

The Interpreter

An analysis of news, issues and trends affecting the computer industry

Dual-personality IBM 3270-PC bridges micros and mainframes

New architecture tests PC compatibility, increases functions for 3270 and PC users

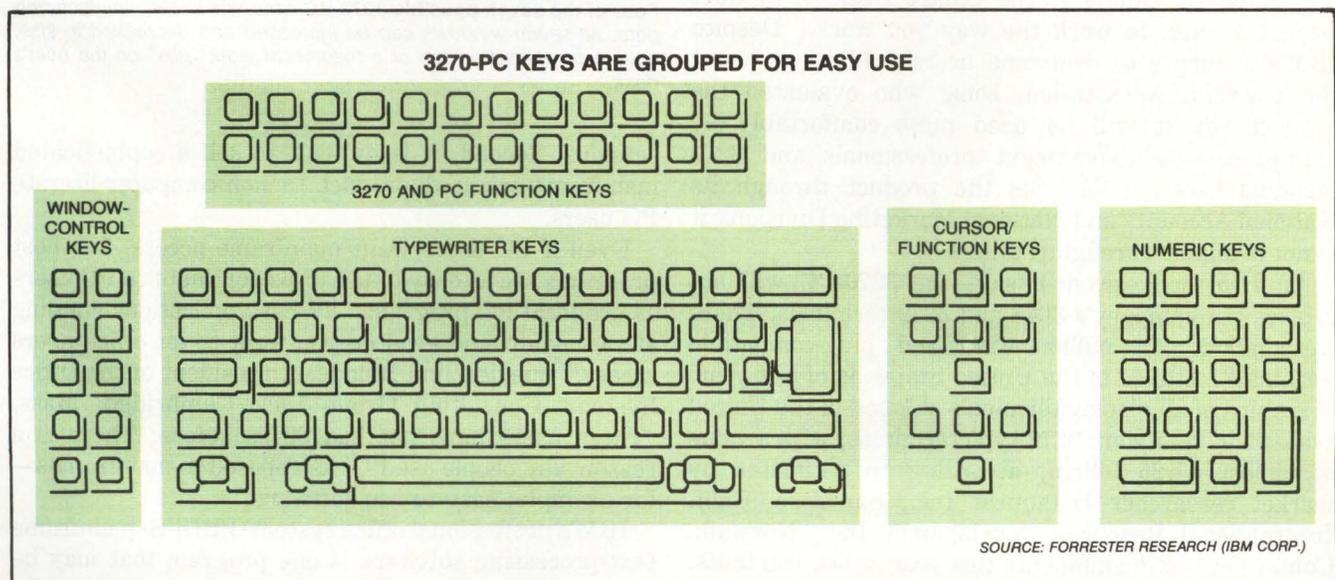
Lori Valigra, Senior Editor

IBM Corp.'s recent spate of personal computer introductions, including the PCjr home computer and the Instruments Division's MC68000-based 9002 UNIX workstation, has eclipsed the impact of its 3270-PC multiple window workstation. But the 3270-PC may be the sleeper in IBM's personal computer line. As it represents IBM's first serious attempt to merge its mainframe and microcomputer worlds within large corporate accounts, much remains to be learned about the 3270-PC's capabilities and who will use it.

Users have been testing the product since U.S. deliveries began in late February. Early reactions include questions about whether executives will use the powerful product and whether it is compatible with other IBM PCs. IBM has set some guidelines on what

the machine should be used for. Differences between the system and the standard PC will test the 3270-PC's PC compatibility. Like other manufacturers attempting to dent the microcomputer market, IBM must conform to the industry-standard PC to gain market share. Market researcher InfoCorp, Cupertino, Calif., expects IBM to ship 30,000 3270-PCs this year.

Unlike earlier IBM personal computers, the 3270-PC is technically sophisticated. It combines 3270 terminal functions and a PC in one desktop unit. Under the guidance of a powerful control program, the 3270-PC displays seven windows, or sessions—four showing data from host mainframe applications, two housing electronic notepads and one employing personal computer programs running under PC-DOS versions 2.0 or 2.1. The PC session normally does not communicate with the host. The workstation uses a 122-key keyboard



There are five key areas on the 3270-PC's keyboard—two sets of control keys for windows and for the cursor, a set of program function keys for 3270 and PC functions, a typewriter area and a numeric pad.

IBM claims that the keys are arranged according to frequency of use and logical function groupings. There is an auto-key function to record and save frequently used keystrokes for playback.

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combining the PC and the 3270 keyboards. The 3270-PC communicates with IBM System/370, 308X or 43XX processors via a 3274 control unit connected by coaxial cable. Systems Network Architecture (SNA) local channel, non-SNA local channel, SDLC remote and bisynchronous remote communications support network attachments.

Price of a basic 3270-PC, including a new high-resolution model 5272 color display and a 3270-PC control program, is \$5,585. A monochrome display can be used in lieu of the color display. RAM size ranges from 256K bytes to 640K bytes.

IBM expects the 3270-PC to be used in program-

Electric Co., Bridgeport, Conn., who has used the 3270-PC. "The 3270-PC is attractive to people who have occasion to interface to a mainframe through a 3270 link." He says such users will include programmers, order-processing personnel, managers and administrators. But he cautions that the 3270-PC is not for PC users who want to access a mainframe.

"This is an elegant device—a very high-function 3270 with a PC thrown on it," notes Jonathan Art, financial analyst with the Gartner Group, Stamford, Conn. But he specifies two barriers to the 3270-PC's acceptance. First, few users, other than programmers and those making multiple database inquiries, need simultaneous

While the regular PC has few interrupts, the 3270-PC has many.

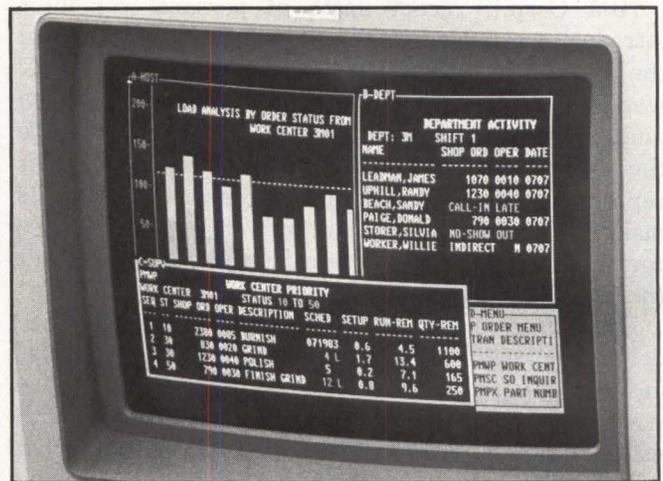
ming, insurance, marketing, finance, manufacturing and other areas in which users need data from multiple mainframe computer files. The 3270-PC also can be used to communicate via electronic mail, to create and send data files through networks, to obtain data from corporate databases for local use by PC functions and to access data from public information networks.

3270-PC is meant for sophisticated users

In advertisements, IBM underscores the 3270-PC's usefulness by calling it the Smart Desk, a product "smart enough to work the way you work." Despite IBM's attempts to overcome users' inhibitions about the powerful workstation, some who evaluated the product say it will be used most comfortably by data-processing department professionals and 3270 terminal users. IBM sells the product through its National Accounts and National Marketing Divisions; it is not available through retailers.

An IBM spokeswoman says the 3270-PC will not replace the company's 3278 and 3279 terminals. There were about 2.4 million 3270 and plug-compatible terminals installed in the United States as of last year. One-third of all display terminals shipped in the United States last year were 3270-type terminals, with a value of almost \$1.25 billion, according to estimates by market researcher Dataquest Inc., San Jose, Calif. International Resource Development Inc., Norwalk, Conn., pegs 3270 shipments this year at 560,000 units.

"[The 3270-PC] will be a very strong product, but it's not a product for the general PC user," says Jeff Ehrlich, manager of systems architecture, General



Four of the seven possible 3270-PC windows show manufacturing data. All seven windows can be increased and decreased in size, hidden or placed on top of a theoretical work "pile" on the user's desk.

sessions. Second, it is difficult to sell a sophisticated mainframe-oriented product to non-computer-literate PC users.

Even if PC users want mainframe access, few host programs are as easy to use or as pertinent to PC users as are local PC programs. "What applications running at the mainframe level do you want to let office users access?" queries Tom Billadeau, president of the Office Systems Consulting Group Inc., Cambridge, Mass. "These users have not had 3270s before. There is a reason why people use PCs as opposed to mainframes—for example, easy-to-use software."

IBM's professional office system (PROFS) mainframe text-processing software is one program that may be attractive to office PC users. PROFS has especially strong electronic-mail facilities, Billadeau says.

Researcher George Colony of Forrester Research

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Inc., Cambridge, Mass., surveyed 25 Fortune 1000 companies and found that each had ordered 20 to 30 3270-PCs. He predicts that in two years the ratio of 3270-PC orders to PC and XT orders will be 1 to 1. Colony estimates there are about 25,000 3270-PCs on back order for Fortune 1000 companies and 10,000 more for smaller companies. Although Colony argues that IBM has not yet shown that it wants to integrate its products, he says IBM's goal is to have a line of personal computers, including terminals and workstations, on which any user can transfer files with full compatibility.

IBM touts the 3270-PC as a valuable programmers'

Don Heiskell, engineering manager for Digital Research's graphics group, explains that GSX is an implementation of the virtual device interface, an ongoing effort by the American National Standards Institute to standardize graphics interfaces for different hardware. GSX makes different machines' screens "look" the same to a programmer and makes different hard-copy devices look like virtual devices. For example, with GSX, a Diablo Systems Inc. ink-jet printer with higher resolution than a computer's display screen could still make a printout of the screen's contents. He notes that Digital Research has a large library of GSX device drivers for IBM. Using the GSX tool kit,

Slot	Option	Standard 3270-PC model		
		2	4	6
1	3270 system adapter	x	x	x
2	64K-byte/256K-byte expansion		x	x
3				
4	display adapter	x	x	x
5	fixed disk adapter			x
6	diskette drive adapter	x	x	x
7	printer adapter		x	x
8	keyboard adapter	x	x	x

Source: IBM Corp.

In the 3270-PC, slots 1 through 6 are long slots; slots 7 and 8 are short. The following off-the-shelf IBM PC options can be ordered and used with the 3270-PC: an asynchronous communications adapter, a communications adapter cable, a printer adapter, a printer cable, 64K-byte/256K-byte memory expansion, a 64K-byte memory-module kit, a 10M-byte fixed disk drive, a fixed-disk adapter and a dual-sided diskette drive.

workstation for interactive software development in a mainframe network. The 3270-PC allows programmers to log onto one or more programs and move data between programs without using the mainframe job-control language. IBM notes the 3270-PC can also be used for network management.

Supporting PC session software development is Digital Research Inc., Pacific Grove, Calif. Digital Research and IBM's National Accounts and National Marketing Divisions will sell Digital Research's programming languages and tools, including Level II COBOL, Pascal MT+, CBASIC compiler, PL-1, Access Manager, Display Manager, Animator, Forms II, and Assembler+ Tools. Digital Research expects IBM to sell the graphics products DR Draw, DR Graph and the GSX tool kit.

IBM touts the 3270-PC as a valuable programmers workstation for interactive software development in a network.

software developers can write programs on the PC for the 3270-PC. The \$350 GSX tool kit incorporates Digital Research's links to its CP/M and DOS languages and bindings to GSX.

Window management is strong

The 3270-PC's seven windows move rapidly, controlled by a new video board with a separate processor rather than by software. GE's Ehrlich applauds IBM for giving users rapid windowing capabilities.

The 3270-PC is designed to mimic the way people work, claims IBM. It compiles information from several sources to solve problems, prepare reports and make decisions. Windows can be moved as a person would slide papers for multiple tasks on a desktop. The windows also can be temporarily hidden when not in use, and certain tasks can be given visual priority. The control program allows users to define which portions of windows are visible. The seven windows can be enlarged, reduced and stored in memory in 10 arrangements. Applications on the 3270 or PC windows "think" they have the whole screen; a small window appears as a reduced version of a full screen.

One keystroke transfers control of the 3270-PC's single active session to and from personal computing and host-connected sessions. Two "notepad" sessions are for writing messages and memos, maintaining a calendar or transferring data in blocks of 1,920 characters (one to two paragraphs) between screen sessions. This data transfer is essentially a logical "retyping" of information from 3270 windows to the

System integrator opportunities depend on IBM

New business opportunities are emerging for those who perceive gaps in IBM Corp.'s recent strategic move to match its mainframe and micro-computer environments in a dual personality product, the 3270-PC.

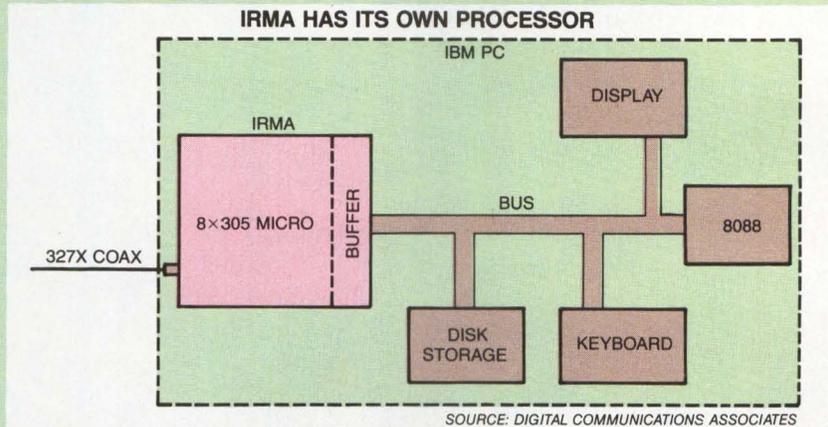
"A lot of companies will buy this because it is safe to buy IBM's solution to the 3270 and PC [combination]," predicts Fred Berry, who is responsible for software support and marketing at Personal Systems Technology Inc. (Persyst), Irvine, Calif. Persyst offers a 3270 emulation family of software and hardware with 3278 or 3279 capabilities for the PC. Berry says Persyst plans to add value to the 3270-PC but declines to specify those plans.

The 3270 add-on manufacturers will feel the brunt of the 3270-PC's introduction, comments Jeff Ehrlich, manager of systems architecture at General Electric Co., Bridgeport, Conn.

Persyst's Berry says add-on board manufacturers' attraction to the 3270-PC will depend on how IBM tries to attract third-party suppliers. He says IBM is not as forthcoming with 3270-PC specifications as it was with those of the PC. IBM has not yet announced an expansion chassis and thus does not guarantee an expansion chassis will work, confirms Larry Schenck, product planner for the 3270-PC in IBM's Kingston, N.Y., Communications Products Division. Schenck says the 3270-PC model 6 has one long slot open, the model 4 has two long slots open, and the model 2 has three long slots and one short slot open. This is assuming that no graphics boards are installed.

Another key to popularizing the 3270-PC will be to satisfy users' demands for functional equivalency to the standard PC, emphasizes Berry. Users want to be able to use PC software, he says. But he questions whether independent software vendors have the marketing motivation to alter software for the 3270-PC.

Instead of moving software or functions to the 3270-PC, add-on board manufacturers are examining adding 3270 functions to the standard PC. "Why can't you convert the ordinary PC to a 3270-PC?" asks



SOURCE: DIGITAL COMMUNICATIONS ASSOCIATES

Digital Communications' Irma communications board features an on-board processor independent of the IBM PC's 8088 CPU. IBM's 3270-PC shares its 8088 between local and host communications.

Ehrlich. He says it would be a technically complicated project to create an add-on to make the PC or XT into 3270-PCs. The new video board is especially complex, as is the 3270-PC keyboard, which combines both the PC and 3270 terminal keyboards, including separate cursor controls and enter keys for each. The keyboard also has a split cable attachment, with half going to the PC session and the other half going to the four 3270 sessions.

Ehrlich describes the 3270-PC as a "clean" product compared with add-ons that attempt to give 3270 functionality to off-the-shelf PCs. He says the add-on products' keyboard is "not right" and the products are "technically complicated and kludgy."

Persyst's Berry anticipates third parties will quickly try to beat the price and performance of an IBM coaxial board released a year ago. The IBM 3278/3279 emulation adapter and control program lets a PC or an XT emulate a 3278 or 3279 display unit. It lets users run most application programs for the 3278 model 2 and 3279 model 2A or S2A, switch between active PC and host processor tasks with a "hot key," transfer files, including DOS application files, between the PC and the host mainframe and print screens with a PC printer. The PC or XT is connected via coaxial cable to a 3274 controller but can also be attached directly to a 4321, 4331 or 4361

processor or a 4701 finance communications controller. Prices for the adapter card and its control program are \$905 and \$235, respectively. IBM also offers a 3270 Personal Computing Attachment Board for 3278 or 3279 terminals.

With the adapter board in mind, Berry points to an apparent case of IBM competing against itself. The board and software with a dual floppy drive PC would be priced at about \$3,500 to \$4,000. The 3270-PC with dual floppy drives sells for \$5,300.

An early add-on communications board supplier is Digital Communications Associates, Norcross, Ga., with its Irma boards for PC, XT and PC-compatible systems. Irma is linked by coaxial cable to most 3270 controllers, including the 3274 and 3276. One difference between the 3270-PC communications and the Irma board is that Irma's on-board processor is independent of the PC's 8088. The 3270-PC shares its 8088 for local and host communications tasks, which some observers believe could cause timing problems.

Persyst offers the Best of Both (BOB) board for the PC, which provides high-resolution text. It also has color graphics but does not use a standard IBM-class monitor. Persyst's Berry says the BOB board takes the program symbols of IBM and implements them to be in parity with the 3270-PC running the same symbols. BOB, available for testing, is \$495.

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notepad sessions or to other 3270 sessions, explains Larry Schenck, product planner for the 3270-PC in IBM's Communications Products Division, Kingston, N.Y.

Data transfer is limited

Some users complain that the 3270-PC does not allow them to copy information from the 3270 session into the PC session. "This is because all PC applications are not aware of the screen as an input device. They usually treat input from a keyboard or other device," notes Schenck. Advanced Office Concepts' Billadeau says IBM expects to support multiple data transfers by year-end. "Data transfer is more efficient if done at the terminal rather than the mainframe level," he says.

For now, the host computer reacts to each 3270 window session as though it were a separate display. Schenck explains that windows logically replace as many as four 3270 mainframe displays and a separate PC system in the memory and control environment. Host sessions can contain as many as 3,440 characters, and the local PC session can contain as many as 2,000 characters.

Schenck suggests that IBM will introduce a programmable interface that will allow users to write a local routine monitoring the activity of a function not visible on the screen—taking place, for example, on a main-

frame. The user could transfer the file information to the visible, active PC window. Going back and forth between the active window and a hidden window now requires using the keyboard.

Some users question why the 3270-PC has only one PC session. The reason, says IBM's Schenck, is that it is difficult to convert host windows to PC windows because such a conversion requires changing the program that addresses the hardware. Billadeau suggests that software suppliers may take the alternative approach of offering a 3270 window in a windowing program for the PC.

Users can customize the 3270-PC to transfer informa-

Windows can be moved the way a person would slide papers for multiple tasks across a desk.

tion from the PC window to the mainframe over a host interface as a structured data file or as a screen in 2,000-character blocks, Schenck says. An optional feature can "convert" ASCII data on the PC diskette to EBCDIC data (a format used by mainframes) on the host. Binary transfers also are possible.

3270-PC configurations are based on three models

5271 model 2

- System unit with 256K bytes of memory (expandable to 640K bytes)
- 5271 keyboard
- Dual-sided diskette drive and adapter
- 5151 monochrome/5272 color display adapter
- 3270-PC keyboard timer/adapter
- 3270 system adapter
- Reference manual and binder
- Operations guide
- Maintenance information
- \$4,290

5271 model 4

- 5271 model 2 features plus:
- Second dual-sided diskette drive
- 64K-byte memory-expansion option to 320K bytes
- Printer adapter for 5152 graphics printer
- \$5,319

5271 model 6

- 5271 model 2 features plus:
- 10M-byte fixed disk and adapter
- 64K-byte memory-expansion option to 320K bytes
- Printer adapter for 5152 graphics printer
- \$7,180

5272 color display

- 14-inch, eight-color
- 720 by 350 pixels
- Anti-glare, smudge-resistant
- Stand with tilt/rotate mechanism
- Line cord
- \$995

5271 keyboard

- Low-profile, attached EBCDIC keyboard
- Adjustable slope
- Five key function areas

- Auto-key facility for frequently used keystroke entries
- 3270 host key-top graphics printed in black
- IBM PC operations printed in blue
- 1.8m. (approximately 6-foot) coiled cord
- Included in three models' prices

3270-PC control program

- On-line "helper" tutorial
- Object code
- One-time \$300 charge

3270-PC file-transfer program

- Transfers bulk data to and from host
- Host computer sessions can include VM/SP or MVS/TSO software
- One-time \$600 charge

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Two configurations determine 3270-PC windowing

System integrators can configure the 3270-PC in control-unit or distributed-function terminal mode. Control-unit terminal mode allows one 3270 window to emulate a 3178, a 3278 model 2 or a 3279 model S2A with 3278 or 3279 terminals. It requires no change in the 3274 controller's microcode. Control-unit terminal mode makes the 3270-PC a 3278 or 3279 look-alike, so that the 3274 controller "thinks" it is talking to a 3278 or 3279 device. In control-unit terminal mode, the 3270-PC also can attach to 4321, 4331 or 4361 systems via a \$995 display/printer adapter.

Distributed-function terminal mode allows as many

The video board has a separate CRT controller, but users can't issue instructions to it.

as four host sessions, handled as separate logical terminals, to run over one coaxial cable. This mode allows the sessions to emulate any 3178, 3278 (except model 2A) or 3279 (except model 2C) terminal. It supports 3270 extended data-stream operation in eight colors. The mode requires that microcode in the 3274 controller change to the T 31 (or higher) or D 61 (or higher) releases. Users of this mode require a larger control unit. Although the 3274 control unit has 32 ports or cables, as many as 128 logical sessions can exist using the 3270-PC in distributed-function terminal mode.

Many users and industry watchers question how many windows are needed, especially by executives. Colony of Forrester Research says four 3270-PC sessions running simultaneously are overkill. Colin Havard, a senior systems analyst at Manufacturers Hanover Trust, New York, concurs: "The 3270-PC probably will not be used with four simultaneous 3270 sessions. I have a tough time seeing executives using PCs, period." He says that, in general, non-technical users could use the 3270-PC only if data-processing personnel set up window size and location.

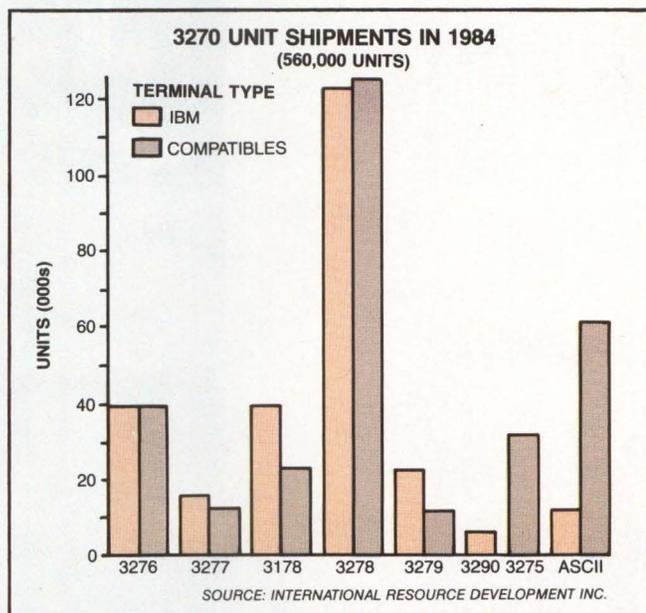
Havard, who acts as an interface between the data-processing department and end users in his organization, says Manufacturers Hanover received an early delivery of 25 3270-PCs. At press time, Manufacturers Hanover was testing the units and installing the 3274 controllers. System analysts and programmers were using the 3270-PCs.

Forrester's Colony expects that IBM will soon announce a hard disk and a CPU option for the 3274

that would let 3270-PC users store applications and files locally, thus reducing the cost of communicating with the mainframe. Now, PC session applications or files can be stored locally on a diskette. But if a user wishes to store 3270 session applications or files locally the 3270 session information must first be copied into a notepad session. Large host applications are copied directly onto a diskette in the peripheral floppy disk drive, an IBM spokeswoman states.

Graphics users applaud new video board

The 3270-PC's video board has a separate 6845 CRT controller that works from an instruction set, special adapters, logic and a control program. IBM's Schenck



says logic on each board supports the control program, and the control program supports each board. The 3270-PC manages the controller, so users cannot issue instructions to the controller. Instructions for the 3270 sessions are interwoven with the control program, and the PC's instructions are in the 8K bytes of on-board video memory. Users cannot issue instructions to the control program or the video memory.

The 3270-PC has resolution as high as 720 by 350 pixels with two colors and 360 by 350 pixels with four colors. Digital Research's Heiskell, who worked with IBM to implement Digital Research's GSX graphics on the 3270-PC, says the system's high resolution compares favorably with that of Apple Computer Inc.'s Lisa microcomputer. The original PC monitor has 640-by-200-dot monochrome resolution; to get both

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high-resolution alphanumeric and color requires two monitors. Because alphanumeric and graphics are overlaid on the 3270-PC, only one monitor is needed.

Heiskell explains that an IBM PC has two boards—a monochrome board with one block of memory and a graphics adapter with another block of memory. He notes that on the 3270-PC these blocks of memory are all “laid on top of each other” on the screen under hardware control. Separate video memory exists for the PC, 3270 and graphics portions of the 3270-PC, but this memory is put into hardware in a unique design by IBM. Heiskell hopes that if IBM decides to introduce a windowing product for the PC it will place window control in hardware. Hardware control would keep the

PC users may look at the enhanced color graphics on the 3270-PC as a way to get ‘IBM standard’ enhanced graphics.

windowing fast and would decrease the software overhead.

Heiskell reports that IBM put several new calls into the ROM BIOS on the main board to initialize new graphics modes. Despite the changes, Digital Research used its drivers for the PC without alteration to run its programs on the 3270-PC. He notes that Digital Research’s version of the Wordstar word-processing package runs as fast on the 3270-PC as on the standard PC and that Digital Research’s compilers run with no degradation.

Although the initial 3270-PC does not include all points-addressable graphics, IBM recently released a \$550 PC graphics board for points-addressable graphics. A second \$800 board is for host graphics in the distributed-function terminal mode. Also available is an adapter card that can store six user-defined symbol sets of 190 symbols each. Only one slot is available for add-on boards in a hard-disk 3270-PC configuration. Schenck claims most users will not need both graphics boards in one system at the same time.

Printing is done from any host session using an attached 3274 printer. A PC printer is used for printing documents created during PC or notepad sessions. A quick copy of any window can be printed using the PC printer.

Video board may promote a graphics standard

The subtle differences between the 3270-PC’s video board and the video board on the standard PC may

determine whether a graphics program for the PC will run on the 3270-PC. GE’s Ehrlich notes that GE tested its own software, which he describes as similar to Lotus Development Corp.’s 1-2-3 integrated package. The GE software directly addresses the video memory space for improved performance. That the GE package successfully addressed video memory directly denotes a high level of compatibility between the 3270-PC and the standard PC.

Ehrlich says the primary advantage of the 3270-PC is that it can access 3279 color. The 3279, IBM’s 3270-line graphics terminal, is popular because of its high resolution. Ehrlich contends that no one offers a competitive 3279 emulator for the basic PC. He says emulating the 3270-PC’s video board would be complicated because of the sophisticated display electronics. He speculates that PC users, therefore, will look to the 3270-PC as a way to get enhanced “IBM standard” color graphics: “The graphics [video] board for the 3270-PC might establish a standard for look-alike boards for the PC.” He notes that other manufacturers’ enhanced graphics boards for the PC suffered because their differences from each other kept the manufacturers from building a significant base of software written by independent software suppliers.

Digital Research’s Heiskell will use the 3270-PC to get high-resolution graphics without two monitors. Heiskell says Digital Research will try to use dial-up connections from the 3270-PC to a service bureau to get 3279 graphics, because Digital Research does not have a mainframe.

Beware of minor differences from PC

While the PC has few interrupts (mechanisms that allow high-priority tasks to gain control of the CPU), the 3270-PC has many, Heiskell says. Although he successfully ran a Tektronix Inc. terminal emulator through a serial port that is interrupt-driven, he advises users not to change the interrupt controller chip on the 3270-PC. Another timing concern centers on the 8088 processor, which the PC session and host communications functions “share.” This could cause some timing problems when the PC session communicates asynchronously with a host. But Schenck says the PC session ran successfully when communicating asynchronously to the Dow Jones financial service database.

Some differences between the 3270-PC and PC are less obvious. For example, when Manufacturers Hanover’s Havard ran the dBase II database program from Ashton-Tate, Culver City, Calif., on his 3270-PC, the cursor was not visible in a reverse-video field. This makes the package difficult to use because the right

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part of the screen appears in reverse video whenever a dBASE II file is appended. Havard notes a similar problem in other programs that use reverse video to highlight certain functions, such as moving a block of text.

Paul Streit, senior product manager for dBase II at Ashton-Tate, explains that, while the PC cursor is defined in hardware as a blinking underline in a blank area of the screen, the 3270-PC cursor is defined as an inverse video box that matches the full box of reverse video in dBase II. Thus, dBase II's cursor disappears on the 3270-PC. Streit says simple commands in dBase II alter the cursor's video attributes and make it visible on the 3270-PC. Ashton-Tate plans to amend dBase II documentation to explain how to make the cursor visible. The company also plans to produce a version of dBase II for the 3270-PC, Streit says.

Lotus adapted its 1-2-3 integrated package slightly for the 3270-PC by doubling the amount of memory recommended to 384K bytes from 192K bytes, reports Brian Stains, manager of product management at the

Cambridge, Mass., company. The increase is necessary to hold IBM's 3270-PC control program. Required to run Lotus 1-2-3 is a graphics card. He recommends 1-2-3 be run in enlarge mode so that the window occupies the entire 3270-PC screen. Price for the 3270-PC package is the same as that of the standard PC package: \$495. Stains says Lotus has not decided whether to make a version of its new Symphony package for the 3270-PC.

More distinctions between the PC and the 3270-PC most likely will emerge as more standard PC software is tested on the device in large corporate accounts. Even so, the major challenge to corporations won't be small software fixes but the large-scale experimenting and education required to get corporate executives to use the 3270-PC successfully. □

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