SYSTEM

The Fastest Portable: IBM's P75 Road Warrior

ROGER C. ALFORD

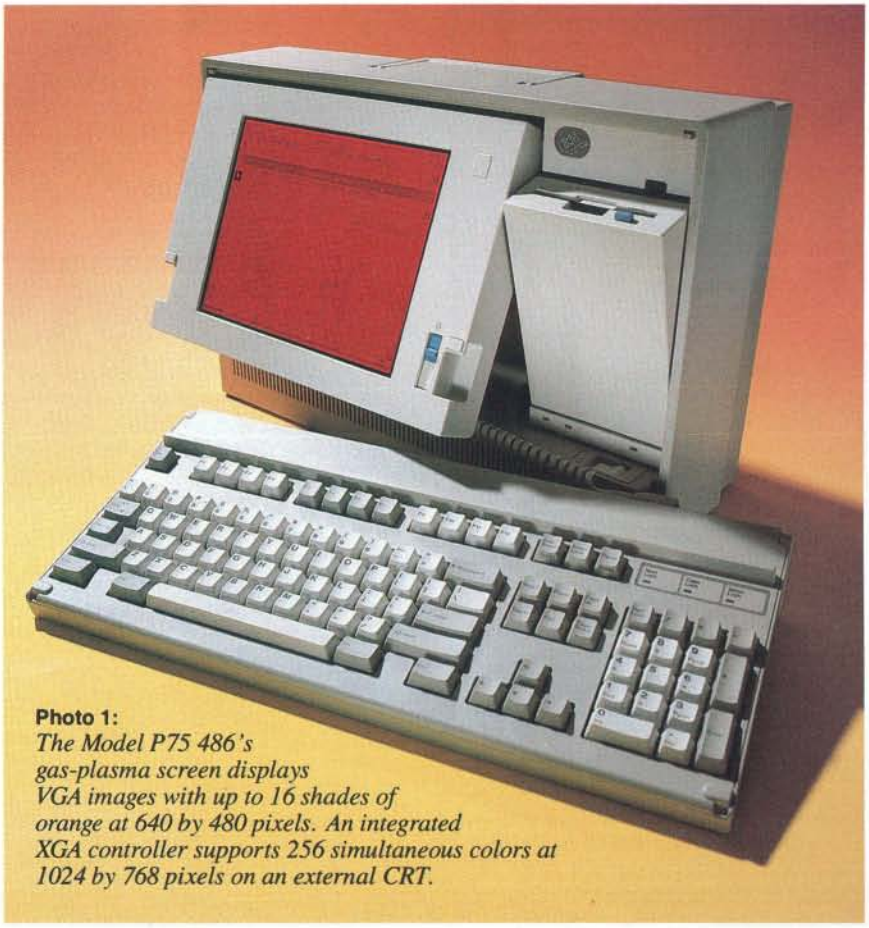

Photo 1: *The Model P75 486's gas-plasma screen displays VGA images with up to 16 shades of orange at 640 by 480 pixels. An integrated XGA controller supports 256 simultaneous colors at 1024 by 768 pixels on an external CRT.*

Most of the new powerful 33-MHz 486 systems come in large desktop or tower cases, but faster doesn't have to be bigger. IBM's PS/2 Model P75 486 portable proves that point.

The P75 outperforms any other portable computer BYTE has tested. However, the machine is small only when compared to desktop machines: at 18 by 12 by 6 inches and 22 pounds, this is no laptop. Physically, its design resembles that of IBM's PS/2 Model P70. The keyboard detaches from the case to reveal the display and floppy disk drive, both of which tilt forward when in use.

The base system includes a 3½-inch high-density floppy disk drive, a 101-key IBM Enhanced PS/2 keyboard, an integrated 10-inch diagonal gas-plasma display, an integrated XGA controller, a SCSI hard disk drive controller, 8 megabytes of system RAM, a serial port, a parallel port, a mouse port, four Micro Channel expansion slots, and a 160-MB, 16-millisecond or 400-MB, 11.5-ms 3½-inch SCSI hard disk drive. IBM lists the system with a 160-MB drive for $15,990; the 400-MB system, which I tested, costs $18,890. IBM also tossed in a 2400-bps modem ($462) and IBM DOS 4.0 ($150), which brought the total system price to $19,502.

Rocket with a Handle

The P75 is an impressive example of how much computing power you can cram into a portable computer. The well-laid-out interior takes maximum advantage of all available space. IBM placed the power supply, hard disk drive, and whisper-quiet fan along the vented bottom of the unit. As you might expect, the system design makes extensive use of surface-mount technology and fine-line traces on multilayer circuit boards to achieve the highest possible integration.

Two half-size 16-bit Micro Channel slots and two full-size 32-bit Micro Channel slots are easily accessible, making it easy to add an internal modem, network controller, or other add-in board. By integrating the floppy disk drive controller, SCSI controller, XGA video controller, and serial and parallel I/O ports onto the system logic boards, the P75 486 has ensured that all four Micro Channel slots are available.

Four high-density (72-pin) single in-line memory module sockets hold the system RAM. The 36-bit-wide memory modules (32-bit memory plus 4 parity bits) that plug into these sockets have a notably wider data path than the 9-bit-wide modules that plug into the more conventional 30-pin SIMM sockets that are found in most of today's systems. Typical 386 and 486 systems have 30-pin SIMM sockets, so you must install DRAM modules in groups of four to support the 32-bit-wide processor data path. With the Model P75, you can install single modules.

Two 4-MB SIMMs of 70-nanosecond DRAMs make up the system's standard 8 MB of memory. IBM offers both 2-MB ($565) and 4-MB ($1095) memory upgrade modules to allow total system memory of 8, 10, 12, 14, or 16 MB. You can add more memory by way of a Micro Channel memory board.

Following the latest trend in high-end systems, the Model P75 positions the i486 processor on its own replaceable board. This, presumably, will allow an easy upgrade to a 50-MHz i486 when it becomes available. A heat sink sits atop the i486, secured by a hold-down screw and thermally conductive epoxy. The P75 includes no external cache, and it does not support Weitek's WTL4167 math coprocessor.

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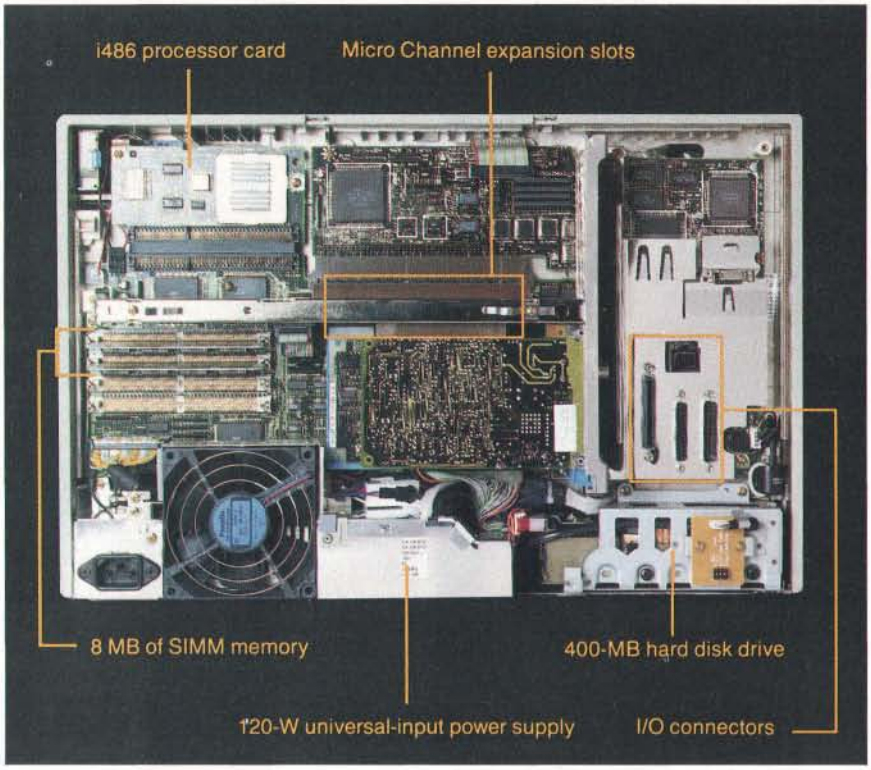


Photo 2: *The Model P75's interior makes effective use of limited space by using highly integrated surface-mount technology. The 400-MB hard disk drive and the universal-input power supply are tucked neatly away along the bottom of the unit. A removable i486 processor card (upper left) allows for future CPU upgrades. The I/O ports (right) sit behind a plastic access door.*

Shades of Gray and XGA

The gas-plasma display is about what you might expect from a flat-panel display: It's merely adequate. The display has a wide viewing angle and is acceptably bright, but the orange-on-black or black-on-orange display options both lack contrast. The display converts colors into 16 shades of orange. This lets you run many graphics programs but compounds the contrast problem.

The gas-plasma display supports CGA, EGA, and VGA graphics, at up to 640 by 480 pixels. To extend display life, you can set the system to blank the screen automatically after an interval of inactivity ranging from 1 to 120 minutes. You restore the screen by pressing the Shift key or by moving the mouse or other pointing device.

The flat-panel display will serve in the field, but you'll want to hook up a real CRT when you're in your office. The P75's XGA video controller includes 1 MB of memory and generates images at up to 1024 by 768 pixels with 256 simultaneous colors, or 640 by 480 pixels with 64,000 colors. For an extra $82, you can get a 10-foot keyboard cable extension, which lets you put the system unit on the floor.

An access door at the left rear of the P75 provides access to the XGA video connector, as well as the serial, parallel, and pointing device ports, an external floppy disk drive connector, and a SCSI connector. You access the I/O connectors for Micro Channel boards through this door as well.

In addition to supporting the internal SCSI hard disk drive, the integrated SCSI controller can support up to six external devices, such as a CD-ROM drive, scanner, tape backup system, or additional hard disk drives.

The spring-loaded floppy disk drive automatically pops out to an accessible angle when you remove the keyboard from the front of the case, and the bottom of the gas-plasma display also pulls out to adjust the viewing angle. Three LEDs below the floppy disk drive indicate power on, floppy disk access, and hard disk access. The lightweight keyboard case is flimsy, but the keyboard itself has a good feel, with a soft keyclick feedback. The system also includes a speaker, but the sound is almost inaudible in a room with any background noise.

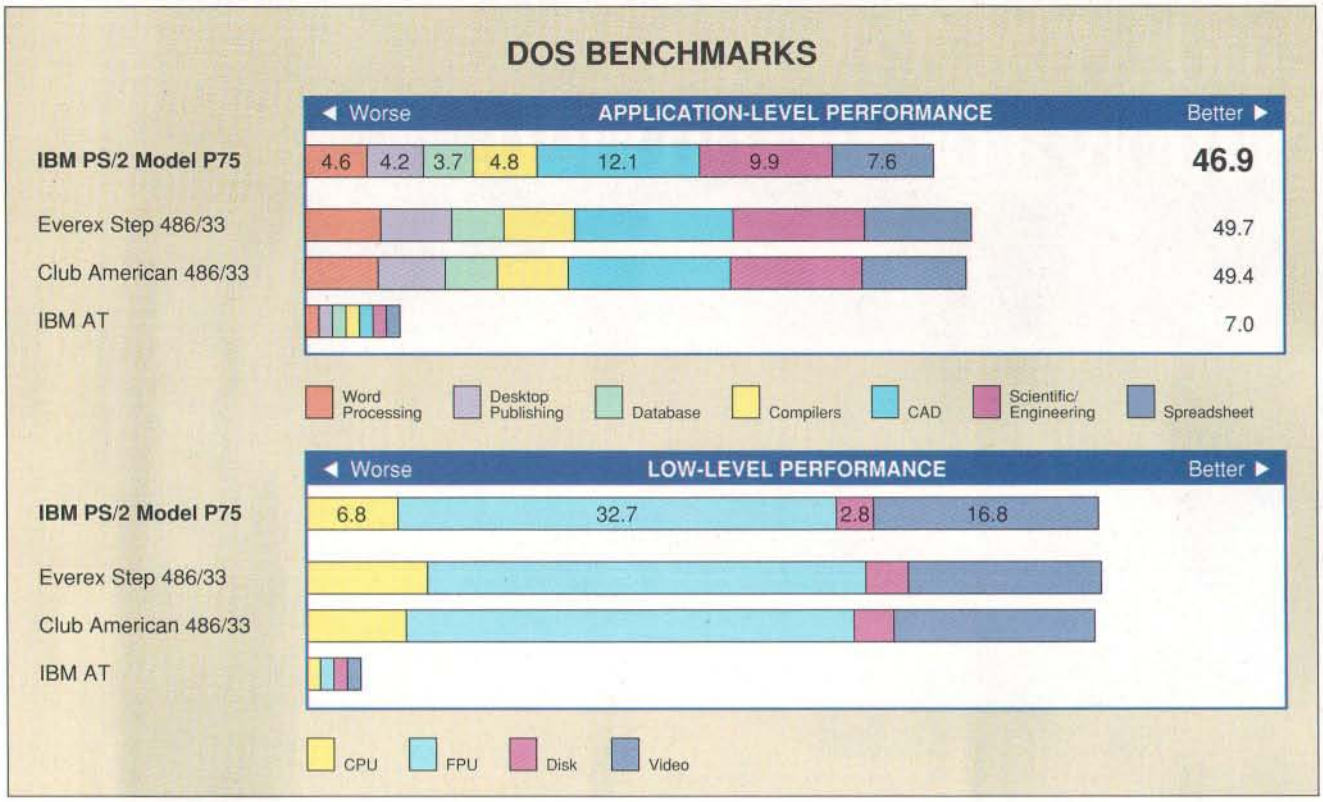
The Model P75's universal-input 120-watt power supply is easily adequate for a portable system. The power supply accepts 100 to 240 volts input at 50 to 60 Hz, making it usable worldwide. The power cord receptacle is located at the rear of the system behind a sliding access door.

For portability, IBM included a fold-down handle on the top of the P75. An optional molded plastic traveling case

BYTE ACTION SUMMARY

- **IBM PS/2 MODEL P75 8573-401**
- **WHAT YOU'LL LIKE**
  IBM's new portable puts i486 power and top video performance in a 22-pound package.
- **WHAT YOU'LL DISLIKE**
  You'll pay a premium for the Model P75. It's not as fast as desktop i486-based systems in most performance categories, and the system's gas-plasma display doesn't take full advantage of the system's XGA graphics capability.
- **SYSTEM CONFIGURATION TESTED**
  33-MHz i486 CPU, 8 MB of SIMM RAM; 400-MB SCSI hard disk drive, 3½-inch high-density floppy disk drive; 10-inch gas-plasma display with 640- by 480-pixel VGA graphics and 16 gray scales; IBM Enhanced PS/2 101-key keyboard; four Micro Channel slots: two 16-bit half-size and two 32-bit full-length; ports for serial, parallel, mouse, and external floppy disk drive; 60-pin external SCSI port, external XGA; internal 2400-bps modem; PC-DOS 4.0
- **WHAT YOU'LL PAY**
  Base system starts at $15,990
  System as tested: $19,502
- **FOR MORE INFORMATION**
  IBM Corp.
  U.S. Marketing & Services
  Department ZW1
  1133 Westchester Ave.
  White Plains, NY 10604
  (800) 426-2468

  Circle 1221 on Inquiry Card.



CONVENTIONAL BENCHMARKS

	LINPACK (single) (MFLOPS)	Dhrystones (Dhry./sec.)
PS/2 Model P75	0.88440	25488.8
Everex Step 486/33	0.91120	26912.9
Club American 486/33	0.92630	27472.3
IBM AT	0.02105	2317.9

For application and low-level benchmarks, results are indexed and show relative performance; for each individual index, an 8-MHz IBM AT running MS-DOS 3.30 = 1. For all benchmarks, higher numbers indicate better performance.

The BYTE low-level benchmark suite identifies performance differences between machines at the hardware level; the application benchmarks evaluate real-world performance by running a standard test suite using commercially available applications. Application indexes include tests using the following programs: Word processing: WordPerfect 5.0; Desktop Publishing: Aldus PageMaker 3.0; Database: Borland Paradox 3.0 and Ashton-Tate dBASE IV; Compilers: Microsoft C 5.1 and Turbo Pascal 5.5; CAD: AutoCAD release 10 and Generic CADD level 3 1.1.5; Scientific/Engineering: Stata release 2, MathCAD 2.5, and PC-Matlab 3.5f; and Spreadsheet: Lotus 1-2-3 release 3.0 and Microsoft Excel 2.1.

The BYTE Lab introduced version 2.0 of the DOS benchmarks in the August 1990 issue (see "BYTE's New Benchmarks: New Looks, New Numbers"). Benchmark results for machines reviewed under previous versions aren't directly comparable. To obtain a copy of the benchmarks, join the listings area of the byte.bmarks conference on BIX or contact BYTE directly.

($299) includes a handle, wheels, and storage for cables and a mouse.

The system comes with drivers for its XGA interface, and a reference disk with several utilities, including system setup, disk cache, and diagnostics. IBM also includes an informative, well-illustrated quick reference manual.

As expected, the unit showed a high level of IBM compatibility. It ran everything I threw at it. I ran the system using IBM PC DOS 4.0. IBM is working on SCSI drivers for its upcoming release of AIX for the P75.

As Fast as You Wanna Be

The P75 is the fastest portable BYTE has tested. Most 33-MHz 486 desktop systems are faster, however. In fact, the system came in with the slowest overall performance of the 486/33s tested so far by the BYTE Lab, excelling only in the video tests. This isn't surprising, since the P75 is a revision of the older 386-based P70 design and lacks an external CPU cache. Still, the system will blow the case off any 386 portable around.

In the low-level system benchmarks, the P75 posted a 6.8 CPU index—well below the 7.2-to-9.0 ratings for the desktop systems BYTE has tested. FPU performance was closer but still brought up the rear. Similarly, the system's SCSI disk subsystem performance—even with IBM's 11.5-ms hard disk drive—is middling. The P75 makes up for its slower performance on those tests with its blinding video speed. Its video performance of 16.8 left the Club American 486/33, at 15.0, a distant second.

The application-level performance indexes follow the low-level indexes fairly closely, with the CAD index being the only one where the P75 is not the slowest (see the figure).

The Model P75 is a high-powered portable that gives you the most possible processing power and disk storage on the road. If you need the power and can pay its high-powered price, the P75 might be the right system for you. With the exception of the keyboard, it's well built. On the other hand, $16,000 will buy you a respectable 386 portable with enough money left over to buy a moderately equipped 486 desktop system. ■

Roger C. Alford is president of Programmable Designs, a Michigan-based consulting firm. He is the author of Programmable Logic Designer's Guide *(Howard W. Sams, 1989). You can reach him on BIX c/o "editors."*