NCR *Personal Computer* Model 4

A sturdy IBM PC-compatible

BY ELAINE HOLDEN

The NCR Personal Computer Model 4 is definitely not a portable—it weighs 50 pounds and measures 18 inches wide and almost 15 inches high (see photo 1). But you couldn't find a more rugged computer. And NCR dealers provide dependable service. (Each dealer has a technician trained to handle any repairs. If you're not near a dealer, you can use NCR's mail-in service.)

The NCR computer comes in six variations. Choices include monochrome or color screen, one or two double-sided double-density floppy-disk drives, or a half-height 10-megabyte Winchester drive in place of the second drive.

It is a pleasure to find the on/off switch and the volume and brightness controls located on the front of the unit. The quality of sound is excellent.

SOFTWARE

Like all other IBM Personal Computer (PC) clones, the NCR Personal Computer cannot have BASIC in ROM (read-only memory) as it is in the IBM PC. In order not to violate copyright restrictions, an IBM PC-compatible BASIC must be on a floppy disk. The NCR version of GW-BASIC is easy to use, and the documentation provides excellent support. But the need to have BASIC on a disk almost necessitates the use of two drives; constantly switching disks can be annoying.

I was impressed by the exceptional compatibility of the NCR with the IBM PC. I was able to run Lotus 1-2-3, the Leading Edge word processor, and other packages for the IBM without any problems.

The software that comes with the NCR computer includes self-teaching programs: NCR Tutor, NCR Pal, and an on-disk help facility, NCR Help. I found these programs to be well designed. The disks provide examples of spreadsheets, word processing, games such as blackjack (I'm into the machine for five grand), program-development software (editors, compilers, etc.), and

system software (operating systems, run-time interpreters, and utilities). NCR-DOS 2.11, part of the same package, boots easily and is operationally compatible with MS-DOS and PC-DOS systems found on other personal computers. A good feature for novice users is the control placed on the master disk. NCR has designed it to be copied only and not ever used. Once you make the copy, you store the original master and use the copy. This is excellent insurance against accidental loss of the master disk and also gets the user comfortable with making backup copies.

RAM DISK

Another interesting piece of software provided by NCR is the RAM (random-access read/write memory) disk utility. While not to be confused with a plug-in card with lots of memory and the software to use the memory as a disk, this program is an attempt to use internal memory for the same function. Basically, the RAM-disk utility lets you partition the RAM and use part of it for information or programs normally stored on the floppy disk. The information or the program is kept completely in internal memory and can thus speed the functioning of the computer because it has to reference only the information held in RAM rather than go to the external floppy. It is like having a third, very fast, disk drive.

Other microcomputers have lacked this convenience, and it does increase the speed considerably. And when using a word processor, the machine processes directly through the RAM disk and saves time by not referring constantly to the floppy disk for program instructions. The only drawback I see is the need for a large amount of memory to begin with. In order to fully utilize this feature, you would need almost all the memory NCR has to offer.

If you have less than maximum memory in your Model 4, you will have to take my or the company's word for the feature since the RAM Disk Demo does not perform well

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with less memory. The example included with the documentation clocks the time it takes to run a multiplication table with and without the RAM disk. Nice benchmark test—only they both took the same amount of time (11 seconds): no difference noted with only the 128K bytes or up to 256K bytes of memory.

DISPLAY
I found the monochrome display to have excellent resolution, competitive with any on the market. The green-phosphor screen has an 80-character by 25-line display. All characters are clear and easily read. I was equally impressed with the clarity of the color display. This 16-color screen also has a display of 80 by 25 and 640 by 200 pixels.

KEYBOARD
Weighing in at 4½ pounds, the keyboard tilts forward or lies flat (see photo 2). NCR sells the keyboard separately. It's plug-compatible with the IBM PC and the Compaq Deskpro. The keyboard connection is easily accessible at the back of the unit. Layout is compatible with the IBM PC, but NCR designers have added a separate cursor-control pad as well as separate Control, Page Up, Page Down, Delete, End, and Insert keys to the numeric keypad. I found this convenient because I could control functions in word processing while the numeric keypad was still on. Business users will find this a most important feature when jumping from one application to another.

LED (light-emitting diode) indicators on the Caps Lock and Num Lock keys are also an improvement over the standard IBM keyboard. They are not distracting but serve as gentle reminders.

PROCESSOR BOARD
The NCR Model 4 is controlled by an Intel 8088 microprocessor. This unit functioned well through all the benchmarks.

Standard for the NCR is 128K bytes of RAM, expandable to 640K bytes. Expan-sion from 128K bytes to 256K bytes is accomplished by adding extra chips to the main board in increments of 64K bytes. This board is located behind the adapter boards. To add memory, you remove the back of the machine and all of the boards and insert the chips one at a time. If your fingers have been genetically programmed to resemble needle-nose pliers, you won't have any problem. However, I suspect the workspace may be cramped for the larger-handed members of our species.

Another step in the process calls for the resetting of toggle switches located at the very top of the main board. I did not have a problem with this task, but I suspect that a novice user might, especially since the documentation is insufficient here. NCR should provide a clearer explanation and a set of diagrams.

Photo 1: *The NCR Model 4 with two vertical disk drives.*

You can further expand the system to the full 640K bytes of RAM by inserting a 384K-byte memory board. But if you want extra memory by using the memory board, the 128K-byte expansion chips must first be in place. Once again you have to reset the toggle switches and then replace the boards.

This unit has five third-party-compatible expansion slots and three ports: keyboard, integrated RS-232C asynchronous interface, and a Centronics parallel interface for the printer.

DISK DRIVES

The NCR Personal Computer is available with one or two 360K-byte double-sided double-density floppy-disk drives. An optional 10-megabyte Winchester drive can also be added in place of one of the floppy-disk drives, an obvious advantage for business users who demand extensive external storage. The 5¼-inch TEAC drives are positioned vertically to the right of the screen. This makes disk exchange very convenient. Initially, though, these drives seemed noisier than those on any of my other computers.

Maybe the positioning of the drives is to blame, though vertical positioning should not be a factor in more noise or vibration. Engineering of either horizontal or vertical disk drives provides for proper bearing placement and counterbalancing of the read/write head, which would preclude any extra noise.

Rather than condemn vertical drives in general, I would rather say these particular drives are noisier. This may be related to the choice of manufacturer; some companies *do* make noisier drives, particularly if they use metal drive bands. When I dismantled the computer I noted that the drives' magnetic-head carriage is moved along the guide shafts by a motor controlled by a steel belt. The drives are secured to a metal housing by three screws (two on the top and one on the bottom), and they rest on a metal plate that may act inadvertently as a sound board. Future engineering changes should deal with the source of the extra vibration and perhaps eliminate the sound board or cushion the assembly with a gasket to absorb more of the vibration encountered by the drive movement.

DOCUMENTATION

The documentation for the Model 4 is, for the most part, excellent. Since setup is not complicated, a first-time user will feel at once comfortable and in control. The manuals are accurate, and they provide material ranging

Photo 2: *The keyboard, sold separately by NCR, is plug-compatible with the IBM PC and the Compaq Deskpro.*

Name
NCR Personal Computer

Manufacturer
NCR Corporation
1700 South Patterson Blvd.
Dayton, OH 45479
(513) 445-5000

Size
14.8 by 14.6 by 18 inches;
50 pounds

Components
Processor: Intel 8088,
4.77 MHz
Memory: 128K system
memory, expandable to 256K;
board expansion to 640K
Mass storage: One or two
360K double-sided double-
density 5¼-inch TEAC floppy-
disk drives; optional half-
height 10-megabyte
Winchester hard-disk drive or
dual 8-inch flexible-disk drives
Display: 80 characters by 25
lines, monochrome green
(optional color), 640 by 200
pixels
Keyboard: IBM PC-
compatible, plus separate
cursor-control pad
Expansion: Three IBM PC-
compatible slots available in
dual-disk system
I/O interfaces: RS-232C port,
parallel printer port

Software
GW-BASIC, NCR-DOS 2.11,
NCR Tutor, NCR Pal, NCR
Help, diagnostics

Documentation
Owner's manual, GW-BASIC
manual, NCR-DOS manual

Price
Monochrome screen, one
drive, and 128K RAM, $2400;
second drive, $425;
64K RAM, $90;
128K RAM, $180;
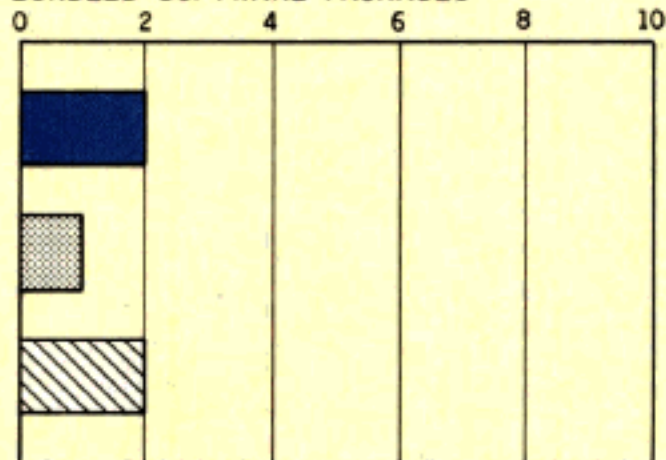parallel or serial
printer cable, $45;
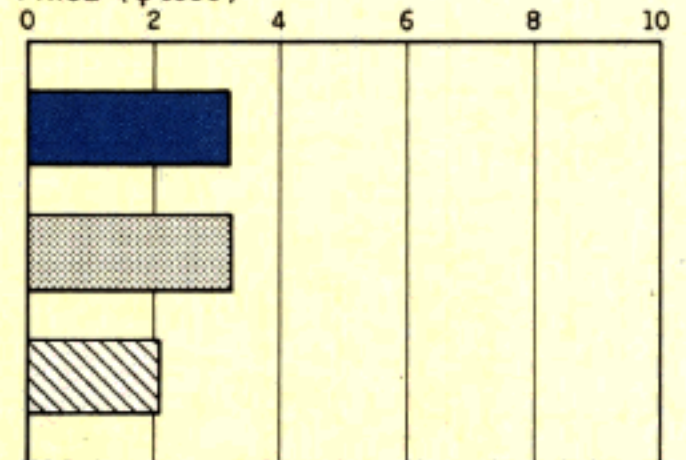10-megabyte hard disk, $2195

MEMORY SIZE (K BYTES)
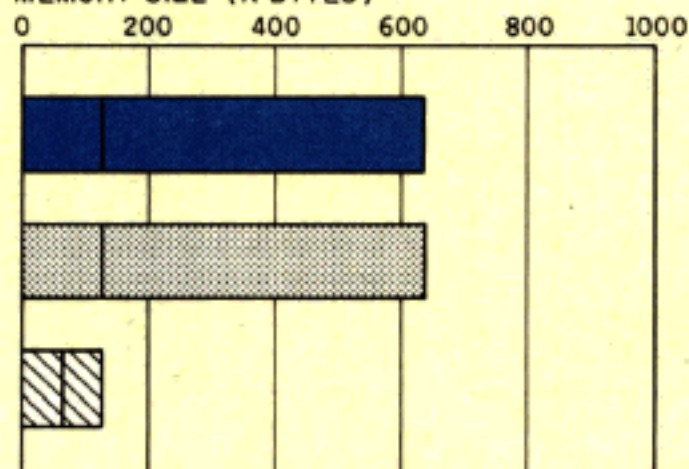
DISK STORAGE (K BYTES)
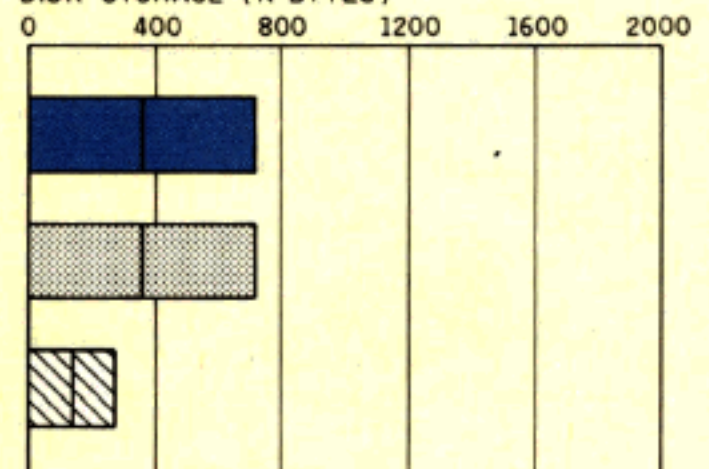
BUNDLED SOFTWARE PACKAGES

PRICE ($ 1000)

NCR PC   IBM PC   APPLE II E

The Memory Size graph shows the standard and optional memory for the computers under comparison. The Disk Storage graph shows the highest capacity of one and two floppy-disk drives for each system. The Bundled Software Packages graph shows the number of packages included with each system. The Price graph shows the list price of a system with two high-capacity floppy-disk drives, a monochrome monitor, graphics and color-display capability, a printer port and a serial port, 256K bytes of memory (64K for 8-bit systems), the standard operating system for the computers, and their standard BASIC interpreters.
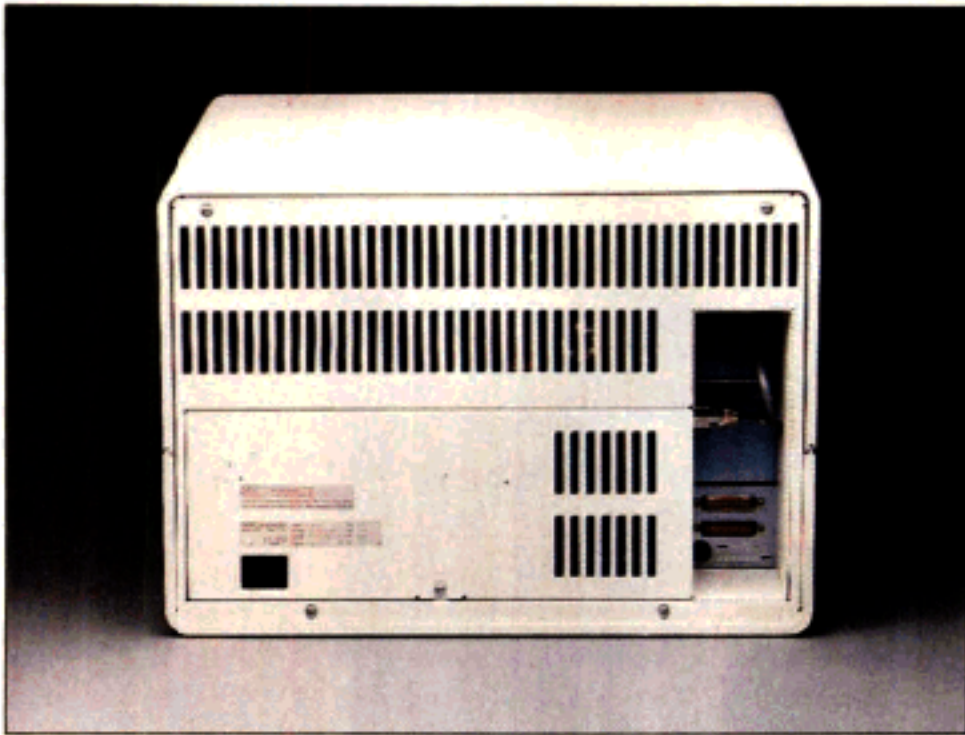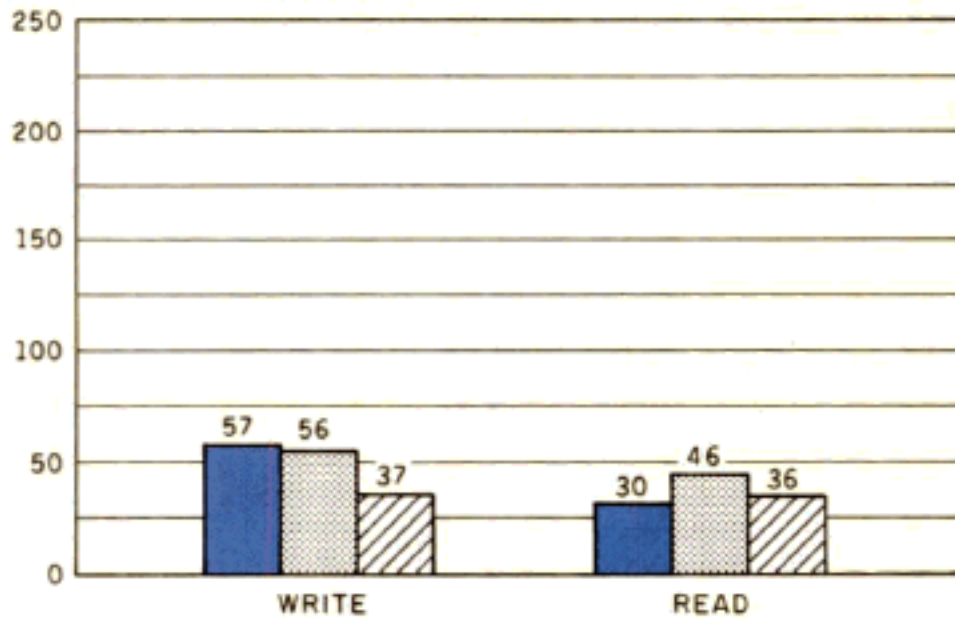
The rear of the NCR PC Model 4. The power supply is at left, the RS-232C and parallel ports are at right.
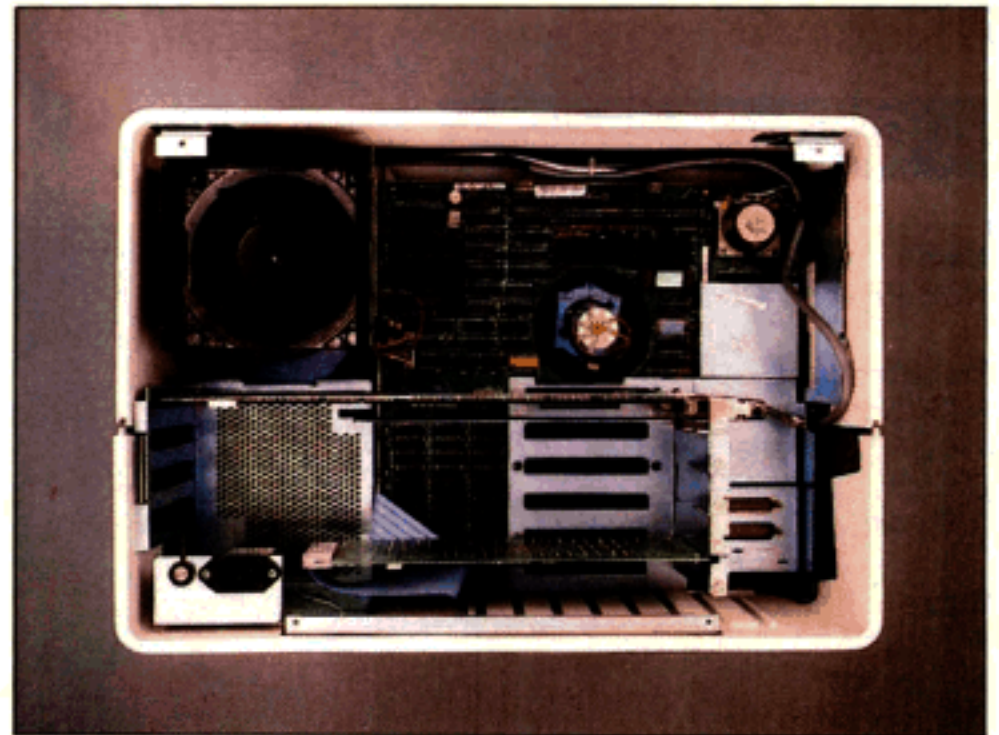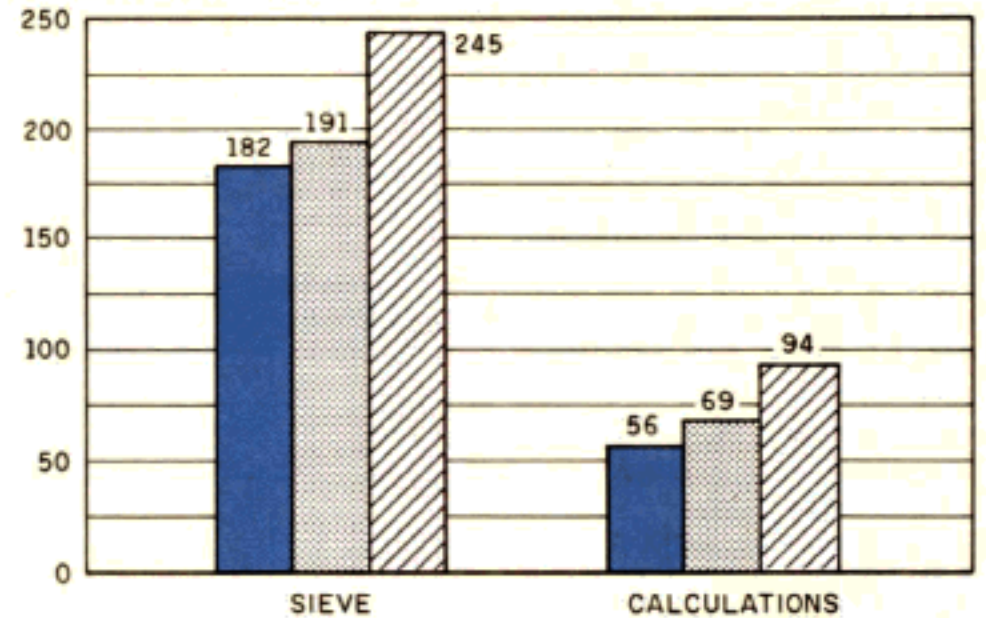

Inside the Model 4. The main CPU board is visible behind the expansion slots.
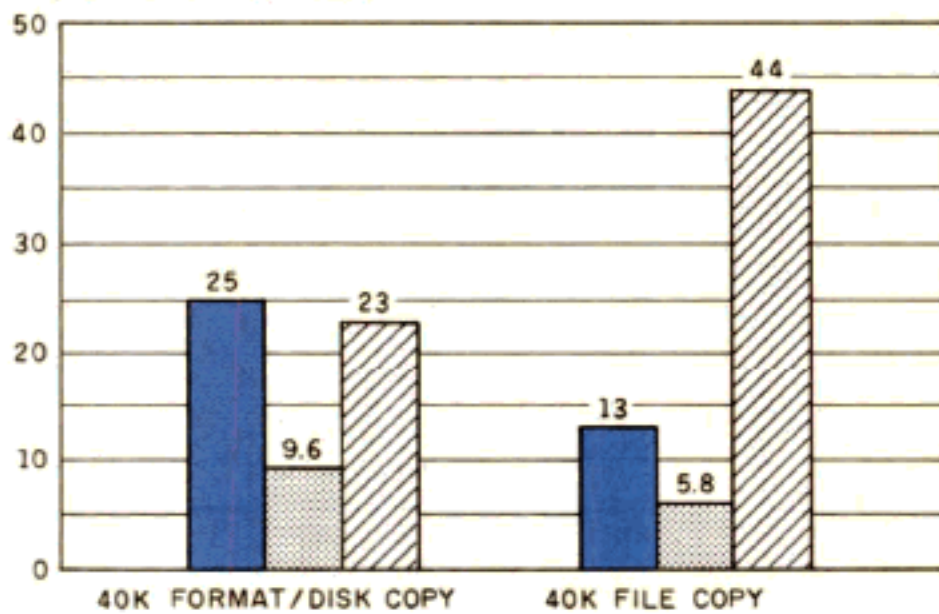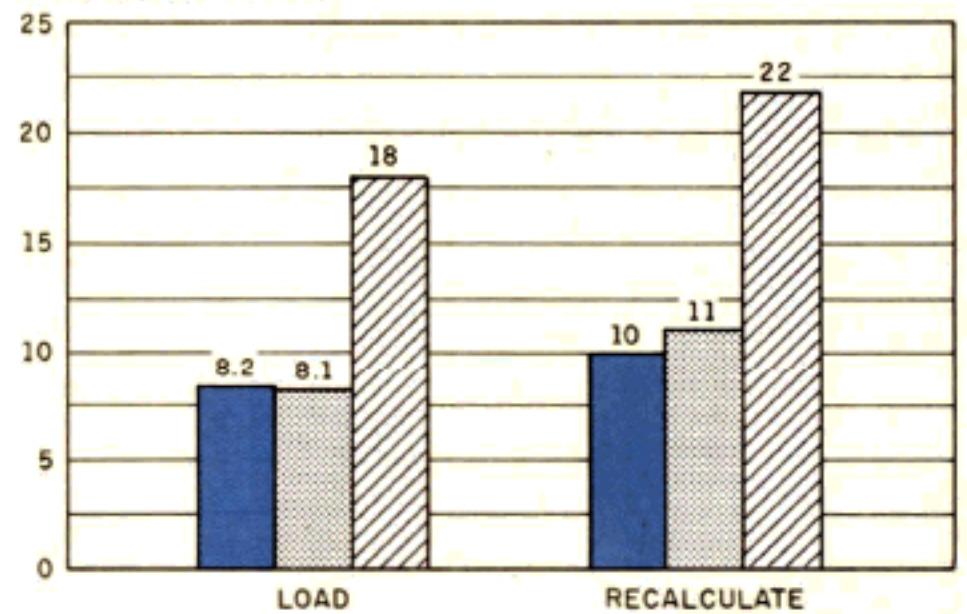
DISK ACCESS IN BASIC (SEC)

	NCR PC	IBM PC	APPLE IIE
WRITE	57	56	37
READ	30	46	36

BASIC PERFORMANCE (SEC)

	NCR PC	IBM PC	APPLE IIE
SIEVE	182	191	245
CALCULATIONS	56	69	94

SYSTEM UTILITIES (SEC)

	NCR PC	IBM PC	APPLE IIE
40K FORMAT/DISK COPY	25	9.6	23
40K FILE COPY	13	5.8	44

SPREADSHEET (SEC)

	NCR PC	IBM PC	APPLE IIE
LOAD	8.2	8.1	18
RECALCULATE	10	11	22

NCR PC   IBM PC   APPLE IIE

In the Disk Access in BASIC graph, a 64K-byte sequential text file was written to a blank floppy disk and then read. (For the program listings, see June 1984 BYTE, page 327, and October 1984, page 33.) In the BASIC Performance graph, the Sieve column shows how long it takes to run one iteration of the Sieve of Eratosthenes. The Calculations column shows how long it takes to do 10,000 multiplication and 10,000 division operations using single-precision numbers. The System Utilities graph shows how long it takes to format and copy a disk (adjusted time for 40K bytes of disk data) and to transfer a 40K-byte file using the system utilities. The Spreadsheet graph shows how long the computers take to load and recalculate a 25-by 25-cell spreadsheet where each cell equals 1.001 times the cell to its left. The spreadsheet program used was Microsoft Multiplan. The tests for the Apple IIe were done with the ProDOS operating system (except for the spreadsheet test, which was done with DOS 3.3). The IBM PC was tested with PC-DOS 2.0.

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from a history of computers to the sort of technical information appreciated by long-time computer users. The technical manual is impressive with its detail. Again, the only area that could use revision is the section that describes installation of additional memory.

Support from the company is also notable. All dealers are trained to provide technical assistance and troubleshoot. The manuals, tutorials, and integrated help package should get you through most crises. The manuals make frequent mention of contacting the local dealer if problems arise.

CONCLUSION

Although the NCR Personal Computer is not very portable and has the few imperfections I mentioned, it is still a good value. Ease of setup, documentation, tutorials, company backing, and solid engineering make this machine worthwhile. Other features include the choice between two excellent displays, terrific graphics, a RAM-disk utility that runs programs faster than most IBM PC-compatibles, and moderately easy memory expansion.

Having taught computer science to college students, I know the punishment that hardware must withstand. After giving the Model 4 the same type of rough treatment, I can say it is built like a tank. For heavy computer use and business purposes, this durability is a very important consideration. ■