems Overview section for a systems view of the PC in these environments and the I/O & Communications section for detailed information. See also Data Communications and Applications Packages in the SOFTWARE section of this report for details on software support.

Displays

5151-001 IBM Monochrome Display • 11.5-inch diagonal, green phosphor screen; 25-row x 80-character display format; 7x9 dot-matrix character formation in 9x14 field • upper-/lowercase alphanumeric characters; special characters; line-graphic characters • character/field attributes include:



IBM PC 1, PC/XT & Portable PC Personal Computers

underlining; blinking; normal/high intensity; reverse image; non-display • includes signal and power cables • requires 1504900 IBM Monochrome Display and Printer Adapter • for the PC 1 and PC/XT only:

\$345 prch \$44/\$35/\$28/\$25 maint

5153-001 Color/Graphics Display • 80-character x 25-line, 12.5-inch screen • can display 256 different characters in 16 colors against 1 of 8 background colors • reverse image underlining blinking intensity control • all points addressable • for all models:

680 125/100/80/70

1504910 Color/Graphics Monitor Adapter • supports attachment of color/B&W monitor or standard TV and customer-supplied light pen; generates direct-drive RGB signal for attachment of monitor; generates composite video signal for attachment of standard TV (customer-supplied RF modulator also required for standard TV) • includes 16K-byte multiple-screen refresh buffer • medium-resolution graphics mode supports: 320x200-pixel, 4-color format; 128-character set • high-resolution graphics mode supports: 640x200-pixel, B&W format; 128-character set • text mode supports: 256-character set; 16 foreground and 8 background colors • requires system expansion slot

244 NC/NC/NC/NC

1504900 IBM Monochrome Display & Printer Adapter • supports attachment of IBM Monochrome Display and a matrix printer • requires system expansion slot • for PC 1 and PC/XT only:

305 NC/NC/NC/NC

Portable PC Display • integral CRT with 9-inch amber screen • 25-row x 80-character display format; upper-/lowercase characters in an 8x8 dot matrix with one descender • included in packaged system.

Color/Graphics Adapter Board • for the Portable PC only • provides 640x200-pixel graphics resolution; supports composite video output on an external monitor; defines 16 shades of grey in high-resolution mode • occupies 1 I/O slot; included in packaged system.

Keyboards

1501100 Keyboard • 83-key, typewriter-style, alphanumeric keyboard • all non-control keys feature auto-repeat • 10 program function keys; ALT key permits access to all 256 ASCII and special characters • attached to PC 1 or PC/XT System Unit via a 6-foot coiled cable:

\$270 prch NA/NA/NA/NA maint

Portable PC Keyboard • same as the PC 1 and PC/XT keyboard except lighter weight and sized smaller to fit the dimensions of the system unit when closing it • included in packaged system.

1501300 Game Control Adapter • supports 2 customer-supplied joysticks or up to 4 customer-supplied game paddles • requires system expansion slot:

55 NC/NC/NC/NC

Audio Output • facilities include programmable speaker capable of producing tones • included in packaged systems.

Printers/Graphics Output

The IBM Personal Computers support an optional printer, attached via a separately available adapter. With appropriate systems-software modifications, multiple adapters can be used to support multiple printers.

5181-0102 Compact Printer Connector Adapter • connects the 5181 printer to the PC; mates the 16-pin compact printer cable to the 25-pin async adapter connector on the PC:

\$40 prch NC/NC/NC/NC maint

8570 IBM 65-/85-PC Typewriter Attachment Device Convenience Kit • allows the PC to utilize IBM 6714 and 6724 Electronic Typewriter models 65 and 85 as letter-quality trail printers • does not allow typewriter keyboard input • consists of electronics board, cable which connects to the parallel printer port, and IPL/Diagnostic Diskette • diagnostic program requires

approximately 2350 bytes of main memory; requires printer adapter or printer adapter card • attachment and diskette can be purchased separately:

345 NC/NC/NC/NC

8566 65/85-PC Attachment Board • electronics board, cable for connecting the model 65 or 85 typewriter to the parallel printer port; diagnostic diskette not included:

285 NC/NC/NC/NC

8569 Diagnostic Diskette • for 65/85 Attachment board:

60 NC/NC/NC/NC

1505200 Printer Adapter • supports attachment of 5152-002 Graphics Printer to the PC; intended for use with systems configured with the 1504910 Color/Graphics Monitor Adapter • requires system expansion slot:

150 NC/NC/NC/NC

1504900 Monochrome Display & Printer Adapter • supports attachment of 5152-002 Graphics Printer to PC 1 or PC/XT; (see Terminals/Workstations section).

5181-001 Compact Printer • 50-cps unidirectional dot-matrix thermal printer with APA graphics printing at 200 dots per second • lightweight 6.6 pounds; prints 80 characters per line, 10-character-per-inch (cpi) pitch; program selectable 6- or 9-lpi vertical spacing in standard mode; can also print 40 characters per line in double-width mode, 136 characters per line (17.5 cpi) in compressed mode and 68 characters per line (8.75 cpi) in compressed double-width mode • full ASCII 128-character set; 191 printable characters stored in printer ROM • prints on 8.5-inch (21.6-centimeter) width paper rolls on 8.5x11-inch sheets of treated thermal paper; friction fed • EIA RS-232C interface with 1200-bps speed; 256-character buffer, connects to serial ports on any PC • requires 5181-0102 connector adapter for attachment to serial ports:

174 18/14/11/11

5182-001 PC Color Printer • 200-cps bidirectional dot-matrix printer • 132 columns • 4 print modes include draft (200 cps), text (110 cps), APA graphics, and near-letter-quality (35 cps); 4-band ribbon mixable to produce 8 colors • 6K-byte print buffer fixed proportional spacing; 10, 12, 17.1 normal fixed pitch with double width at each pitch; 13.5-inch print line; 3 resident fonts • tractor feed and manual single-sheet feed; up to 4-part forms • requires standard printer signal cable on Printer Adapter, or on Monochrome Display and Printer Adapter software compatible with the 5152-002 graphics printer:

1,995 565/455/365/365

5152-002 Graphics Printer • 80 cps; bidirectional printer allowing mixing of text and graphics • 9x9 dot matrix; 40, 66, 80, or 132 characters per line:

595 63/50/40/35

1525612 Printer Cable • 6-foot cable connects 5152-002 Graphics Printer to 1505200 Printer Adapter or 1504900 Monochrome Display and Printer Adapter:

55 NC/NC/NC/NC

6714-B65 Standard Model 65 Electronic Typewriter • electronic typewriter with 7400 characters of memory, 2 standard typing elements; 96-character set unless otherwise specified 26 alpha and 99 numeric positions on the keyboard, 15.5-inch paper capacity • provides for proportional spacing as well as 10- and 12-cpi pitch; right justification during printing payout for any pitch • resident diagnostics • requires 65/85 PC attachment option in order to attach to the PC • can be rented for \$133 monthly short-term billing:

1,286 NA/NA/NA/NA

6714-K65 Custom Model 65 Electronic Typewriter • same as standard Model 65 except with customized keyboard • can be rented for \$133 monthly, short-term billing:

1,337 NA/NA/NA/NA

6714-B85 Standard Model 85 Electronic Typewriter • same as standard Model 65 except with a total of 15,500 characters of memory, return and advance keybuttons, semiautomatic paper insert lever, lighted carrier position indicator • can be rented for



IBM PC 1, PC/XT & Portable PC Personal Computers

\$165 monthly, short-term billing:

1,677 NA/NA/NA/NA

6714-K85 Custom Model 85 Electronic Typewriter • same as standard Model 85 except with customized keyboard • can be rented for \$165 monthly, short-term billing:

1,729 NA/NA/NA/NA

6724-K65 Custom Model 65 Electronic Typewriter • same as 6714-K65 except with 19.1-inch-wide carriage:

1,445 NA/NA/NA/NA

6724-K85 Custom Model 85 Electronic Typewriter • same as 6714-K85 except with 19.1-inch-wide carriage:

1,729 NA/NA/NA/NA

5931 Memory Protect (Field Installation) • battery backup, 25 minutes; for K or B models:

210 NA/NA/NA/NA

5931 Memory Protect (Plant Installation) • battery backup, 25 minutes; for K models only:

175 NA/NA/NA/NA

7371 Color Plotter • 2-pen desktop-size, high-resolution vector plotter; produces multicolor graphics on paper or transparency film; plot size is 8.5x11 inches • programming is upward

compatible with the 7371 plotter • RS-232C attachment cable needed for connecting to the PC/XT and PC Expansion Units via the Asynchronous Communications Adapter • available May 1984:

1,100 NA/160/90/NA

7372 Color Plotter • 6-pen desktop-size, high-resolution vector plotter; produces multicolor graphics on paper or transparency film; plot size is 8.5x11 inches or 11x17 inches • supports additional commands that provide area fill for arcs, circles, and bars, and 4 sizes of drawings • RS-232C attachment cable needed for connecting to the PC/XT and PC Expansion Units via the Asynchronous Communications Adapter • available May 1984:

1,900 NA/180/96/NA

Other Peripherals

1501400 Prototype Card • for building and testing custom attachments to the system; includes IBM bus interface circuitry and I/O decode logic description:

\$45 prch NC/NC/NC/NC maint

• END



IBM PCjr Home Computer System

■ PROFILE

Operating Systems • DOS 2.1 single-user operating system; cassette operating system in ROM.

Data Management • pfs:FILE information management system; pfs:REPORT report generator; FileCommand file management system.

Communications/Networks • Personal Communications Manager electronic mail package; cluster configurations supporting PCjr, PC 1, and PC/XTs in a LAN.

Languages • ROM-based Cassette Level BASIC interpreter standard; diskette-based Disk/Advanced Level BASIC included with DOS 2.1 diskette • macro assembler optional.

Models • 4860 Models 4 and 67.

CPU • Intel 8088 microprocessor.

Memory • 64K to 128K bytes of main memory; 64K-byte ROM.

Chassis Slots • single display/64K-byte RAM expansion slot; single internal modem slot.

Ports • one RS-232C port.

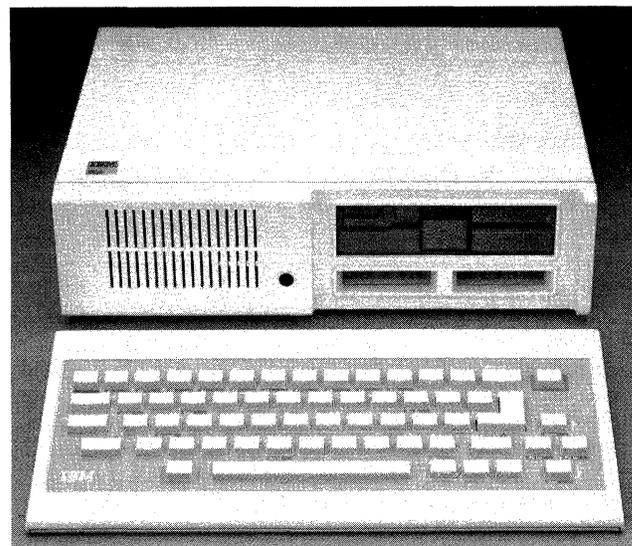
Mass Storage • one 5.25-inch 360K-byte diskette drive; ROM cartridges.

Terminals/Workstations • single-user system.

Printers • dot-matrix, color, and graphics printers available.

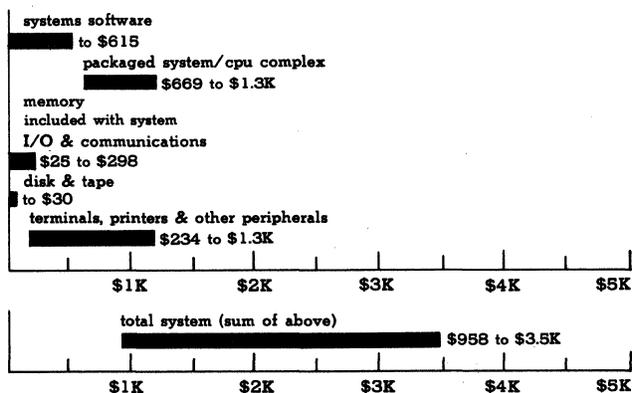
First Delivery • first quarter of 1984.

Systems Delivered • information not available at this time.



PURCHASE PRICE RANGE

hardware & software



IBM PCJR PURCHASE PRICING bar graphs illustrate price ranges for small to large systems, with solid bars reflecting software/hardware purchase pricing • **SMALL SYSTEM** is based on Model 4 packaged system (includes CPU, 64K-byte RAM, 64K-byte ROM with cassette operating system and BASIC interpreter, 2 cartridge slots, keyboard, and RS-232C port) and the following options: cassette interface, TV connector, joy sticks, compact printer, and serial adapter cable • **LARGE SYSTEM** is based on Model 64 packaged system (includes CPU, 128K-byte RAM, 64K-byte ROM with cassette operating system and BASIC interpreter, 2 cartridge slots, keyboard, RS-232C port, one 360K-byte diskette drive) and the following options: DOS 2.1, Disk Level, and Advanced Level BASIC, spreadsheet, word processing and communications software; modem; color/graphics display and adapter cable; graphics printer and printer attachment device.

Comparable Systems • in the home market, competes with Atari 800, Commodore 64, Coleco Adam, and Radio Shack Color Computer; however, major competitor is Apple IIe, which bridges the gap between home and office.

Vendor • International Business Machines (IBM) Corporation, Information Systems and Communications Group, Entry Systems Division; P.O. Box 1328, Boca Raton, FL 33432 • 305-998-6007.

Canada • IBM Canada Ltd; 3500 Steeles Avenue East, Markham, ON L3R 2Z1 • 416-474-2111 • offices located in other cities in Canada.

Distribution • sold nationally through IBM local sales offices; IBM Product Centers; and independent stores and dealers • Product/Service Centers located in San Francisco, CA; Baltimore, MD; and Philadelphia, PA; other service locations in Los Angeles, CA; Washington, DC; Chicago, IL; Boston, MA; Detroit, MI; New York, NY; Dallas, TX; Houston, TX; and Seattle, WA; National Support Center located in Greencastle, IN.

■ ANALYSIS

IBM introduced its long-awaited PCjr in November 1983, after months of rumors, speculation, and anticipation about the new home computer, which was initially dubbed the "Peanut." When the system was finally unveiled, it left more than a few industry analysts less than ecstatic. The system is only partially IBM PC compatible, has an inadequate keyboard, and limited disk storage. On the other hand, it's a good game machine with high-resolution graphics and animation, and a 4-voice sound chip.

It would be unfair to compare the PCjr to its bigger brother—the IBM PC—since they are not meant for the same audience. The system makes an ideal home unit for those who have an IBM PC in the office, and sometimes



IBM PCjr Home Computer System

need to work at home. It is also targeted at the educational market and might fit nicely in the business environment as a low-end communications terminal. In any event, the system will succeed in the marketplace because of its IBM logo.

In the home market, the PCjr will compete with Atari, Commodore, Coleco, and Radio Shack, systems that were designed primarily for entertainment and personal applications. With its 16-bit processor and 64K to 128K bytes of memory, the system is situated at the high end of this marketplace. However, because of its high price tag, it remains to be seen whether consumers will buy the PCjr when they can get sufficient processing power and features to meet their needs from less expensive machines.

The PCjr's major competitor, however, is the Apple IIe, which not only fills the gap between the home and the office, but is also an active product in the educational market. With the Apple IIe being heavily discounted at most retailers, the 2 systems are price comparable considering their features. The Apple presently has more expansion capabilities than the PCjr, both in hardware and software, but that could change within the next 6 to 12 months. The war is on, and the outcome will be interesting.

Strengths

Having the IBM logo is the major attraction of the PCjr. People will buy the system just because it's an IBM product. And because it's an IBM product, an abundance of third-party hardware and software products will become available.

The PCjr also has some attractive qualities in its own right. It provides users with software flexibility by offering a choice of tape, cartridge, and diskette-based programs. When used as a home machine, it provides ample memory (128K bytes) and a range of video modes from a low-resolution graphics capability which is better for TV set-up, to a high-resolution mode comparable to the PC.

Its major attraction in the business marketplace is that it can hook into the larger IBM systems and its capability of running many existing PC programs. It will also serve as a very inexpensive unit in the PC cluster environment, capable of operating without disk drives and instead sharing files of the master cluster station.

Limitations

For some reason, IBM obviously is not putting much effort into keyboard designs for its PCs. The major complaint of the PCjr is the same as the PC models—only worse. It has a terrible keyboard. The keys are "chiclet"-style and are uncomfortable to use for any length of time. Anyone trying to do data-intensive work on it will find it rather frustrating. The practicality of a cordless keyboard that uses an infrared optical link can also be questioned since it could get interference from other household electronic products. Is a cordless keyboard really useful or just a gimmick?

Another problem with the PCjr has to do with the position of the monitor or TV. It cannot be placed on top of the system unit because it interferes with the disk drive and can cause errors (the disk drive is improperly shielded).

This also affects the size of the PCjr's footprint which IBM capitalizes on in its promotions.

When looking at the PCjr as a business system, it can be classified as an entry-level single diskette-based PC, with lower memory, disk, and I/O capacity than the PC 1. As a result certain PC 1 programs cannot be moved down, which is usually the case when a new entry-level system is introduced. The most notable restriction is that of a single diskette drive, which bars the system from a variety of applications. The PC also does not support the 8087 math coprocessor, fixed disk, BSC, or SDLC communications or the IBM 5151 monochrome display. It will be incompatible with PC 1 programs that depend on machine timing, even though the same speed Intel 8088 is used. It does not support direct memory access (DMA), nor any programs that read and write directly to I/O devices instead of interfacing to PC BIOS.

■ SOFTWARE

Terms & Support

Terms • software products are available on a one-time license-fee basis; license permits the use of the licensed product on a single IBM Personal Computer system, the copying/modification of the licensed product (except for copy-protected products), and the transfer of the license and product to another party.

Support • program products are licensed as-is, without warranty; only diskettes are warranted against defects in materials and workmanship for a period of 3 months • IBM Personal Computing Assistance Center (PCAC) offers an electronic database of PC information, a 3-day customer orientation class, and a telephone support line to customers who purchase their PCs under volume procurement agreements from IBM branch offices and marketing representatives, but not from retail outlets including IBM Product Centers.

Software Overview

The PCjr runs cassette- and disk-based programs as well as ROM cartridges. Included in the system unit is 64K bytes of ROM which contains the power-on, self-test, Cassette BASIC Interpreter, and cassette operating system.

For disk-based programs, IBM supports MS-DOS 2.1 on the PCjr. Both IBM and Microsoft claim the system will handle the majority of PC and PC/XT programs without modification if the programs require 128K bytes of memory or less. However, there are certain points a user will have to keep in mind when trying to utilize a PC or PC/XT program on the PCjr.

First, the PCjr uses 16K bytes of the 128K bytes of memory for the video display. This means there is really less than 128K bytes to support a program. If a package needs the full 128K bytes to run, it might not run. Programs that are copy protected also might not run on the PCjr. The schemes used in copy protection are related to peculiarities in the disk characteristics, and the PCjr uses different drives than the PC and PC/XT.

Technical modifications may have to be implemented for some programs. This could be due to the different number of keys in the keyboard; the memory-mapped video screen; or any unusual features a program might have. Additionally, any programs that are entirely or partially time dependent could suffer due to the PCjr's reduced speed.

Packaged Software

6024120 DOS Version 2.1 • includes all DOS 2.0 functions plus extensions (see Operating Systems) • includes BASIC 2 functions: \$65 linc

Operating Systems

IBM Disk Operating System (DOS) Version 2.1 • like the Version 2.0 that it replaces, Version 2.1 includes all the features of



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DOS 1.1 plus additional features and enhancements • Versions 2.0 and 2.1 both have the capability of handling hard disk drives; format diskettes at 9 sectors per track increasing the capacity from 163,840 to 184,320 characters and from 327,680 to 368,640 characters; normally allocates 2 disk or diskette buffers at start-up time but will allow user to specify number of buffers to reserve • provides tree-structured directories; extended screen and keyboard control; redefines the keyboard; redirects I/O; provides piping functions and filters • includes such new commands as backup, RESTORE, RECOVER, VERIFY; enhanced commands for debug, erase, format functions, others • Version 2.1 adds support of the PCjr as well as PC 1, PC/XT, etc; supports chaining of files in a predefined job stream with the whole jobstream or a single program being designated for automatic execution when the system is turned on; also can display a diskette directory, rename, erase, display, compare, or copy files; includes line editor, debug, and linker utilities • requires 128K-byte main memory • DOS 2.1 resides in 24K bytes of memory.

□ Utilities

Various utilities are inherent in the operating system. Additionally, standalone packages are available for file organizing and cataloging.

6024062 Personal Computer File Command • file management system using display of a file directory with a multiline command area to issue DOS commands and execute programs; directory can be sorted by file size, by alphabetical order, by date, or by drive or directory path; assigns commands to function keys • commands can be associated with file names allowing automatic subdirectory listings, single keystroke execution of frequently used programs, fast entry • requires PCjr with 128K-byte memory and one diskette:

\$35 lens

6024050 Diskette Librarian • creates and maintains a catalog of file names over multiple diskettes • requires 128K-byte main memory, 1 diskette drive, DOS 2.1, and BASIC cartridge:

45

□ Data Management

6024041 pfs:FILE V.1.05 • information management system; enables the user to design a form and enter, retrieve, modify, and print information • requires 128K-byte main memory and DOS 2.1:

\$140 lens

6024045 pfs:REPORT V.1.05 • produces reports from files created by pfs:FILE; handles up to 16 column reports • requires pfs:FILE, 128K-byte main memory, and DOS 2.1:

125

□ Communications/Networks

6024100 Personal Communications Manager • electronic mail package with auto-dial support for the PCjr internal modem or an external modem like Hayes Smartmodem • capabilities include mail-management, (scheduling, checking, reports) mail logging (time, sender, subject), mail review; mailbox address can be by alphanumeric name containing mailbox name, addressee's name, telephone number, and modem speed • communications features supported include both tone and pulse dialing, 300- or 1200-bps speed, guaranteed accurate transmission; selectable features for half-/full-duplex, parity, transmission rate, flow control, etc • provides for user-defined function keys; user-specified editor can be accessed • requires 128K-byte memory; one diskette drive; monitor and adapter; modem and appropriate adapter; the required portions of DOS are already on the diskette, so DOS is not required:

\$100 lens

6024107 PC Cluster Program • enables PCs and PCjrs to be used together in a clustered multiuser configuration, sharing a fixed disk and exchanging messages and data • provides a disk server with one public read-only volume for the cluster and one private read/write volume per computer in the cluster; the remaining area on the disk is assigned to the disk server stations;

PC/XT or PC 1 with an expansion unit can be designated the disk server • provides the option to download DOS and an application program from the fixed disk; this capability enables the PCjr to operate in the cluster without drives • supports file transfer, message send/receive, and message broadcast whether or not a disk server is included in the cluster • used in conjunction with the cluster adapter and cluster cable kit (see I/O and Communications under HARDWARE) • requires DOS 2.1, 128K bytes of memory, 1 diskette drive; disk server unit requires 256K bytes of memory, hard disk, 1 double-sided diskette drive; cluster with 1 or more PCjrs must have a disk server:

92

6024182 PC Cluster Program 5-Pack • same descriptions as above • permits use of the program on 5 machines only; allows customers to make up to 4 copies of the cluster program:

400

□ Program Development/Languages

Cassette Level BASIC • interpreter supports subset implementation of Dartmouth BASIC; resident in 64K bytes of read-only memory (ROM) • provides driver and sequential-file facilities for cassette-tape ancillary storage; supports I/O functions for display, keyboard, printer, light pen and joystick • features 17-digit numeric precision; integer, real, and string variables; single- and double-precision floating-point variables; variable names up to 40 characters in length; up to 250 characters per program line; multiple statements per program line; comments on program lines; automatic line numbering; full-screen editing; error trapping • handles PCjr sound features and 10 video modes which extend the PCjr's graphics capabilities • included in packaged systems • developed by Microsoft, Inc.

6024101 PCjr BASIC Interpreter Cartridge VJ1.0 • superset of ROM Cassette Level BASIC; Version J1.0 is also a superset of PC 1 and PC/XT advanced BASIC; supports new graphics and music • improves programmer productivity by reducing need for machine-language subroutines • includes double-precision transcendental functions, path name support for tree-structured directories, advanced graphics, advanced light pen, and joystick support, event trapping for some I/O activities; supports asynchronous terminal emulation, a parallel printer • supplied on a cartridge; can load and run a BASIC program in a second cartridge slot • some commands require DOS to be present, but most do not • requires PCjr system unit uses 6K bytes of memory without DOS:

\$75 lens

Disk Level BASIC • diskette-based extension to Cassette Level BASIC described above • provides instructions, commands, and built-in functions to support IBM Disk Operating System (DOS); includes date, time-of-day, and communications capabilities • with default communications option, occupies 25.5K-byte main memory; without communications option, occupies 24K-byte main memory; requires 32K-byte main memory and 1 diskette drive • available as part of IBM Personal Computer Diskette Software (DOS Diskette) packaged software (see Packaged Software section) • developed by Microsoft, Inc.

Advanced Level BASIC • diskette-based extension to Cassette Level BASIC described above • includes all Disk Level BASIC functions and also supports: display graphics; light pen and joystick; interrupt handling for communications, function keys, light pen, and game controllers; variety of external hardware devices • includes Graphics Macro Language and Music Macro Language • with default communications option, occupies 30.5K-byte main memory; without communications option, occupies 29K-byte main memory; requires 32K-byte main memory and 1 diskette drive • available as part of IBM Personal Computer Diskette Software (DOS Diskette) packaged software (see Packaged Software section) • developed by Microsoft, Inc.

6024003 BASIC Compiler • diskette-based compiler version of IBM Advanced Level BASIC • includes all Advanced Level

LCNS: one-time license fee. Prices effective as of November 1983.



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BASIC functions • requires: DOS; 64K-byte main memory; and 1 diskette drive • can operate on PCjr but must have sufficient storage for compile and link • developed by Microsoft, Inc:

300

6024012 FORTRAN Compiler • compiler supports implementation of ANSI standard X3.9-1978 (subset level) and features from ANSI X3.9-1978 (full level) • features include: combining object modules with subroutines in Pascal or macro assembler; 2-pass compilations; compiler metacommands; edit control • requires: DOS; 128K-byte main memory • compiler cannot run on PCjr, but compiler output will run if there is sufficient storage • developed by Microsoft, Inc.

6024076 LOGO • for developing problem-solving skills and introducing programming concepts to children and adults • requires DOS 2.1 • marketed through Logo Computer Systems:

175

6024002 Macro Assembler • 8088 macro assembler generates relocatable code • features include: listings that include start and end addresses, line numbers, and alphabetic cross-reference; compatibility with BASIC, Pascal, and FORTRAN programs • package includes full and subset versions of macro assembler • requires 96K-byte main memory for full version or 64K-byte main memory for subset version; and 1 diskette drive; DOS 2.1 • developed by Microsoft, Inc:

100

6024011 COBOL Compiler • compiler supports ANSI X3.23-1974 COBOL standard • extensions support color and screen formatting • requires: IBM Disk Operating System; 64K-byte memory • compiler cannot run on PCjr, but compiler output will run if there is sufficient storage • developed by Microsoft, Inc.

All of the program development utilities described below, except for the BASIC Programming Development System, are available as part of the IBM Personal Computer Diskette Software (DOS Diskette) packaged software (see Packaged Software section).

EDLIN Editor • supports creation/modification of source-language files.

Debug Utility • supports program testing and debugging at assembly language level.

Linkage Editor • supports conversion of compiler or assembler-produced relocatable modules to executable load modules.

□ Applications Packages

6024004 VisiCalc V.1.2 • supports management-oriented planning, analysis, and reporting applications • data is arranged in spreadsheet grids each with up to 63 columns and 254 rows; grid elements can be numeric values, labels, or formulas; formulas can include standard functions such as summation, net present value, and trigonometric functions • VisiCalc 1.2 includes all the facilities of VisiCalc 1.1 plus extended addressing of worksheet storage to correspond to memory increases (up to 512K bytes); INSTALL utility allows unlimited copying of VisiCalc V.1.2 to any of its directories • requires 64K-byte main memory; DOS 2.1; and 1 diskette drive for diskette version • developed by Personal Software, Inc:

\$200 lens

6024108 Multiplan V.1.1 • spreadsheet analysis; provides projections, what-ifs, sensitivity analysis, budget and resource planning, and scheduling • spreadsheet grid of 255 rows x 63 columns; online help text; natural language commands and variable names up to 8 display windows; automatic recalculation • Multiplan V.1.1 includes all the features of Multiplan V.1.0 plus extended addressing of worksheet storage to correspond to memory increases (up to 512K bytes); increased math precision up to 14 digits for transcendental math functions; increased print width up to 512 characters; optional disabling of window paint command of Multiplan 1.0 • can run on any PC, including PCjr • requires 64K-byte memory, 1 diskette drive, DOS 2.1 • developed by Microsoft, Inc:

250

6024019 Time Manager V.1.05 • calendar and event-tracking program • records and displays both events and expenses; activities can be viewed on daily, monthly, or yearly basis; keyword and subject searching for retrieval of historical data • requires 64K-byte main memory; DOS 2.1, and diskette drive • developed by Image Producers, Inc:

100

6024031 Dow Jones Reporter • stock market news and information package • supports access to Dow Jones Wire Service; Wall Street Journal; Barrons; New York, American, Mid West, and Pacific Stock Exchanges and Over-The-Counter market electronic databases • requires 64K-byte main memory; diskette drive; Asynchronous Communications Adapter; modem; DOS 2.1; BASIC cartridge:

100

6024005 Easy Writer 1.15 • integrated word processing system provides full-screen text editing and text formatting capabilities • features include: horizontal and vertical scrolling; global and selective search/replace; File Menu; Editor Menu; Additional Commands Menu • requires 64K-byte main memory; 1 diskette drive; DOS 2.1 • developed by Information Unlimited Software, Inc:

175

6024051 Personal Editor • full-screen full-function text editor • requires 64K-byte main memory, 1 diskette drive, DOS 2.1, 40- or 80-column monitor:

100

6024048 Professional Editor • full-screen editor like the Personal Editor but is menu-driven instead of command driven • includes more extensive search/replace facilities, right justification • file merging, insertion of character strings with single keystroke • requires DOS 2.1, 80-column monitor:

130

6024071 Word Proof • for checking spelling and providing synonyms; contains full-screen editor with multiple functions • requires DOS 2.1:

60

6024090 Homeword • full-screen word processor and text editor for PCjr; 40- or 80-column screens; picture menus with joystick selection option • can bypass menu and go to a function from text entry; word processing features include global and selective search and replace, insert and overwrite modes; back-up document on diskettes, most common word processing functions • supports serial or parallel printer • requires 128K-byte PCjr system with diskette, display, printer; no software required since the required portions of DOS are on the diskette:

75

□ Other Facilities

Keyboard Adventure • uses graphics, colors, and sound to highlight the keyboard • included in ROM.

Exploring the PCjr • tutorial that acquaints the user with the system • provided on diskette; included with the Model 67.

Your IBM Sampler • provides sample programs for preparing budgets, writing letters, organizing files, addresses, and phone lists, and managing a variety of everyday activities • provided on diskette; included with Model 67.

■ HARDWARE

□ Terms, Support & Documentation

Terms • hardware products are available for purchase only and include a 12-month warranty.

Support • service available through Authorized IBM PC Dealers, IBM Product Centers, and IBM's Customer Service Division Service/Exchange Centers • warranty extensions and maintenance agreements provided through IBM's Customer Service Division as well as through a Dealer Service Option package available to authorized dealers; dealers can also offer their own warranty extension and service plans • IBM provides training through 4 independent training companies.



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Documentation • systems come with a Guide to Operations and Hands-On BASIC manual; Model 67 also includes a diskette containing a system tutorial, "Exploring PCjr"; set-up instructions are provided with each model • other manuals available for a fee.

Physical Specifications (H x W x D); Weight

PCjr

System Unit • 3.8 x 13.9 x 11.4 inches; 9 pounds.

Display • not applicable; uses TV or various monitors.

Keyboard • 1.02 x 13.45 x 6.61 inches; 1 pound, 9 ounces.

Systems Overview & Configurability

The PCjr is composed of 3 components—a system unit, a transformer, and a cordless keyboard. The system unit houses an Intel 8088 microprocessor, which is the same CPU that drives the PC 1 and PC/XT systems. It also contains 2 cartridge slots; an audible alarm; a sound subsystem; and I/O connectors for attaching serial devices, a cassette, joy sticks, a modem, a diskette drive, video/graphics subsystem, direct-drive video, composite video, television ports, light pen, I/O expansion bus, and external audio.

The 62-key cordless keyboard is battery powered; provides all of the functions of the 83-key IBM PC keyboard; and interfaces with the system unit by an infrared optical link. An optional keyboard cord is available to power the keyboard and to send data to the system unit. This cord must be used when multiple systems are being operated in the same immediate area to eliminate cross-communication.

The PCjr comes in 2 models: the Model 4 which is a cassette-based system and contains 64K bytes of RAM, and the Model 67 which includes a single diskette drive, 128K bytes of RAM, and expanded display capabilities. The Model 4 displays up to 40 columns of information, while the Model 67 can handle up to 80 columns. The Model 67 can also display higher density video modes. These enhanced display features are optional on the Model 4.

Maximum configurability is stated below; minimum configurations are discussed under Packaged Systems.

PCjr System Maximums • 128K-byte main memory; 64K-byte ROM; 360K-byte diskette storage on 1 drive; 1 cassette tape drive, 2 joysticks, modem, light pen, keyboard, 1 TV or display monitor, 1 parallel printer, 1 RS-232C serial device • future extensions possible by daisy chaining off the parallel printer interface bus extension.

Packaged Systems

The PCjr basic system prices include 3 physical units, the System Unit, a cordless keyboard, and a transformer. The two models differ as to primary mass storage orientation; Model 4 is cassette based and Model 67 is diskette based. Model 4 can be upgraded to the equivalent of Model 67.

Basic System Unit • includes Intel 8088 microprocessor, main memory, 64K-byte ROM with cassette operating system, BASIC interpreter, and 2 cartridge slots • 18 built-in connectors for attachment of keyboard cord, display, or TV transformer, light pen, 2 joysticks, cassette drive, diskette drive, parallel printer, audio speaker, and RS-232C-type device • system board also contains connectors for built-in modem and memory/display expansion option.

Transformer • separately housed, 60-volt-ampere, step-down type transformer; includes 6-foot-long power cord from power source to transformer, and 4-foot-long cord from transformer to system unit.

4860-0004 PCjr Model 4 System Unit • Model 4 price includes basic system unit (above), transformer (above) and cordless keyboard (see Terminals/Workstations) • implemented with 64K-byte main memory, 40-character-wide display logic orientation:

\$669 prch

4860-067 PCjr Model 67 System Unit • includes all of the features of the basic system unit, transformer, and keyboard, but

implemented with 128K-byte main memory, 80-character-wide display expansion logic, and 360K-byte dual-sided slimline diskette drive:

1,269

4860-0023 PCjr Carrying Case • for moving or storing the PCjr (not intended for shipping); 18x20x6.25-inch container with room for the System Unit, Parallel Printer Attachment, keyboard and cable, TV connector, transformer and cord, 4 program cartridges, and 5 diskettes • 3-digit changeable-combination lock; case fits under many airline seats:

60

CPU

Intel 8088 Processor • 8-bit data bus interface, 16-bit internal architecture, direct addressing to 1M bytes of memory, 16-bit register set with symmetrical operations, 24 operand addressing modes, 8-bit and 16-bit signed and unsigned arithmetic with binary and decimal operands • 210-nanosecond cycle time; 4.77-MHz clock speed.

Memory

PCjr Model 4 Standard Main Memory • 64K bytes of RAM, expandable to 128K bytes; 16K bytes are reserved for screen memory • uses eight 64K-bit, 150-nanosecond dynamic RAM chips, VLSI MOS memory.

4860-0007 64K-Byte Memory & Display Expansion • adds 64K-byte main memory module, raising Model 4 memory total to 128K bytes; also includes expansion of display capabilities; see Terminals/Workstations for more details on display expansion • this expansion feature plugs directly into a 44-pin connector on the system processor board on Model 4; it is a standard feature on Model 67:

\$140 prch

PCjr Model 67 Standard Main Memory • 128K bytes of RAM, not expandable; 16K bytes are reserved for screen memory • equivalent to Model 4 standard memory plus feature 4860-0007.

I/O & Communications

The I/O attachment of the PCjr is almost completely defined since almost every device adapter/controller is integral to the system. Specific device adapters with external jacks are provided for:

- A home TV or IBM Color Monitor, with ports for direct drive video and composite video.
- Video/graphics subsystem.
- Cassette drive.
- Diskette drive.
- Two joysticks.
- Light pen.
- Modem.
- External Audio.
- RS-232C port.

In addition to these specific adapters, an I/O expansion bus attachment is provided for. At present, IBM offers only the parallel printer adapter to extend this bus.

The printer adapter plugs into the expansion adapter at the right side of the system unit, and internally extends the bus so that the I/O expansion bus is again presented at the right side of the adapter. Presumably more devices could be daisy chained onto the printer adapter.

The PCjr supports asynchronous communications either by means of the internal modem described below, or by an external modem attached to an RS-232C interface. The PCjr can also be connected in a clustered multiuser environment.

PRCH: purchase price. Prices effective as of November 1983.



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4860-0026 Adapter Cable for Serial Devices • RS-232C-compatible connection for bit serial devices such as printers and external modems; standard 3-inch cable with RS-232C, D-type, 25-pin connector; connection is provided for typical signal pins such as transmit data, receive data, request-to-send, clear-to-send, data set ready, signal ground, carrier detect, data terminal ready.

\$25 prch

4860-0009 PCjr Parallel Printer Attachment • used to connect the 5152-002 Graphics Printer to the PCjr System Unit

99

4680-0008 PCjr Internal Modem • AT&T 103-compatible programmable internal modem; 300 bps, auto-dial (touch-tone, rotary, or dual-tone modulated frequency by software command); auto/manual answer and originate FCC part 68-approved direct connect to telephone line using modular telephone jack (detects dial tone, ring-back, line break, busy signal) • full-duplex asynchronous communications on normal household-type 2-wire switched network • programmable interface allows for 7- or 8-bit ASCII characters; odd, even, or no parity generation and detection; 1 stop bit generation; baud rate generation • prioritized interrupt controls • installed by customer without system reconfiguration into dedicated system board slot rather than the serial port

199

PC Cluster Configurations

The PC 1, PC/XT, Portable PC, and PCjr can all be connected in a cluster configuration. To make this connection, a user needs a cluster adapter for each PC, a cluster cable kit for connecting 2 PCs, and the Cluster Software program. (See Communications section under SOFTWARE.) The cluster configuration utilizes baseband signaling and the CSMA/CA access protocol. The topology of the interconnection between 2 computers is a bus environment. Data transmission rate is 375K bps. Up to 64 computers can be supported in a cluster.

The clustered configuration consists of a main coaxial cable bus with cable drops to the PC Cluster Adapter or the PCjr Cluster Attachment. The cable drop connects to the main coaxial cable with BNC T-connectors and to the Cluster Adapter with BNC connectors.

8600027 IBM PCjr Cluster Attachment • for attaching PCjr's in a cluster environment • each attachment is pre-set for remote initial program load (IPL) • cluster problem determination procedures and a terminating plug are shipped with the attachment; diagnostics are included in the ROM on the attachment itself • cluster attachment connects to the side of the PCjr system unit • cannot be installed with the PCjr diskette drive, internal modem, and parallel printer attachment

\$400 prch

1501207 Cluster Cable Kit • connects 2 PCs; each computer in the cluster beyond the first 2 PCs requires an additional kit • includes the main coaxial cable bus, 2 cable drops, 2 BNC T-connectors, and 2 terminating plugs; coaxial cable bus length is 32 feet; cable drop length is 9 feet

140

□ Mass Storage

Diskettes

A single diskette drive can be attached to the PCjr; the drive adapter is integrated in the diskette unit. The PCjr drive cannot be attached to the PC 1 or PC/XT, nor can PC 1 and PC/XT drives be attached to the PCjr. However, diskettes can be exchanged between all PC models since the recording format is completely compatible.

4860-0005 Diskette Drive for Model 4 • 360K-byte double-sided diskette drive; also reads and records on single-sided diskettes; slimline drive mounted in system unit; not supported on PC models other than the PCjr • records on 5.25-inch diskettes with 40 tracks per side, 9 sectors per track, 512 bytes per sector; 48-track-per-inch density; 250K-bps transfer rate; 300-rpm 6-millisecond track-to-track access • unit includes PCjr-diskette drive adapter, which supports the write

protect feature; adapter is buffered on I/O bus; uses the system ROM BIOS (Basic Input/Output System) • requires 4860-0004 System Unit; DOS 2.1 operating system; memory expansion to 128K bytes is recommended.

\$480 prch

Diskette Drive for Model 67 • the diskette drive packaged in the basic Model 67 System Unit is the same drive as 4860-0005.

Tape

The PCjr can be equipped with a standard audio cassette tape drive for program/data storage. A cassette-tape interface (standard audio-type jack) is included in both PCjr models.

4860-0022 Adapter Cable for PCjr Cassette • attaches user-supplied cassette recorder to the I/O connector jacks on the system unit • the cassette recorder/player must have 3 connectors, 2 Belden 51 or equivalent miniature phone-plug (auxiliary and earphone) connectors as well as a Belden 56-style or equivalent subminiature phone-plug connector; all 3 must be present

\$30 prch

□ Terminals/Workstations

The IBM PCjr is a single-user system featuring a detached, typewriter-style keyboard. A separately available display for user/system interaction is needed. The display can be a home TV or the IBM color monitor.

Display

5153-001 Color/Graphics Display • 1640-character, 8x25 lines, 12.5-inch screen • can display 256 different characters in 16 colors against 1 of 8 background colors • reverse image underlining; blinking intensity control • all points addressable • attaches to PCjr, PC 1, and PC/XT:

\$680 prch

4860-0020 PCjr Connector for TV • allows use of home television as system display output • connects to VHF television terminals, usually channel 3 or 4; supports sets made for operation in the U.S. and Canada; 2-channel selection switch • selection switch allows TV to operate in either computer or TV mode • certified within emission limits for FCC Class B Computing Device sealed RF modulator • may require user-supplied 75-ohm to 300-ohm converter for connection to cable TV in TV mode • connects to jack on rear of system unit

30

4860-0021 PCjr Adapter Cable for Color Display • allows connection of Color Display • certified within the emission limits for an FCC Class B computing device • connects to display attachment connector on PCjr System Unit

20

4860-007 Display Expansion with 64K-Byte Memory Expansion • supplies the logic required to handle 80-character-wide displays on monochrome or color monitors; this logic is integral with 64K-byte memory module used to expand system memory to 128K bytes • note that the display buffer for the PCjr is located in system memory, and consequently reduces the main memory available to the user by 16K bytes • enables use of higher density video modes; supports 16 colors with 160x200 and 320x200 pixel graphics resolution; 4 colors with 640x200 pixel graphics resolution • 4860-0007 is required to attach color display or for 80-character-wide displays on monochrome monitors on the PCjr Model 4 (4860-004); 4860-007 is standard on PCjr Model 67 (4860-067) • occupies 1 slot

140

Keyboard

PCjr Standard Cordless Keyboard • cordless battery-powered 62-key keyboard; optional cord; interfaces to system unit by an infrared optical link which transmits coded information from keyboard diodes to a receiver card in the system unit; can be operated up to 20 feet away provided there are no obstructions • low-profile, 62-key, typewriter-style layout with labels affixed above the key position instead of on the keytop, thus allowing customization and easy relabelling; keys have rounded tops



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instead of contouring; one function key; additional cursor control keys plus functions on upper shift of numeric keys • all keys are programmable • extendable legs allow 2 tilt positions of 5 degrees and 12 degrees • cannot be used with PC 1, PC/XT, or related models • requires 4 AA batteries:

NC prch

4860-0012 Keyboard Cord • 6-foot cord for connecting the keyboard to the system unit; when connected, automatically disengages/disables battery and infrared circuit • attaches to jack on back of system unit • this option is required if more than one PCjr is in the same room since infrared signals will conflict; cord does not affect system performance:

20

4860-0013 Cordless Keyboard Overlays • blank, heavy stock paper allowing customization by writing, typing, or printing on the overlays; scored for easy storage and distribution; 5 per envelope:

10

4860-0010 PCjr Attachable Joy Stick • includes cable; provides 2-dimensional positioning control typically for graphics and game playing; 2 joysticks can be attached, each with their own mode selection; spring return mode returns the stick to the center position when released, and free-floating mode allows the joystick to remain in position when released • each joystick has 2 momentary contact buttons for additional input capability; pushbuttons are single-pole, single-throw normally open • 1 or 2 joysticks connect to specified jacks on the back of the PCjr system unit; cannot be connected to PC 1, PC/XT, and related models:

40

Light Pen • user-supplied light pen can be attached to jack on PCjr System Unit.

Audio Output • facilities include programmable speaker capable of producing tones • included in packaged systems.

Printers

5181-001 Compact Printer • 50-cps unidirectional dot-matrix thermal printer with APA graphics printing at 200 dots per second • lightweight 6.6 pounds; prints 80 characters per line, 10 characters per inch (cpi) pitch; program selectable 6- or 9-lpi vertical spacing in standard mode; can also print 40 characters per line in double-width mode, 136 characters per line (17.5 cpi) in compressed mode and 68 characters per line (8.75 cpi) in compressed double-width mode • full ASCII 128-character set; 191 printable characters stored in printer ROM • prints on 8.5-inch (21.6-centimeter) width paper rolls on 8.5x11-inch sheets of treated thermal paper; friction fed • RS-232C interface with 1200-bps speed; 256-character buffer, connects to serial port; requires serial adapter cable:

\$174 prch

5152-002 Graphics Printer • 80 cps; bidirectional printer allowing mixing of text and graphics • 9x9 dot matrix; 40, 66, 80, or 132 characters per line:

595

• END



IBM XT/370 Personal Computer

5160-568 & 5160-588 Systems

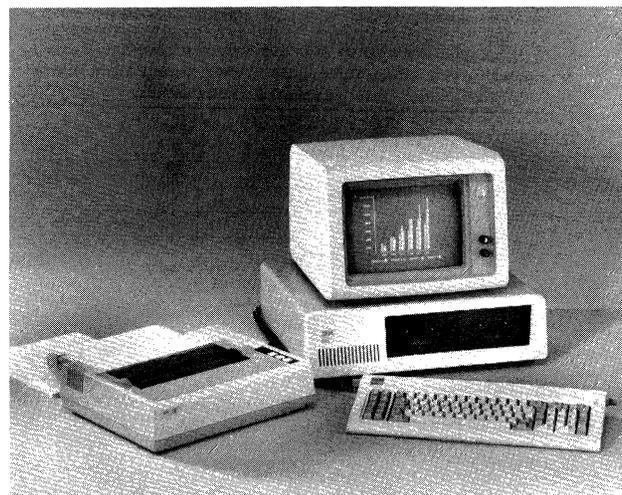
■ PROFILE

System Type • desktop mainframe designed for VM program development and 3270 terminal system interconnection in 370-compatible mode; also has full-featured PC/XT microcomputer mode.

Operating Systems • VM/PC and DOS 2.0 or 2.1 • VM/PC and DOS operations switchable, not concurrent; some software and hardware supported in both environments • VM/PC is a multitasking, virtual memory, virtual machine operating system, a compatible subset of VM/SP R.2 designed for the XT/370 PC; VM/PC allows 3 modes switchable by hot key, i.e., local CMS session, remote 3277-2 emulation, remote 3101 emulation • DOS 2.0 or 2.1 is single-user interactive/batch processing system for standalone environments or as intelligent workstation; supported by read-only-memory-based Cassette Level BASIC interpreter; for configurations with diskette storage or hard disk; UCSD p-System for configurations with diskette ancillary storage only.

Data Management • no database management systems under VM or DOS; file handling supplied by VM; information on compatibility of programs like VM/FSF not yet released by IBM • pfs:FILE, pfs:REPORT under DOS.

Communications/Networks • 3277-2 emulation standard in VM mode; provides control when XT/370 is linked by coaxial cable to 3274; supports upload/download of files via the 3270 system; VM also supports separate asynchronous 3101 terminal emulation program, BSC, SDLC pathway separate from 3270 is not supported under VM • DOS mode supports TTY, asynchronous 3101, BSC 3270 or 3770, and SDLC communications, 5520, 5250, 3270 coaxial connections and emulation, but non-VM coaxial connections are impractical, except perhaps for 5520.



Languages • COBOL, FORTRAN, BASIC/VM, PL/1, Pascal, Assembler H under VM • BASIC Interpreter and compiler, COBOL, FORTRAN, Pascal, macro assembler, APL, and LOGO under DOS.

Models/Performance • 5160-568 and 5160-588 workstations with detachable keyboard, separately available display • differentiated by location of basic disk storage • CPU chips are Intel 8088 on PC/XT board; 2 Motorola 68000s and 1 Intel 8087 on 370 boards • performance in 370 mode is 0.5x4321 or about 0.1 MIPS for commercial workload; scientific performance is 2.0x4321, but IBM has not released Whetstone ratings.

Chassis Slots • 8 basic system slots with 6 allocated, 2 available on Model 588; 8 slots in basic unit and 8 in expansion unit on Model 568 with 8 allocated and 8 available for further expansion.

Ports • no ports on the system; ports are located on expansion cards.

Memory • 768K-byte combined physical memory with overlapped partitioning such that DOS can address up to 640K bytes and VM can address up to 480 bytes for VM and user-accessible memory, and 32K bytes for control storage.

Mass Storage • up to two 5.25-inch, 360K-byte diskette drives for a maximum diskette capacity of 720K bytes; up to two 10M-byte 5.25-inch Winchester hard disk drives for a maximum capacity of 20M bytes.

Printers • single printer typically; matrix-impact and graphics models.

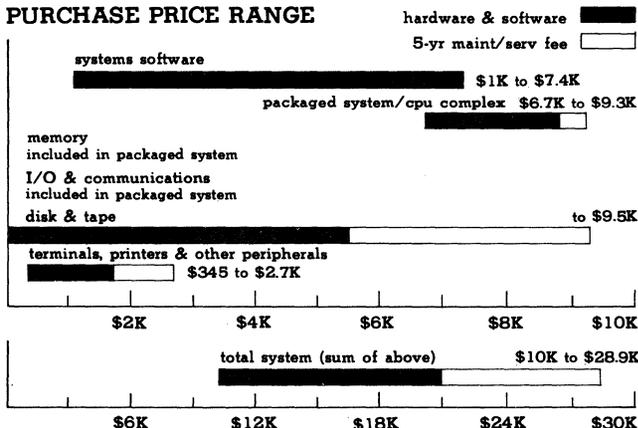
First Delivery • second quarter of 1984.

Systems Delivered • not yet applicable.

Comparable Systems • no single-terminal system with VM program development • multiterminal development systems from Salo Systems, Dialogic are not comparable to IBM's price for a small number of users but do compare on a per-terminal basis for a larger number of terminals.

Vendor • International Business Machines (IBM) Corporation, Information Systems Group • National Accounts Division; 1133 Westchester Avenue, White Plains, NY 10604; 914-696-1900 •

PURCHASE PRICE RANGE



XT/370 PURCHASE PRICING bar graphs illustrate price ranges for small to large systems, with solid bars reflecting software/hardware purchase pricing, and open bars reflecting 5-year service/maintenance fees associated with large system • **SMALL SYSTEM** is based on 5160-588 packaged system (includes CPU, 480K-/640K-byte addressable memory, diskette drive and adapter, fixed disk drive and adapter) and the following options: VM/PC and DOS software, display terminal, and printer • **LARGE SYSTEM** is based on 5160-568 packaged system (includes CPU, 480K-/640K-byte addressable memory, keyboard, diskette drive and adapter, 3274 attachment feature, expansion unit attachment feature) and the following options: VM/PC, DOS 2.1 and supporting software, I/O expansion unit with 20M-byte fixed disk, display terminal, and graphics printer.



IBM XT/370 Personal Computer 5160-568 & 5160-588 Systems

National Marketing Division; 4111 Northside Parkway, Atlanta, GA 30327; 404-238-2000.

Canada • IBM Canada Ltd; Markham, 3500 Steeles Avenue East, Markham, ONT L3R 2Z1 • 416-474-2111 • offices located in other cities in Canada.

Distribution • nationally through: IBM local sales offices; IBM Product Centers • Product/Service Centers located in San Francisco, CA; Baltimore, MD; and Philadelphia, PA; other service locations in Los Angeles, CA; Washington, DC; Chicago, IL; Boston, MA; Detroit, MI; New York, NY; Dallas, TX; Houston, TX; and Seattle, WA; National Support Center located in Greencastle, IN.

■ ANALYSIS

The XT/370 is a single-user desktop system that operates in two environments. The primary environment/application area is a 32-bit desktop program development system, i.e., a VM-compatible, virtual memory desktop mainframe. In addition, the system is hardware and software compatible with the 16-bit PC/XT microcomputer.

The XT/370 can be bought as integrated-system models 5160-568 and 5160-588 (which differ as to how the fixed disk is attached) or as an upgrade to existing PC/XT installations. The XT/370 as an extension of the PC/XT, houses the same components as the XT in its System Unit, plus provides a System/370 processor card, a related memory card, and a 3277 emulation card. XT/370 memory is laid out differently than the PC/XT, with 256K bytes on the 370 system board and another 512K on a separate memory card. Memory capacity, however, is the same as the other PC/XT systems—up to 640K—in Personal Computer mode. When acting in System/370 mode, it's only 480K. The 3277 card is designed so that the XT/370 can be attached to a 3274 unit for BSC/SDLC/SNA communications; 3101 asynchronous communication is optional.

In PC mode, the system runs under DOS 2.0 or 2.1; no other PC operating systems are supported. In order to switch to VM, the user keys in "VMPC." The PC implementation of VM retains many of the features of mainframe VM, including automatic virtual memory paging and most CMS commands. In addition, a "hot key" allows switching between CMS, 3277 emulation communications, and 3101 (asynchronous) communications sessions. Program development software can be downloaded from the mainframe, licensed at greatly reduced prices. VM/PC Remote Services allows concurrent sessions to operate in the background while the user is using an interactive CMS session. The example that IBM provides is that a user can be editing a local file in a CMS session while a program is being compiled on the host in a remote session.

IBM has released information on certain PC-DOS programs and hardware features which are supported under VM/PC, certain programs and hardware features which are not supported, and which VM/SP programs are authorized to be downloaded from the host. IBM has also released the broad criteria that govern the ability of an IBM-supplied or user-developed VM program to run on the XT/370 under VM/PC (see Compatibility/Emulation/Conversion). IBM has not supplied a detailed compatibility

list for all VM programs, probably because they have not finished testing.

This report reflects only the VM/PC environment as described so far by IBM. The XT/370 can support all DOS 2/2.1 features when operating in DOS mode, but only those supported by VM are included here. See the report on the PCjr, PC 1, and PC/XT for a full description of the DOS environment.

□ Strengths

The list of software products that IBM has authorized to be downloaded from the host indicates that IBM intends to focus the XT/370 system on VM program development and not much else. VM compilers, libraries, and editors can run under VM/PC for a fraction of the cost required to license them on a mainframe. VM/PC is a subset of VM/SP V.2, but the downloaded compilers, libraries, and supporting software are the full unabridged mainframe versions.

Although limitations on real memory, I/O, and especially disk capacity undoubtedly will affect the viability of some VM applications, users and value-added turnkey vendors are bound to find other uses for the XT/370 system. An application developed for the XT/370 will be software compatible with larger 4300 systems, and hence can be moved up. The growth path is virtually unlimited.

Although the XT/370 is only a single-user system, it has double the scientific processing throughput of the multiuser 4321 (and 4331-1) mainframes. This is partly a reflection on the 4321's weakness, of course, but even so the XT/370 is particularly attractive as a low-cost scientific workstation in a dedicated user environment that wants to retain IBM compatibility.

□ Limitations

The XT/370, as presently implemented, is far more limited than has been implied by some of the early press, which stated in several (non-industry) newspapers that all of the enormous base of 370/30XX/4300 software was available to it. First of all, IBM's largest user base, the DOS/VS/VSE base native to the low and middle end of the 4300 series, has not been implemented at all, although it is designed for small systems and is suitable for this type of machine. Nor have the (less suitable) OS/VS1, MVS, ACP/TPF, or MUSIC V operating systems been adapted for the XT. Furthermore, the version of VM that has been provided for the XT is restricted relative to 4300 versions.

If users do decide to run "unauthorized" VM applications from IBM, other than those designated for downloaded program development, license charges are the same as for mainframes. IBM has stated that other applications may run, but they are not supported.

Although in theory all PC/XT options can be supported in DOS mode, even if they are not supported under VM/PC, most types of system interconnection options would seem to be impractical to implement if the XT/370 3277 board is connected to the 3274 controller (which IBM invites the user to do, since the 3277 board is a standard feature). To have the same XT/370 connected to the 3274 in 2 ways seems impractical on the one hand; on the other hand,



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only 3278 (not 3277) emulation is supported under DOS. Connecting the XT/370 simultaneously to a 5520 system (supported under DOS) and to a VM-supported 3270 is not impossible, but it would seem to be an unlikely, complex environment.

■ SOFTWARE

□ Terms & Support

Terms • software products are available on a one-time license fee basis; license permits the use of the licensed product on a single IBM Personal Computer system, the copying/modification of the licensed product (except for copy-protected products), and the transfer of the license and product to another party • quantity discounts are available under the Volume Licensing Agreement (VLA); users ordering program products in quantities of 20 or more are charged a one-time license fee per copy of program product less a volume discount.

Support • program products are licensed as-is, without warranty; only diskettes are warranted against defects in materials and workmanship for a period of 3 months • telephone assistance for DOS is available for a period of 3 months after the date of installation from the ISD Personal Computer Assistance Center • the PC Assistance Center in Boca Raton, FL provides telephone assistance for users with 20 or more VM/PC licenses for 12 months after the company supplies the name of a specific technical coordinator to IBM; questions can be submitted in writing at any time regardless of the number of programs • the technical coordinator also accesses Field Engineering IBM Support Center for defect reporting and resolution.

□ Software Overview

The XT/370 operates in terms of 2 basic modes reflecting 2 environments. As an upgrade to the PC/XT, it can run PC-DOS 2.0/2.1 and its subsidiary programs. When the VMPC command is entered, control is switched to a separate set of system boards that provide a System/370 instruction set and compatibility with VM/SP R.2 with CMS.

The VM/PC environment is the defining element of the XT/370, its raison d'être. It is clear that IBM initially sees the VM/PC-XT/370 system as an individualized program development system. All of the programs initially authorized for downloading center around this application. However, users will undoubtedly find user-written VM programs that will run comfortably on the PC, and open other application areas.

The operating system section of this report includes information on PC-DOS 2/2.1 as the link to the PC environment, VM/SP R.2 as a description of the state-of-the-art of the complex VM environment, and VM/PC as the focus of XT/370 operations. The rest of the software sections deal only with those software packages that IBM has formally announced as being supported for operation under VM/PC. See the PCjr, PC 1 & PC/XT report for information on the full DOS 2.0/2.1 environment. See the IBM Mainframe report for full coverage of the VM environment.

□ Packaged Software

6936733 VM/PC Virtual Machine/Personal Computer • operating system control program (CP) a compatible subset of VM/SP R.2 (see Operating Systems); also includes CMS, IMPORT/EXPORT, XEDIT, Exec 2, Remote Service 5, 370 Processor Control, Host Remote Server, and Configuration • requires XT/370 or a PC/XT with the XT/370 Option Kit installed, diskette drive, fixed disk drive, 25x80-character display, and 3277-2-compatible coaxial connection if remote server support is desired • also requires DOS V.2.0 or 2.1 • if upload/download facility is to be utilized, host must run VM/SP R.1, 2, or 3 with or without HPO, BSEP R.2, and supporting S/370 programs:

\$1,000 OTC

6024001 IBM Personal Computer Diskette Software (DOS Diskette) Version 1.1 • includes: IBM Disk Operating System (DOS); Disk and Advanced Level BASIC language extensions to read-only-memory-based Cassette Level BASIC; editor, debug,

and linkage utilities • does not run on XT/370:

\$40 lens

6024061 DOS Version 2 • includes DOS 1.1 functions with higher memory capacities and hard disk • not available from IBM after December 1983; replaced by DOS 2.1:

60

6024120 DOS Version 2.1 • includes all DOS 2.0 functions plus extensions (see Operating Systems) • includes BASIC 2 functions, support of XT/370:

65

□ Operating Systems

The primary focus of the XT/370 is for VM program development. Many VM programs are potentially able to run on the PC. In order to bring the VM environment into focus, the mainframe VM environment is first described, then the VM/PC subset, and finally the DOS microcomputer supporting environment.

Virtual Machine Facility—VM/370, VME, VM/SP, VM/BSE Mainframe Environments

The VM/370 group of operating systems were originally understood as operating systems for controlling multiple concurrent operating systems. They were not originally designed as standalone operating systems as were the OS or DOS groups of SCPs, but support the various forms of OS and DOS concurrently within the same processor and manage the resources of the processor to give each user the sense of access to an independent machine. The resources are obviously shared among the resident operating systems, so the sense of independence is virtual rather than real, but the effect is that 2 (or more) users, one running under DOS/VS and the other under OS/VS1, for example, can operate the same machine at the same time and be totally unaware of each other's existence.

As VM developed, however, users discovered that the Conversational Monitor System (CMS) component of VM was an excellent small interactive program development system with significantly lower overhead than TSO. Although VM with CMS was designed to operate in conjunction with another operating system, and hence lacked many of the more sophisticated features, users who had limited production requirements found VM/CMS an excellent standalone system for timesharing and program development.

The VM/370 group supports all 370-generic uniprocessor and AP configurations from the 4331 through to the 3081. The operating systems that can execute under VM/370 are DOS/VS, OS/VS1, SVS, MVS groups, and most earlier 360/370 versions of DOS and OS. Note that DOS/VSE is not directly supported under VM/370, but certain provisions of VM/370 R.6, VM/BSE, and VM/SP can accommodate a DOS/VSE-equipped 4300 Series as a guest processor through an SDLC link operating under ACF/VTAMÉ. All subordinate virtual machines in a VM environment execute in the problem state; only the VM control program executes in the control state.

Although the VM-supported concurrent virtual environment is essentially transparent to each user, there are several operational restrictions on guest operating systems machine/program timing dependencies are not permitted; the READ DIRECT and WRITE DIRECT commands cannot be used; dynamic modifications to channel programs are sharply restricted, and MVS groups on dual processors must usually execute in the uniprocessor mode or AP mode, that is, in asymmetric mode with all I/O on 1 processor (VME and later) unless the VM/SP program product level of the operating system is configured. Some capabilities gained in the VM environment are: multiple copies of the same operating system can run in 1 processor to redistribute unrelated multitasking operations; operating systems that do not support the Dynamic Address Translation (DAT) hardware can function as virtual systems; and a Conversational Monitor System (CMS) is

LCNS: monthly license fee unless otherwise indicated. OTC: one-time charge. Software maintenance is not available. Prices effective as of October 1983.



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provided as an alternative language to JCL. The VM/XA Migration Aid provides concurrent running of MVS/SP production and test environments for conversion to MVS/XA.

VM/370 Release 6 SCP

VM/370 consists of a control program, a Conversational Monitor System (CMS), a Remote Spooling and Communications Subsystem (RSCS), and an Interactive Problem Control System (IPCS). VM/370 is offered in 5 release versions, R.3 through R.6. The following paragraphs describe VM/370 R.6. Release 6 is the release used to configure partially unbundled versions of VM, namely VM/SE (VME), VM/BSE, and VM/SP.

Control Program (CP) • complemented by a Virtual Machine Assist hardware feature that operates with the CP to trap and process all interrupts and privileged instructions from the virtual machines; this scheme establishes the control state of VM/370 and places all virtual machines in the problem state; primary CP functions are time, storage, virtual I/O, and spooling management • time is managed through an asynchronous time-slice algorithm that regulates the frequency of time allocations as a simple function of the frequency-of-request history of each virtual machine • storage management is similar to the MVS scheme of 4K-byte pages and 64K-byte segments in which each virtual machine's environment is defined by table with parameters built from real program requirements • the CP handles virtual I/O assignments by intercepting every START I/O instruction and by using the issuer's identity as a pointer to a relative-displacement index that defines the user's preassigned I/O device/volume allocations • local spooling management is essentially an extension to the virtual I/O management facility • certain CP command privileges are distributed to each virtual machine to provide varying degrees of user access to the control environment.

Conversational Monitor Systems (CMS) • an interactive program development and file manipulation language that can reduce or totally eliminate the need for JCL • permits source programs, data, and text files to be created directly on disk and supports all file maintenance operations; supports assembler, BASIC, COBOL, FORTRAN, Pascal, and PL/1; CMS files use automatically allocated/deallocated chained fixed-length blocks; file read/write is supported only for programs operating under CMS and can be handled by CMS, OS BSAM/QSAM/BDAM, and DOS sequential I/O macros • CMS can read but not write from OS sequential and partitioned data sets; full portability and compatibility among CMS, OS, and DOS is supported for VSAM data sets from COBOL, PL/1, and VS BASIC programs.

Remote Spooling Communications Subsystem (RSCS) • supports multiple concurrent spooling functions for programmable/nonprogrammable terminals in a telecommunication environment; manages distribution of spooled data to host programs and from programs to designated I/O • unprogrammable terminals interface through 3704/3705, 3725, 2701, 2703, or an Integrated Communications Adapter (e.g., S/370, 138, 4331); programmable terminals are supported for any processor running HASP, ASP, RES, JES2, or JES3 • general support is provided for the 2770/2780, the 3770 as a 2770, the 3776 (3777-1 as a 3780), and the 3780; also provides access to the 8100 with DPPX/RJE (BSC).

Interactive Problem Control System (IPCS) • generally similar to the MVS IPCS; permits problem analysis facilities to be distributed to remote users on a controlled access basis.

General Support Characteristics of VM/370 R.6 • supports 3033 AP and 4300 Series in 370 mode; ECPS-VM/370 Assist option is available to 4300 users operating in 370 mode, but option is mutually exclusive with ECPS-VS1 Assist feature; supports 3278 Display Console and 3287 Printer; supports Communications Adapter feature of the 4331 and thus permits a DOS/VSE guest virtual machine with ACF/VTAME active to operate in a VM/370 environment; supports the 3800 Printing Subsystem and the 3203 Model 5 Printer as dedicated or real spooling devices; permits multiple alternate system consoles to be specified and supported.

VM/SP

VM/SP is the most current version of the VM group of operating

systems, which includes VM/370, VM/SE (sometimes termed VME), VM/BSE, and VM/SP. In addition, the VM/XA Migration Aid is a totally unbundled migration aid which has some characteristics like those of a freestanding operating system. The VM group of operating systems can operate with CMS as a restricted-capability standalone operating system.

The original VM/370 consists of a control program, a Conversational Monitor System (CMS), a Remote Spooling and Communications Subsystem (RSCS), and an Interactive Problem Control System (IPCS). VM/370 Releases 5 and 6 are used to configure partially unbundled versions of VM, namely VME, VM/BSE, and VM/SP. Future enhancements in VM systems will be made by changes to VM/BSE and VM/SP; the VM/370 R.6 component will not change.

5664-167 VM/System Product (VM/SP) R.1.1, R.1.2 • includes multiprocessor support, 3080 Series Support, 4321, 4331, and 4341 support, in addition to all the facilities of VM/SE and VM/BSE; supports all facilities of the 3380 DASD; accommodates the 3800 Printing Subsystem as a spooling device; extends CMS/DOS support to OS/VS1 BPE, DOS/VSE/Advanced Functions R.2 and R.3, and to VSE/VSAM R.2 (except for DASD sharing, VSE/VSAM space management for SAM users, and backup/restore); provides support for 5440-X45 JES2 and 5740-XYN JES3 of MVS/SP • new missing interrupt handler available July 1982 for Release 1.1; service level 116 is required to use this feature in conjunction with VM/SP HPO • supports 3080 Series and 3033S and up.

5664-167 VM/System Product (VM/SP) R.2, R.3.0 & R.3.1

• R.2 includes all of the functions of Release 1, but with a restructured CMS nucleus, new CMS productivity aids and functions; removal of some CMS restrictions; programmable operator support to reduce system operator messages, allowing an operation of a remote VM/SP by a host VM/SP; enhanced support for ASCII, BSC 3270, 3088, and 3800 devices; CMS/DOS support through VSE/AF R.3, VSE/VSAM R.2, and 3375 DASD • runs on all VM/SP R.1-compatible systems except 3081-D24, D32, and 3081K; support for 3081-D16 available first quarter of 1983; supports all applications running on VME R.2, VM/BSE R.2, and VM/SP R.1 without alteration unless they include code dependent on internal CP or CMS structure or control blocks • new missing interrupt handler available fourth quarter of 1982 for R.2 and later; service level 218 is required to use this feature in conjunction with VM/SP High-Performance Option • R.3 includes all of the functions of R.2 plus a System Product Interpreter, improved VSAM support, enhancements to CMS, and CP extensions for applications programs; all of the VSE/VSAM assembler macros and their options, and a subset of OS/VSAM macros are now supported by CMS • R.3 available September 1983 • R.3 at SLU (PUT 8308) service level or later is required to support the 4381-1 or 4381-2; R.3 supports AP/MP models and 3081-D16 processors as of the first quarter of 1984 • corresponding ECPS:370 microcode levels for R.3 must be Level 18 on 370/136-3, 370/138, 370/145-3, 370/148; Level 19 on 4331-1, 4331-2, or 3031; and Level 20 on all 4341 processors; note that ECPS:VM/370 and ECPS:MVS microcode assists can be used on 4341-12 and 4341-2 but are mutually exclusive on other 4341 models • R.3.1 includes all the VM/SP CP and CMB capabilities of R.3 plus capability of directly installing 5664-173 VM/SP HPO (High-Performance Option) prior to system generation; this provides the VM/SP HPO user with a capability similar to a System IPO/E and eliminates the need for a separate System IPO/E for VM/SP R.3.1; R.3.1 available first quarter of 1984; users can receive R.3.1 capability by applying for a service program update tape (PUT) • installation aids available in R.3.1.

VM/PC for XT/370

VM/PC Virtual Machine/Personal Computer • compatible subset of mainframe VM/SP Release 2 designed to run on the XT/370 version of PC/XT; resides in XT/370 together with PC-DOS V.2.0 or V.2.1; XT/370 mode is invoked by the VMPC command, whereupon XT/370 runs as a System/370 workstation which can switch modes using a "hot key"; modes include local CMS session using commands similar or identical to VM/SP Release 2; 3277 Model 2 emulation session via coaxial cable connection to an IBM 3274 control unit with a type B adapter (see HARDWARE: Data Communications); and remote



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3101 emulation session using an optional asynchronous adapter card and 3101 emulation program • provides for uploading and downloading of CMS files between a VM host and 3274-attached VM/PC workstation; printer spooling of CMS files to a local or host printer; access to host files as CMS minidisk extensions to workstation CMS minidisks; VM/PC manages single virtual memory space up to 4M bytes • components include CMS, IMPORT/EXPORT for transferring files between CMS format and PC-DOS format; XEDIT editor and EXEC 2 language (both compatible with VM/SP R.2); VM/PC Remote Services for handling 3277 emulation, remote printing, and file transfers; 370 Processor Control for debugging and full-screen editing; PC Configurator for ongoing reconfiguration and tailoring; remote server residing in host for handling file transfers.

VM/PC Control Program Commands Supported • #CP, *ATTN, BEGIN, CHANGE, CLSOE, CP, DEFINE, DETACH, DISPLAY, DUMP, EXTERNAL, IPL, LINK, LOGOFF, ORDER PURGE, QUERY, REQUEST, SET, SPOOL, STORE, TAG, TERMINAL, TRACE.

CMS Commands Supported • include: ACCESS, CMDCALL, COMPARE, COPYFILE, CP, DEBUG, DEFAULTS, DROPBUF, ERASE, ESTATE, EXEC, EXEC10, EXPORT, FILEDEF, FILELIST, FINIS, FORMAT, GENMOD, GLOBAL, GLOBALV, IDENTIFY, IMPORT, INCLUDE, LISTFILE, LOAD, LOADMOD, MACLIB, MAKEBUF, MODMAP, NUCXDROP, NUCXLOAD, NUCXMAP, PRINT, QUERY, RELEASE, RENAME, SENTRIES, SET, SORT, START, STATE, STATEW, SYNO NYM, TXTLIB, TYPE, UPDATE, XEDIT, HT, HX, RT.

DOS 2.0/2.1 for XT/370

IBM Disk Operating System (DOS) Version 2.0 • general-purpose diskette operating system supports single-user interactive and batch processing; provides high-level interface between user software and associated hardware environment • Version 1.1 (which does not run on the XT/370) supports up to two 5.25-inch diskette drives with sequential and random file access and dynamic space allocation; user-accessible functions include: diskette-directory display; file rename, erase, display, compare, and copy; chaining of diskette-based programs in predefined job streams; designation of single program or job stream for automatic execution after system startup • DOS includes Linkage Editor, Editor, and Debug utilities • requires minimum of 32K bytes of main memory and 1 diskette drive on 5150 diskette-based models • included in 6024061 IBM Personal Computer DOS packaged software (see Packaged Software section) • **Version 2** includes all the features of DOS 1.1 plus additional features and enhancements; capability of handling hard disk drives • formats diskettes at 9 sectors per track increasing the capacity from 163,840 to 184,320 characters and from 327,680 to 368,640 characters • normally allocates 2 disk or diskette buffers at start-up time but will allow user to specify number of buffers to reserve • provides tree-structured directories • extended screen and keyboard control; redefines the keyboard • redirects I/O • provides piping functions and filters • includes such new commands as backup, RESTORE, RECOVER, VERIFY • enhanced commands for debug, erase, format functions, others • requires minimum of 64K bytes on diskette-based systems; 128K bytes when using a hard disk system.

DOS Version 2.1 • includes all of the features of DOS 2.0; supports chaining of files in a predefined jobstream with the whole jobstream or a single program being designated for automatic execution when the system is turned on; also can display a diskette directory, rename erase, display, compare, or copy files; includes line editor, debug, and linker utilities • DOS 2.1 (as well as DOS 2.0) resides in 24K bytes of memory, 12K bytes more than DOS 1.1.

□ Data Management

Conversational Monitor Subsystem (CMS) File Management • one of the primary functions of CMS is the manipulation of files; users can create, modify, debug, copy, delete, list, rename, and spool files; the contents of files can be according to sort fields.

□ Transaction Management

No transaction processing control software is likely to be added to

the XT/370, since it is a single-user system without subordinate terminals or adequate database size for supporting such a subsystem.

□ Communications/Networks

VM/PC Remote Services (3277 Emulation) • part of VM/PC • communications handler that provides a remote 3277 emulation session that can be used concurrently with a local CMS session; also provides for virtual minidisk files; the VM/PC user can access files on a host as if they were local; remote services also allows host printers to be used as VM/PC printers.

Host Remote Server • separate program residing in host, distributed with VM/PC, and implemented in a separate installation step if the user so desires • remote server provides spool, disk, and file services, VM/PC service request processing, and logical and physical communications management.

NC Icnr

6024032 Asynchronous Communications Support • terminal-emulation and file-transfer utility manages communications with systems supporting TTY ASR 33/35 or equivalent data transmission procedures • user-/program-selectable communications parameters include: 75- to 2400-bps data rate; parity; number of stop bits; line-output turnaround characters; half- or full-duplex operation; XON/XOFF operation • tested for operation with VM/370 Release 6 and VM/Systems Product Release 1 on IBM System/370 Model 158 with IBM 3705 communications equipment • requires: DOS; 64K-byte main memory; 1 diskette drive; 1502074 Asynchronous Communications Adapter; and full-duplex modem; requires 128K-byte memory when used with fixed disk • no host license required.

60

6024042 3101 Emulation • emulates 3101-20; allows conversion of ASCII diskette files to and from binary format • requires 64K-byte user memory, 1 diskette drive, asynchronous communications adapter, DOS 1.1; when program and/or its data files are on fixed disk, requires 128K-byte memory and DOS 2.0; also requires full-duplex modem or necessary cabling for direct connect to local host computer • no host license required.

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□ Program/Development Languages

5740-CB1 OS/VS COBOL Compiler & Library • complies with ANS COBOL X3.23-1968 and X3.23-1974; provides for reformatted source listings with imbedded cross-referencing information; supplies execution statistics for debugging and code optimization support; provides symbolic debug and code optimization facilities • requires 1M-byte virtual memory page size; 1M-byte disk space • host license is \$311 monthly.

\$19 Icnr

5740-LM1 • OS/VS COBOL • Library only; requires 0.4M-byte disk space • host license \$101 monthly.

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5748-F03 VS FORTRAN Compiler & Library R.1 • complies with ANS FORTRAN X3.8-1978 and ISO 1539-1980; includes and extends all of the procedures of the preceding FORTRANs • provides integrated optimization facilities similar to OS FORTRAN IV (H Extended); cross-operating-system compilation is supported; all source programs written for earlier FORTRAN versions are accepted through a 1966-level option • requires XT/370 PC, 2M-byte virtual memory page size; 1M-byte disk space • host license initial fee of \$636 and \$212 monthly.

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5748-LM3 VS FORTRAN R.2 Library • library for 5748-F03 only • host license initial fee of \$189, and \$63 monthly.

4

5796-PNQ Pascal/VS • PO • superset of basic Pascal that meets the proposed ISO standard with extensions; permits programs to be subdivided into multiple separately compilable sections; supplies dynamic character string to support variable-length text data manipulation; static declarations can be used to localize reusable data between procedure invocations • requires 1M-byte virtual memory page size; 1.2M-byte disk space



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• host license of \$188 monthly:

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5668-962 OS Assembler H V.2 R.1 • functional replacement for 5734-AS1 OS Assembler H R.5 • includes all the functions of OS Assembler H plus support for bimodel addressing in MVS/XA environment, new XA machine instructions, new channel command word instructions, support for VM/SP and VM/XA Migration Aid in the CMS environment • distinction between V.1 R.5 standard, commercial, and scientific instruction sets eliminated; user chooses XA, 370, or Universal sets • requires 1M-byte virtual memory page size; 0.2M-byte disk space • host license initial fee of \$435, and \$145 monthly:

9

OS PL/1 Optimizing Compiler With Resident & Transient Libraries R.4 • only the compiler is required for compile-only operation; only the resident library is required for link editing without compilation or execution; only the transient library is required for execute-only operation; the compiler, resident library, and transient library are required for compilation/link editing/execution • resident library provides mathematical routines, data conversion, edit routines, and system control program interfaces • transient library generally supports error/interrupt handling, file open/close, I/O transmissions, program initialization, and storage management • 1-step compiler rather than a translator/interpreter; supports VSAM data sets; communicates with assembler, COBOL, and FORTRAN object modules; provides ASCII support using QSAM; includes GRAPHICS, a new data type for processing large character sets.

5734-LM4 OS PL/1 • Resident Library; requires 0.6M-byte disk space • single host license \$55 monthly, regardless of number of PCs:

4

5734-LM5 OS PL/1 • Transient Library; requires 0.6M-byte disk space • single host license \$32 monthly, regardless of number of PCs:

4

5734-PL3 OS PL/1 Optimizing Compiler • with Resident and Transient Libraries • requires 1M-byte virtual memory page size; 3M-byte disk space • single host license \$339 monthly, regardless of number of PCs:

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5668-996 IBM BASIC/VM Processor & Library • enhancement of ANSI X3.60-1978 Minimal BASIC standards • interactive source program development and debugging with line-by-line syntax checking; HELP facilities; object program execution in interactive or batch mode • requires 1M-byte virtual memory page size; 0.4M-byte disk space • single host license initial fee of \$1,050 and \$350 monthly, regardless of number of PCs:

21

XEDIT • part of VM/PC • file handling and editing utility; users can create files, manipulate data, transfer data between files; screen support includes multiple views of the same file or different files; joining, splitting, and wrapping lines; extended string search screen definition; column pointers and selective column viewing.

5734-CB4 COBOL Interactive Debug • provides conversation debug facilities to the terminal operator; permits constant and conditional breakpoint specifications; provides dynamic monitoring and trace facilities; provides a manipulation facility for COBOL data items • requires 1M-byte virtual memory page size; 0.2M-byte disk space • single host license \$351 monthly, regardless of number of PC copies:

21

5748-XX9 Document Composition Facility R.2 (SCRIPT/VS) • text processing program for interactive or batch mode production of typeset text • consists of a formatter and the optional Foreground Environment Feature • SCRIPT/VS provides for markup, full-page makeup printing, etc of documents; can also be used as a preprocessor to prepare documents for processing

by other programs • requires 1M-byte virtual memory page size; 0.6M-byte disk space • single host license \$303 monthly, regardless of number of PC copies:

18

Application Packages

None available from IBM have yet been authorized for operation under VM/PC.

Other Facilities

PC Configurator • integral to VM/PC • allows the user to customize systems after installation as the environment changes; user can modify passwords, disk allocation, page-file allocation, communication options, virtual machine size • configuration information is saved on a system file; default configuration can be used without modification for a single user to access all CMS/PC files without host connect requirements.

Programs developed for S/370 VM/CMS can run on the VM/PC without alteration provided they use no more than one virtual address space, can run in a virtual machine of less than 4M bytes, and do not require more than 416K bytes of real memory. They must also support a 3277-2, be able to run without exceeding the system disk capacity, and use only VM/PC-supported commands. They must not rely on a protection exception, depend on S/370 DOS emulation (VSAM), rely on time-dependent operations, or rely on internal VM/SP and/or HPO structure or formats.

See Operating Systems for a list of which VM/CP and CMS commands are supported.

■ HARDWARE

Terms & Support

Terms • hardware products are available for purchase only and include a 90-day warranty • IBM Personal Computing Marketing Division sells the PC/XT Personal Computer to both IBM's own retail outlets and to non-IBM retail outlets in any quantity; the XT/370, however, is sold only by IBM's direct sales force; IBM will sell to the end user in volume orders (VPA) of 20 or more, or in pilot orders leading to a VPA of 20 or more; VPA orders can be for the basic system or for packaged systems; non-VPA orders can only be for basic systems • discounts for most CPU components are as follows: 12% for 20 to 49, 16% for 50 to 149, 20% for 150 to 249, 24% for 250 to 499, 27% for 500 to 999, and 30% for 1,000 or more • educational allowance for 1 to 49 units is 20%, not additive to other discounts.

Support • on-site, courier pickup, carry-in, and mail-in maintenance contracts available; Warranty Extension Option provides pickup/delivery maintenance coverage for the entire first year at a lower cost than the usual carry-in/mail-in annual contract • annual option provides pickup/delivery maintenance coverage for subsequent years • carry-in and mail-in maintenance contracts for subsequent years are also available • on-site contracts are presently available in the cities having an IBM service/exchange center • to obtain maintenance service, user must provide IBM National Support Center with results of Hardware Maintenance and Service fault-isolation procedures (see Software section); malfunctioning units can then be sent to IBM Product/Service Centers, IBM Customer Service Division (CSD), designated service locations, authorized IBM Personal Computer Dealers, or the IBM National Support Center in Greencastle, IN.

Physical Specifications (H x W x D); Weight

CPU • 5.5 x 19.6 x 16.1 inches; weight information not available.

Display • 11 x 15 x 14 inches (mono display); 17 pounds.

Keyboard • 2 x 20 x 8 inches; 6 pounds.

Systems Overview & Configurability

The XT/370 Personal Computer is a desktop mainframe; it is an upgrade to the PC/XT that expands the number of environments the PC/XT participates in rather than expanding PC/XT capabilities as such. The basic PC/XT processor board, based on



IBM XT/370 Personal Computer 5160-568 & 5160-588 Systems

the Intel 8088, is still a part of the system, and consequently the system can support any program that the PC/XT can support. In addition, three standard processor/memory boards add another environment, a System/370-compatible, VM-compatible satellite processing environment, designed to be downloaded. Communication via 3277 emulation in a 3274-attached configuration is supported by standard features, although the user is not required to connect the XT/370 to a 3274 controller.

Maximum configurability is stated below; minimum configurations are discussed under Packaged Systems.

System Maximums—XT/370 • 768K-byte physical memory but board addressing is divided such that 640K bytes addressable by DOS 2.0, 2.1; and 480K bytes addressable by VM/PC • 40K-byte ROM, 720K-byte diskette storage, 20M-byte hard disk, single display • 8 slots on 5160-568 model (without expansion unit) with 1 slot remaining for additional options (printer, asynchronous communications, etc) after basic system requirements; 16 slots on 5160-588 model (including required expansion unit) with 7 slots remaining for added options.

Performance

IBM claims that the PC operates at about half the MIPS throughput rate of the 4321/4331-1, i.e., about 0.1 MIPS. Scientific processing is about twice the power of the 4321/4331-1 due to the high speed of the Intel 8087. However, the scientific processing power of the 4321/4331-1 is very low relative to the 4341/4361/4381 processors, and IBM has declared its Whetstone benchmark ratings as proprietary. Consequently, it is difficult to evaluate the scientific versus commercial program development power of the PC relative to other machines.

☐ Packaged Systems

Personal Computer XT/370

5160-588 XT/370 System Unit • includes 2 CPU cards, keyboard, 640K-byte user memory, 40K-byte ROM containing Cassette Level BASIC interpreter, a single dual-sided 360K-byte diskette drive with adapter, 10M-byte fixed disk drive with adapter, audio speaker, and 8 slots with 3 slots available to the user • requires VM-PC, DOS 2 or 2.1, display:

\$8,995 prch \$823/\$657/\$528/\$462 maint

5160-568 XT/370 System Unit • same as 5160-588 except includes an expansion unit adapter and no hard disk drives and adapter • requires hard disk, display, VM-PC, DOS 2.1:

6,720 528/422/338/297

PC/XT & PC/XT Upgrade

A standard 5160 PC can be upgraded to an XT/370 by means of an upgrade kit. Prices for the PC/XT and the upgrade kit follow.

5160-087 PC/XT System Unit • includes CPU, keyboard, 128K-byte main memory expandable to 640K bytes, 40K-byte ROM containing Cassette Level BASIC interpreter, a single dual-sided 360K-byte diskette drive with adapter, a 10M-byte fixed disk drive with adapter, audio speaker, asynchronous communications adapter, and 8 slots with 5 available to the user • requires DOS 2 or 2.1:

\$4,995 prch \$275/\$220/\$175/\$155 maint

1503891 XT/370 Option Kit • for converting the PC/XT to an XT/370 • includes 3 cards: the System/370 processor card; 512K-byte memory card; and the 3277 emulation card; installation instructions; logo kit to change nameplate • requires PC/XT with 256K-byte memory • available second quarter of 1984:

3,790 170/136/109/95

☐ CPU

The XT/370 is both a desktop mainframe and an extended version of the PC/XT. In addition to the Intel 8088 PC CPU for operating in PC mode, it also includes 3 other microprocessors on another board (additional memory board and a 3277 emulation board) for operating in 32-bit System/370 mode. The 2 models of the XT/370 differ in their standard disk configurations.

PC/370-P Card • consists of 3 microprocessors, a page table, and attendant circuitry • first processor, a modified Motorola MC68000, executes most of the commonly used fixed-point System/370 instructions; second processor, a standard Motorola MC68000, emulates the remaining non-floating-point System/370 instructions; third processor, an Intel 8087, executes System/370 floating-point instructions • page table consists of 3 static RAM devices in a 1024x12-bit array.

Intel 8088 Processor • 8-bit data bus interface, 16-bit internal architecture, direct addressing to 1M bytes of memory, 16-bit register set with symmetrical operations, 24 operand addressing modes, 8-bit and 16-bit signed and unsigned arithmetic with binary and decimal operands • 210-nanosecond cycle time; 4.77-MHz clock speed.

Intel 8087 Math Co-Processor • standard component of PC/370-P Card • supported as an add-on option only under DOS • provides extension of 8086 for 100 times faster hardware execution of number-crunching mathematics • 84-bit-wide data paths; 8-bit-wide working registers • option kit contains an 8087 chip plus a current-level 8088 chip for ensuring that the high performance of the co-processor is maintained between the 2 chips:

\$260 prch NA/NA/NA/NA maint

☐ Memory

Standard physical memory is 768K bytes, 256K bytes on the system motherboard, and 512K bytes on a separate memory board associated with the XT/370. The full 768K bytes is not available to either processor set, however.

DOS Mode Memory • CPU addresses up to 640K bytes.

VM Mode Memory • CPU utilizes 512K bytes, but 32K bytes are used for control storage, so only 480K bytes are addressable.

Virtual & Real Memory Utilization Under VM • of the 480K bytes addressable under VM, 64K bytes are used by resident portions of the operating system, while the remaining 416K bytes can be used for CMS/user applications • fixed disk paging can vary depending on the processing load and environment, but must be large enough to accommodate the needs of the largest program • each user program can address up to 4M bytes of virtual memory; all the programs certified by IBM for downloading to the PC require a 1M-byte virtual memory space except the combined VS FORTRAN Compiler and Library, which requires 2M bytes.

XT/370 ROM • 40K bytes • includes BASIC-80 Interpreter for and operating logic for DOS system, and built-in power-on diagnostic self-test.

☐ I/O & Communications

The PC 1 and the PC/XT have the same type of open-ended I/O attachment system, utilizing general-purpose feature slots that allow attachment of a variety of I/O devices by means of adapter cards.

Standard features on the XT/370 Model 588 use 5 slots: 1 for the diskette adapter, 3 for the XT/370 cards mentioned above, and 1 for a hard disk adapter. After adding the optional monitor interface, only 2 slots are left. The Model 568 requires the same slots, however the required expansion adapter ties up 2 slots, one on the system unit and one on the expansion unit itself.

5161-2 Expansion Unit • includes one 10M-byte fixed disk drive, card, and 8 feature expansion slots • both the disk adapter card and the XT integrated disk must be moved into the Expansion Unit to provide full 20M bytes • for 5160-588:

\$2,695 prch \$125/\$100/\$80/\$70 maint

5161-3 Expansion Unit • for XT/370 Model 568 • same as

PRCH: purchase price. MAINT: first figure is charge for on-site maintenance; second figure is for annual pickup/delivery option; third figure is for carry in; and fourth figure is for mail-in annual charge for maintenance coverage. NA: not available. NC: no charge. Prices effective as of October 1983.



IBM XT/370 Personal Computer 5160-568 & 5160-588 Systems

5161-2 except contains two 10M-byte drives • available in the second quarter of 1984:

4,970	715/570/460/400
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Since the 3277 emulation/attachment board is a standard feature of the XT/370, the system is obviously designed to be an integral part of a 3270 system with a 3274 controller. The user need not do so, but this is the only configuration that will support BSC/SDLC/SNA communications between the host and VM system. The XT/370 also supports 3101 asynchronous communications emulation either in conjunction with 3277 emulation or as an alternative.

PC/3277EM Card • standard to 5160-568 and 5160-588 System Units • allows 3277 Model 2 device emulation on XT/370 with an IBM display • uses user-supplied coaxial cable to attach an XT/370 to a local or remote 3274 Control Unit with a type B adapter • color display with appropriate adapter may be used; however, 3277 mode does not support color, so default colors will appear on the screen • occupies 1 I/O slot; included with PC/XT-XT/370 upgrade as well as XT/370 system units.

1502074 Asynchronous Communications Adapter • single-port, asynchronous, half-/full-duplex interface module provides RS-232C or 20-mA current-loop signal levels; software-selectable data rates of 50 to 9600 bps; 5 to 8 data bits; 1 start bit; 1 or 2 stop bits; odd, even, or no parity; optional system-interrupt generation • includes 25-pin, D-shell male connector and jumper block • requires system expansion slot:

120	NC/NC/NC/NC
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3274 Control Units

The XT/370 PC/3277EM card connects to the 3274 type B adapter with a user-supplied coaxial cable.

3274 Control Unit Series 21, 31 & 41 Category A & Category B • Category A and B refer to terminal type, not to A, B, C, and D submodels • 3274 is a floorstanding control unit supporting up to 32 Category A terminal clusters (except 3290 which is limited to 31); 16 Category B terminal clusters supported by 21A, 21B, 21C, 21D, 31A, 31C, and 31D • Type A adapters attach to Category A terminals; Type B adapters attach to Category B terminals on all control units except 21C and 31C • local and remote attach cluster controllers • Category A terminals consist of 3178 Models C1 and C2 display stations; 3262, 3268, 3287, 3289, and 5210 printers; 3278 Models 2, 3, and 4 displays, 3278 Model 5 (Model 21B excluded); 3279 Models 52A, 52B, 53G, 2X, 3X, 2A, 2B, 3A, and 3B (base color models only on 21A, 21B, 21C, 21D, 31A, 31C, and 31D); 3290 information panel (except 21A, 21B, 21C, and 21D); 5210 Models G1 and G2 printwheel printers • 24 Type A connectors standard on 21A, 21B, 21C, 21D, 31A, 31C, and 31D; 32 Type A Connectors standard on 41A, 41C, and 41D • Category B terminal is the 3277 Model 2 • diskette program loading facilities on 3274 allow user to configure initial display system and then change hardware/functions to meet new needs as required • Model 21 series can be upgraded directly to 31 series; Model 41A can be upgraded to 41D and vice versa • Model 21 equipped with 64K-byte controller; Model 31 equipped with 128K-byte controller; Model 41 equipped with 192K-byte controller.

3274 Model 21A • local SNA mode:	
\$15,800 prch	\$76/NA/NA/NA maint

3274 Model 21B • local mode:	
15,800	78/NA/NA/NA

3274 Model 21C • remote BSC/SDLC:	
11,100	58/NA/NA/NA

3274 Model 21D • local mode for virtual storage:	
15,800	83/NA/NA/NA

3274 Model 31A • local SNA mode:	
18,500	85/NA/NA/NA

3274 Model 31C • remote BSC/SDLC:	
13,800	77/NA/NA/NA

3274 Model 31D • local mode for virtual storage:	
18,500	103/NA/NA/NA

3274 Model 41A • local SNA mode:	
18,230	58/NA/NA/NA

3274 Model 41C • remote BSC/SDLC:	
13,840	40/NA/NA/NA

3274 Model 41D • local mode for virtual storage:	
18,230	58/NA/NA/NA

3274 Model 1, 21 & 31 Series • some terminal configurations and/or features and functions exceed the basic control storage capacity of 3274 controller configuration; IBM provides detailed tables equating memory requirements versus terminal types/categories and features/functions offered • requires 1 or more increments of Type C and D Extended Function Store (EFS) memory (features 3622, 3623, 3625, 3627, and 3628), and/or Type A terminal adapters (feature 6903).

6903 Type A3 Adapter • terminals 25 to 32:	
1,020	2/NA/NA/NA

7802 Type B1 Adapter • terminals 1 to 4:	
1,095	4/NA/NA/NA

7803 Type B2 Adapter • terminals 5 to 8:	
923	2/NA/NA/NA

7804 Type B3 Adapter • terminals 9 to 12:	
923	2/NA/NA/NA

7805 Type B4 Adapter • terminals 13 to 16:	
923	2/NA/NA/NA

3274 Control Unit—Models 51C & 61C • tabletop control unit supporting up to 12 Category A and up to 4 Category B terminals on the 51C; the 61C supports 16 Category A terminals • 51C is shipped with 8-Category A terminal capacity; 61C is shipped with 16-terminal capacity.

Direct local connection without communication facilities or modem is possible for 3274 Model 51C to 3704/3705/3725 Communications Controller or 4321/4331/4361 Communications Adapter attachment • operation is at 1200 bps in BSC or SDLC.

3274 Model 51C • remote BSC/SDLC 8-Category A terminal support:	
6,035	39/NA/NA/NA

3274 Model 61C • remote BSC/SDLC 16-Category A terminal support • 192K-byte control storage:	
7,600	27/NA/NA/NA

3274 Model 51C Configuration Support • the 3274 Model 51C may need additional memory capacity to meet configuration and/or feature/function requirements • such additions involve 1802 Control Storage Expansion, 3630 series Extended Function Store (EFS) memory increments; the controller comes equipped with ports for 8 Type A terminals in basic configuration.

1802 Control Storage Expansion • basic expansion module:	
985	4/NA/NA/NA

3630 EFS • Type D1; 32K bytes:	
1,010	7/NA/NA/NA

3631 EFS • Type D3; 32K bytes:	
910	7/NA/NA/NA

3632 EFS • Type D2; 645K bytes:	
2,025	15/NA/NA/NA

7801 Type B Adapter • terminals 1 to 4:	
1,095	4/NA/NA/NA

5550 Power Expansion Unit • required for supplying additional power for terminals attached via Type B adapters:	
379	2/NA/NA/NA

3274 Control Unit Communications:

Models 21C, 31C, and 41C communicate in BSC or SDLC protocol over dedicated lines at 2000/2400/4800/7200/9600-bps rates. Models 51C and 61C communicate in BSC or SDLC on



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dedicated lines at 1200/2000/2400/4800/7200/9600-bps rates, and on switched lines at 1200/2000/2400/4800 bps.

Adapters & Interfaces • various communication adapters or interfaces are employed for data transmission applications on 3274 Model C controllers • 3701 External Modem Interface provides EIA cable and interface logic for attachment of IBM or equivalent modems • Digital Data Service (DDS) adapters support BSC/SDLC transmission at 2400/4800/9600 bps over AT&T Dataphone Data Service (DDS) facilities; 5650 DDS adapter supports point-to-point communication, and 5651 DDS supports multipoint communication • 1 Common Communications Adapter is required on 3274 Model 51C and 61C to handle BSC/SDLC transmission control protocols, and to support other communication adapters or interfaces; 6302 Common Communications Adapter supports communication of up to 9600 bps through IBM or equivalent modems that provide clocking or through DDS adapters.

1550 CCITT V.35 Interface:

525	1/NA/NA/NA
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3701 External Modem Interface • for EIA cabling and logic (included with Models 21C, 31C, and 41C):

337	3/NA/NA/NA
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5650 DDS • point-to-point adapter:

840	1/NA/NA/NA
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5651 DDS • multipoint adapter:

840	1/NA/NA/NA
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5655 X.21 Adapter • non-switched networks:

800	1/NA/NA/NA
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5656 X.21 Adapter • switched networks:

884	2/NA/NA/NA
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6302 Common Communications • BSC/SDLC 9600-bps adapter (included with Models 21C, 31C, and 41C):

365	2/NA/NA/NA
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6303 High-Performance Communications Adapter • required on 41C and 61C for attaching to communications facilities at speeds up to 9600 bps; BSC/SDLC operation:

1,010	8/NA/NA/NA
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4850 Loop Adapter • for 8100 system operations:

797	3/NA/NA/NA
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Peripheral Portability

Peripherals that attach to the PC/XT continue to be supported in DOS mode when a PC/XT is upgraded to an XT/370. When the VM/PC mode is invoked, however, only a subset of the DOS peripherals are operable under VM. Furthermore, coaxial cable connections to clustered terminal controllers or displays (e.g., 3274, 3278, 3279, 4321, 4331, 4361, 4701, and 5525 direct connects) are not practical, since the XT/370 includes, as a standard feature, a coaxial-type connector to the 3274 controller with 3277 emulation support in the PC.

None of the peripherals on the PC can be attached to an IBM mainframe or other non-PC system. A 3274 with the PC attached as a terminal can be directly attached to mainframes in the same ways as a 3274 without a PC.

Mass Storage

The IBM XT/370 basic configuration includes a 360K-byte diskette drive and adapter, plus a 10M-byte fixed disk drive and adapter located in either the basic System Unit (Model 568) or a required expansion unit (Model 588). See I/O for information on the expansion units. Each disk/diskette adapter supports 2 drives, the maximum allowable on each, for a total of 20.72M bytes of mass storage. Both operating systems have equal access to all of the mass storage, but the recording formats for VM's CMS and PC-DOS are different. CMS and DOS formats can be converted back and forth by the IMPORT/EXPORT facilities under CMS (see Database Management under Software).

Tape drives are not supported on the XT/370.

Disk Utilization Under VM

Since VM is a virtual memory (as well as a virtual machine) operating system, disk files are used for operating systems paging as well as for storage of files and data. The combined compiler and library packages require a sizable percentage of disk space. For the storage of the program alone, aside from data, disk requirements for these composite packages are 3M bytes for PL/1, 1.5M bytes for VS FORTRAN, 1.2M bytes for Pascal (compiler only), and 1M bytes for COBOL. Other packages need 0.6M bytes or less (including SCRIPT/VS). Diskette storage can be used by VM as well as fixed disk.

Typical FORTRAN Development Disk Utilization • 1.6M-byte system storage for VM/PC and DOS, 1.5M for VS FORTRAN and libraries, 0.6M for SCRIPT/VS, 2M for paging file, 2.8M for user CMS data and programs, 1M for user area for PC data and programs, 0.5M for print spooling.

Typical COBOL Development Disk Utilization • 1.6M-byte system storage for VM/PC and DOS, 1M bytes for OS/VS COBOL and libraries, 0.6M bytes for SCRIPT/VS, 1M bytes for paging file, 3M bytes for User A CMS data and programs, 2.3M bytes for user area for PC data and programs, 0.5M bytes for print spooling.

Diskette Drives

The XT/370 models support a single adapter which in turn attaches 1 or 2 diskette drives; either or both drives can be single sided or double sided. Diskettes can be exchanged between all PC models since the DOS recording format is completely compatible. VM/PC can also record on diskette in CMS format.

1503780 5.25-Inch Diskette Adapter • supports attachment of up to two 5.25-inch diskette drives standard to all XT/370 systems • maximum of 1 adapter per system • requires system expansion slot • manufactured by Tandon Corporation:

NC prch	NC/NC/NC/NC maint
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1503800 5.25-Inch Single-Sided Diskette Drive • 5.25-inch, single sided, single density, 180K bytes when used with DOS 2; 40 tracks per diskette; 48 tracks per inch; 6-millisecond track-to-track access time; 20,480-byte-per-second transfer rate; 300 rpm • maximum of 2 drives per 1503780 5.25-inch Diskette Adapter; user installable in System Unit housing • requires 1503780 5.25-inch Diskette Adapter • manufactured by Tandon Corporation:

289	NA/NA/NA/NA
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1503810 5.25-Inch Double-Sided Diskette Drive • 360K-byte double-sided version of 1503800 drive; one is standard to all XT/370 systems; features otherwise similar to 1503800 drive:

529	58/47/38/33
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XT/370 Hard Disk

Fixed disk storage is a standard feature of the XT/370.

An XT/370 Model 568 system has the initial drive housed in the system unit. On this model, expansion to 2 drives entails attachment of the 5161-2 expansion unit with one fixed disk already installed and moving the standard disk from the system unit to the expansion unit. Since the disk drive is integral to the expansion unit, it is not possible to expand the number of slots in the XT/370 Model 568 system without adding a second drive.

The XT/370 Model 588 does not include fixed disk in the basic system; instead it requires installation of 2 fixed disks by means of the 5161-3 model expansion unit.

Disk Drive • 10M-byte fixed disk storage using same physical dimensions as diskette drive • 90-millisecond average access; 512 bytes per sector, 17 sectors per track, 306 cylinders/tracks per surface; 3600 rpm • standard to 5160-568 system unit and 5161 expansion units.

Fixed Disk Drive Adapter • provides buffering, error detection/correction, and DMA data transfer control for 1 or 2 1602500 10M-byte fixed disks • located in either the XT/370 system unit or the 5161 expansion unit.



IBM XT/370 Personal Computer

5160-568 & 5160-588 Systems

□ Terminals/Workstations

The IBM XT/370 Personal Computer is a single-user system, featuring a detached, typewriter-style keyboard which is standard and separately available display for user/system interaction. The XT/370 does not attach to the 3278 display, but instead has its own display; the 3277 emulation board allows the PC/XT display/system unit to attach to the 3274 as if it were a 3277.

For color/B&W graphic and alphanumeric display applications, the Color/Graphics Monitor Adapter supports attachment of a user-supplied monitor or standard TV. For B&W alphanumeric display applications, the IBM Monochrome Display and Printer Adapter supports attachment of the IBM Monochrome Display. Another output facility, an audio speaker, is included in packaged systems.

1504910 Color/Graphics Monitor Adapter • supports attachment of color/B&W monitor and customer-supplied light pen; generates direct-drive RGB signal for attachment of monitor • includes 16K-byte multiple-screen refresh buffer • medium-resolution graphics mode supports 320x200-pixel, 4-color format; 128-character set • high-resolution graphics mode supports: 640x200-pixel, B&W format; 128-character set • text mode supports: 256-character set; 16 foreground and 8 background colors • when used under VM/PC, colors displayed are default colors • requires system expansion slot:

 \$244 prch NC/NC/NC/NC maint

1504900 IBM Monochrome Display & Printer Adapter • supports attachment of 5151-001 IBM Monochrome Display and IBM Matrix Printer • requires system expansion slot:

 305 NC/NC/NC/NC

Displays

5151-001 IBM Monochrome Display • 11.5-inch diagonal, green phosphor screen; 25-row x 80-character display format; 7x9 dot-matrix character formation in 9x12 field • upper-/lowercase alphanumeric characters; special characters; line-graphic characters • character/field attributes include: underlining; blinking; normal/high intensity; reverse image; non-display • includes signal and power cables • requires 1504900 IBM Monochrome Display and Printer Adapter:

 \$345 prch \$44/\$35/\$28/\$25 maint

5153-001 Color/Graphics Display • 1640-character, 8x25 lines, 12.5-inch screen • can display 256 different characters in 16 colors against 1 of 8 background colors • reverse image underlining blinking intensity control • all points addressable • requires 1504910 monitor adapter:

 680 125/100/80/70

Audio Output • facilities include programmable speaker capable of producing tones • included in packaged systems.

1501100 Keyboard • 83-key, typewriter-style, alphanumeric PC keyboard • all non-control keys feature auto-repeat • 10 program function keys; ALT key permits access to all 256 ASCII and special characters • attached to System Unit via a 6-foot coiled cable • included in packaged systems and available separately:

 270 NA/NA/NA/NA

□ Printers

The XT/370 under VM/PC supports an optional PC-type printer, attached via a separately available adapter.

1505200 Printer Adapter • supports attachment of 5152-002 Graphics Printer; intended for use with systems configured with the 1504910 Color/Graphics Monitor Adapter • requires system expansion slot:

 \$150 prch NC/NC/NC/NC maint

1504900 Monochrome Display & Printer Adapter • supports attachment of matrix printer or graphics printer (see Terminals/Workstations section).

5181-0102 Compact Printer Connector Adapter • connects the 5181 printer to the XT/370; mates the 16-pin compact printer cable to the 25-pin asynchronous adapter connector on the XT/370:

 40 NC/NC/NC/NC

5152-002 Graphics Printer • 80 cps; bidirectional printer allowing mixing of text and graphics • 9x9 dot matrix; 40, 66, 80, or 132 characters per line:

 595 63/50/40/35

1525612 Printer Cable • 6-foot cable connects 5152-002 Graphics Printer to 1505200 Printer Adapter or 1504900 Monochrome Display and Printer Adapter:

 55 NC/NC/NC/NC

5181-001 Compact Printer • 50-cps unidirectional dot-matrix thermal printer with APA graphics printing at 200 dots per second • lightweight 6.6 pounds; prints 80-character-per-line, 10-character-per-inch (cpi) pitch; program-selectable 6- or 9-lpi vertical spacing in standard mode; can also print 40 characters per line in double-width mode, 136 characters per line (17.5 cpi) in compressed mode, and 68 characters per line (8.75 cpi) in compressed double-width mode • full ASCII 128-character set; 191 printable characters stored in printer ROM • prints on 8.5-inch (21.6-centimeter) width paper rolls or 8.5x11-inch sheets of treated thermal paper; friction fed • EIA RS-232C interface with 1200-bps speed; 256-character buffer, connects to serial ports on any PC • requires 5181-0102 connector adapter for attachment to serial ports on XT/370:

 175 18/14/11/11

5182-001 PC Color Printer • 200-cps bidirectional dot-matrix printer • 132 columns • 4 print modes include draft (200 cps), text (110 cps), APA graphics, and near-letter-quality (35 cps); 4-band ribbon mixable to produce 8 colors • 6K-byte print buffer fixed proportional spacing; 10, 12, 17.1 nominal fixed pitch with double width at each pitch; 13.5-inch print line; 3 resident fonts • tractor feed and manual single-sheet feed; up to 4-part forms • requires parallel printer adapter on XT/370; requires standard printer signal cable on Printer Adapter, or on Monochrome Display and Printer Adapter software compatible with the 5152-002 graphics printer:

 1,995 565/455/365/365

• END



IBM 3270 Personal Computer

5271-2, 5271-4 & 5271-6 Systems

■ PROFILE

Operating Systems • 3270-PC Control Program and DOS 2.1 or DOS 2 • DOS 2.0 or 2.1 supports single-user interactive/batch processing in standalone environments or as intelligent workstation; configurations with diskette storage, or DOS 2 is hard-disk based.

Data Management • Diskette Librarian; PFS: File, an information management system; PFS: REPORT, a report generator.

Communications/Networks • through 3274 interconnection; also supports TTY-terminal emulation and file-transfer operations supported by communications utility under IBM DOS.

Languages • read-only-memory-based Cassette Level BASIC interpreter standard; diskette-based Disk/Advanced Level BASIC interpreter and compiler extensions, APL, Logo, Pascal, FORTRAN, and COBOL compilers, and macro assembler optional.

Models • 5271-2, 5271-4, and 5271-6 packaged systems.

Memory • 256K to 640K bytes.

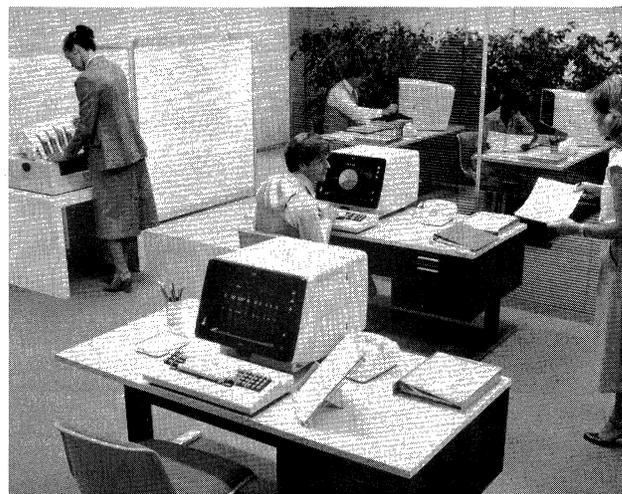
Chassis Slots • eight general-purpose slots.

Ports • 1 RS-232C serial port.

Mass Storage • up to 2 5.25-inch, 360K-byte diskette drives for a maximum diskette capacity of 720K bytes; or 1 10M-byte 5.25-inch Winchester hard disk drives and 1 diskette.

Terminals/Workstations • single-terminal systems; use detached, typewriter-style keyboard and separately available color or B&W display; up to 32 (PC and 3270) physical terminals and 128 logical terminals can be connected to a 3274 depending on the 3274 model.

Printers • single printer typically; matrix-impact model.



First Delivery • first quarter 1984.

Systems Delivered • not applicable.

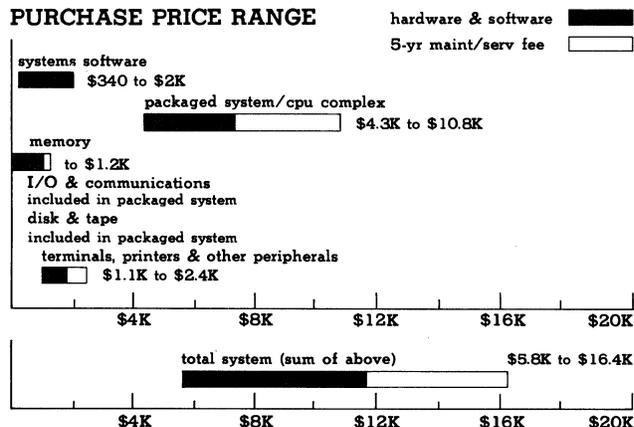
Comparable Systems • the windowing functions of the 3270-PC are similar to the Apple Lisa, but the micro-mainframe interconnection capabilities of the 3270-PC are unique.

Vendor • International Business Machines (IBM) Corporation, Information Systems Group • National Accounts Division; 1133 Westchester Avenue, White Plains, NY 10604; 914-696-1900 • National Marketing Division; 4111 Northside Parkway, Atlanta, GA 30327; 404-238-2000.

Canada • IBM Canada Ltd; Markham, 3500 Steeles Avenue East, Markham, ONT L3R 2Z1 • 416-474-2111 • offices located in other cities in Canada.

Distribution • nationally through: IBM local sales offices; IBM Product Centers; Product/Service Centers located in San Francisco, CA; Baltimore, MD; and Philadelphia, PA; other service locations in Los Angeles, CA; Washington, DC; Chicago, IL; Boston, MA; Detroit, MI; New York, NY; Dallas, TX; Houston, TX; and Seattle, WA; National Support Center located in Greencastle, IN.

PURCHASE PRICE RANGE



IBM 3270 PERSONAL COMPUTER PURCHASE PRICING bar graphs illustrate price ranges for small to large systems, with solid bars reflecting software/hardware purchase pricing, and open bars reflecting 5-year service/maintenance fees associated with large system • **SMALL SYSTEM** is based on 5271-2 packaged system (includes CPU, 256K-byte memory, keyboard, diskette drive, 3274 attachment, and the following options: 3270-PC CP and DOS 2.1 software, display, and printer) • **LARGE SYSTEM** is based on 5271-6 packaged system (includes CPU, 320K-byte memory, 10M-byte fixed disk, 3274 attachment) and the following options: 3270-PC CP, DOS 2.1 and supporting software, color display, graphics printer.

■ ANALYSIS

The introduction of the 3270-PC in October 1983 tied together a developing communications thread in the PC product line, and at the same time started a whole new display slant. The 3270-PC, like standard PCs with appropriate attachment features, can attach to a 3274 communication controller or 4300 display printer adapter by coaxial cable. Instead of this being an add-on feature, the attachment to the 3274 is the primary focus of the system. The most unusual feature of the 3270-PC, when compared to other PCs, is the large number of concurrent operations possible, and the windowing feature on the screen which allows the user to see all active processes in



IBM 3270 Personal Computer 5271-2, 5271-4 & 5271-6 Systems

TABLE 1: MODEL DIFFERENCES

DESCRIPTION	PCjr	PC 1	PC 1-3270	3270-PC	PC/XT	XT/370
CPU/SYSTEM						
Primary Type	Standalone	Standalone	3270 Slave	3270 Slave	Standalone	Standalone
System Unit Model	4860	5150	5150	5271	5160	5160
System Unit Submodels	4/67	104/114/164/174	X14/X64/X74	2/4/6	87	568/588
Switchable Sessions	—	—	—	7	—	4
Required Display Types	IBM or TV	IBM or TV	3278 or 3279	5151 or 5272	IBM or TV	IBM or TV
Keyboard	+ Cord	Standard	On 327X	3270-PC	Standard	Standard
CPU Microprocessors						
Intel 8088	CPU	CPU	CPU	CPU	CPU	1 for DOS
Intel 8087	—	Option	Option	—	Option	1 for VM
Motorola 68000	—	—	—	—	—	2 for VM
Clustered System, Via 5520	No	Yes	No	No	Yes	Yes
MEMORY						
RAM, bytes						
Minimum	64K	64K	64K	256K	128K	256K
Maximum	128K	640K	640K	640K	640K	640K
ROM, bytes	64K	40K	40K	40K	40K	40K
I/O						
Standard System						
Dedicated Interfaces	10	3	3	0	2	2
Basic Slots	—	5	5	8	8	8
Maximum Slots	—	13	13	8	16	16
Program Cartridge Slots	2	0	0	0	0	0
Cassette Drives	0-1	0-1	0-1	—	—	—
Diskette Drives	0-1	0-2	0-2	1-2	1-2	1-2
Hard Disk Drives	—	0-2	0-2	0-1	1-2	1-2
3274/4300 Direct Attach	No	Yes	No: 3278/79	Yes	Yes	Yes
SOFTWARE						
Current DOS Level	2.1	1.1, 2.1	1.1, 2.1	2.1	2.1	2.1
UCSD pSystem	—	Yes	Yes	—	Yes	—
CPM-86	—	Yes	Yes	—	Yes	—
Concurrent CPM	—	Yes	Yes	—	Yes	—
Other	—	—	—	3270 CP	—	VM/PC

overlapping windows. Up to 4 concurrent host sessions, a PC-DOS session and 2 local scratch pad sessions can all be active at the same time. All of the windows except the DOS window can transmit data into any of the other windows, all including DOS, can receive from any of the other windows. The keyboard can connect into any window for an interactive session while the applications related to other windows are processed in the background. The use of a color screen allows the user to color code the various windows.

The operation of the 3270-PC is governed by two modes, which are determined in part by the way the system is attached to its host. If the PC is attached to a 3274 with configuration support T or D it may operate in distributed function terminal mode, invoking 1 to 4 sessions (logical units) and emulation of the 3178, any 3278 except 3278-2A or 3278-5, or any 3279 except 3279-2C. If the PC is attached to any 3274 or to the display/printer adapter on the 4321, 4331, or 4361, and is emulating the 3178, 3278-2, or 3279-S2A, it can operate in control unit terminal mode with a single session (logical unit). In either mode the 3270-PC supports 2 local notepad sessions, and 1 PC-DOS 2.1 session.

The 3270-PC local configuration is like a restricted version of the PC/XT but with greatly enhanced display capabilities and a micro-mainframe connection. The

restrictions refer to the rigidly defined basic systems which can attach 1 display, 1 keyboard, up to 640K bytes of memory, the 3270 connector, a printer, a hard disk, and a diskette drive—but, at the current time, no expansion unit.

Connection to a local or remote mainframe is supported by file transfer software running under VM or MVS. Logically enough, considering the mainframe communications orientation of the system, it is sold only by IBM's direct sales force rather than through micro retail outlets.

Strengths

The 3270-PC combines the personal computing capabilities of a PC-DOS system together with a versatility in handling and displaying concurrent operations that is unique to nearly all of IBM's comparably priced displays. The ability to handle 7 "windows," 4 of which can be concurrent active host-corrected sessions, also makes the PC the nexus of a variety of host data paths. This 3270-PC attachment, like other types of 3270-PC 3270-attachments, adds local file storage and manipulation to the host-controlled 3270 systems. Up to 4 logical terminals can be defined for each single physical terminal, expanding the 3270 capacity to 128 logical terminals.

The 3270-PC, although it has a number of differences from other "standard" PC models, records files in standard DOS



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formats, allowing easy exchange of data, and use of PC virtual files on a variety of hosts.

□ Limitations

The most obvious limitation for the 3270-PC is the lack of file transfer support under DOS/VS or DOS/VSE, IBM's largest user base. File transfer software only runs under MVS or VM.

Although the 3270-PC display provides more capabilities than other PC systems, and the 3274 attachment allows a very flexible communications environment, the 3270-PC is, initially at least, bounded by I/O restrictions that appear to be arbitrary. IBM has set up a formally specified configuration to the point of designating which device adapter is to be attached to which slot. The high-end Model 6, which has a fixed disk, a diskette drive, and a printer adapter in addition to the keyboard, memory, display, and 3270 system attachments; has room for only one more option—a slot that must be filled by a memory board if system memory is to be expanded beyond 512K bytes.

The only contending option on the standard features list is an asynchronous communications adapter. This means that although the disk and diskette adapters can each theoretically attach a second drive, there is no way to attach an IBM drive because the add-on IBM drives are designed to be housed in an expansion unit—which is not on IBM's list of standard features. Alternatively, the user is responsible for testing PC options not included with the 3270-PC; IBM does not accept responsibility for them.

The attachment of a PC can impact the 3270 system cluster performance. If the PC is connected to a local channel-attached control unit (3274-31A, 31D, 41A, or 41D) running in Control Unit mode, response time may be increased up to 100 milliseconds. During file transfers in Control Unit Terminal mode there may be a noticeable impact on the response time of other terminals in the 3270 system. In an attempt to minimize this impact, the 3270-PC File Transfer program transfers files in 2000-byte blocks.

A number of 3270 capabilities are not available on the PC. The PC does not support attachment of the 3270 selector light-pen, magnetic reader control and accessories or video output. It does not have the range of 3270 keyboard types, Katakana characters, APL/TEXT character set, and various RPQs. It does not supply base 4-color copy to the 3274 attached printer, nor the port 0 customization function on the 3274 control unit. It does not support the 3274 Entry Assist feature, binary synchronous copy command, explicit partitions, graphics escape, keyboard clicker, monospace switch, numeric lock, programmed symbols, security keylock, or 3270 diagnostic reset dump. It does not emulate the 3278-5.

Most PC applications can run under DOS 2.1 concurrently with the 3270 sessions, but they must not include APA graphics statements or use PC-DOS 2.0 or 2.1 print spooling. PC-DOS programs cannot disable storage addresses above the interrupt level 12 pointer in BIOS except when they are referencing the PC display refresh buffer. Applications must not issue instructions to the 6845 display adapter/controller; nor must they

reprogram the 8259 interrupt controller, disable interrupts, mask selected interrupt levels for more than 100 milliseconds or fail to issue an end-of-interrupt or IRET on a hardware interrupt level.

■ SOFTWARE

□ Terms & Support

Terms • software products are available on a one-time license-fee basis; license permits the use of the licensed product on a single IBM Personal Computer system, the copying/modification of the licensed product (except for copy-protected products), and the transfer of the license and product to another party • quantity discounts are available under the Volume Licensing Agreement (VLA); users ordering program products in quantities of 20 or more are charged a one-time license fee per copy of program product less a volume discount.

Support • program products are licensed as-is, without warranty; only diskettes are warranted against defects in materials and workmanship for a period of 3 months • telephone assistance is available for a period of 3 months after the date of installation from the ISD Personal Computer Assistance Center.

□ Software Overview

The 3270-PC is controlled by the 3270-PC control program, a multitasking communications executive that allows PC-DOS 2.0 or 2.1 to run as one of the concurrent system tasks. No other PC operating environment is supported.

□ Packaged Systems

See Operating Systems for a full description of 3270-PC control program and PC-DOS 2.1.

6024120 IBM Personal Computer Diskette Software (DOS Diskette) Version 2.1 • includes: IBM Disk Operating System (DOS); Disk and Advanced Level BASIC 2 language extensions to read-only-memory-based Cassette Level BASIC; editor, debug, and linkage utilities • see Operating Systems:

\$65 lcms

□ Operating Systems

1837434 3270-PC Control Program • establishes an umbrella or virtual machine type of environment that provides for concurrent operation of a PC-DOS partition, 2 scratchpad sessions and 1 to 4 host-interactive sessions • all active sessions can be displayed simultaneously on the screen providing multiple windows on system activities • the 3270-PC CP set-up defines a control unit terminal mode or distributed function mode (see System Overview) during 3274/3270-PC customization • management control features provide flexible screen manipulation (see Terminals/Workstations) • 3270-PC CP supports file transfer program product; allows data to be copied to/from any window into any other window, except the PC window can only receive data but not send it • 3270-PC CP requires 5271 system unit, keyboard, 5151 or 5272 display and DOS 2.1 • memory residence, and hence overall system memory requirements depend on the terminal mode, number of sessions, and session screen sizes; PC-DOS 2.1 requires 24K bytes; 3270-PC applications under DOS require 8,320 bytes for save/restore, 15,870 bytes for file transfer, 6,656 bytes for patch and 25,088 bytes for tutorial for a subtotal of about 80K bytes; to this must be added 94,116 bytes for control unit terminal mode, 145,828 bytes for non-SNA distributed function mode or 156,708 bytes for SNA distributed function mode yielding a subtotal of 174K to 236K bytes; in addition each host session must dedicate an area based on screen size and number of colors, ranging from 1,968 for a 4-color 1920-character base screen up to 6,966 bytes for an 8-color, EDS, 3440-character screen; to this is added 3,840

LCNS: one-time license fee. Software maintenance is not available. Prices effective as of June 1983.



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bytes for each scratchpad and 2,000 bytes or more for the PC-DOS session:

\$300 lcms

IBM Disk Operating System (DOS) Versions 2.0, 2.1 • general-purpose diskette operating system supports single-user interactive and batch processing; provides high-level interface between user software and associated hardware environment • sequential and random file access and dynamic space allocation • user-accessible functions include: diskette-directory display; file rename, erase, display, compare, and copy; chaining of diskette-based programs in predefined job streams; designation of single program or job stream for automatic execution after system startup • includes Linkage Editor, Editor, and Debug utilities • capability of handling hard disk drives • formats diskettes at 9 sectors per track for a capacity of 184,320 characters on single-sided diskettes or 368,640 characters on double-sided diskettes • normally allocates 2 disk or diskette buffers at start-up time but will allow user to specify number of buffers to reserve • provides tree-structured directories • extended screen and keyboard control; redefines the keyboard • redirects I/O • provides piping functions and filters • includes such new commands as backup, RESTORE, RECOVER, VERIFY • enhanced commands for debug, erase, format functions, others • Version 2.1 adds support of the PCjr as well as PC 1, PC/XT, etc; supports chaining of files in a predefined job stream with the whole jobstream or a single program being designated for automatic execution when the system is turned on; also can display a diskette directory, rename, erase, display, compare, or copy files; includes line editor, debug, and linker utilities • requires minimum of 64K bytes on diskette-based systems; 128K bytes when using a hard disk system • 128K is also recommended on any system with fixed disks; DOS 2.1 (as well as DOS 2.0) resides in 24K bytes of memory.

□ Data Management

602411 Fixed Disk Organizer • development tool that uses simple menus to help the user organize the fixed disk; allows the user to create complex batch files and link current applications through user-defined menu options; can produce online help text; establishes passwords to prevent unauthorized access • requires DOS, 128K-byte memory on PC 1 or PC/XT, 1 fixed disk, 1 diskette, display:

\$50 lcms

6024062 Personal Computer File Command • file management system using display of a file directory with a multiline command area to issue DOS commands and execute programs; directory can be sorted by file size, by alphabetical order, by date, or by drive or directory path; assigns commands to function keys • commands can be associated with file names allowing automatic subdirectory listings, single keystroke execution of frequently used programs, fast entry • requires PC with 64K-byte memory, one diskette monitor:

35

6024050 Diskette Librarian • creates and maintains a catalog of file names over multiple diskettes • requires 64K-byte main memory, 1 diskette drive, DOS:

45

6024041 pfs:FILE V.1, V.1.05 • information management system; enables the user to design a form and enter, retrieve, modify, and print information • requires 64K-byte main memory, 2 diskette drives for diskette version; when program and/or its data files are stored on fixed disk, requires 128K-byte memory, DOS • V.1.05 required under DOS 2.1:

140

6024045 pfs:REPORT V.1, V.1.05 • produces reports from files created by pfs:FILE; handles up to 16 column reports • requires pfs:FILE, 64K-byte main memory, 2 diskette drives for diskette version; when program and/or its data files are stored on fixed disk, requires 128K-byte memory • V.1.05 required under DOS 2.1:

125

□ Communications/Networks

The 3270-PC Control Program is the primary communications handler for the 3270-PC (see Operating Systems). This program supports BSC and SDLC protocols in non-SNA and SNA environments. The 3270-PC can also attach an asynchronous adapter for asynchronous communications support.

6024032 Asynchronous Communications Support • terminal-emulation and file-transfer utility manages communications with systems supporting TTY ASR 33/35 or equivalent data transmission procedures • user-/program-selectable communications parameters include: 75- to 2400-bps data rate; parity; number of stop bits; line-output turnaround characters; half- or full-duplex operation; XON/XOFF operation • tested for operation with VM/370 Release 6 and VM/Systems Product Release 1 on IBM System/370 Model 158 with IBM 3705 communications equipment • requires: DOS; 64K-byte main memory; 1 diskette drive; 1502074 Asynchronous Communications Adapter, and full-duplex modem; requires 128K-byte memory when used with fixed disk:

\$60 lcms

6024042 3101 Emulation • emulates 3101-20; allows conversion of ASCII diskette files to and from binary format • requires 64K-byte user memory, 1 diskette drive, asynchronous communications adapter, DOS 1.1; when program and/or its data files are on fixed disk, requires 128K-byte memory and DOS 2.0; also requires full-duplex modem or necessary cabling for direct connect to local host computer:

140

6024100 Personal Communications Manager • electronic mail package with auto-dial support for an external modem like Hayes Smartmodem • capabilities include mail management (scheduling, checking, reports), mail logging (time, sender, subject), mail review; mailbox address can be by alphanumeric name containing mailbox name, addressee's name, telephone number and modem speed • communications features supported included both tone and pulse dialing, 300- or 1200-bps speed, guaranteed accurate transmission; selectable features for half-/full-duplex, parity, transmission rate, flow control, etc • provides for user-defined function keys • user-specified editor can be accessed • requires PC with 128K-byte memory; one dual-sided diskette drive; monitor adapter, modem, and appropriate adapter; the required portions of DOS are already on the diskette, so DOS is not required:

100

6428147 Batch Communication Program • allows PC users to transmit files of transactions on switched networks to host CICS and IMS applications; particularly useful for remote collection and distribution when host access is of short duration • SNA / SDLC communications, auto-answer, attended or unattended operation; multiple sessions within one telephone call; automatic session recovery with message synchronization • requires a PC with DOS operating system, diskette drive; central service available until December 31, 1985:

350

5664-281 3270-PC File Transfer Program • allows transfer of files from IBM S/370, 4300, 303X, or 308X host to a 3270-PC, PC, or PC/XT coaxially attached to a 3274 control unit or to the display/printer adapter on the 4321, 4331, or 4361; also allows PC to host transfer, off-line data manipulation, updating, or correction on the PC • this program runs on the host, requires VM/SP R.2.1 operating environment • supports either the 3270-PC running under 3270-PC Control program or the PC 1 or PC/XT running under the 3278/79 Emulation Control Program; in both environments the PC must be running DOS 2.0 or 2.1:

600

5665-311 3270-PC File Transfer Program • same functions and hardware requirements as 5664-281, but requires MVS/TSO (MVS/SP) operating environment in host:

600



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□ Program Development/Languages

Standalone Languages

The BASIC language described below runs independently of disk/diskette operating systems.

Cassette Level BASIC • interpreter supports subset implementation of Dartmouth BASIC; resident in 40K bytes of read-only memory (ROM) • provides driver and sequential-file facilities for cassette-tape ancillary storage; supports I/O functions for display, keyboard, printer, and customer-supplied light pen and joystick • features include: 16-color-foreground/8-color-background graphic-display I/O; 17-digit numeric precision; integer, real, and string variables; single- and double-precision floating-point variables; variable names up to 40 characters in length; up to 250 characters per program line; multiple statements per program line; comments on program lines; automatic line numbering; full-screen editing; error trapping • 4K bytes of programmable main memory used as system workspace; maximum of 60K bytes of addressable user workspace • included in all packaged systems • developed by Microsoft, Inc.

IBM Disk Operating System Program Development

All of the program development utilities described below, except for the BASIC Programming Development System, are available as part of the 6024001 or 6024061 IBM Personal Computer Diskette Software (DOS Diskette) packaged software (see Packaged Software section). The utilities support program development using the 6024010 Pascal Compiler, 6024012 FORTRAN Compiler, 6024002 Macro Assembler, 6024011 COBOL compiler, and 6024003 BASIC compiler.

EDLIN Editor • supports creation/modification of source-language files.

Debug Utility • supports program testing and debugging at assembly language level.

Linkage Editor • supports conversion of compiler—or assembler-produced relocatable modules to executable load modules.

6024046 BASIC Programming Development System • contains text file editor, Structured BASIC preprocessor, BASIC formatter, BASIC cross-reference • requires 96K-byte main memory, 2 diskette drives, DOS:

\$130 lens

IBM Disk Operating System Languages

Languages described below run under the IBM Disk Operating System (DOS).

Disk Level BASIC • diskette-based extension to Cassette Level BASIC described above • provides instructions, commands, and built-in functions to support IBM Disk Operating System (DOS); includes date, time-of-day, and communications capabilities • with default communications option, occupies 25.5K-byte main memory; without communications option, occupies 24K-byte main memory; requires 32K-byte main memory and 1 diskette drive • available as part of 6024001 IBM Personal Computer Diskette Software (DOS Diskette) packaged software (see Packaged Software section) • developed by Microsoft, Inc.

Advanced Level BASIC • diskette-based extension to Cassette Level BASIC described above • includes all Disk Level BASIC functions and also supports: display graphics; customer-supplied light pen and joystick; interrupt handling for communications, function keys, light pen, and game controllers; variety of external hardware devices • includes Graphics Macro Language and Music Macro Language • with default communications option, occupies 30.5K-byte main memory; without communications option, occupies 29K-byte-main memory; requires 32K-byte main memory and 1 diskette drive • available as part of 6024001 IBM Personal Computer Diskette Software (DOS Diskette) packaged software (see Packaged Software section) • developed by Microsoft, Inc.

BASIC 2 • hard disk-based extension to Advanced Level BASIC • requires 64K bytes of memory, 1 diskette drive, and hard disk •

available as part of 6024061 DOS 2 software package • developed by Microsoft, Inc.

6024003 BASIC Compiler • diskette-based compiler version of IBM Advanced Level BASIC • includes all Advanced Level BASIC functions • requires: DOS; 64K-byte main memory; and 1 diskette drive; when program and/or its data files are stored on fixed disk, requires 128K-byte memory and DOS 2.0 or 2.1 • developed by Microsoft, Inc:

\$300 lens

6024010 Pascal Compiler • compiler supports implementation of International Standards Organization (ISO) Working Draft #6 for Pascal language with the exception of conformant array parameters; super array parameters are provided instead • requires: DOS; 128K-byte main memory; and 2 diskette drives; program and/or its data files can also be stored on hard disk • developed by Microsoft, Inc:

300

6024012 FORTRAN Compiler • compiler supports implementation of ANSI standard X3.9-1978 (subset level) and features from ANSI X3.9-1978 (full level) • features include: combining object modules with subroutines in Pascal or macro assembler; 2-pass compilations; compiler metacommands; edit control • requires: DOS; 128K-byte main memory; and 2 diskette drives; program and/or its data files can also be stored on hard disk • developed by Microsoft, Inc:

350

6024077 APL, A Programming Language • general-purpose language used for mathematical and scientific computing:

195

6024076 LOGO • for developing problem-solving skills and introducing programming concepts to children and adults • marketed through LOGO Computer Systems • available fourth quarter 1983:

175

6024002 Macro Assembler • 8088 macro assembler generates relocatable code • features include: listings that include start and end addresses, line numbers, and alphabetic cross-reference; compatibility with BASIC, Pascal, and FORTRAN programs • package includes full and subset versions of macro assembler • requires: DOS; 96K-byte main memory for full version or 64K-byte main memory for subset version; and 1 diskette drive; when program and/or its data files are stored on fixed disk, requires 128K-byte memory, DOS 2.0 or 2.1 • developed by Microsoft, Inc:

100

6024011 COBOL Compiler • compiler supports ANSI X3.23-1974 COBOL standard • extensions support color and screen formatting • requires: IBM Disk Operating System; 64K-byte memory; and 2 diskette drives; when program and/or its data files are stored on fixed disk, requires 128K-byte memory, DOS 2.0 or 2.1 • developed by Microsoft, Inc:

700

UCSD Macro Assembler • 8088 macro assembler generates relocatable code • features include: macro parameters; conditional assembly; production of code to be linked to UCSD Pascal, FORTRAN, and BASIC programs • included in 6024016 UCSD p-System with UCSD Pascal, and 6024017 UCSD p-System with FORTRAN-77 (see Packaged Software section).

□ Applications Packages

6024005 Easy Writer 1.1 • integrated word processing system provides full-screen text editing and text formatting capabilities • features include: horizontal and vertical scrolling; global and selective search/replace; File Menu; Editor Menu; Additional Commands Menu • requires: 64K-byte main memory; and 1 diskette drive for diskette version; when the data files are stored on a fixed disk, requires 128K-byte memory and DOS 2.0; program itself cannot be stored on fixed disk • developed by Information Unlimited Software, Inc:

\$175 lens

6024051 Personal Editor • full-screen full-function text editor •



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requires 64K-byte main memory, 1 diskette drive, DOS, 40- or 80-column monitor:

100

6024048 Professional Editor • full-screen editor like the Personal Editor but is menu driven instead of command driven • includes more extensive search/replace facilities, right justification • file merging, insertion of character strings with single keystroke:

130

6024039 PeachText Word Processing • allows preparation and revision on a document using the display before automatic printing of corrected text; includes online help functions, full-screen editor, displaying and or merging of a second document while editing the first, automatic pauses in printing for keyboard entry of variables proportional printing (on appropriate third-party printers) global and selective search and replace, creation of DOS ASCII files, word wraparound, automatic carriage return • paging from diskette for files available that are larger than memory creates equivalent of virtual memory system • requires 64K-byte memory, 1 diskette for diskette version; when program and/or data files are stored on a fixed disk, requires 128K-byte memory and DOS 2.0 or 2.1 • by Peachtree Software, Inc:

400

6024049 Mailing List Manager • for entering, storing, retrieving, and updating names and addresses, and printing mailing labels • requires 128K-byte memory, 2 diskette drives, or 1 diskette drive and fixed disk:

195

6024071 Word Proof • for checking spelling and providing synonyms; contains full-screen editor with multiple functions:

60

6428092 ADRS/PC A Departmental Reporting System • subset of 5796-PLN mainframe ADRS-II that allows users to produce professional business reports; user can define, change, record, calculate, select sort format, display, print, and maintain reports • file transfer between host VM/CMS or MVS/TSO systems supported • requires PC with 128K-byte memory, one diskette drive, but 196K-byte memory and 2 diskette drives recommended; also requires 80-character-wide display and matrix printer or equivalent; asynchronous communications must have host TTY-ASR 33-/35-type support; requires DOS 2.0 or 2.1:

325

6024004 VisiCalc Version 1.1, V.1.2 • Version 1.1 supports management-oriented planning, analysis, and reporting applications • data is arranged in spreadsheet grids each with up to 63 columns and 254 rows; grid elements can be numeric values, labels, or formulas; formulas can include standard functions such as summation, net present value, and trigonometric functions • VisiCalc 1.2 includes all the facilities of VisiCalc 1.1 plus extended addressing of worksheet storage to correspond to memory increases (up to 512K bytes); also provides for both VisiCalc program and data files to reside on and support a fixed disk; INSTALL utility allows unlimited copying of VisiCalc V.1.2 to the fixed disk and any of its directories • either version requires: 64K-byte main memory and 1 diskette drive for diskette version; when the data files are stored on a fixed disk, requires 128K-byte memory and DOS 2.0 or 2.1; program itself cannot be stored on fixed disk • developed by Personal Software, Inc:

200

6024108 Multiplan V.1, V.1.1 • spreadsheet analysis; Version 1.0 provides projections, what-ifs, sensitivity analysis, budget and resource planning, and scheduling • spreadsheet grid of 255 rows x 63 columns; online help text; natural language commands and variable names up to 8 display windows; automatic recalculation • Multiplan V.1.1 includes all the features of Multiplan V.1.0 plus extended addressing of worksheet storage to correspond to memory increases (up to 512K bytes); increased math precision up to 14 digits for transcendental math functions; increased print width up to 512 characters; optional disabling of window paint command of Multiplan 1.0 • V.1.1 also provides for both Multiplan program and data files to reside on and support a fixed disk; MPFDCOPY utility in Multiplan 1.1 allows a one-time

copy of Multiplan 1.0 program files to fixed disk, with backup/restore procedures; if program resides on diskette, DOS 2.0 or 2.1 Multiplan users must load from a separate diskette in a 2-stage operation since DOS 2.0 and 2.1 take up more room • either version requires: 64K-byte memory, 1 diskette drive for diskette version; when program and/or data files are stored on fixed disk, requires 128K-byte memory, DOS 2.0 or 2.1 • developed by Microsoft, Inc:

250

Upgrade Kit, Multiplan 1.0 to Multiplan 1.1 • program diskette, tutorial diskette users' manual and upgrade kit information sheet for upgrading Multiplan instead of replacing it; available until April 30, 1984:

33

6024026 BPI General Accounting System • includes general ledger, accounts payable, accounts receivable, payroll capabilities • system is self-contained and may be used independently or interfaced with BPI Inventory Control or Accounts Receivable packages • features include: chart of accounts; check register; invoice register; cash sales journal; merchandise purchased journal; cash receipts journal; menu queues for multiple requests with single entry; check writing capability • requires: 64K-byte main memory; DOS; and 2 diskette drives • neither the program nor the data files can be stored on hard disk • developed by BPI Systems, Inc:

425

6024030 BPI Inventory Control • perpetual inventory package • system is self-contained and may be used independently or interfaced with BPI Accounts Receivable or General Ledger packages • costs inventory by FIFO, LIFO, or Average methods; creates inventory records which detail vendor/product information and automatically adjusts inventory averages or declines; writes P.O.'s records merchandise into inventory; prepares sales invoices • requires: DOS; 64K-byte main memory; and 2 diskette drives • neither the program nor the data files can be stored on hard disk • developed by BPI Systems, Inc:

425

6024027 BPI Accounts Receivable • integrated menu-driven accounts receivable package used for statement preparation, aging reports, and credit analysis • system is self-contained and may be used independently or interfaced with BPI Inventory Control and General Accounting packages • requires: IBM Disk Operating System; 64K-byte main memory; and 2 diskette drives • neither the program nor the data files can be stored on hard disk • developed by BPI Systems, Inc:

425

6024028 BPI Payroll • writes checks and deducts current Federal payroll taxes plus state and local taxes • requires: 64K-byte main memory, 2 diskette drives, DOS • cannot be stored on fixed disk • developed by BPI Systems, Inc:

425

6024029 BPI Job Cost • for preparing individual bids for jobs and for keeping track of both labor and non-labor costs for each job • requires: 64K-byte main memory, 2 diskette drives, DOS • cannot be stored on fixed disk • developed by BPI Systems, Inc:

550

6024058 Peachtree General Ledger 1.1 • 16-module package performs creation, maintenance, updating, and report-generating functions for general ledger; maintains detailed records of financial transactions; generates balance sheets and income statements • end-of-period reports include: trial balance; transaction registers; balance sheet; and income statement • system is self-contained and may be used independently or interfaced with Peachtree Accounts Receivable, Accounts Payable, or Inventory Control packages • requires: IBM Disk Operating System; Disk or Advanced Level BASIC; 128K-byte main memory, and 1 disk drive; 2 diskette drives • developed by Peachtree Software, Inc:

595

6024056 Peachtree Accounts Receivable 1.1 • generates complete invoicing and monthly statements for accounts



IBM 3270 Personal Computer

5271-2, 5271-4 & 5271-6 Systems

receivable • customer records include: customer number; address; credits; debits; discount; tax rate; balances; and year-to-date information • supports open-item and balance-forward methods; handles accounts receivable aging • system is self-contained and may be used independently or interfaced with Peachtree General Ledger, Accounts Payable, or Inventory Control packages • automatic interfacing to 6024008 General Ledger • requires: IBM Disk Operating System; Disk or Advanced Level BASIC; 64K-byte main memory and 2 diskette drives (PC); 128K-byte main memory and 1 fixed disk, 1 floppy diskette (XT) • developed by Peachtree Software, Inc:

595

6024059 Peachtree Accounts Payable 1.1 • maintains current and aged accounts payable; provides cash-requirements forecast based on due or discount dates; handles check printing with detailed stubs and automatic check register • automatic interfacing to 6024008 General Ledger • system is self-contained and may be used independently or interfaced with Peachtree General Ledger, Accounts Receivable, or Inventory Control packages • requires: IBM Disk Operating System; Disk or Advanced Level BASIC; 64K-byte main memory and 2 diskette drives (PC); 128K-byte main memory and 1 fixed, 1 floppy disk drive (XT) • developed by Peachtree Software, Inc:

595

6024057 Peachtree Inventory Control 1.1 • inventory control package supports up to 3 pricing levels; up to 939 items per 160K-byte diskette • system is self-contained and may be used independently or interfaced with Peachtree General Ledger, Accounts Receivable, or Accounts Payable packages • features include online query; standard or average costing and tracking of sales items, returns, and receipts • requires: DOS; 64K-byte main memory; and 2 diskette drives (PC); 128K-byte main memory and 1 fixed, 1 floppy drive (XT) • developed by Peachtree Software, Inc:

595

6024060 Peachtree Payroll 1.1 • handles weekly, biweekly, semimonthly, and monthly paid employees • automatic interfacing to 6024058 General Ledger • requires: DOS; Disk or Advanced Level BASIC; 64K-byte main memory and 2 diskette drives or 128K-byte main memory and 1 floppy, 1 fixed disk drive:

595

6024047 Home Budget • personal finance manager • keeps track of up to 48 separate accounts including savings and charge accounts, food bills, auto expenses, and utilities • requires: 64K-byte memory, 1 diskette, DOS; cannot be stored on fixed disk:

60

6024052 Private Tutor • self-study computer-assisted instruction program:

50

6024068 Learning DOS 2.0 • teaches how to use DOS • requires Private Tutor:

30

6024081 Learning to Program BASIC • teaches BASIC programming skills • requires Private Tutor:

35

6024053 BASIC Primer • computer-aided instruction program for teaching elementary BASIC statements; provides practice using files, provides practice using files, saving programs • requires PC 1 PC/XT with 64K bytes of memory, DOS, diskette drive, display:

60

64280XX Personal Computer Instructional System (PC-IS) • by Computer Systems Research, Inc; coordinated menu-driven, prompter-assisted interactive training program, presents courses to students, allows user to develop their own materials and customize acquired materials, monitors student activity, provides for asynchronous communications and compatibility with IBM hosts so that development and presentation can occur either on the PC or the mainframe • requires 128K-byte PC with 2 diskette drives, 80-character-wide display printer.

6428071 PC-IS Presentation • module which controls presentation of courses to students:

85

6428072 PC-IS Authoring • program development module:

525

6428087 PC-IS Administration • control, monitoring, and reporting module:

400

602401X Typing Tutor • typing instruction and drill program • provides immediate and summary feedback, including typing speed in words per minute.

6024013 Typing Tutor • diskette version • requires: IBM Disk Operating System; 48K-byte main memory; and 1 diskette drive:

25

6024018 Typing Tutor • cassette version • requires 32K-byte main memory and customer-supplied cassette tape recorder:

25

6024019 Time Manager V.1, V.1.05 • calendar and event-tracking program • records and displays both events and expenses; activities can be viewed on daily, monthly, or yearly basis; keyword and subject searching for retrieval of historical data • V.1.05 required for DOS 2.1 • requires: 64K-byte main memory; DOS 1.1, and diskette drive • developed by Image Producers, Inc:

100

6024031 Dow Jones Reporter • stock market news and information package • supports access to Dow Jones Wire Service; Wall Street Journal; Barrons; New York, American, Mid West, and Pacific Stock Exchanges and Over-The-Counter market electronic databases • requires: IBM Disk Operating System; 64K-byte main memory; diskette drive; Asynchronous Communications Adapter; and modem:

100

6024065 Insurance Agency Program • general-purpose management and accounting system for small to intermediate agencies • provides for maintenance of client records, for letter writing/word processing, invoicing, general ledger, accounts receivable/payable, also for profiling of clients and report production • requires PC 128K-byte memory, 2 diskette drives, display, 5152-3 graphics printer, DOS:

2,500

Other Facilities

6025072 Hardware Maintenance & Service • fault-isolation program for hardware components, including System Unit, 5151-001 Monochrome Display, 1501100 Keyboard, and 5152001 80-cps Matrix Printer • requires Cassette or Disk/Advanced Level BASIC:

\$155 lens

HARDWARE

Terms & Support

Terms • hardware products are available for purchase only and include a 90-day warranty; 3270 products can also be leased • the National Accounts Division and National Marketing Division both sell to the end user in single or volume orders (VPA) of 20 or more, or in pilot orders leading to a VPA of 20 or more; VPA orders can be for the basic system or for packaged systems; non-VPA orders can only be for basic systems • quantity discounts are available under the Volume Purchase Amendment (VPA); quantities of 20 to 49 systems are subject to a 12% discount; quantities of 50 to 149, a 16% discount; quantities of 150 to 249, a 20% discount; 250 to 499, a 24% discount; 500 to 999, a 27% discount; and quantities of 1,000 or more, a 30% discount • VPA contract period is 12 months.

Support • on-site, courier pick-up, carry-in, and mail-in maintenance contracts available; Warranty Extension Option provides pickup/delivery maintenance coverage for the entire first year at a lower cost than the usual carry-in/mail-in annual



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contract • annual option provides pickup/delivery maintenance coverage for subsequent years • carry-in and mail-in maintenance contracts for subsequent years are also available • on-site contracts are available in cities having an IBM service/exchange center • to obtain maintenance service, user must provide IBM National Support Center with results of 6025072 Hardware Maintenance and Service fault-isolation procedures (see Software—Other Facilities section); malfunctioning units can then be sent to IBM Product/Service Centers, IBM Customer Service Division (CSD), designated service locations, authorized IBM Personal Computer Dealers, or the IBM National Support Center in Greencastle, IN; IBM will repair System Units within 2 days and repair or replace printers, displays, keyboards, and other types of devices within 24 hours; all non-IBM devices must be removed from defective units prior to obtaining maintenance service.

□ Physical Specifications (H x W x D); Weight

CPU • 5.6 x 19.6 x 16.1 inches; 33 pounds.

Display • 15.2 x 15 x 16 inches (5272 color display); 33.1 pounds.

Keyboard • 2.5 x 22 x 9 inches; 9.3 pounds.

□ Systems Overview & Configurability

The 3270-PC is a highly defined, specialized version of the PC designed to be attached to a 3274 control unit in communications local-attach environments. It can also be attached to the display/printer adapter on 4321, 4331, or 4361 mainframes. The 3270-PC adds local intelligence and multiple logical terminal capability to the 3274; it can handle 4 active host sessions in addition to the PC-DOS and 2 scratchpad sessions. Since the 3274 has only one physical line, the multiple host capability has to be implemented by having the front end to which the 3274 attaches to the vehicle for multiple host connections.

The 3270-PC still maintains only one session that the keyboard can connect to, but a total of 7 sessions can be displayed simultaneously on the screen "windows." The display used is the 5151 or 5272 IBM monitor, not the 3270 series displays. The PC connects directly to the 3274 control unit.

3270-to-Processor Local Attachment

Local host processor attachment is via selector, byte multiplexer, or block multiplexer channel on the S/370 models and via byte multiplexer or block multiplexer channels on 3030, 3080, 4341, and 4381 processors with 3270 control unit attached to 1 of 8 positions on channel interface (note that IBM does not recommend non-DDC subchannel attachment to block multiplexer channel or to selector channel because of less than maximum throughput considerations) • the 3270 can locally attach to a display adapter or to the byte multiplexer on the 4321, 4331, or 4361 • CPU channel provides 3270 control unit with display/print data, and with control instructions needed to operate attached terminal devices • terminal buffers store data forwarded via control unit for display/print or modification • local-attached 3270 control units may be positioned no more than 200 feet from processor channel • all 3274 Models control units except the "C" models are used for local attachment.

Remote host processor attachment is via communication facilities to channel-connected transmission control units/adapters; however, certain remote 3270 control units can communicate via communication controllers or adapters without recourse to modem or communication facilities in a direct-connect mode (see 3270 Controllers and Communications sections for other particulars).

3270-to-Terminal Device Attachment

The 3274 attaches Category B terminals via direct cable connection at distances up to 2,000 feet from terminal adapter • 3274 Category A terminals can be located up to 4,900 feet from controller.

3270 Communications Attachment

The 3270 display system communicates with a remote processor via half-duplex data transmission on a single point-to-point

half-/full-duplex or multipoint full-duplex facility in BSC and/or SDLC protocol • dedicated (leased) private line facilities can be employed with any 3270 control unit • switched (dial) public telephone facilities can also be employed with certain 3274 models • IBM or independent vendor-supplied modems can be employed.

All remote 3270 models communicate with S/360, S/370 (including 3030 and 3080), or 4300 processors by transmitting to a channel-attached 3704, 3705, or 3725 communication front end; they can also transmit to integrated adapters on the S/370 Models 115, 125, 135, and 138 or on the 4300 (1601 ICA). Only 1 remote host processor may be directly attached to a 3270. 3270-type display printer and line printer terminals cannot remotely attach to 3270 control units via transmission line facilities.

System Maximums

Maximum configurability is stated below; minimum configurations are discussed under Packaged Systems.

System Maximums • 640K bytes of memory, 1 10M-byte fixed disk and 1 360K-byte diskette drive or 720K bytes on 2 diskette drives; one printer; one display; one keyboard and communications link to 3270 system • 3270 can have up to 128 logical terminals on up to 32 physical terminals • other PC options, specifically an asynchronous line adapter, are supported by requiring supplanting of another option in the expanded system described above; IBM states other PC/XT expansions cannot be implemented but the user implements them at his own risk.

□ Packaged Systems

5271 Base System Unit • includes CPU, memory expandable to 640K bytes, and integrated adapters for connecting keyboard, diskette, display, and the 3270 system; basic system has eight expansion slots basic system features implemented leave from 1 to (Model 6) to 4 (Model 2) slots available for options determined by the user.

5271-2 System Unit • includes 5271 Base System Unit, 256K bytes of main memory, keyboard, one dual-sided diskette drive, documentation • standard features use 4 of the 8 option slots • requires 5151 monochrome or 5272 Color display, 3270-PC Control Program and PC-DOS 2.0 or 2.1:

\$4,290 prch \$378/\$244/NA/NA maint

5271-4 System Unit • includes 5271 Base System Unit and all 5271-2 features but with 320K-byte memory, 64/256K adapter, second diskette drive, and graphics printer adapter • standard features use 6 of the 8 option slots:

5,319 514/330/NA/NA

5271-6 System Unit • includes 5271 Base System Unit and all 5271-2 features but with 320K-byte memory and 64/256K adapter, 10M-byte hard disk with adapter, and printer adapter for attachment of 5152 graphics printer as standard features • standard features uses 7 of the 8 option slots • requires 5151 Monochrome or 5272 Color Display, 3270-PC Control Program and PC-DOS 2.0 or 2.1:

7,180 723/466/NA/NA

□ CPU

The IBM 3270 Personal Computer is based on the Intel 8088 microprocessor. For PC 1 and PC/XT users who need to perform floating-point arithmetic, logarithmic, and trigonometric functions, IBM offers an 8087 math co-processor option, but this option is none of those formally offered for the 3270-PC. IBM states that it does not accept responsibility for options it has not formally endorsed.

PRCH: purchase price. MAINT: annual charge for maintenance coverage; first figure is on-site maintenance, second figure is for annual pickup/delivery option, third figure is for carry-in repair, and fourth figure is for mail-in. NA: not available. NC: no charge. Prices effective as of November 1983.



IBM 3270 Personal Computer 5271-2, 5271-4 & 5271-6 Systems

Intel 8088 Processor • 8-bit data bus interface, 16-bit internal architecture, direct addressing to 1M bytes of memory, 16-bit register set with symmetrical operations, 24 operand addressing modes, 8-bit and 16-bit signed and unsigned arithmetic with binary and decimal operands • 210-nanosecond cycle time; 4.77-MHz clock speed.

□ Memory

5271-2 Main Memory • 256K bytes on a system board; 64K-bit chips with parity checking, 250-nanosecond access time; memory expandable to 512K using 64K/256K Memory Expansion Board or to a maximum of 640K using two expansion boards.

5271-4 & 5271-6 Main Memory • 320K bytes; the first 256K bytes are on the system board and the next 64K bytes are on a 1501013 64K/256K memory board with 1 of the 4 possible 64K-byte modules implemented; the 1501013 board takes up one option slot although it is a standard feature; expansion to 512K using 3 more 64K byte modules on the 1501013 board; a second (optional) 1501013 board, using one more option slot is needed to expand from 512K bytes to 640K bytes.

1501013 64K-/256K-byte Expansion Option • allows 3270-PC to be expanded beyond the 256K-byte capacity of the initial system board • single circuit card capable of carrying four 1501003 64K-byte modules; one board with a 64K-byte module is implemented in the basic Model 4 and Model 6 systems as a standard feature • 2 expansion cards can be added to the Model 2 system and 1 to Models 4 and 6 in addition to the initial memory card(s) in order to expand from 256K to 512K bytes and from 512K bytes to 640K bytes; the memory ceiling of 640K bytes means that last card can carry only 2 modules:

\$325 prch \$38/\$30/\$24/\$21 maint

1501003 64K-byte Module • provides 64K-byte plug-in module; attaches to 1501013 Expansion Board:

16S NC/NC/NC/NC

3270-PC ROM • 40K bytes • includes BASIC-80 Interpreter and operating logic for cassette level system, and built-in power-on diagnostic self-test.

□ I/O & Communications

The 3270-PC 5271 System Unit includes 8 slots, like a PC/XT System Unit, but 4 to 7 slots are taken up by standard features. Standard (and presumably optional) feature slot locations are rigidly specified as follows.

Slot 1 (Long) • 3270 System Adapter • standard to all models.

Slot 2 (Long) • 1501013 64K-/256K-Byte Expansion Board • standard on Models 4 and 6; optional on Model 2.

Slot 3 (Long) • unassigned.

Slot 4 (Long) • 3270-PC Display Adapter; this adapter, which is standard to all models, can attach either a 5151 monochrome display or a 5272 color display; unlike other PC display adapters.

Slot 5 (Long) • 1602501 Fixed Disk Adapter • standard on Model 6, optional on Models 2 and 4.

Slot 6 (Long) • 1503780 Diskette Adapter • standard on all models.

Slot 7 (Short) • 1505200 Printer Adapter • standard on models 4 and 6, optional on Model 2.

Slot 8 (Short) • Keyboard Adapter • standard on all models.

Thus Model 2 has 4 unassigned slots, Model 4 has 2 and Model 6 has 1. The primary candidate for the unassigned slot is a second 64K-/256K-byte Expansion Board, needed to expand memory beyond 512K bytes. However, IBM also allows attachment of an asynchronous adapter (RS-232C) allowing a second communications line or other RS-232C-compatible device. If one of these options is chosen, memory can only be expanded to 512K bytes on Model 6.

The expansion units supported on other PC systems are not currently supported on the 3270-PC. Disk and diskette adapters each support 2 drives but there is room for only 2 drives in the system unit. Therefore Model 6 systems with a fixed disk

implemented do not permit the diskette subsystem to expand to 2 drives. Since fixed disk systems already have a standard diskette drive, a user who wants a second fixed disk would have to either use a third-party add-on drive, since the fixed-disk adapter for dual drives is already in the system, or would have to add IBM's (unsupported) expansion unit and test it for problems.

The I/O restrictions on the 3270-PC, particularly the lack of support of an expansion unit, may be a temporary problem. It is difficult to see why IBM would disallow the disk expansion since the disk and diskette adapters, which can each support 2 units, are already in the system.

The primary communications controller for the 3270-PC is the 3274 communications system. The same functions are also supplied by the 4300 display/printer adapter. In addition an optional asynchronous interface is supported.

3274 Control Units

3274 Control Unit Series 21, 31 & 41 Category A & Category B • floorstanding control unit supporting up to 32 Category A terminal clusters (except 3290 which is limited to 31); 16 Category B terminal clusters supported by 21A, 21B, 21C, 21D, 31A, 31C, and 31D • Type A adapters attach to Category A terminals; Type B adapters attach to Category B terminals on all control units except 21C and 31C • local and remote attach cluster controllers • Category A terminals consist of 3178 Models C1 and C2 display stations; 3262 3268, 3287, 3289, and 5210 printers; 3278 Models 2, 3, and 4 displays, 3278 Model 5 (Model 21B excluded); 3279 Models 52A, 52B, 53G, 2X, 3X, 2A, 2B, 3A, and 3B (base color models only on 21A, 21B, 21C, 21D, 31A, 31C, and 31D); 3290 information panel (except 21A, 21B, 21C, and 21D); 5210 Models G1 and G2 printwheel printers • 24 Type A connectors standard on 21A, 21B, 21C, 21D, 31A, 31C, and 31D; 32 Type A connectors standard on 41A, 41C, and 41D • Category B terminal is the 3277 Model 2 • diskette program loading facilities on 3274 allows user to configure initial display system and then change hardware/functions to meet new needs as required • Model 21 series can be upgraded directly to 31 series; Model 41A can be upgraded to 41D and vice versa • Model 21 equipped with 64K-byte controller; Model 31 equipped with 128K-byte controller; Model 41 equipped with 192K-byte controller.

3274 Model 21A • local SNA mode:

\$15,800 prch \$76/NA/NA/NA maint

3274 Model 21B • local mode:

15,800 78/NA/NA/NA

3274 Model 21C • remote BSC/SDLC:

11,100 58/NA/NA/NA

3274 Model 21D • local mode for virtual storage:

15,800 83/NA/NA/NA

3274 Model 31A • local SNA mode:

18,500 95/NA/NA/NA

3274 Model 31C • remote BSC/SDLC:

13,800 77/NA/NA/NA

3274 Model 31D • local mode for virtual storage:

18,500 103/NA/NA/NA

3274 Model 41A • local SNA mode:

18,230 58/NA/NA/NA

3274 Model 41C • remote BSC/SDLC:

13,840 40/NA/NA/NA

3274 Model 41D • local mode for virtual storage:

18,230 58/NA/NA/NA

3274 Model 1, 21 & 31 Series • some terminal configurations and/or features and functions exceed the basic control storage capacity of 3274 controller configuration; IBM provides detailed tables equating memory requirements versus terminal types/categories and features/functions offered • requires 1 or more increments of Type C and D Extended Function Store (EFS) memory (features 3622, 3623, 3625, 3627, and 3628); and/or Type A terminal adapters (feature 6903).



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6903 Type A3 Adapter • terminals 25 to 32:	1,020	2/NA/NA/NA
7802 Type B1 Adapter • terminals 1 to 4:	1,095	4/NA/NA/NA
7803 Type B2 Adapter • terminals 5 to 8:	923	2/NA/NA/NA
7804 Type B3 Adapter • terminals 9 to 12:	923	2/NA/NA/NA
7805 Type B4 Adapter • terminals 13 to 16:	923	2/NA/NA/NA

3274 Control Unit—Models 51C & 61C • tabletop control unit supporting up to 12 Category A and up to 4 Category B terminals on the 51C; the 61C supports 16 Category A terminals • 51C is shipped with 8 Category A terminal capacity; 61C is shipped with 16-terminal capacity.

Direct local connection without communication facilities or modem is possible for 3274 Model 51C to 3704/3705/3725 Communications Controller or 4321/4331/4361 Communications Adapter attachment • operation is at 1200 bps in BSC or SDLC.

3274 Model 51C • remote BSC/SDLC 8 Category A terminal support:

6,035	39/NA/NA/NA
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3274 Model 61C • remote BSC/SDLC 16 Category A terminal support • 192K bytes of control storage:

7,600	27/NA/NA/NA
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3274 Model 51C Configuration Support • the 3274 Model 51C may need additional memory capacity to meet configuration and/or feature/function requirements • such additions involve 1802 Control Storage Expansion, 3630 series Extended Function Store (EFS) memory increments; the controller comes equipped with ports for 8 Type A terminals in basic configuration.

1802 Control Storage Expansion • basic expansion module:

985	4/NA/NA/NA
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3630 EFS • Type D1; 32K bytes:

1,010	7/NA/NA/NA
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3631 EFS • Type D3; 32K bytes:

910	7/NA/NA/NA
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3632 EFS • Type D2; 65K bytes:

2,025	15/NA/NA/NA
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7801 Type B Adapter • terminals 1 to 4:

1,095	4/NA/NA/NA
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5550 Power Expansion Unit • required for supplying additional power for terminals attached via Type B adapters:

379	2/NA/NA/NA
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3274 Control Unit Communications:

Models 21C, 31C, and 41C communicate in BSC or SDLC protocol over dedicated lines at 2000/2400/4800/7200/9600-bps rates • Models 51C and 61C communicate in BSC or SDLC on dedicated lines at 1200/2000/2400/4800/7200/9600-bps rates, and on switched lines at 1200/2000/2400/4800 bps.

Adapters & Interfaces • various communication adapters or interfaces are employed for data transmission applications on 3274 Model "C" controllers • 3701 External Modem Interface provides EIA cable and interface logic for attachment of IBM or equivalent modems • Digital Data Service (DDS) adapters support BSC/SDLC transmission at 2400/4800/9600 bps over AT&T Dataphone Data Service (DDS) facilities; 5650 DDS adapter supports point-to-point communication, and 5651 DDS supports multipoint communication • 1 Common Communications Adapter is required on 3274 Model 51C and 61C to handle BSC/SDLC transmission control protocols, and to support other communication adapters or interfaces; 6302 Common Communications Adapter supports communication of up to 9600 bps through IBM or equivalent modems that provide clocking or through DDS adapters.

1550 CCITT V.35 Interface:

525	1/NA/NA/NA
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3701 External Modem Interface • for EIA cabling and logic (included with Models 21C, 31C, and 41C):

337	3/NA/NA/NA
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5650 DDS • point-to-point adapter:

840	1/NA/NA/NA
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5651 DDS • multipoint adapter:

840	1/NA/NA/NA
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5655 X.21 Adapter • non-switched networks:

800	1/NA/NA/NA
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5656 X.21 Adapter • switched networks:

884	2/NA/NA/NA
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6302 Common Communications • BSC/SDLC 9600-bps adapter (included with Models 21C, 31C, and 41C):

365	2/NA/NA/NA
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6303 High-Performance Communications Adapter • required on 41C and 61C for attaching to communications facilities at speeds up to 9600 bps; BSC/SDLC operation:

1,010	8/NA/NA/NA
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4850 Loop Adapter • for 8100 system operations:

797	3/NA/NA/NA
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1502074 Asynchronous Communications Adapter • single-port, asynchronous, half-/full-duplex interface module provides RS-232C or 20-mA current-loop signal levels; software-selectable data rates of 50 to 9600 bps; 5 to 8 data bits; 1 start bit; 1 or 2 stop bits; odd, even, or no parity; optional system-interrupt generation • includes 25-pin, D-shell male connector and jumper block • requires system expansion slot:

120	NC/NC/NC/NC
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1502067 Communications Adapter Cable:

75	NC/NC/NC/NC
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Mass Storage

All 3270-PC models include a diskette drive and adapter as a standard feature. A fixed disk can be attached to any system, and is standard to the 5271-6 system package. See I/O for a discussion of expansion difficulties.

1503780 5.25-Inch Diskette Adapter • standard to all 3270-PC models supports attachment of up to two 5.25-inch diskette drives • maximum of 1 adapter per system • requires system expansion slot number • manufactured by Tandon Corporation:

NC prch	NC/NC/NC/NC maint
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1503800 5.25-Inch Dual-Sided Diskette Drive • 360K-byte, 5.25-inch, dual-sided, 180K bytes per side; 40 tracks per diskette; 48 tracks per inch; 6-millisecond track-to-track access time; 20,480-byte-per-second transfer rate; 300 revolutions per minute • maximum of 2 drives per 1503780 5.25-Inch Diskette Adapter providing there is space in System Unit • user installable in System Unit housing • requires 1503780 5.25-Inch Diskette Adapter • manufactured by Tandon Corporation:

529	58/47/38/33
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1602500 Disk Drive • for PC 1 • 10M bytes of fixed disk storage using same physical dimensions and mounting as diskette drive • 90-millisecond average access; 512 bytes per sector, 17 sectors per track, 306 cylinders/tracks per surface; 3,600 rpm; can be installed in the 5161-1 Expansion Unit for the 5150 to expand disk capacity from 10M to 20M bytes; not available for 5161-2 • requires DOS 2 and 1602501 Adapter:

1,695	295/235/190/165
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1602501 Fixed Disk Drive Adapter • provides buffering, error detection/correction, and DMA data transfer control for 1 or 2 1602500 10M-byte fixed disks • located in slot • requires 1 full feature slot, DOS 2 or 2.1:

695	NC/NC/NC/NC
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IBM 3270 Personal Computer 5271-2, 5271-4 & 5271-6 Systems

□ Terminals/Workstations

Standard 3270-PC Screen Management features permit the user to view all or part of a presentation space (a logical screen). Screens of up to 3,440 characters are supported although those larger than 2,000 will have to be scrolled. Operating software controls screen windows that can view portions or all of up to 10 logical screens; windows can be moved to anywhere on or off the screen. Different foreground and background colors can be defined for different host sessions providing they are not using extended data stream attributes. The 5151 display can be attached to the system but the 5272 is the display really tailored to the 5271 System Unit. Unlike other PCs both displays attach to the same (standard) adapter.

5272 Color Display • 14-inch, 8-color monitor; 720x350 pixels for graphics; 1920 characters for host and notepad sessions, 2000 characters for PC-DOS 2.0 or 2.1 sessions:

 \$995 prch \$90/\$65/NA/NA maint

5151-001 IBM Monochrome Display • 11.5-inch diagonal, green phosphor screen; 25-row x 80-character display format; 7x9 dot-matrix character formation in 9x12 field • upper-/lowercase alphanumeric characters; special characters; line-graphic characters • character/field attributes include: underlining; blinking; normal/high intensity; reverse image; non-display • includes signal and power cables • requires standard 3270-PC Display Adapter:

 345 44/35/28/25

5271-5730 Keyboard • typewriter-style, special alphanumeric keyboard • 3270 host keytop graphics printed in black; keytops unique to PC-DOS operations are printed in blue • adjustable slope • all non-control keys feature auto-repeat • keystroke record/play function to common key sequences; program function keys; ALT key permits access to all 256 ASCII and special characters • attached to System Unit via a coiled cable • included in packaged systems and available separately:

 270 NA/NA/NA/NA

□ Printers

The IBM 3270 Personal Computer supports an optional printer, attached via a separately available adapter, which is a standard feature on 5271-4 and 5271-6 System Units and optional on the 5271-2.

1505200 Printer Adapter • supports attachment of 5152-002 and compatible Graphics Printers; intended for use with systems configured with a Color/Graphics Monitor Adapter • requires system expansion slot number 7 (short slot):

 \$150 prch NC/NC/NC/NC maint

5152-002 Graphics Printer • 80 cps; bidirectional printer allowing mixing of text and graphics • 9x9 dot matrix; 40, 66, 80, or 132 characters per line • requires 1505200 adapter:

 595 63/50/40/35

1525612 Printer Cable • 6-foot cable connects 5152-002 Graphics Printer to 1505200 Printer Adapter or 1504900 Monochrome Display and Printer Adapter:

 55 NC/NC/NC/NC

5182-001 PC Color Printer • 200-cps bidirectional dot matrix printer • 132 columns • 4 print modes include draft (200 cps), text (110 cps), APA graphics, and near-letter-quality (35 cps); 4-band ribbon mixable to produce 8 colors • 6K-byte print buffer fixed proportional spacing, 10, 12, 17.1 nominal fixed pitch with double width at each pitch; 13.5-inch print line; 3 resident fonts • tractor feed and manual single-sheet feed; up to 4 part forms • requires parallel printer adapter on PCjr; requires standard printer signal cable; Printer Adapter, or on Monochrome Display and Printer Adapter software compatible with the 5152-002 graphics printer:

 1,995 565/455/365/365

• END



Kaypro 2, 4 & 10 Personal Computer Systems

■ PROFILE

Operating System • Digital Research CP/M 2.2 provided with all Kaypro systems; Microsoft MS-DOS included with Kaypro Plus 88 models.

Data Management • Perfect Software's Perfect Filer included with system; Ashton Tate's dBase II database management system available separately.

Communications/Networks • Kaylink HASP station emulator.

Languages • Microsoft MBASIC-80 interpreter, Digital Research CBASIC compiler, Topaz Programming S-BASIC compiler.

Models • Kaypro 2, 4 and 10: single-processor systems; 2 Plus 88 and 4 Plus 88: dual-processor models; all are single-user systems.

CPU • 8-bit Zilog Z80 standard on Models 2 and 2 Plus; 8-bit Zilog Z80A standard on Models 4, 10, and 4 Plus; 16-bit Intel 8088 included in Plus 88 systems.

Memory • 64K-byte memory standard on single processor systems; additional 256K included in Plus 88 systems.

Chassis Slots • no chassis slots available; the Plus 88 CPU with RAM memory extension is half-board which fits over Kaypro motherboard.

Ports • models 2 and 2 Plus 88 include 1 RS-232C serial port for asynchronous communications; models 4, 4 Plus 88 and 10 include 2 serial ports; all models include 1 parallel interface.

Mass Storage • Kaypro 2: dual 191K byte diskettes; Kaypro 4: dual 392K byte diskettes; Kaypro 10: single 400K byte diskette with



single 8.90M byte hard disk; all capacities listed are formatted sizes.

Terminals/Workstations • single-terminal systems, with integral monitor and detachable keyboard, designed as transportable system.

Printers • not supplied by Kaypro; parallel printer interface included with basic system to provide compatibility with wide selection of commercially available systems.

First Delivery • Kaypro 2: June 1982; Kaypro 4: June 1983; Kaypro 10: May 1983.

Systems Delivered • October financial report stated 2,000 shipments in fiscal 1982 and 53,000 in fiscal 1983.

Comparable Systems • all CP/M systems based on an 8-bit Z80 processor with a 64K-byte memory, a transportable design, and bundled software within the \$2,000 to \$3,000 price range; the addition of the Intel 8088 processor in the Plus 88 models, at this time, limits the number of directly comparable systems to the Otrona Attache (Z80-1 Intel 8086-based), Seequa Chameleon (Z80-1 Intel 8086 based).

Vendor • Kaypro Corporation; 533 Stevens Avenue, Solana Beach, CA 92075; mailing address: Post Office Box N, Del Mar, CA 92014 • 619-481-4300.

Canada • Distributor: Computron, 56 Toorbay Road, Unit 5, Toronto, ON L3R 1G7 • 416-477-0828.

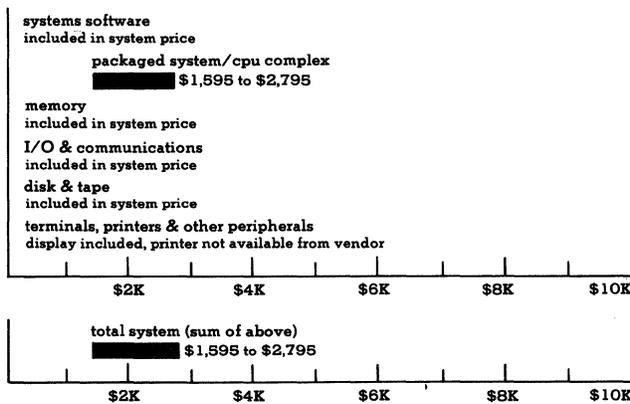
Distribution • national network of 900 dealers with thirteen Kaypro regional district managers; all European operations are based out of Holland office.

■ ANALYSIS

Kaypro Corporation began its existence as a division of Non-Linear Systems. Founded in 1953, Non-Linear Systems was the developer of the first digital voltmeter and the smallest commercial oscilloscope. In August 1983, Kaypro Corporation made its initial public stock offering as a separate corporate entity, though still affiliated with Non-

PURCHASE PRICE RANGE

hardware & software



KAYPRO PURCHASE PRICING bar graphs illustrate price ranges for small to large systems, with solid bars reflecting software/hardware purchase pricing • **SMALL SYSTEM** is based on Kaypro 2 packaged system (includes 8-bit Z80 processor, 64K-byte memory, dual 191K-byte mini-diskettes, 9-inch integral display, detachable keyboard, RS-232C interface, parallel printer interface, CP/M 2.2, WordStar, Perfect Writer, Perfect Speller, Perfect Calc, Perfect Filer, Profit Plan, M-BASIC) • **LARGE SYSTEM** is based on Kaypro 10 packaged system (includes 8-bit Z80 processor, 64K-byte memory, single 8.9M-byte hard disk, single 400K-byte mini-diskette, 9-inch integral display, detachable keyboard, 2 RS-232C interfaces, parallel printer interface, CP/M 2.2, WordStar, Perfect Writer, Perfect Speller, Perfect Calc, Perfect Filer, Microplan, M-BASIC, C-BASIC, S-BASIC, Super Term.



Kaypro 2, 4 & 10 Personal Computer Systems

TABLE 1: KAYPRO MODEL DIFFERENCES

DESCRIPTION	KAYPRO 2	KAYPRO 2 PLUS 88	KAYPRO 4	KAYPRO 4 PLUS 88	KAYPRO 10
CPU	Zilog Z80	Zilog Z80 Intel 8088	Zilog Z80	Zilog Z80 Intel 8088	Zilog Z80
MEMORY	64K bytes	320K bytes	64K bytes	320K bytes	64K bytes
DISPLAY	24 lines x 80 characters	24 lines x 80 characters, 25th status line	24 lines x 80 characters	24 lines x 80 characters, 25th status line	24 lines x 80 characters
GRAPHICS	none	160 x 100 pixels	none	160 x 100 pixels	none
DISK STORAGE	dual 191K byte diskettes	dual 191K byte diskettes	dual 392K byte diskettes	dual 392K byte diskettes	10M-byte Winchester; 392K byte diskette
PORTS	1 RS-232-C 1 parallel	1 RS-232-C 1 parallel	2 RS-232-C 1 parallel	2 RS-232-C 1 parallel	2 RS-232-C 1 parallel
BUNDLED SOFTWARE	CP/M 2.2, WordStar, Perfect Writer, Perfect Speller, Perfect Calc, Perfect Filer, Profit Plan, M-BASIC	CP/M 2.2, MS-DOS, WordStar, Perfect Writer, Perfect Speller, Perfect Calc, Perfect Filer, Profit Plan M-Basic	CP/M 2.2, WordStar, Perfect Writer, Perfect Speller, Perfect Calc, Perfect Filer, Microplan, M-BASIC, C-BASIC, S-BASIC, SuperTerm	CP/M 2.2, MS-DOS, WordStar, Perfect Writer, Perfect Speller, Perfect Calc, Perfect Filer, Microplan, M-BASIC, C-BASIC, S-BASIC, SuperTerm	CP/M 2.2, WordStar, Perfect Writer, Perfect Speller, Perfect Calc, Perfect Filer, Microplan, M-BASIC, C-BASIC, S-BASIC, SuperTerm

Linear Systems. Kaypro Systems reported their profit for fiscal year 1983 after a slight loss in 1982.

Kaypro jumped into the transportable market created by Adam Osborne and made a number of good moves. First, they added more software into the basic system. Second, they announced products in a timely manner. Third, each new product was different enough and enough of an upward step to add sales rather than compete with the rest of the line.

Their latest announcement, the Robie, is a desktop (non-transportable) computer reported to have an extremely small footprint, about one foot square. The system is not included in this report as it is still in the prototype stage.

Strengths

Each Kaypro system provides basic computing power combined with a wide selection of software at a low price. The systems are transportable units weighing about 26 pounds. They are an average size and weight for that market. Transportable systems generally range between 20 to 35 pounds as opposed to the newer and much smaller lap-sized systems.

The recently announced UniForm diskette compatibility is an added bonus. It allows Kaypro systems to read and write diskettes in the Osborne I (single and double density), Xerox 820 and 820 II, and Radio Shack TRS-80 Model 1 formats. This is one step to alleviate the problems caused by a lack of standard formats for the 5.25-inch diskettes.

The new Plus 88 dual processor configurations are also a positive move for Kaypro. The addition of a sixteen-bit processor is an improvement in both terms of the performance and software capabilities of the machines. Running MS-DOS does not imply any significant IBM compatibility, but it does expand the number of applications packages available for use on the system.

The agreement with the MAI Sorbus Service Division to provide maintenance and repair for the Kaypro models was another positive step at this time. Also, ProFiles, a glossy, bi-monthly consumer magazine is sent to each Kaypro user free for one year from the date of purchase. This new magazine premiered in mid-June with an initial circulation of 40,000 to 50,000 readers. Kaypro is keeping in touch with their users.

Limitations

The limitations to the Kaypro models are designed into the product. The models are meant to be low cost systems providing basic computing with a wide choice of software. The low cost is fine but some things get lost along the way. The Kaypro 2, for example, does not allow any text highlighting (half-intensity, blink, etc.). You have to move to a Kaypro 4 or 10 to get a display that can use the capabilities of the software bundled into the basic systems. The Kaypro systems are also not very expandable since they have no available chassis slots.

The Kaypro 10 was the first and lowest price system to include a hard disk. The early problems reported with the



Kaypro 2, 4 & 10 Personal Computer Systems

reliability of the hard disk systems seems to still exist. Hard disks are delicate pieces of equipment that must be handled carefully. Toting them around in a portable unit subjects them to shocks that can cause not only a loss of files but, in some cases, loss of the entire disk itself.

Kaypro is not the only vendor facing this problem. Other transportable manufacturers that have added hard disks drives to their systems also have had reliability problems.

Admittedly, the Kaypro 10 was both the first and lowest price system to include a hard disk but the initial low price pales in comparison to the cost and time involved in regenerating 10M bytes of data lost due to a disk failure.

■ SOFTWARE

□ Terms & Support

Terms • software selections are either bundled into system price or available for one-time license fee.

Support • software support to be provided through local dealers; dealers have technical contacts at Kaypro for additional information; after-sale support available to users directly from Kaypro only after dealer involvement.

□ Software Overview

All Kaypro systems include the operating system as well as a number of software packages in the basic system price. The applications software provided includes word processing packages, financial spreadsheets, a database manager, spelling checkers, programming languages, and modem communications.

The 8-bit Kaypro models include CP/M 2.2 from Digital Research as the bundled operating system. The Plus 88 models with the 16-bit Intel 8088 processor include MS-DOS from Microsoft as the second operating system.

The Kaypro 2 and 2 Plus 88 also include both WordStar and Perfect Writer for word processing applications. Profitplan and Perfect Calc are the two spreadsheets bundled into the price. Additional software includes Perfect Filer, The Word Plus, Perfect Speller, and M-BASIC.

The Kaypro 4, 4 Plus 88, and Kaypro 10 each include the same software selection. These models included all the software provided with the Kaypro 2 with the exception of Profitplan. These newer models include Microplan in its place. In addition, the SuperTerm communications package and both C- and S-BASIC are added to the list of software bundled with these systems.

□ Packaged Software

Not currently available from Kaypro Corporation.

□ Operating System

CP/M 2.2 • single-user, single-tasking, general-purpose operating system designed to support the Intel and Zilog families of 8-bit processors; features and facilities of this basic system are all upward compatible and are present in all other versions of CP/M; consists of four elemental structures: Basic I/O System (BIOS), Basic Disk operating System (BDOS), Console Command Processor (CCP), and a Transient Program Area (TPA) • BIOS is the modifiable portion of the operating system enabling users to tailor CP/M systems to meet specific configurations; allows users to define all hardware-independent elements of the system by defining low-level interface and the peripheral I/O for the system • supports up to 16 logical devices, containing up to 65,536 records, with up to an 8M-byte capacity • CCP provides the interface between the user's console and the rest of the CP/M system; it reads, interprets, and executes commands entered from the console; commands are both built-in commands and transient commands; transient commands are loaded into the TAP and executed • TPA is the area designated to hold programs that are loaded from disk and then executed • standard utilities provided

include: DDT interactive debugger; PIP file transfer facility; DUMP utility; SUBMIT/XSUB batch control utilities; ED command-oriented text editor; ASM assembler; and STAT system status utility • memory requirements depend on number and types of options implemented; basic system requires 20K bytes of memory and an ASCII terminal; included in packaged system price.

MS-DOS 2.0 • single user, interactive and batch processing operating system with Unix-like hierarchical directories, piping functions, filters and hard disk support; equivalent to IBM-PC DOS 2.0 • supports up to 186K bytes in up to 64 different files in single-sided format, up to 360K bytes in up to 112 files in double-sided format, and up to 5M or 10M bytes with thousands of filenames on hard disk; handles records from 1 to 65,535 bytes long in file transfer, executes external (disk based) commands giving the user ability to expand the DOS vocabulary to limits of disk space • batch processing capabilities with automatic execution on power-up, user commands include: DATE, TIME, COPY, ECHO, PATH, MKDIR, RMDIR, CHDIR, TREE, RECOVER, GRAPHICS, BREAK, and CTTY • additions over DOS 1.25 in performance include hierarchical directories to facilitate hard disk use, numerous performance enhancements, redirection of I/O, piping of functions (sequentially rather than concurrently as in UNIX), higher sector density per track (9 sectors per track versus 8 in DOS 1.25), and installable device drivers • MS-DOS is divided into four parts: a device independent I/O handler, an I/O processor, reference and jump vectors in low memory, and a command processor; the device independent I/O handler on hidden file MSDOS.SYS is the core of MS-DOS through which I/O must be directed, I/O is physically moved by hidden file IO.SYS as commanded by MS-DOS.SYS, COMMAND.COM is responsible for interface between user and MS-DOS, error trapping, batch file processing, interpreting user commands and executing file names • MS-DOS 2.0 will read earlier MS-DOS diskettes, there are several unique system interrupt calls and file descriptors that made programs utilizing these features non-transportable between MS-DOS 2.0 and earlier versions • an editor, debugger, and other utilities are provided; included with Plus 88 option.

□ Utilities

TinkerKit • source listings and ROM for Kaypro BIOS; only available for Kaypro 2 and Kaypro 4:

\$95 lens

UniForm • allows Kaypro systems to read and write diskettes in formats compatible with the Osborne I (single and double density), Xerox 820 and 820 II, and Radio Shack TRS-80 Model 1; developed by Micro Solutions; incorporated into CP/M S-BASIC diskette included with Kaypro 4, 4 Plus 88, and 10 basic system.

B-Trees • provides a method for indexed file storage and retrieval, with all algorithms written in S-BASIC:

95

□ Data Management

Perfect Filer • organizational and individual member database; compatible with Perfect series programs; developed by Perfect Software; included with all Kaypro basic systems.

dBase II • database management system, uses English-like commands to ADD, DELETE, EDIT, DISPLAY, and PRINT; handles 64K records per file with 1K bytes per record and 32 fields per record; supports 7 key fields per file; developed by Ashton-Tate:

\$700 lens

□ Communications/Network

SuperTerm • intelligent terminal emulation program which configures the RS-232 bidirectional, serial communications port; included with Kaypro 4, 4 Plus 88, and 10 basic systems, optional for Kaypro 2 and 2 Plus 88 systems:

\$175 lens

Kaylink • HASP station emulator with full HASP protocols to allow mainframe communications, consists of software and minor hard-

LCNS: license fee.



Kaypro 2, 4 & 10 Personal Computer Systems

ware modifications including changes to asynchronous communications port to provide synchronous capabilities; menu-driven program with help screens and security; developed by Florida State University Computing Center and distributed by Computer Marketing Associates:

750

Program Development/Languages

BASIC-80 • interactive interpreter, includes selection of computer games; developed by Microsoft; included with all Kaypro systems.

S-BASIC • high-level structured compiler; developed by Topaz Programming; included with Kaypro 4, 4 Plus 88, and 10 systems, optional on Kaypro 2 and 2 Plus 88 systems:

\$75 lcms

C-BASIC • interactive compiler, developed by Digital Research; included Kaypro 4, 4 Plus 88, and 10 systems, optional on Kaypro 2 and 2 Plus 88 systems:

150

Applications Packages

WordStar • version 3.3, screen-oriented word processing program with variety of text enhancements; developed by MicroPro International and modified to take advantage of Kaypro function keys; included with all Kaypro basic systems.

MailMerge • form letter generator to merge standard text files with variable data, operates as companion to WordStar; developed by MicroPro International:

\$50 lcms

Perfect Writer • word processing package with split screen editing and access to multiple files; three diskettes are included to provide editing, installation, and tutorial; uses same commands as Perfect Speller, Calc and Filer; developed by Perfect Software; included with all Kaypro basic systems.

Perfect Speller • companion product to Perfect Writer; 50,000 word dictionary with estimated 4,000 word-per-minute review rate; included with all Kaypro basic systems.

The Word Plus • spelling checker with automatic hyphenation, finds rhymes and anagrams, provides total word count and word usage count, alphabetizes text files and word lists; included with all Kaypro basic systems.

Profit Plan • business spreadsheet program, developed by Chang Laboratories; included in Kaypro 2 and 2 Plus 88 systems.

MicroPlan Finance Module • programmable upgrade of Profit Plan; displays finance commands, depreciation, mortgages, internal rate of return, ratios, percentages, growth, and tax schedules; developed by Chang Laboratories; included in Kaypro 4, 4 Plus 88, and 10 basic systems or available separately:

350

Perfect Calc • electronic spreadsheet with 15 program functions; interactive with all Perfect programs; included with all Kaypro basic systems.

The Accounting Partner • includes four modules: general ledger, payroll, accounts payable, and accounts receivable; designed for small business and performs all integration calculations and uses standard 80-column business formats; menu-driven program with full documentation; developed by Star Software Systems:

395

HARDWARE

Terms, Support & Documentation

Terms • systems available for purchase only; 90-day warranty included with systems.

Support • maintenance and repair through MAI Sorbus Service Division with 160 field offices, 24-hour service, on-site, 30-day guarantee on parts and labor.

Documentation • packaged systems include User's Manual for system as well as manual for each software package bundled in system price.

Physical Specifications (H x W x D); Weight

Kaypro 2, 4 & 10

CPU • 8.5 (11.6 with stand) x 18.75 x 16.4; 26 pounds for Kaypro 2 and 4, 31 pounds for Kaypro 10.

Display • integrated with CPU unit.

Keyboard • 3 x 18.75 x 8 inches; weight not available.

Systems Overview & Configurability

The Kaypro systems are transportable models built using the same basic design and components. The Kaypro 2, 4, and 10 systems include an 8-bit Zilog Z80 processor with 64K bytes of memory. The differences between these models is the amount and type of integral on-line diskette storage. The Kaypro 2 and 2 Plus 88 include dual 191K-byte mini-diskettes. The Kaypro 4 and 4 Plus 88 include dual 392K-byte mini-diskettes while the Kaypro 10 jumps to a 10M-byte hard disk with a 400K-byte mini-diskette backup.

All Kaypro systems use the same keyboard design and layout, as well as the same nine-inch integral display. The Kaypro 4, 4 Plus 88, and 10 systems, however, include a display with a higher resolution than the Kaypro 2 and 2 Plus 88 systems. This display provides both text highlighting and graphics capabilities.

Maximum configurability is stated below; minimum configurations are discussed under Packaged Systems.

Kaypro 2 System Maximums • 64K-byte memory • dual 191K-byte diskettes • one serial interface, one parallel interface.

Kaypro 2 Plus 88 System Maximums • 320K-byte memory • dual 191K-byte diskettes • one serial interface, one parallel interface.

Kaypro 4 System Maximums • 64K-byte memory • dual 392K-byte diskettes • one serial interface, one parallel interface.

Kaypro 4 Plus 88 System Maximums • 320K-byte memory • dual 392K-byte diskettes • one serial interface, one parallel interface.

Kaypro 10 System Maximums • 64K-byte memory • single 400K-byte diskette, single 8.9M-byte hard disk • two serial interfaces, one parallel interface, light pen interface.

Packaged Systems

Kaypro 2 • transportable system with 8-bit Zilog Z80 processor, 64K-byte memory, dual 191K mini-diskettes, 9-inch integral display, detachable keyboard, RS-232C interface, parallel printer interface, CP/M 2.2, WordStar, Perfect Writer, Perfect Speller, Perfect Calc, Perfect Filer, Profit Plan, M-BASIC:

\$1,595 prch

Kaypro 2 Plus 88 • transportable system with 8-bit Zilog Z80 processor with a 64K-byte memory, 16-bit Intel 8088 processor with a 256K-byte memory, dual 191K mini-diskettes, 9-inch integral display, detachable keyboard, RS-232C interface, parallel printer interface, CP/M 2.2, MS-DOS, WordStar, Perfect Writer, Perfect Speller, Perfect Calc, Perfect Filer, Profit Plan, M-BASIC:

1,995

Kaypro 4 • transportable system with 8-bit Zilog Z80 processor, 64K-byte memory, dual 392K-byte minidiskettes, 9-inch integral display, detachable keyboard, two RS-232C interfaces, parallel printer interface, CP/M 2.2, WordStar, Perfect Writer, Perfect Speller, Perfect Calc, Perfect Filer, Microplan, M-BASIC, CBASIC, S-BASIC, SuperTerm:

1,995

Kaypro 4 Plus 88 • transportable system with 8-bit Zilog Z80 processor with a 64K-byte memory, 16-bit Intel 8088 processor

PRCH: purchase price.



Kaypro 2, 4 & 10

Personal Computer Systems

with a 256K-byte memory, dual 392K-byte minidiskettes, 9-inch integral display, detachable keyboard, two RS-232C interfaces, parallel printer interface, CP/M 2.2, MS-DOS, WordStar, Perfect Writer, Perfect Speller, Perfect Calc, Perfect Filer, Microplan, M-BASIC, CBASIC, S-BASIC, SuperTerm:

2,395

Kaypro 10 • transportable system with 8-bit Zilog Z80 processor, 64K-byte memory, single 400 minidiskette, single 8.9M-byte hard disk, 9-inch integral display, detachable keyboard, two RS-232C interfaces, parallel printer interface, CP/M 2.2, WordStar, Perfect Writer, Perfect Speller, Perfect Calc, Perfect Filer, Microplan, M-BASIC, CBASIC, S-BASIC, SuperTerm:

2,795

CPUs

Zilog Z80 Processor • 8-bit internal architecture, 8-bit data bus interface; direct addressing to 64K bytes of memory; fourteen registers include 16-bit program and stack pointers, two index registers, and a duplicate set of an 8-bit accumulator and a 7-bit flag register; upwardly compatible with Intel 8080, it provides binary coded decimal (BCD) arithmetic, double precision operations, multiple indexing with address registers, multiple interrupt, increment, decrement, and move capabilities • in addition to being able to execute all 78 Intel 8080 instructions, 50 enhancements to the instruction set include advanced block move and search macros, relative jump and three types of selectable response interrupts for a total of 128 operations; included in all Kaypro systems.

Intel 8088 Processor • 8-bit data bus interface, 16-bit internal architecture, direct addressing to 1M bytes of memory, 16-bit register set with symmetrical operations, approximately 70 basic instructions with up to 30 addressing modes, 8-bit and 16-bit signed and unsigned arithmetic with binary and decimal operands, extensive string and block move facilities • powerful segmentation facilities allow memory partitioning for multitasking, concurrent or multiuser capabilities • a pseudo-superset of the Intel 8080 instruction set where translation to 8088 is straight forward • instruction set compatible with Intel 8086; included in Kaypro Plus 88 systems.

Memory

All Kaypro systems include 64K bytes of memory for use with the 8-bit Zilog Z80 processor. The Plus 88 systems, based on the Kaypro 2 and 4 units, add 256K bytes of memory to the basic 64K. This additional memory is included in the Plus 88 upgrade. It is a half-board which fits over the Kaypro main system board. This board contains the extra memory, the 16-bit Intel processor, and a

socket for the Zilog processor. The board plugs into the 8-bit CPU socket on the main board and the Z80 is moved to the socket on the half-board.

All Kaypro systems also include 2K bytes of ROM memory as part of the basic system configuration.

I/O & Communications

Serial Port • the Kaypro systems all include an RS-232C interface with asynchronous communications to 19,200 bps • the Kaypro 4, 4 Plus 88, and 10 systems include a second serial interface as part of the basic unit.

Parallel Port • all Kaypro systems include a parallel Centronics printer interface as part of the basic bundled system.

Mass Storage

Dual 191K Diskettes • included in standard Kaypro 2 and 2 Plus 88 systems; 5.25-inch single-sided, double-density minidiskette drives integral to portable unit.

Dual 392K Diskettes • included in standard Kaypro 4 and 4 Plus 88 systems; 5.25-inch double-sided, double-density minidiskette drives integral to portable unit.

10M-Byte Hard Disk with 400K Diskette • included in standard Kaypro 10 systems; 5.25-inch double-sided, double-density minidiskette with 10M-byte Winchester hard disk unit, both integral to portable unit.

Terminals/Workstations

Display • all Kaypro systems include a nine-inch integral green phosphor monitor as part of the basic system; all provide a 24-line by 80-character screen format • the Kaypro 10 uses a high resolution display with a 25th status line; this display includes inverse video, blinking, underlining, and reduced intensity to provide text highlighting; the high-resolution display provides a 160 by 100 pixel graphic display.

Keyboard • all the Kaypro systems use the same detached keyboard • the layout includes four cursor control keys and a 14-key numeric pad.

Printer/Graphics

Not supplied by vendor; integral serial and parallel interfaces provide compatibility with wide variety of commercially available printers.

• END

