A Performance Comparison: Macintosh vs. Windows PCs

An independent benchmark study

Summary

This report summarizes the key findings of a personal computer performance study conducted in September, 1991 by Ingram Laboratories, a leading independent PC-testing company whose clients include AST, Epson, NEC, Hewlett-Packard, Intel, IBM, and Apple. Ingram Laboratories is a subsidiary of Ingram Micro, the world's largest distributor of microcomputer products.

The study tested a variety of personal computers running applications available for both the Macintosh and Windows 3.0 environments on the time taken to complete a series of tasks. Computers tested included the Macintosh product line and computers from IBM, Compaq, and leading PC clone companies.

The study showed that Macintosh computers generally outperform comparable PCs running Windows 3.0. Here are some of the details:

- **The new Macintosh Quadra 900 and Macintosh Quadra 700** outperformed every computer tested, including a system based on the Intel 486 processor running at 50-MHz.

- **The new Macintosh Classic II** was the fastest machine with a suggested retail price under $3,000. It was 41% faster than the fastest 16-MHz 386SX-based system.

- **The new Macintosh PowerBook 170 and 140** were the fastest notebook computers tested. **The Macintosh PowerBook 100** outperformed every notebook except one—a 386SX-based notebook costing about twice its price for a similarly configured system.

- **The Macintosh IIci** beat the 25-MHz 486 and every 486SX-based computer tested.

- **The Macintosh IIsi** outperformed every 386-based computer in the tests, including some models having a suggested retail price about 50%.

- **The Macintosh LC** was faster than every 386SX-based machine except one.

- **The Macintosh Classic** had performance competitive with a 12-MHz 286-based computer costing about twice its price.

Methodology

The benchmark tests were designed by Ingram Laboratories to simulate typical usage (for example, opening a file, scrolling, running a macro, performing calculations, and printing) for a variety of the most popular applications available on both the Macintosh and Windows 3.0 platforms. The applications tested were: Word, Excel, PageMaker, PowerPoint, Wingz, Persuasion, and Illustrator.

Ingram measured the amount of time required to execute each test, and then calculated the overall speed of each desktop and notebook machine as a multiple of the slowest machine tested in each class (the 286-based IBM PS/1 for desktops and the Toshiba T1200XE for notebooks). For example, the performance index for the Macintosh Classic II is 2.4, meaning that the Macintosh Classic II averaged 2.4 times faster than the PS/1 over all the benchmark tests.

Since these benchmarks attempt to simulate real world usage, Illustrator was not included in the notebook application suite.

Results

Desktop systems	Performance index (multiple of PS/1)
Macintosh Quadra 900	**9.6** times faster than PS/1
Macintosh Quadra 700	**9.0**
ALR BusinessVEISA 486/50	8.0
Macintosh IIfx	**6.7**
Compaq Deskpro 486/33L	6.2
IBM PS/2 Model 95 XP 486/33	6.1
Dell 433P (486/33)	5.9
Macintosh IIci (w/ cache card)	**5.6**
IBM PS/2 Model 90 XP 486/25	4.8
AST Premium II 486SX/20	4.1
Macintosh IIsi (w/ FPU)	**4.1**
IBM PS/2 Model 90 XP 486SX (486SX/20)	3.8
Compaq Deskpro 386/33L (w/ FPU)	3.7
IBM PS/2 Model 70 386/25 (w/ FPU)	3.2
Dell 325P (386/25 w/ FPU)	2.7
Compaq Deskpro 386/20e	2.6
Compaq Deskpro 386s/20 (386SX/20)	2.5
Macintosh Classic II	**2.4**
Macintosh LC	**2.3**
NEC PowerMate SX/20 (386SX/20)	2.3
AST Premium II 386SX/20	2.1
IBM PS/2 Model 35 SX (386SX/20)	2.0
ACER 1116SX (386SX/16)	1.7
Compaq Deskpro 386N (386SX/16)	1.7
IBM PS/2 Model 55 SX (386SX/16)	1.6
Compaq Deskpro 286N (286/12)	1.4
Macintosh Classic	**1.4**
IBM PS/2 Model 30-286 (286/10)	1.0
IBM PS/1 (286/10)	1.0

Notebook systems	Performance index (multiple of T1200XE)
Macintosh PowerBook 170	**3.0** times faster than T1200XE
Macintosh PowerBook 140	**2.0**
Compaq LTE 386s/20 (386SX/20)	1.8
Macintosh PowerBook 100	**1.7**
AST Premium Exec 386SX/20	1.5
IBM PS/2 Model L40 SX (386SX/20)	1.4
Toshiba T2000SX (386SX/16)	1.2
Toshiba T1200XE (286/12)	1.0

Macintosh PowerBooks vs. PCs

Speed Rating
(1 = speed
of a Toshiba
T1200XE)

[Bar chart showing Speed Rating on vertical axis from 0 to 3, with the following systems:]

- Macintosh PowerBook 170: 3.0
- Macintosh powerBook 140: 2.0
- Compaq LTE 386s/20 (396SX/20): 1.8
- Macintosh PowerBook 100: 1.7
- AST Premium Exec 386SX/20: 1.5
- IBM PS/2 L40 SX (386SX/20): 1.4
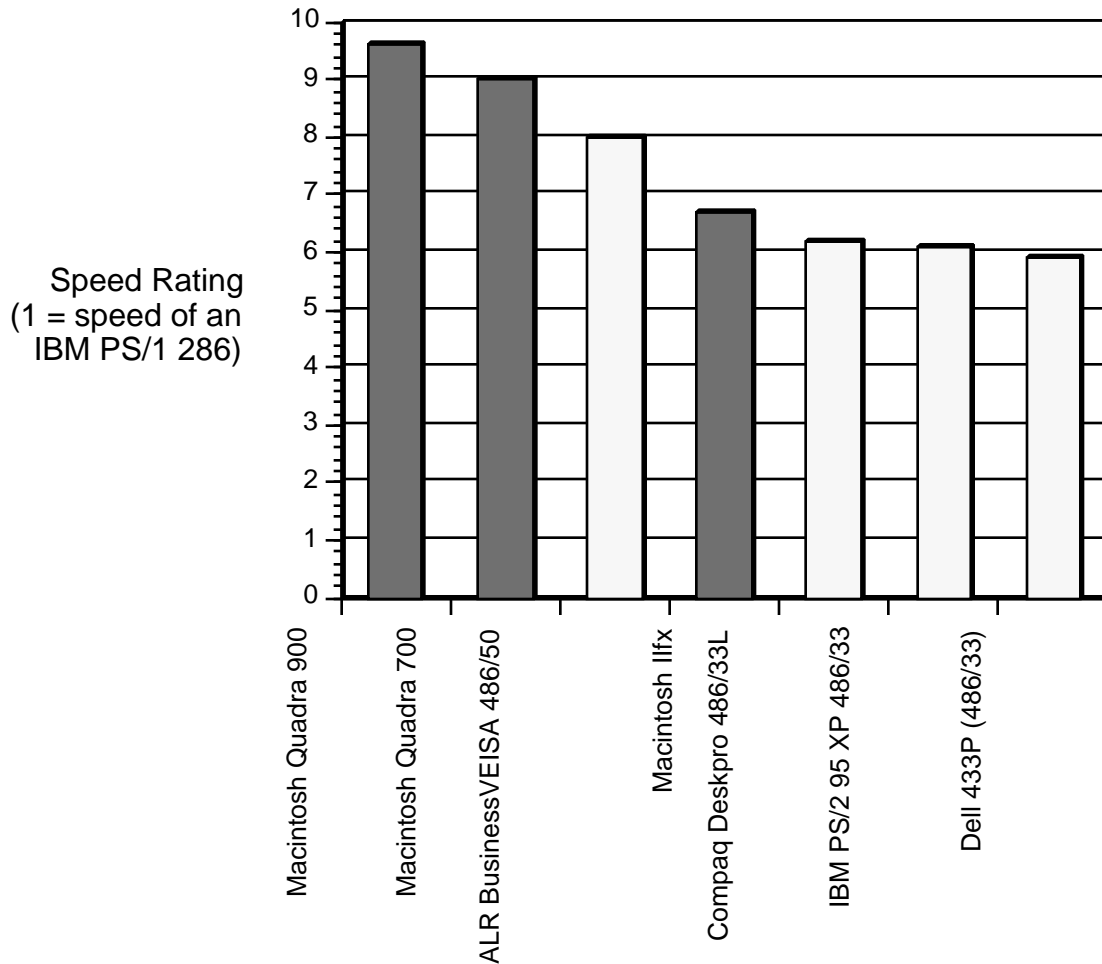- Toshiba T2000SX (386SX/16): 1.2
- Toshiba T1200XE (286/12): 1.0
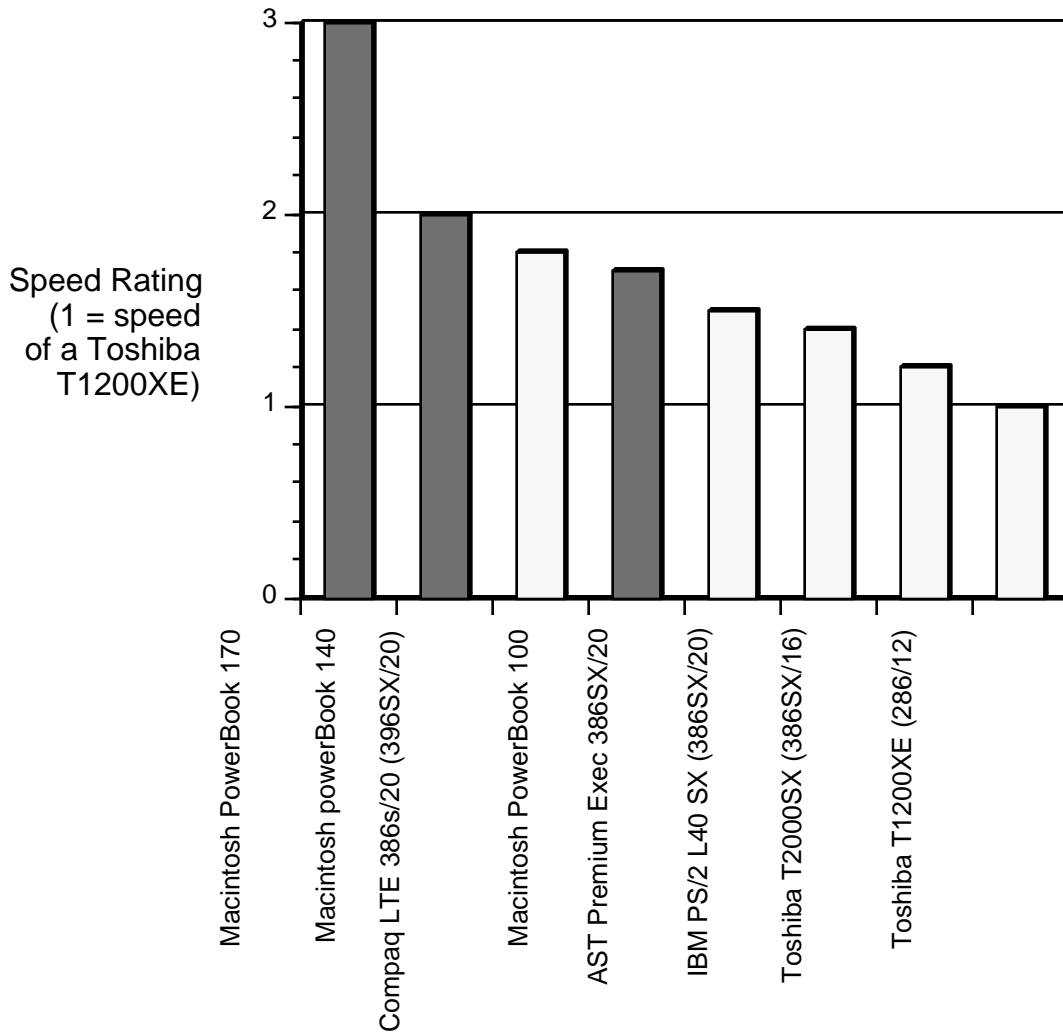
• The Macintosh PowerBook 170 and PowerBook 140 were the fastest notebook systems tested.

• The Macintosh PowerBook 100 was 70% faster than the 286-based Toshiba T1200XE, and was faster than all but one of the 386SX-based notebooks. The only machine it lost to — the Compaq LTE 386s/20 — is about double the price of a Macintosh PowerBook 100.

Macintosh Quadras and Macintosh IIfx vs. PCs

Speed Rating
(1 = speed of an
IBM PS/1 286)

Chart axis (Speed Rating, 1–10):
- Macintosh Quadra 900 — 9.6
- Macintosh Quadra 700 — 9.0
- ALR BusinessVEISA 486/50 — 8.0
- Macintosh IIfx — 6.7
- Compaq Deskpro 486/33L — 6.2
- IBM PS/2 95 XP 486/33 — 6.1
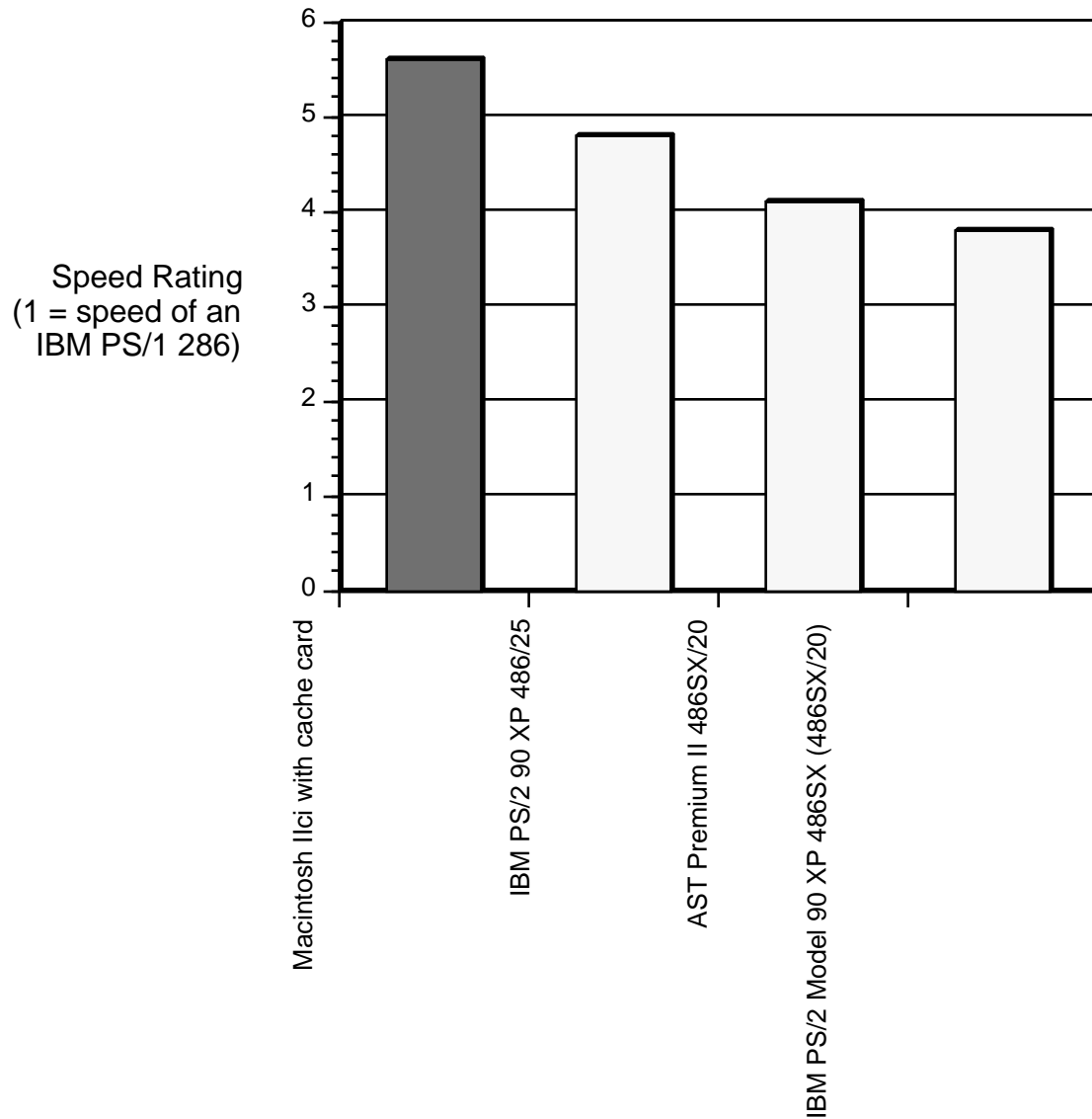- Dell 433P (486/33) — 5.9

These are the highest-performance personal computers available at test time.

• The Macintosh Quadra 900 and 700 were the fastest machines tested. They were 20% and 13% (respectively) faster than the ALR BusinessVEISA 486/50.

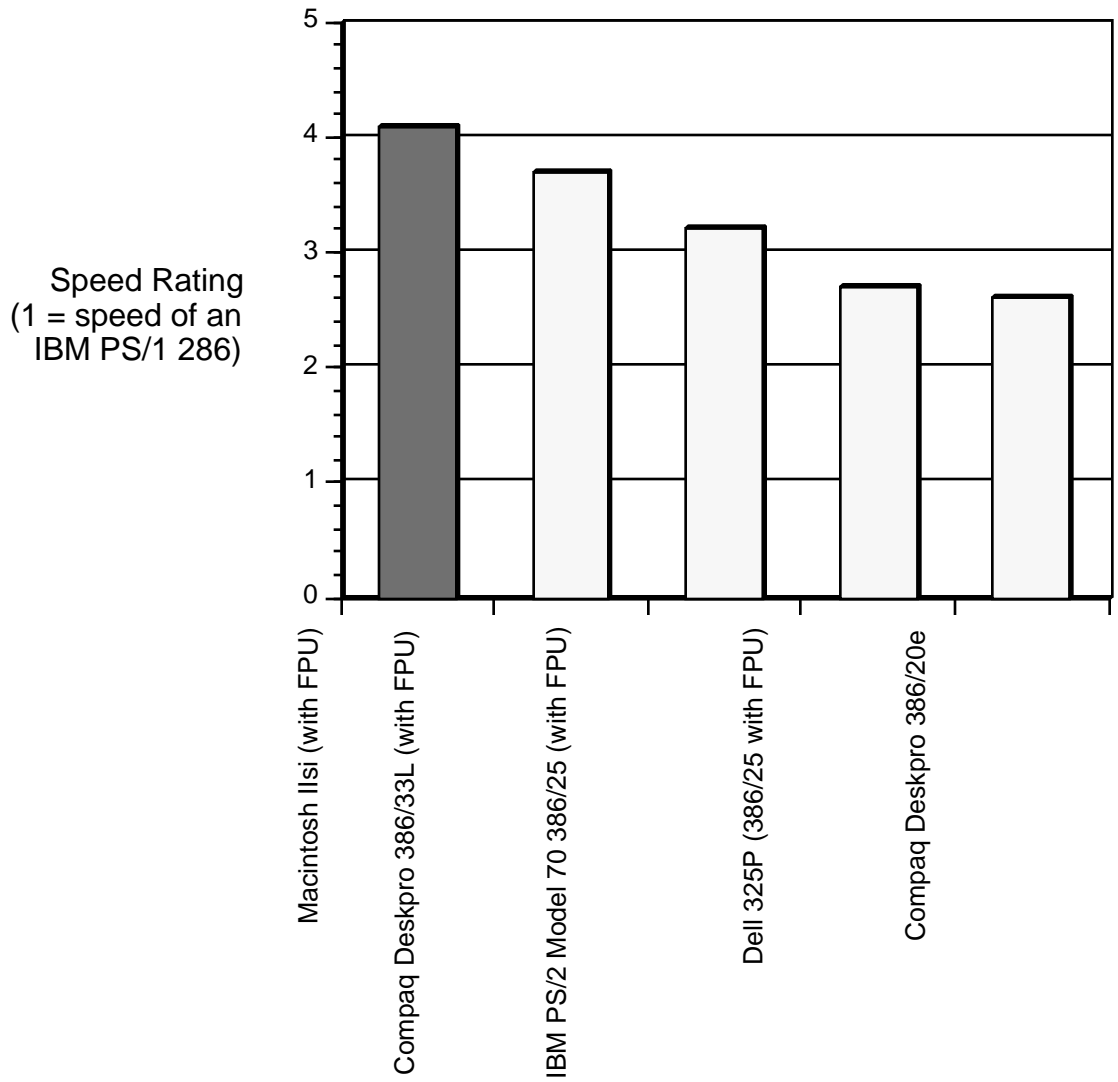• The Macintosh IIfx outperformed every 33-MHz 486 system tested.

Macintosh IIci vs. PCs

Speed Rating
(1 = speed of an
IBM PS/1 286)

- Macintosh IIci with cache card
- IBM PS/2 90 XP 486/25
- AST Premium II 486SX/20
- IBM PS/2 Model 90 XP 486SX (486SX/20)

• The Macintosh IIci beat the 25-MHz 486 and every 486SX system tested.

Macintosh IIsi vs. PCs

Chart title: Speed Rating (1 = speed of an IBM PS/1 286)

Bars (left to right):
- Macintosh IIsi (with FPU): ~4.1
- Compaq Deskpro 386/33L (with FPU): ~3.7
- IBM PS/2 Model 70 386/25 (with FPU): ~3.2
- Dell 325P (386/25 with FPU): ~2.7
- Compaq Deskpro 386/20e: ~2.6
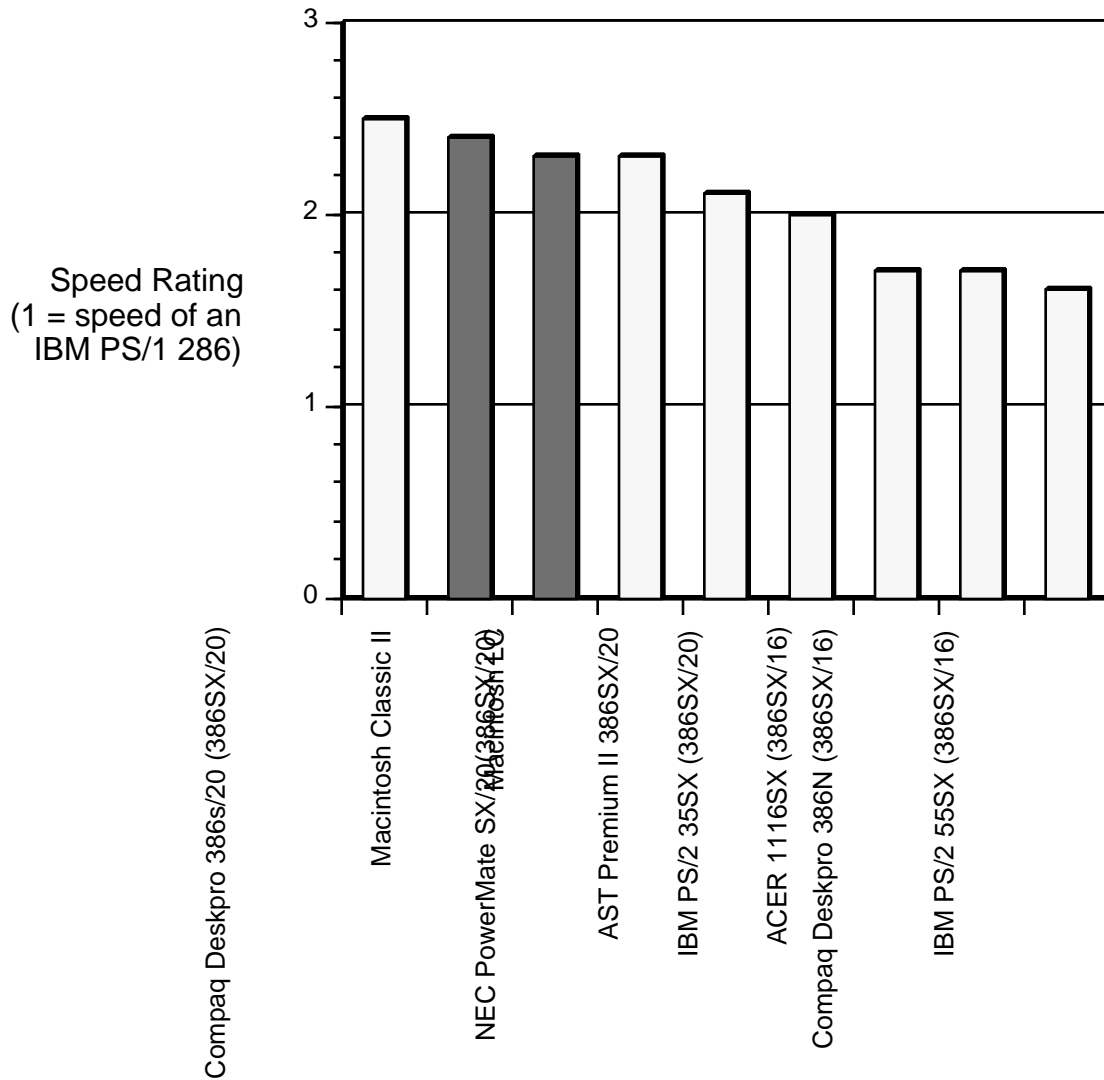
• The Macintosh IIsi outperformed every 386-based computer tested.

Macintosh Classic II and Macintosh LC vs. PCs

Speed Rating
(1 = speed of an
IBM PS/1 286)

Chart categories:
Compaq Deskpro 386s/20 (386SX/20)
Macintosh Classic II
NEC PowerMate SX/20 (386SX/20) / Macintosh LC
AST Premium II 386SX/20
IBM PS/2 35SX (386SX/20)
ACER 1116SX (386SX/16)
Compaq Deskpro 386N (386SX/16)
IBM PS/2 55SX (386SX/16)

• The Macintosh Classic II had performance better than every 386SX system except one — the Compaq 386s/20, which costs about 60% more than a Macintosh Classic II for a configured system.

• The Macintosh LC was right behind. It outperformed the fastest 16-MHz 386SX machine by 35%.

Macintosh Classic vs. PCs

Speed Rating (1 = speed of an IBM PS/1 286)

Compaq Deskpro 286N (286/12)

Macintosh Classic

IBM PS/2 30-286 (286/10)

IBM PS/1 (286/10)
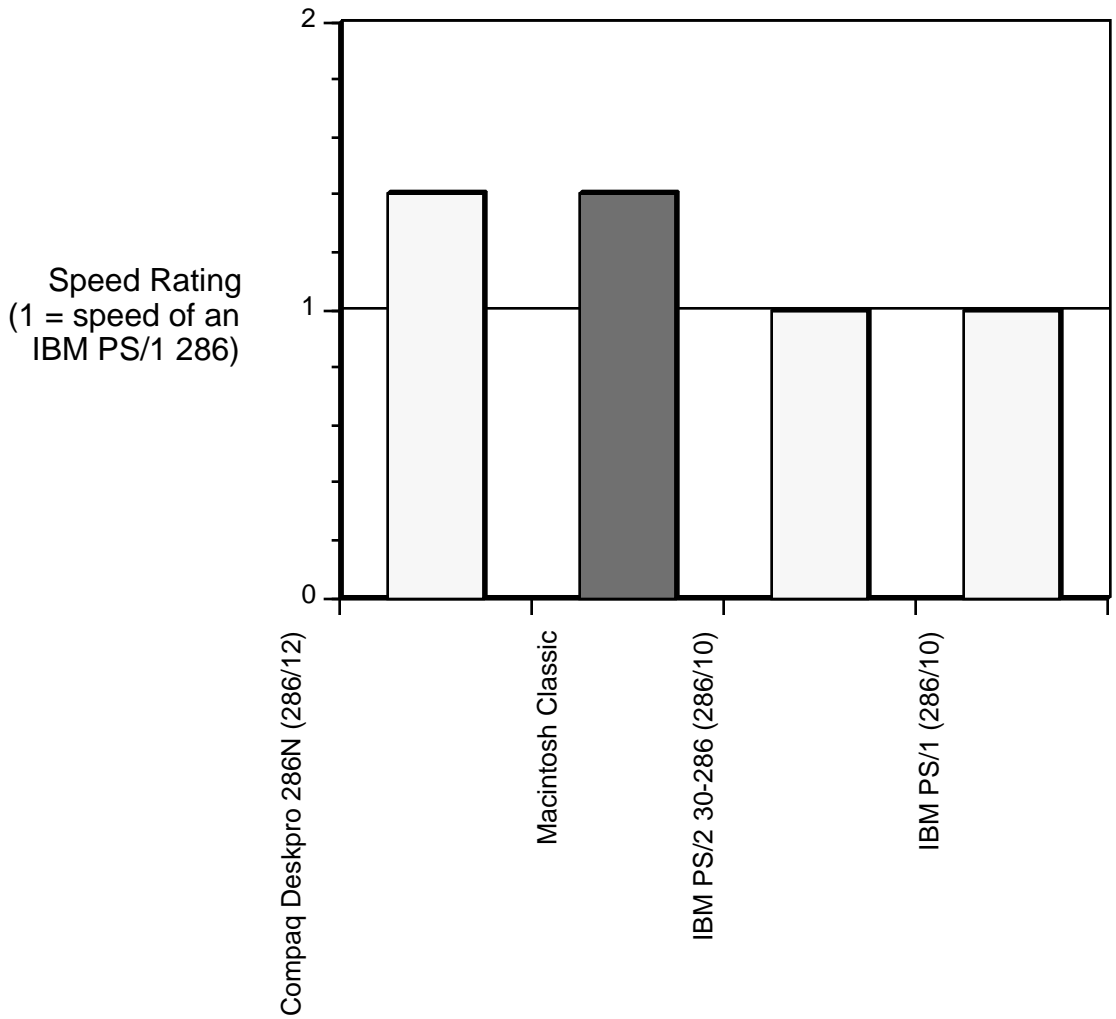
• The Macintosh Classic finished in a virtual tie with the Compaq 286N, which is about twice the suggested retail price of the Macintosh Classic for a configured system.

Notes

Pricing and configurations

Desktop Systems:

	Memory/ Hard Drive	Base Price	Extra Memory		Monitor	FPU (or cache)	Keybrd	Mouse	DOS	Windows	Shipping	CONFIG. SRP
ACER 1116SX	1/40 MB	$1,495	3 MB	$330	$399		inc.	inc.**	inc.	$225 *		$2,449
ALR 486/50 Business VEISA	17/420MB	$9,495			$695	Built-in	inc.	inc.**	$99*	$225 *		$10,514
Apple Macintosh Classic	2/40 MB	$1,499	2 MB	$225	inc.		inc.	inc.				$1,724
Apple Macintosh Classic II	4/80 MB	$2,399			inc.		inc.	inc.				$2,399
Apple Macintosh LC	2/40 MB	$2,499	2 MB	$225	$599		inc.	inc.				$3,323
Apple Macintosh IIsi (w/ FPU)	5/80 MB	$4,569			$999	$249	$229	inc.				$6,046
Apple Macintosh IIci (w/ cache card)	5/80 MB	$5,969			$999	(Cache inc.)	$229	inc.				$7,197
Apple Macintosh IIfx	4/80 MB	$8,069			$999		$229	inc.				$9,297
Apple Macintosh Quadra 700	4/400 MB	$7,699			$999		$229	inc.				$8,927
Apple Macintosh Quadra 900	4/400 MB	$9,199			$999		$229	inc.				$10,427
AST Premium II 386SX/20	2/80 MB	$2,095	2 MB	$200	$695		inc.	inc.**	$99	$225 *		$3,314
AST Premium II 486SX/20	4/80 MB	$3,495			$695		inc.	inc.**	$99	$225 *		$4,514
Compaq 286N Model 40	1/40 MB	$1,799	3 MB	$656	$299		inc.	inc.**	$99	$225 *		$3,078
Compaq 386N Model 40	1/40 MB	$1,799	3 MB	$507	$699		inc.	inc.**	$99	$225 *		$3,329
Compaq 386S/20 Model 60	2/60 MB	$2,599	2 MB	$319	$699		inc.	inc.**	$99	$225 *		$3,941
Compaq 386/20E Model 110	4/110 MB	$3,699			$699		inc.	inc.**	$99	$225 *		$4,722
Compaq 386/33L Model 120	4/120 MB	$6,199	2 MB	$319	$699	$1,599	inc.	inc.**	$99	$225 *		$9,140
Compaq 486/33L Model 120	4/120 MB	$8,999			$699	Built-in	inc.	inc.**	$99	$225 *		$10,022
Dell 325P†	2/80 MB	$2,299	3 MB	$300	inc.	$249	inc.	——	$169	——	$50	$3,067
Dell 433P†	2/80 MB	$2,999	2 MB	$200	inc.	Built-in	inc.	——	$169	——	$50	$3,418
IBM PS/1 -M34	1/30 MB	$1,649	2 MB	$399	inc.		inc.	inc.	inc.	$149 *		$2,197
IBM PS/2 Model 30-286 -E31	1/30 MB	$1,995	3 MB	$790	$342		inc.	$99	$165	$149 *		$3,540
IBM PS/2 Model 55SX -O61	2/60 MB	$2,945	2 MB	$495	$950		inc.	$99	$165	$149 *		$4,803
IBM PS/2 Model 35SX -O40	2/80 MB	$3,055	2 MB	$495	$950		inc.	$99	$165	$149 *		$4,913
IBM PS/2 Model 70 386/25 -A81	4/80 MB	$5,845	2 MB	$495	$950	$299*	inc.	$99	$165	$149 *		$8,002
IBM PS/2 Model 90XP 486SX -OG5	4/80 MB	$8,345	2 MB	$495	$950		inc.	$99	$165	$149 *		$10,203
IBM PS/2 Model 90XP 486/25 -OJ5	8/80 MB	$10,845			$950	Built-in	inc.	$99	$165	$149 *		$12,208
IBM PS/2 Model 95XP 486/33 -OKD8/320 MB	$16,445			$950	Built-in	inc.	$99	$165	$149 *		$17,808
NEC PowerMate SX/20	2/42 MB	$2,199	2 MB	$415	$499		inc.	$125 *	inc.	inc.		$3,238

Notebook Systems :

	Memory/ Hard Drive	Base Price	Extra Memory		Monitor	FPU (or cache)	Keybrd	Mouse	DOS	Windows	Shipping	CONFIG. SRP
Apple Macintosh PowerBook 100	2/20 MB	$2,299	2 MB	$399	inc.		inc.	inc.				$2,698
Apple Macintosh PowerBook 140	2/20 MB	$2,899	2 MB	$399	inc.		inc.	inc.				$3,298
Apple Macintosh PowerBook 170	4/40 MB	$4,599			inc.		inc.	inc.				$4,599
AST Premium Exec 386SX	2/40 MB	$3,395	3 MB	$999	inc.		inc.	inc.**	inc.*	$225 *		$4,619
Compaq LTE 386S/20 Model 30	2/30 MB	$4,399	2 MB	$698	inc.		inc.	inc.**	$99	$225 *		$5,421
IBM PS/2 L40SX	2/60 MB	$5,245	2 MB	$540	inc.		inc.	$159	$165	$149 *		$6,258
Toshiba T1200XE	1/20 MB	$1,999	4 MB	$878	inc.		inc.	inc.**	inc.	$225 *		$3,102
Toshiba T2000SX	1/40 MB	$3,749	2 MB	$479	inc.		inc.	inc.**	inc.	$225 *		$4,453

*These are prices from Microsoft and Intel, since the manufacturer does not resell this product.
**These mice are packaged with Microsoft Windows.
†When making price comparisons, remember that Dell is a mail order company.

Prices and configurations are supplied by Ingram, and are current as of September 23, 1991. Prices and configurations change frequently, so this information may not be accurate by the time you read it.

Software

The applications and versions tested were:

	Macintosh	PCs
Microsoft Excel	3.0	3.0
Microsoft Word	4.0	1.1
Microsoft PowerPoint	2.01	2.0
Aldus PageMaker	4.01	4.0
Aldus Persuasion	2.0	2.0
Informix Wingz	1.1	1.1a
Adobe Illustrator	3.02	1.1

System software: MS-DOS 5.0 and Windows 3.0 on the PC; System 7.0 on the Macintosh.

• Application performance can vary depending on test configurations and the exact functions tested. Apple encourages customers to conduct their own evaluations.

• Pricing comparisons were made using manufacturers' U.S. suggested retail prices.

A Note from Apple: Putting the Benchmarks in Perspective

The study's performance benchmarks show that the Macintosh computer's unified architecture—with the hardware and software designed together from the chips up—gives better performance than Intel-based PCs, which have a graphical interface added on top of a character-based system, and which have hardware developed separately from the operating system software.

However, *benchmark performance is not the most important feature of a personal computer.*   Apple encourages customers not to buy the fastest system, but the system which will allow them to get the most done. That means considering things like ease of use, quality of applications, and productivity. Although those features don't show up in benchmarks, Apple feels they are the most important advantages of Macintosh...

• Because Apple built ease of use into the Macintosh from the beginning, rather than adding it as an afterthought, Macintosh is easier to use. Examples include simple set up and configuration, the SCSI connector that lets users plug in peripherals without adding boards, and an intuitive user interface that is years ahead of the competition.

Furthermore, Macintosh users can take advantage of powerful new technology faster and with less disruption than can users of other systems. The Macintosh computer enables users to treat multiple monitors as a single large screen; the Macintosh SuperDrive floppy disk drive can read IBM, Macintosh, and Apple II disks; and the Macintosh sound architecture makes computer-based voice mail practical today. What this means to users is much better productivity.

• Because of strong relationships with third party developers, and the interface tools built into every Macintosh computer, Macintosh has more applications than any other graphical environment. Furthermore, Macintosh applications work better together because of their consistency and live copy/paste capability, even over networks.

• Because the Macintosh was designed for networking from the start, it's easy for Macintosh users to set up a local area network to share files and printers, and to connect to other computing environments, such as IBM, DEC, OSI, and TCP/IP.

• Because the Macintosh architecture was designed to grow, all Macintosh owners have a clear growth path to System 7 and beyond. By contrast, today's PC owner must choose between DOS, Windows, and OS/2.

But the most important proof of the superiority of Macintosh is not its long list of advantages. It's the millions of satisfied Macintosh users.

When Macintosh and Windows 3.0 users were surveyed by a national research organization, Macintosh scored higher on overall satisfaction. According to the survey, conducted by this Diagnostic Research, Inc., Macintosh provides the highest level of customer satisfaction not only for people who use personal computers, but also for information managers who are responsible for their installation and maintenance.

When it comes to demonstrating the real power of Macintosh, satisfied customers are more important than faster benchmark performance.