



What's Old Is New

The AT bus is back, and anyone with any kind of attachment to the old AT will say it's about time. But IBM's new PS/2 Model 30 286 marks more than a mere revival of the vintage AT bus. It's a compelling low-cost computer—just under \$2,000 without a hard disk—that reveals yet another new marketing strategy for America's premier PC manufacturer.

When IBM introduced its PS/2 line on April 2, 1987, it signed the death warrant for the popular 16-bit bus of the AT. With-

in months IBM machines with the bus that had been introduced less than 3 years earlier (on August 14, 1984) disappeared, replaced by a two-pronged attack from the new PS/2s—the 8-bit Models 25 and 30 on the low end and the Micro Channel-based Models 50 and up on the high end.

When the reigning industry standard was abandoned by its inventor, the compatibles industry went on a rampage. Computer makers capitalized on the installed base of AT-bus products and on their ex-

IBM's PS/2 family has a new member—with an AT bus. The PS/2 Model 30 286 is sleek, cheap, and controversial; why has IBM brought the AT bus back to life?

■ IBM PS/2 MODEL 30 286

pertise in extracting ever higher performance from the well understood bus. By offering both bargain-basement ATs that undercut the low-end PS/2s and racy 80386-based machines that outdistanced the high-end models, the compatible makers cut IBM's share of the personal computer market from nearly 40 percent to about 26 percent in little more than a year.

The appearance of the Model 30 286 appears to be slated to reverse that trend. The reintroduction of the AT bus in the aggressively priced Model 30 286 could be an IBM counter attack. It may be a loss leader meant to undercut compatibles makers.

On the other hand, the Model 30 286 may mark a different trend. It could be an admission of a massive mistake by IBM's marketing mavens—underestimating the merits the marketplace attributed to the old bus. It could indicate the start of the downfall of Micro Channel and a return to the classic bus, a change that may leave IBM behind the rest of the personal computer

industry and stamp the Micro Channel as the second-generation PCjr.

Then again, the Model 30 286 could be a strategic masterstroke, the full reach of which cannot yet be understood. Or it just may be a good computer, at a good price, that will win space on office desktops worldwide.

Depending on which pundit you believe, the Model 30 286 could be any one of these. Because tight-lipped IBM won't reveal its reasons or strategies, the real story has to be pieced together from the evidence at hand. And the best evidence is the Model 30 286 itself.

JUST ANOTHER PRETTY CASE At first look, the Model 30 286 is unmistakably a full-fledged member of the PS/2 family. It features the same compact, squared-off styling of the other desktop PS/2s, a flat box compromised only by a slight diagonal overhang on the front panel. In a word, it's trim. Just large enough to fit under a VGA display, its case measures

a mere 4 by 16 by 15½ inches (HWD)—about a third the volume of an AT. It sports the same bleached-beige paint as the rest of the PS/2 line. It's a twin to its namesake, the original Model 30.

As with the rest of the desktop PS/2 line, standard equipment puts a high-density 3½-inch floppy drive near the middle of the front panel. The optional hard disk lies just to the right, with the activity indicator of the hard drive showing through a notch in the panel, and a row of slots cut into its faceplate to allow cooling air to circulate inside. On the far right, a white paddle-style power switch completes the front-panel controls and decor.

Around the corner on the right side of the case, just behind the front fascia, is a flat keylock that should prevent ardent interlopers from prying inside the case. As with other PS/2s, the lock does not control the keyboard. That's left to the password system built into the system's hardware.

The case of the Model 30 286 is mostly steel and has earned FCC Class B certification, meeting the tougher residential-level emission standards. The actual chassis is a stamped bottom plate that wraps up to become the inside of the front and rear panels, and folds about ¾-inch up the right and left sides. Both the front and back of the machine are covered with decorative plastic fascia panels, off-white up front, brown in the rear.

The top of the case is steel as well. It folds down to cover the right and left sides and is secured just behind the front panel by a single Phillips capture screw on either side. Loosen the screws, and the top slides back half an inch to be lifted up and off.

Unlike the Model 50, which literally snaps together, the Model 30 286 is screwed together with conventional hardware on the inside. The system board, for instance, is bolted directly to dimples in the bottom of the chassis.

This system board installation proved the only flaw in IBM's otherwise exemplary workmanship in the review sample Model 30 286. Of eight bolts that should have held the system board in place, only seven were in place. The hole for the missing bolt was properly threaded in the chassis, but the mounting holes in the system board and in the chassis did not line up properly. Apparently the mechanical en-



IBM PS/2 Model 30 286 vs. Model 30 and Model 50: Summary of Features

(Products listed in ascending price order)

Basic configuration	IBM PS/2 Model 30	IBM PS/2 Model 30 286	IBM PS/2 Model 50
List price	\$2,395	\$2,595	\$3,595
RAM	640K	512K	1MB
Floppy disk drives	One 720K 3 ½-inch	One 1.44MB 3 ½-inch	One 1.44MB 3 ½-inch
Hard disk	20MB	20MB	20MB
Software included	Setup, diagnostics	Setup, diagnostics	Setup, diagnostics
On-board video adapter	MCGA	VGA	VGA
Ports	One serial, one parallel, one mouse	One serial, one parallel, one mouse	One serial, one parallel, one mouse
Slots	Three 8-bit	Three 16-bit	Three 16-bit
Specifications			
Clock speed	8 MHz	10 MHz	10 MHz
16-bit memory implementation	None	4MB on system board, 12MB in expansion slots	1MB on system board, 15MB in expansion slots
Math coprocessor	8087	80287	80287
RAM chips	DRAM	DRAM	DRAM
Other			
Warranty	1 year	1 year	1 year
FCC certification class	B	B	B

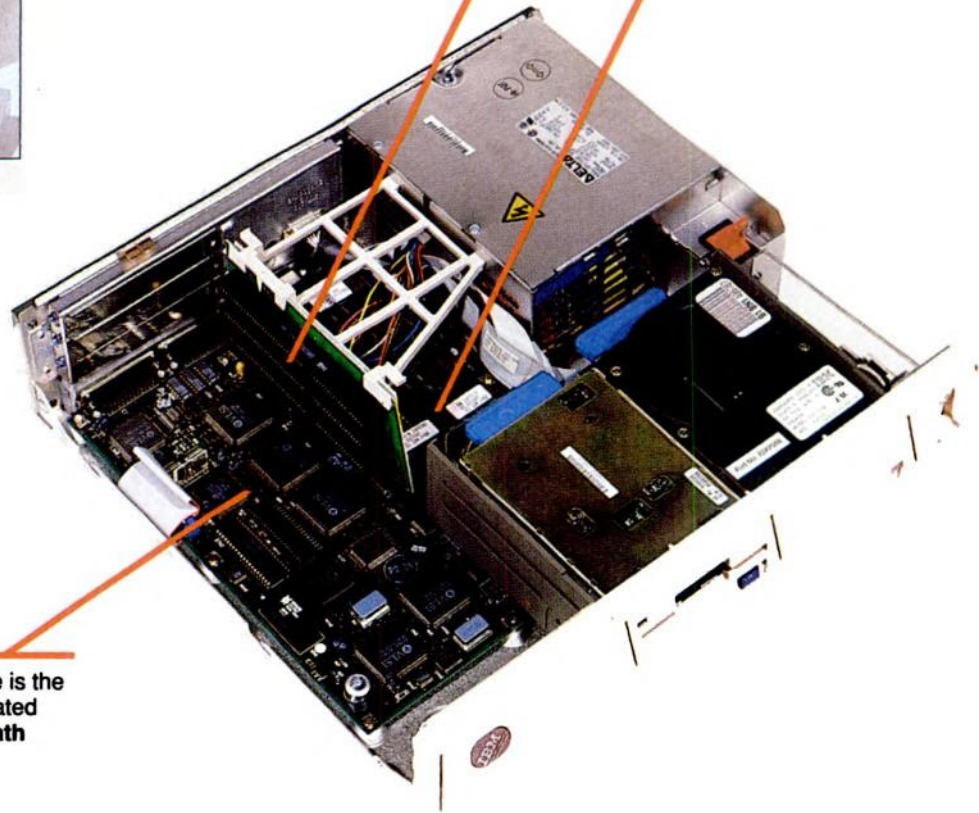


Bringing Back the Bus: Inside the PS/2 Model 30 286



The IBM PS/2 Model 30 286 marks IBM's first use of the standard bus it abandoned when the Micro Channel bus was introduced. At \$2,595 with a 20MB hard disk, this computer's **passive vertical AT-style expansion backplane** guarantees compatibility with traditional add-in cards.

Although it's only 75 percent as large as an AT system board, the Model 30 286 board incorporates such features as the **VGA video system**. **System ROMs** can be found above the on-board VGA.



The brains of this 10-MHz machine is the **Intel 80286 microprocessor**, situated below the socket for an **80287 math coprocessor**.

gineers of the system board and the chassis didn't see eye-to-eye on this one. This nearly insignificant problem will likely be cleared up in later production runs.

SPACE CASE Inside its case, the Model 30 286 is elegantly spare. Although it lacks the wireless design of the Model 50, it doesn't suffer from the snake's nest of cables found in many compatibles. In fact, the box appears almost empty—a case full of space. That airy look is a tribute to a

well-thought-out wiring arrangement. For example, the floppy-disk control cables, which connect to the left side of the system board, are folded underneath it and out of sight. The hard-disk cable is split in half lengthwise, not to twist and reorient its connectors, but to make it lie flat against the power supply.

Only the video cable and power-supply cables run through the free space. The video cable emerges about midway down the right side of the system board and then flies

to the center of the rear panel, wearing as a bracelet a large (1½-inch-long) ferrite tube that helps eliminate radio frequency emissions on the video cable running to the monitor.

The power-supply cabling runs to two connectors on the system board; one is a miniaturized version of the two standard power-supply connectors of the PC and AT systems, but merged so they cannot be inadvertently and disastrously switched. The other power cable functionally dupli-

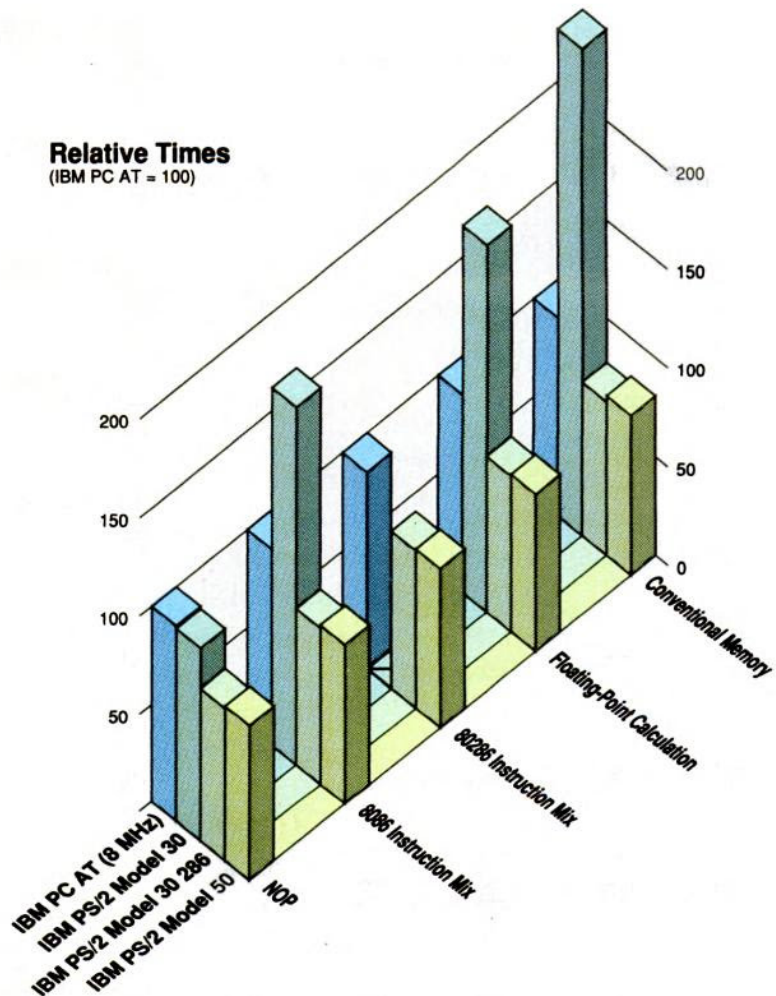


Benchmark Tests: IBM PS/2 Model 30 286

IBM's new addition to its PS/2 line places an AT bus in the slim chassis of the PS/2 Model 30. The IBM PS/2 Model 30 286, which sports a 10-MHz 80286 processor, demonstrates its superior performance on the NOP test, processor tests, Floating-Point test, and Conventional Memory test. No expanded or extended memory test was run because the computers in our comparison group did not provide for these features in their standard configurations.

The disk benchmark tests indicate that the IBM PS/2 Model 50 is equipped with a faster-performing hard disk. On both the small- and large-record runs of the DOS File Access tests, the Model 50 tested consistently faster than its two PS/2 competitors. Even on the DOS Disk Access test and the BIOS Disk Seek test, the Model 50's hard disk outclasses that of the new Model 30 286.

On the video tests the Model 30 286 generally outperformed the Model 30, but once again couldn't keep up with the Model 50. Although the 80286 processors of the PS/2 Models 50 and 30 286 run at 10 MHz, the results of the video tests point to a difference in bus performance.



Processor and Memory Benchmark Tests

Performance Times

(Times given in seconds)

	NOP	8086 Instruction Mix	80286 Instruction Mix	Floating-Point Calculation	Conventional Memory
IBM PC AT (8 MHz)	4.23	8.95	8.84	35.43	1.29
IBM PS/2 Model 30	4.17	16.26	N/A	65.91	3.18
IBM PS/2 Model 30 286	3.30	7.14	7.09	28.01	1.00
IBM PS/2 Model 50	3.35	7.28	7.17	28.34	1.04

N/A—Not applicable: this computer does not support an 80286 processor.

The **NOP** benchmark test is designed to measure raw clock speed and memory access time while minimizing differences in microprocessors and the effect of memory caching. This test executes almost nothing but NOP ("No Operation") machine code instructions in a big 128K loop.

The **8086 Instruction Mix** benchmark test measures the time it takes to execute a selected series of processor-intensive tasks. The test program uses 8086 instruction code. These instructions are a subset of the total processor instruction set.

The **80286 Instruction Mix** benchmark test measures the time it takes to execute a selected series of processor-intensive tasks. The test program uses 80286 instruction code. These instructions are a subset of the total processor instruction set.

The **Floating-Point Calculation** benchmark test measures processor speed by looping through a series of floating-point calculations, including multiplication, division, exponentiation, and logarithmic and trigonometric functions. The benchmark program uses the floating-point library included with Microsoft C Compiler 4.0.

The **Conventional Memory** benchmark test allocates 256K of conventional memory and treats it as a series of 64-byte records. Then, 16,384 random records are read into and written from this memory. The result shown is the average of the read and write times.

Disk Benchmark Tests

Performance Times

(Times given in seconds except where noted)

	DOS File Access (small record)	DOS File Access (large record)	DOS Disk Access (milli-seconds)	BIOS Disk Seek (milli-seconds)
IBM PC AT (8 MHz)	70.71	18.74	42.79	37.40
IBM PS/2 Model 30	124.52	26.01	96.29	82.61
IBM PS/2 Model 30 286	110.46	19.94	96.12	83.12
IBM PS/2 Model 50	100.12	12.15	92.58	80.14

The **DOS File Access** benchmark test measures the throughput rate of the disk being tested. In this case, throughput times are measured in terms of how long the disk takes to perform common DOS file-management functions. Five tasks—file creation, sequential file write, sequential file read, random file write, and random file read—are timed and the results summed.

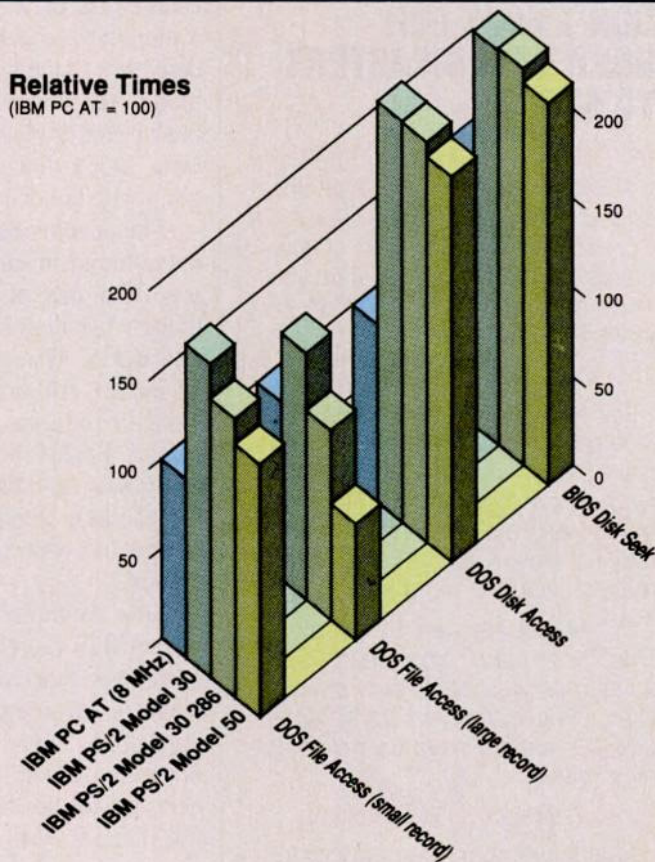
The test is carried out for two different types of files—small-record files and large-record files—that are used by common PC applications. Files created using small records are typically used by database management programs, and large records are typically used for word processing and spreadsheet files. Loading a DOS program is also simulated by the large-record test.

The **DOS Disk Access** benchmark test measures the time it takes to do a random sector read using DOS. DOS buffers are set at 3 and the interleave factor is left at the drive's default setting. This test adds DOS's overhead to the BIOS and hardware times. The test program performs the sector read 1,000 times within the DOS disk partition. The average result is shown in milliseconds.

The **BIOS Disk Seek** benchmark test measures the time it takes to do a random seek using the disk's ROM BIOS. The test result includes minimal software overhead and may not parallel the manufacturer's claimed average access time. The test program performs 1,000 seeks. The average result is shown in milliseconds.

Relative Times

(IBM PC AT = 100)



Video Benchmark Tests

Performance Times

(Times given in seconds)

	Direct to Screen	Video BIOS Routine with Scrolling	Video BIOS Routine Without Scrolling
IBM PC AT (8 MHz)	9.06	11.26	7.25
IBM PS/2 Model 30	5.82	8.24	5.76
IBM PS/2 Model 30 286	6.87	5.16	2.20
IBM PS/2 Model 50	6.65	4.34	1.54

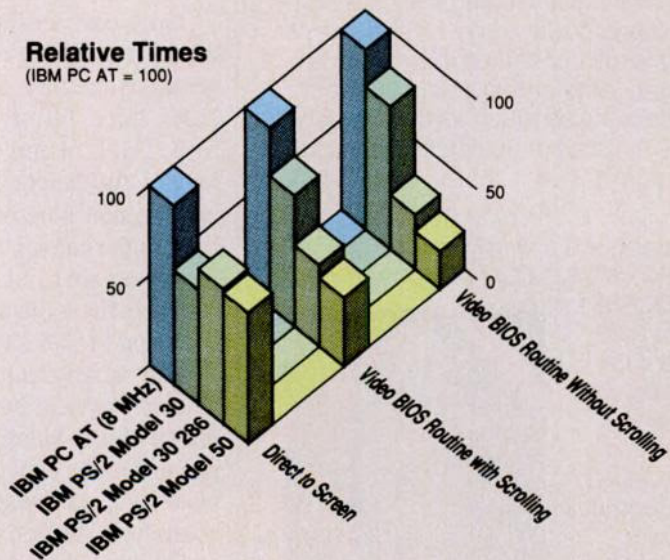
The **Direct to Screen** benchmark test measures the bandwidth of the video adapter by writing directly to the display memory buffer. The test is performed in video mode 3. The entire screen is updated using the assembly language REP STOSW instruction with register CX equal to 2000. This is done 1,000 times, and the result shown is the total of the 1,000 trials.

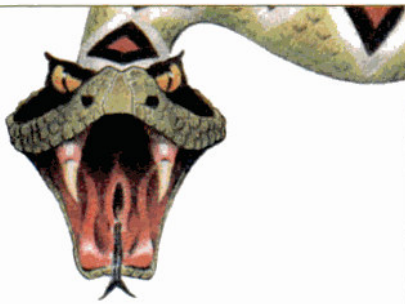
The **Video BIOS Routine with Scrolling** benchmark test measures the speed of the BIOS Teletype routine with scrolling. The test is performed in video mode 3. The screen is cleared and 240 lines of 60 characters each (including a terminating carriage return and line feed) are written to the display through the BIOS Teletype routine. Although the first 24 lines written to the display do not involve scrolling, all the remaining lines scroll the display.

The **Video BIOS Routine Without Scrolling** benchmark test measures the speed of the BIOS Teletype routine without scrolling. The test is performed in video mode 3. The screen is cleared and 24 lines of 60 characters each (including a terminating carriage return and line feed) are written to the display through the BIOS Teletype routine. This is done ten times, and the result shown is the total of the ten trials.

Relative Times

(IBM PC AT = 100)





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cates a disk-drive power cable, again with a miniaturized connector. Drive power is delivered to the system board and distributed to the floppy and hard disks through their signal cables. Installing either a hard or a floppy disk drive thus requires tangling with but one cable.

The system board itself looks tinier than those found in other IBM computers—in particular that of the original PC—even though the dimensions of the Model 30 286 and PC system boards match at 8½ by 11 inches. Although it's about 25 percent smaller than an AT system board, the Model 30 286 board incorporates many additional on-board functions, including the parallel, serial, and mouse ports, the floppy disk controller, and the VGA video system.

This downsizing is attributable to the nine ASICs (application-specific integrated circuits) that dominate the sparsely populated board along with about a dozen support chips. About the only chips that are not miniaturized surface-mount components are the few that are socketed, such as the three ROMs (two BIOS, one keyboard), the microprocessor, and the optional 80287 numeric coprocessor.

Only one nonstandard expansion connector is available on the system board. It serves as the base for a daughtercard that holds three AT-style expansion connectors. Each of the three accepts a full-length, full-height AT board. Boards fit into the slots horizontally, running front to back in the conventional way. All three of these slots are available for adding options in both the standard and hard disk-equipped Model 30 286s.

The daughtercard-expansion connector assembly is held in place by a snap-down plastic flying buttress that's rooted in the power supply. Expansion cards are kept in place by a combination of their expansion connectors, their card retaining brackets, and molded plastic card guides permanently affixed at the front of the slots. Although this system should hold full-length cards rigidly in place, the mounting for shorter cards (which won't reach the card guides) won't be nearly as secure. You'll want to be sure to screw the retaining brackets of expansion cards tightly into place in the Model 30 286.

A potential problem with horizontally

mounted expansion cards is that they tend to hinder convective cooling. Although heat buildup should be no more troublesome in the Model 30 286 than in any other small-footprint computer that uses horizontal slots, you'll probably want to put the most power-hungry expansion cards in the top so you don't slowly fry them.

The two 3½-inch drive bays are part of a molded plastic shelf that serves as the foundation for a drive mounting system that requires no hardware. As with other PS/2s, drives slide and latch into place on plastic sleds.

ELECTRIC TRICKS The brain of the Model 30 286 is an 80286 microprocessor that's rated at 10 MHz. Unlike other IBM 80286-based computers, the chip in the Model 30 286 uses the Plastic Leadless Chip Carrier (PLCC) package instead of the Pin-Grid Array (PGA). The new package has many short, folded legs that sprout from all four sides of the chip and press against mating contacts in its socket. The PGA package uses a matrix of gold-plated pins on its bottom surface.

The new package is less expensive to manufacture and less susceptible to damage when the chip is inserted and removed. However, it confounds many 80386-based accelerator board upgrades, which are designed for the PGA package and may require adapters for the PLCC of the Model 30 286.

Adjacent to the 80286 is a DIP socket for an 80287 numeric coprocessor. The Model 30 286 runs its coprocessor at full microprocessor speed, 10 MHz. Both expansion bus and memory also run at this rate, although the memory imposes 1 wait state on the microprocessor.

The microprocessor, coprocessor, and memory speeds of the Model 30 286 exactly parallel those of the Micro Channel Models 50 and 60 (but not the new zero-wait-state 50Z). In single-thread applications, the two classes of machine achieve identical performance, about 25 percent faster than an 8-MHz AT and 50 percent faster than the original Model 30.

System memory is physically located near the opposite edge of the board from the microprocessor, next to the power supply. All system-board RAM is installed as Single In-line Memory Modules (SIMMs)

with parity checking. The Model 30 286 supports both 256-kilobit and 1-megabit SIMMs, with the former used for the standard 512K of RAM. In the evaluation unit, these appeared to be standard SIMMs made by Oki rather than the proprietary IBM memory modules used in the more exotic PS/2s.

SIMMs must be added in pairs and are rated at 120 nanoseconds. SIMMs of different capacities cannot be mixed on the system board, so allowable capacities beyond 512K are 1, 2, and 4MB.

Additional 16-bit memory can be added in the expansion slots, with no performance penalty over that on the system board. Maximum system capacity is 16MB, the addressing limit of the 80286 microprocessor.

Another 256K of memory is attached to the system board to serve the needs of the built-in VGA system. The necessary eight 4-by-64-kilobit chips are soldered to two flaplike daughtercards that are, in turn, both soldered to the system board near the main RAM.

IMPECCABLE COMPATIBILITY The system BIOS was, of course, written by IBM. As with all IBM computers, it includes a rudimentary version of BASIC built in. By definition, the Model 30 286 has perfect IBM compatibility.

The VGA circuitry of the Model 30 286 also scores with impeccable compatibility. Besides BIOS compatibility with all IBM video standards, including MDA, CGA, and EGA, the VGA circuitry extends system graphics resolution to 640 by 480 pixels in 16 colors and to 320 by 200 in 256 colors (selected from a palette of 256,000). Text resolution can be up to 720 by 400 pixels. As with all VGA systems, the Model 30 286 produces analog signals with a 31.4-kHz horizontal frequency; it requires VGA monitors or compatible multisync-style displays for proper operation. The Model 30 286 will work either with color or monochrome VGA displays with equal ease, but no monitor is included in the price of the system.

Using special feedback signals in the video cable, the VGA circuitry automatically detects whether a monochrome or color display is attached. (For monochrome displays, colors are rendered in 64

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shades of gray using the green channel of the color signal.) Unlike some other IBM VGA systems, however, that of the Model 30 286 will display monochrome-only modes on color displays.

Although the system uses a full 16-bit data bus, access to the VGA circuitry is through an 8-bit path. Teletype-mode video routines (those that use the code in the BIOS firmware) run twice as fast as their equivalents on the XT Model 286 but at a fraction of the speed of high-end PS/2s with BIOS shadowing abilities. (The 80286 does not lend itself to shadowing ROM memory as the 80386 does.) However, direct memory writing speed for the Model 30 286 is nearly identical with that of 80386-equipped PS/2s.

The two input/output ports built into the Model 30 286 system board follow the prevailing PS/2 practices rather than those of the AT. The serial port operates at speeds up to 19,200 bps (with official IBM sanc-

tion—the ports can be driven faster by special software) and terminates at the back of the chassis in a 25-pin male D-shell connector. The parallel port is bidirectional and uses a 25-pin female D-shell. Both the standard keyboard and the mouse ports use PS/2-style female 6-pin miniature DIN connectors. The video output uses a female high-density 15-pin D-shell.

DISK DRIVES The standard floppy disk drive is manufactured by ALPS, the printer people. It's virtually interchangeable with any of the half-dozen other high-density 3½-inch floppy disk drives currently on the market. Its 1.44MB capacity is twice that of the original Model 30, the same as the Micro Channel PS/2s.

The floppy disk controller on the system board can operate up to two floppy disk drives, but the cable inside the Model 30 286 has but one floppy-disk-drive connector on it. Adding a second floppy disk

drive will require a new cable. IBM does not currently offer a second drive for this system.

The optional 20MB hard disk is manufactured by IBM. A rather unremarkable product, it is obviously engineered for reliability rather than for performance. The one in the evaluation machine didn't even achieve its 80-millisecond average access-time rating in testing, dragging along at about 83 ms.

The IBM hard disk uses an embedded interface and Modified Frequency Modulation (MFM) to achieve a data transfer rate of 5 MHz. The interface itself provides only an 8-bit data path compared with the 16-bit path used in the AT.

Embedding the interface puts all of the controller electronics on the drive itself. The drive then connects to the system through a cable that merely ties in to an extension of the expansion bus. Adding a hard disk to the standard Model 30 286 (it

STOP WAITING ON TABLES.

	1982	1983	1984	1985	1986
Net sales	\$ 263,537	\$ 277,545	\$ 326,268	\$ 425,654	\$ 480,000
Expenses	303,000	313,456	370,000	370,000	370,000
Gross profit	(39,463)	64,089	56,268	112,198	110,000
Tax rate	4%	4%	6%	45.7%	42%
Taxes	18,000	10,000	19,000	(51,274)	(46,000)
Net income	(\$23,100)	16,502	37,268	\$ 60,924	\$ 62,000
Earnings per share	\$ 0.02	\$ 0.32	\$ 0.53	\$ 0.93	\$ 0.92
Shares	55,211	57,034	58,764	65,465	65,000

lacks one) will thus require either a drive with an embedded controller or a controller on an expansion card. High-performance 3½-inch drives with embedded controllers are now becoming available with transfer rates up to 10 MHz and capacities over 100MB.

The Model 30 286 hard disk is low-level formatted with an interleave of two—compared with the drives of the AT, XT 286, and the original Model 30, all of which used an interleave factor of three.

Unlike the AT and the XT Model 286, the Model 30 286, like the earlier Model 30, relies on its DMA controller for transfers between the system and its hard disk. All such transfers must be made in the 8-bit mode of the DMA system. Overall, the hard disk performance of the Model 30 286 tests out slightly worse than that of the XT Model 286 and far behind the AT.

To overcome the slow-access encumbrances of the Model 30 286 hard disk,

IBM supplies a disk-caching program on the Reference Disk that accompanies the machine. Using it will give much faster apparent drive performance when reading from the disk but not when writing, because the IBM cache does not work on

■ More than two disk drives cannot be added to a Model 30 286 simply because there is no space.

writes. The program installs as a device driver in the system's CONFIG.SYS file. A second program is supplied to set up the cache automatically.

Other than hard disk cards and external

units, more than two drives cannot be added to a Model 30 286 simply because there is no space. Moreover, because of the non-standard power scheme, any add-in hard disk or replacement floppy disk drive for the Model 30 286 will require special connectors or adapter cables to match them to the system.

Drive and other expansion options are also limited by the somewhat meager reserves and lack of drive power connectors from the 90.75-watt Delta Electronic Industry Co., power supply. But stick with what's inside the Model 30 286 and you should encounter no problems. Because of the low power required by the highly integrated system board and the lower consumption of the 3½-inch drives, the full 22.5 watts at which AT slots are rated should be available from each of the three slots inside the Model 30 286.

As with other IBM power supplies, that of the Model 30 286 is a sealed steel box,

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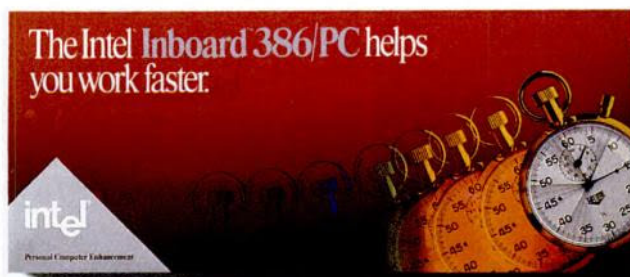
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located in the right rear of the chassis. Unlike other recent IBM power supplies, this one is not autoranging. Instead, a switch on the rear panel allows the selection of one of two operating voltage ranges, 90–137 or 180–265 volts at 50 to 60 Hz. Also of note, the white power paddle on the front panel is connected to the power supply only indirectly, linked to a similar orange paddle inside the case of the Model 30 286 by a stiff wire arm.

The IBM keyboard follows the 101-key Enhanced layout and features the renowned IBM feel. It yields positive over-center action and a distinctive click with each keypress. It's the leader among computer keyboards.

System setup is handled by a series of programs on the Reference Diskette, which is included with every system. This disk also includes an elementary tutorial, diagnostics, the hard-disk-caching program, and, hidden from casual users, a

hard-disk low-level formatting routine.

As with all PS/2s, system setup is completely controlled by this software. No DIP switches or jumpers are needed. The setup software includes both automatic and manual options. The setup memory as well as

■ The keyboard follows the 101-key Enhanced layout and features the renowned IBM feel.

the continuously running time-of-day clock are kept alive when the system is switched off by a lithium battery on the system board.

The only jumper on the system board is

reserved for emergency use. If you program a password into the computer and then forget it, all you need do is move the singular jumper found near the left-front corner of the system board from one of its positions to the other to reset the password memory.

NOT AN AT Even a casual look at the Model 30 286 discloses that it's not what many people think—a new or resurrected AT. In fact, the only resemblances between the Model 30 286 and the original AT are its bus and its compatibility. Nearly everything else about the new machine is different. It's styled as part of the new PS/2 family in a compact case. It runs more quietly than the AT. It's designed to run three times longer without failures. Even its vital circuitry is distinctly new, although functionally similar—the AT's overabundance of chips condensed into a handful.

From the standpoint of market position-

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ing, too, the Model 30 286 is definitely not an AT. The AT—which, if you've forgotten, stands for Advanced Technology—was (to compound clichés) a computer at the leading edge of state-of-the-art. At its introduction it was the top-performing personal computer available. The AT was originally envisioned as a multi-user computer, a minicomputer in disguise.

The Model 30 286 has no such high pretensions. It's a single-user system at heart. It doesn't even aspire to being a multitasking miracle. IBM's own promotional materials call it "IBM's premier DOS machine," hinting that it should not be considered an OS/2 engine—notwithstanding its ability to run IBM's OS/2. The glory and the power are left to the Micro Channel line of PS/2s.

Although the Model 30 286 can outperform the original AT, this is not a performance computer. It's about half as fast as today's high speed norm, the 20-MHz

80386. Even if it were quicker, it would still drag its laggardly hard disk like an anchor behind it.

Rather than the new AT, the Model 30 286 is more a copy of the XT Model 286. It combines a medium-performance micro-

■ Even a casual look at the Model 30 286 reveals it's not what many people think—a resurrected AT.

processor (by today's standards, at least) with low-performance mass storage (ditto). It simply packs more processing power into the same size case as its slower predecessor, just another evolutionary step

from slime mold to synthetic brain. Although power users saw the XT Model 286 as an odd anachronism, it sold like Yellowstone wildfire to practical-minded business users. IBM probably hopes to find the same success with the Model 30 286.

Another label that's been appended to the Model 30 286 is that the machine represents IBM's attempt at cloning an IBM clone. As such, it does bear more than a superficial resemblance to several small-footprint ATs, among them Dell's current 20-MHz Model 220 and the 2-year-old Unisys (formerly Sperry) PC/microIT small-footprint.

Consider performance alone, and the Model 30 286 is a match for the Unisys. But two years of development have pared down both the hardware (the PC/microIT was jam-packed with wires, circuits, and floobydust) and the price. The Model 30 286 wears a list price \$2,000 lower than

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■ IBM PS/2 MODEL 30 286

the PC/microIT with a roughly equivalent hard disk. Compared with the Dell, the Model 30 286 is a slug, running at half the speed—but again at half the price.

Although it bears the features of the better clones, the Model 30 286 is more a continuation and extrapolation of the low-end PS/2 line. It's no more a clone's clone than the original Model 30. The similarity to other manufacturers' products better shows a marketing convergence. The common design elements—compact design, 3½-inch disks, more standard features—only mirror technical advances and our own rising expectations.

Another comparison pits the Model 30 286 against IBM's own PS/2 Model 50. The two share the same microprocessor, clock and bus speed, hard disk, and performance. The only apparent difference is the future-oriented Micro Channel bus of the Model 50, compared with the backward compatibility of the AT bus Model 30 286.

The high-performance Micro Channel products that are finally entering the market will put that rumor to rest. The Model 30 286 is designed for compatibility with what you already have. The Model 50 looks to what you will be doing tomorrow. The Model 50, with its elaborate bus arbitration, expedited interrupt sharing, and expandable DMA is a vastly better multitasking engine. The Model 30 286 can run OS/2; the Model 50 is designed for OS/2.

That singular difference puts a broad gulf between the two systems. In effect, it bifurcates the IBM line of personal computers. On one side are the high-performance, multitasking engines equipped with the Micro Channel. On the other, single-tasking DOS-based machines anchored to the AT bus. In effect, IBM is cutting the singular personal computer market in two—one style of machine for power users and another for casual users.

The implication is that Micro Channel cannot be made cheaply. So far at least, the only computers to use the Micro Channel are, in fact, positioned at the high end of their product lines and the market. The AT bus, however, has proved itself cheap, as exemplified by the Blue Chips and Hyundais. The Model 30 286 emphasizes that distinction, particularly in comparison with the Model 50. Perhaps that's the entire purpose: to make non-Micro Channel



FACT FILE

IBM PS/2 Model 30 286

IBM Corp.

Consult your local authorized IBM dealer.

List Price: IBM PS/2 Model 30 286-E01 with 512K RAM and one 1.44MB 3½-inch floppy disk drive, \$1,995; Model 30 286-E21 with 20MB hard disk, \$2,595.

In Short: Sporting an AT bus, this 10-MHz PS/2 is suited to non-power users who won't be bothered by the computer's mediocre hard-disk performance and limited expansion capacity, but who will appreciate its price.

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computers appear more like second-rate cousins, boosting the prestige of IBM's better line.

Ignore the marketing issues, and the Model 30 286 could be classed as a neat little computer. It's just not a machine for power users. At its best it can serve as a desktop workstation for people who have a single purpose in mind, be it word processing, communications, or lightweight calculating (accounting instead of computer-aided engineering).

While its performance is hardly spectacular by today's 80386 standards, it's more than twice as fast as the original Model 30 and (ignoring its hard disk) will outrun any non-Micro Channel personal computer that IBM makes, including all those aging ATs.

Price is perhaps the single facet of the Model 30 286 that makes it most compelling. Its list tag—\$1,995 without hard disk and \$2,595 with—means that you should be able to bargain your dealer down to the dollars you'd spend on a typical clone, even within a few hundred dollars of most mail-order offerings. The extra bucks will buy you the security of knowing the manufacturer will be around a few years from now when the error messages start popping on your screen.

From that perspective, the Model 30 286 is a desirable computer for anyone who's neither power hungry nor in need of the promised multitasking offerings of the future. PC

Winn L. Rosch is a contributing editor of PC Magazine.