PRODUCT COMPARISON

MCA SYSTEMS

IBM promotes Micro Channel Architecture as the standard PC platform, and the competition is starting to take notice. We evaluate seven IBM PS/2 models along with compatibles from five other vendors.

BY ANDRE KVITKA, EUGENE J. WONG, INFOWORLD TEST CENTER AND **DANIEL SOMMER,** ASSOCIATE REVIEWS EDITOR

Products Reviewed

In April 1987, IBM introduced its Micro Channel Architecture (MCA) in the PS/2 line, and ever since the company has been working feverishly to see its product accepted as a new personal computer standard. § In the past year several other vendors have licensed IBM's proprietary bus, and the first MCA-compatible products are now coming to market. Unlike with the PC, IBM eagerly welcomes the blossoming of these clones, as they will help IBM take root as the technology leader while paying Big Blue royalties to boot. § In this comparison we take a look at the members of IBM's MCA lineup, along with competing products from ALR, Mitac, NCR, Olivetti, and Tandy. The clone makers are concentrating thus far on the 386SX processor, which has been accepted by many manufacturers as the entry-level 386 system. We should see several more MCA compatibles in the near future; several other vendors have announced or will announce products this week, though they are not yet shipping their units. § We introduce new tests and scoring criteria with this comparison to respond to our readers' call for real-world benchmarks based on typical business applications, rather than on the isolative component tests prevalent in our industry (including our own). We have also changed our method of scoring support, which now reflects a reader survey. For details, see "How We Tested and Scored MCA Computers," Page 116. We also tested a bus-master board from Core International in each of the systems in order to verify the MCA's multiprocessing capability. § **WHAT WE FOUND.** The memory-intensive portion of our software suite showed a logical progression from the slowest CPUs to the fastest. (We now score speed based on CPU category, e.g., 20-MHz 386.) The IBM Model 60, a 286-10, was slowest; it required more than an hour to perform our Autocad, Lotus (two versions), and Word Perfect tests. The fastest shipping system was ALR's Microflex 7000, a 386-25, which beat IBM's Model 70-A21 by just four seconds in combined time. We also benchmarked ALR's prototype 486 MCA, the Powercache 4, which completed the tests in less than half the time of ALR's 386. § The standout performer in its class was Tandy's 20-MHz 386, the 5000 MC, which at 29 minutes and 59 seconds was about seven minutes faster than IBM's Model 70-121. § The disk-intensive portion of our application suite, which comprises the two Dbases and Paradox, again

placed Tandy at the top of its class. In 48 minutes and five seconds, it was about a half-hour faster than the IBM Model 70-121. In the 25-MHz class, ALR was nine minutes faster than the IBM Model 70-A21. Olivetti led the SX group, about 25 minutes ahead of the IBM Model 55 SX, which lagged well behind the average.

Since none of the MCAs offers a second processing speed, no unit could earn an excellent score in software compatibility. Most of the units balked at running the entire test suite smoothly, though all offered work-arounds to allow the applications to work; Quarterdeck's Desqview environment posed the greatest problems for these systems.

IBM's Models 55 SX and 70, and Olivetti's SX would not run with Desqview and QEMM while multitasking; soon after opening a second window the system would crash. The drivers with IBM DOS 4.01, XMAEM and XMA2EMS, solved the problem. We spoke at length with Quarterdeck and found that IBM Models 55 SX and 70 have a different BIOS version from the other PS/2s; Olivetti uses the same IBM Model 55 SX BIOS specifications as IBM. Unfortunately, this BIOS employs certain interrupts and function calls that Desqview also uses for Microsoft Word 5.0 and Lotus 1-2-3 2.2. Thus, you can't run these programs in background mode; you must select the "advanced options window" in Desqview and disable that feature. Quarterdeck said the next version of Desqview will correct the problem. ALR's Microflex also could not run certain applications in background.

NCR also had problems with Desqview and QEMM, but of a somewhat different nature. When we tried to invoke the Desqview program XDV, we got an error message saying it couldn't load the DV program. When we tried the alternate DV program, we saw "not enough memory to run the program." After rebooting the system, the DV program worked. In order to run the XDV program, we loaded the DOS drivers, XMAEM and XMA2EMS, and XDV ran normally.

The IBM Model P70 won't run Microsoft Word on its gas-plasma display; you must use an external monitor. Microsoft has a fix for this, but you'll have to contact the software vendor for it.

In our hardware compatibility suite, a few units struggled with the 3Com network board and the Hayes 2,400-bps internal modem. NCR couldn't operate the modem while connected to the network via 3Com. We had to use an ASCII editor to alter the .ADF (adapter description files) on the 3Com and Hayes reference disks so the "NumBytes 1" line read "NumBytes 2." We then reconfigured the system with the edited reference disks.

During the power-on self-test, MCA machines fetch a unique address from every board plugged into the bus. For each board found during this scan, the BIOS attempts to load the corresponding ADF. These files describe the possible configurations for that board (like interrupt numbers). The BIOS then configures the boards to resolve conflicts (given the option presented in the ADF files).

The IBM Model 70-121's BIOS presented another problem. In order to use the Hayes device, we had to send a string command to the modem before Crosstalk could communicate with the hardware. (Hayes technical support was the one to notify us of the work-around.)

The IBM Model P70 does not have a video extension slot for IBM's 8514/A adapter, so you won't be able to attach an external monitor to take advantage that board and its higher resolution.

The least expandable systems were the

New Testing, Scoring Criteria

With this product comparison of MCA compatibles, *InfoWorld* redefines two major areas in testing and scoring desktop computers, in order to give you more realistic and more useful results. The first affected area is performance, where we have until now used results from the *InfoWorld* Automated Hardware Benchmark System to score CPU, hard disk sequential-access speed, and hard disk random-access speed. We have also published but not scored a set of applications tests to show performance in a variety of actual uses. Beginning with this issue, we now score computers based on a new version of this software test suite of typical business applications. We will continue to publish our traditional benchmark indexes to ensure continuity from previous reviews.

Our new software test suite consists of a lengthy series of operations in each of seven popular programs: Autocad, Dbase III Plus and Dbase IV, Lotus 1-2-3 2.2 and 3.0, Paradox, and Word Perfect. This switch to applications scoring is the result of a recent reader survey in which we discovered an increasing desire on the part of our readers for real-world benchmark results.

Our other big change is in our method of scoring technical support, which we now base on the results of periodic user-satisfaction surveys of our readers who buy and use desktop computers. This is a better indicator of overall quality of support, whether from vendor or dealer, than phone calls during the review process.

small-footprint IBM Models 50 Z, 55 SX, and 70-A21. Olivetti was the only unit to earn an excellent score in expandability, though ALR's tower case offers the greatest capacity for peripherals.

IBM's manuals are sufficient, but they do not provide any extras. For example, there's no discussion of how to install a math coprocessor. NCR had the best documentation; it includes a quick-start guide, ample diagrams, table of contents, index, glossary, and troubleshooting.

Mitac and Olivetti gain a bonus for including a reset switch. We had the most difficulty with ALR's Microflex. The first system we received had problems with the hard disk, which couldn't be formatted properly. We received and installed a second hard disk with controller, but we couldn't run any applications. Finally, we ordered another system for our testing, and it worked. (We did not score the ALR on the two failed drives.)

Normally there is an automatic method to copy option disk files to the reference disk. For some reason the setup program for ALR doesn't recognize the reference disk and keeps asking for the Phoenix setup disk. Finally, we took the needed files from the option disks and, using the Copy command, installed them onto the reference disk. ALR is aware of the problem and said that Phoenix is working on solving it.

The ALR Microflex is a very sturdy machine. However, it does require a bit of effort to add a peripheral. After removing the outside cover we had to remove a 3-inch-wide metal support that runs the height of the unit. Then we had to swing out a metal arm that holds the hard disk and remove a restraining brace before we could install an expansion card.

Mitac and NCR suffer a bit in the system design category due to the large number of last-minute patches on their motherboards. The IBM Model 70-A21 motherboard is secured to the frame only at the back. There are no screws holding the front of the board.

IBM and NCR earn poor scores in support policies due to their insistence on dealer-only support. Olivetti gained the highest score due to the company's toll-free line. Our technical support scores come from our readers; our recent survey shows a general level of satisfaction with IBM's dealer and ALR's vendor and dealer support staffs. Tandy is much less popular with our readers, and they rated NCR unacceptable for solving their problems. Due to an insufficient number of respondents with Mitac and Olivetti systems, we rated them by our old means — calling anonymously. Mitac made the better impression on us.

The IBM machines are generally satisfactory values. Often when we compare them with other PC clones, their high list prices make them appear overpriced. However, among MCA compatibles IBM fares much better in comparative pricing. This may be partly due to the license fees the other vendors must pay to IBM to copy the Micro Channel. Per-unit prices from IBM dealers also vary considerably with the volume of your order; sometimes your cost can be as much as 30 percent off list price. The one poor value among IBM PS/2s is the Model 80. Its 16-MHz 386DX CPU represents what appears to be a dying category, as SX computers take over the entry-level 386 position, though if you need a tower 386, it's the only one.

Among compatible makers, Mitac offers a good value. It's $1,500 less than the IBM Model 55 SX and gives up little for the savings. Though it costs the same as IBM, NCR suffers from support woes. Olivetti performs better than IBM and the other clone machines in its disk-intensive applications times. ALR is another good value; it provides similar performance to the IBM Model 70-A21, but for about $1,000 less. □

Executive Summary

The stars in the still-limited MCA firmament are Tandy, Mitac, the IBM Model 70-A21, ALR, and to a lesser degree, the IBM Model 55 SX.

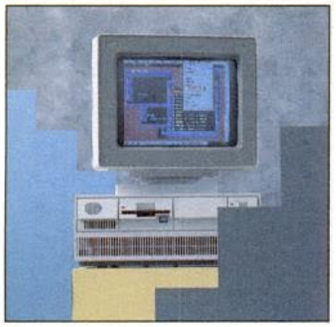
The **Tandy 5000 MC** wins the 20-MHz category; it's a bit more expensive than the IBM Model 70-121, but its performance advantage is considerable. The solid if unspectacular **Mitac MPS2386** is the least expensive SX by $1,500. **IBM's Model 55 SX** offers a superior package or a lower price than the other SXs. The 25-MHz **IBM Model 70-A21** is the strongest IBM performer and a close rival for the **ALR Microflex 7000**, which offers top capacity, a reasonable price, and fine performance.

The losers are the pricey **IBM Model 80**, which is far too expensive for its shrinking niche (the former entry-level 386), and **NCR PC 386sx/MC**, which is subpar in software compatibility, system design, and especially in technical support.

The balance of the machines appear satisfactory in performance and price. The two 286s, the **IBM Model 50 Z** and **IBM Model 60**, offer a small footprint and expandability, respectively. **Olivetti's P500** SX is a strong performer at a typical price. The **IBM Model 70-121's** speed pales next to Tandy and it requires extra work to use a Hayes modem or Desqview, but it's generally a steady machine, and the portable **IBM Model P70** is your only choice for luggability in an MCA.

10-MHz 286 COMPUTERS

REPORT CARD INFO WORLD



10-MHz 286 MCA COMPUTER

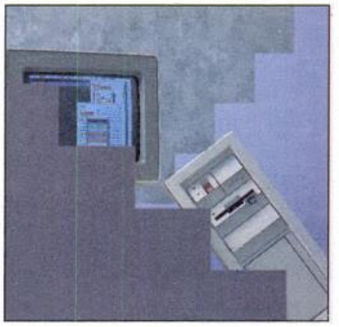
IBM PS/2 Model 50 Z

Criterion	(Weighting)	Score
Performance		
Speed		
Memory-intensive applications	(100)	Good
Disk-intensive applications	(100)	Satisfactory
Software compatibility	(150)	Very Good
Just one processing speed.		
Hardware compatibility	(125)	Excellent
Expandability	(75)	Good
Supports only 2 megabytes of RAM on motherboard; just three free slots, one free drive bay after configuration.		
Documentation	(50)	Satisfactory
Setup	(100)	Good
Serviceability		
System design	(50)	Good
Support policies	(50)	Poor
Dealer-only support.		
Technical support	(75)	Good
Value	(125)	Satisfactory
Final score		**6.3**

PRODUCT SUMMARY

Company: IBM Corp., 1133 Westchester Ave., White Plains, NY 10604; (800) 426-2468.
List Price: $3,650 as configured.
Features: 10-MHz zero-wait-state 80286 CPU; serial, parallel, mouse ports built in; 80287 math coprocessor support; 94-watt power supply.
Peripherals: Enhanced keyboard; built-in 8-bit VGA board (IBM).
Storage and Memory: 60-megabyte IBM hard disk with ESDI 1:1 controller; 1.4-megabyte 3½-inch floppy drive; 1 megabyte of 85-nanosecond RAM in SIMMs (16 megabytes maximum).
Pros: Small footprint; easy to install new peripherals; built-in I/O, video, disk controllers.
Cons: Less expandable than many; dealer-only support.
Summary: Complete, hassle-free entry-level system.

REPORT CARD INFO WORLD



10-MHz 286 MCA COMPUTER

IBM PS/2 Model 60

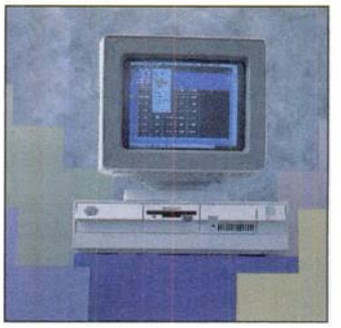
Criterion	(Weighting)	Score
Performance		
Speed		
Memory-intensive applications	(100)	Good
Disk-intensive applications	(100)	Satisfactory
Software compatibility	(150)	Very Good
Just one processing speed.		
Hardware compatibility	(125)	Excellent
Expandability	(75)	Very Good
Supports only 1 megabyte of RAM on motherboard.		
Documentation	(50)	Satisfactory
Setup	(100)	Good
Serviceability		
System design	(50)	Satisfactory
Support policies	(50)	Poor
Dealer-only support.		
Technical support	(75)	Good
Value	(125)	Satisfactory
Final score		**6.4**

PRODUCT SUMMARY

Company: IBM Corp., 1133 Westchester Ave., White Plains, NY 10604; (800) 426-2468.
List Price: $5,295 as configured; $5,993 with 2 megabytes.
Features: 10-MHz one-wait-state 80286 CPU; serial, parallel, and mouse ports built in; 80287 math coprocessor support; 207-watt power supply.
Peripherals: Enhanced keyboard; built-in 8-bit VGA board (IBM).
Storage and Memory: 44-megabyte IBM hard disk with ESDI 1:1 controller; 1.4-megabyte 3½-inch floppy drive; 1 megabyte of 85-nanosecond RAM in SIMMs (16 megabytes maximum).
Pros: Built-in I/O, video; floppy controller; numerous slots available.
Cons: Dealer-only support.
Summary: Basic tower system rivals the competition in expandability; ideal as 286 file server.

16-MHz 386SX COMPUTERS

REPORT CARD INFO WORLD



16-MHz 386SX MCA COMPUTER

IBM PS/2 Model 55 SX

Criterion	(Weighting)	Score
Performance		
Speed		
Memory-intensive applications	(100)	Satisfactory
Disk-intensive applications	(100)	Satisfactory
Software compatibility	(150)	Very Good
Just one processing speed.		
Hardware compatibility	(125)	Excellent
Expandability	(75)	Good
Just three free slots, one free drive bay after configuration; lacks large hard drive option.		
Documentation	(50)	Satisfactory
Setup	(100)	Good
Serviceability		
System design	(50)	Satisfactory
Numerous patches on motherboard.		
Support policies	(50)	Poor
Dealer-only support.		
Technical support	(75)	Good
Value	(125)	Satisfactory
Final score		**6.1**

PRODUCT SUMMARY

Company: IBM Corp., 1133 Westchester Ave., White Plains, NY 10604; (800) 426-2468.
List Price: $5,690 as configured.
Features: 16-MHz zero-wait-state 80386SX CPU; serial, parallel, and mouse ports built in; 80387SX math coprocessor support; 90-watt power supply.
Peripherals: Enhanced keyboard; built-in 8-bit VGA board (IBM).
Storage and Memory: 60-megabyte IBM hard disk with built-in ESDI 1:1 controller; 1.4-megabyte 3½-inch floppy drive; 4 megabytes of 85-nanosecond RAM in SIMMs (16 megabytes maximum).
Pros: Small footprint; built-in controllers, video, I/O.
Cons: Dealer-only support.
Summary: IBM Model 55 SX matches or beats NCR and Olivetti in list price, and offers basic SX class performance.

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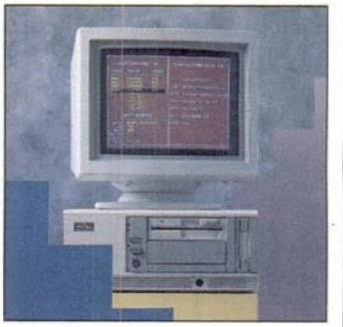


16-MHz 386SX MCA COMPUTER

Mitac MPS2386

Criterion	(Weighting)	Score
Performance		
Speed		
Memory-intensive applications	(100)	Satisfactory
Disk-intensive applications	(100)	Good
Software compatibility	(150)	Very Good
No OS/2.		
Hardware compatibility	(125)	Excellent
Expandability	(75)	Very Good
No case lock; lacks large hard drive option.		
Documentation	(50)	Good
Setup	(100)	Very Good
Serviceability		
System design	(50)	Poor
System board has numerous patches.		
Support policies	(50)	Satisfactory
Technical support	(75)	Very Good
Score based on our calls.		
Value	(125)	Good
Final score		**6.8**

PRODUCT SUMMARY

Company: American Mitac Corp., 410 Plumeria Drive, San Jose, CA 95134; (408) 432-1160.
List Price: $4,019 as configured.
Features: 16-MHz zero-wait-state 80386SX CPU; serial, parallel, and mouse ports built in; 80387SX math coprocessor support; MS-DOS 4.01.
Peripherals: Enhanced keyboard; built-in 16-bit VGA board
Storage and Memory: 40-megabyte hard disk with MFM 1:1 controller; 1.4-megabyte 3½-inch, 1.2-megabyte 5¼-inch floppy drives; 4 megabytes of 100-nanosecond RAM (16 megabytes maximum).
Pros: Built-in floppy controller, I/O; reset button; fine support staff; second floppy drive.
Cons: Several last-minute fixes on motherboard.
Summary: Lowest-price system with typical performance is best value in the SX class.

16-MHz 386SX COMPUTERS

REPORT CARD INFO WORLD

16-MHz 386SX MCA COMPUTER

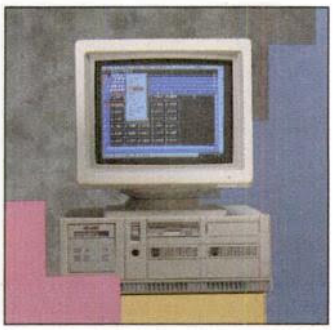
NCR PC386sx/MC

Criterion	(Weighting)	Score
Performance		
Speed		
Memory-intensive applications	(100)	Good *Fastest in its class.*
Disk-intensive applications	(100)	Good
Software compatibility	(150)	Good *Desqview doesn't run with QEMM.SYS; no OS/2.*
Hardware compatibility	(125)	Very Good *Modem, 3Com board require work-arounds to run together.*
Expandability	(75)	Good *Supports only 1 megabyte of RAM on motherboard; just one free drive bay after configuration; lacks large hard drive option.*
Documentation	(50)	Very Good *Quick-start guide; glossary; troubleshooting.*
Setup	(100)	Good
Serviceability		
System design	(50)	Poor *Numerous patches on motherboard.*
Support policies	(50)	Poor *Dealer-only support.*
Technical support	(75)	Unacceptable
Value	(125)	Satisfactory
Final score		**5.4**

PRODUCT SUMMARY

Company: NCR Corp., Workstation Products Division, 1601 S. Main St., Dayton, OH 45479; (513) 445-7478.
List Price: $5,745 as configured.
Features: 16-MHz zero-wait-state 80386SX CPU; serial, parallel, and mouse ports; 80387SX math coprocessor support; MS-DOS 4.01.
Peripherals: Enhanced keyboard; 16-bit VGA board (Paradise).
Storage and Memory: 48-megabyte Seagate hard disk with SCSI 1:1 controller; 1.4-megabyte 3½-inch floppy drive; 4 megabytes of 80-nanosecond RAM (16 megabytes maximum).
Pros: Fine manual; small footprint.
Cons: Minor incompatibilities; many last-minute fixes; dealer-only support policy.
Summary: Costs as much as IBM, but without providing more value.

REPORT CARD INFO WORLD



16-MHz 386SX MCA COMPUTER

Olivetti P500

Criterion	(Weighting)	Score
Performance		
Speed		
Memory-intensive applications	(100)	Satisfactory
Disk-intensive applications	(100)	Very Good *Fastest in its class.*
Software compatibility	(150)	Very Good *Desqview doesn't run with QEMM.SYS.*
Hardware compatibility	(125)	Excellent
Expandability	(75)	Excellent
Documentation	(50)	Satisfactory
Setup	(100)	Very Good
Serviceability		
System design	(50)	Satisfactory
Support policies	(50)	Good *Toll-free line.*
Technical support	(75)	Satisfactory *Score based on our calls.*
Value	(125)	Satisfactory
Final score		**6.9***

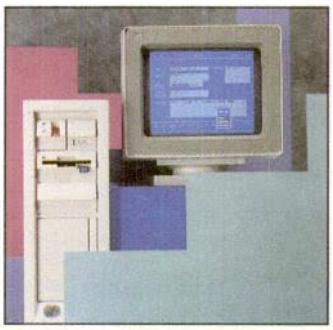
**Value and final score of report card on Page 120 are incorrect.*

PRODUCT SUMMARY

Company: Olivetti USA, 765 U.S. Highway 202, Somerville, NJ 08876;
List Price: $5,565 as configured; $6,774 with math coprocessor, MS-DOS, and OS/2.
Features: 16-MHz zero-wait-state 80386SX CPU; serial, parallel, and mouse ports built in; 80387 math coprocessor; 135-watt power supply.
Peripherals: Enhanced keyboard; built-in 16-bit VGA board.
Storage and Memory: 40-megabyte NEC hard disk with MFM 1:1 controller; 1.4-megabyte 3½-inch floppy drive; 4 megabytes of 100-nanosecond RAM (16 megabytes maximum).
Pros: Built-in controllers, video, I/O; top expandability; simple setup; reset button.
Cons: Plastic case cover.
Summary: Olivetti provides best performance among SX machines in disk-intensive applications; configured price is typical for its class.

16-MHz 386 COMPUTER

REPORT CARD INFO WORLD



16-MHz 386 MCA COMPUTER

IBM PS/2 Model 80

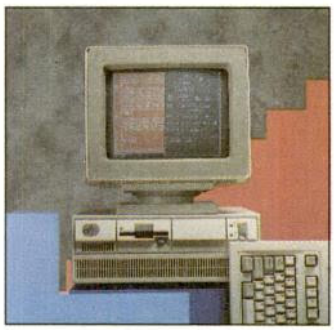
Criterion	(Weighting)	Score
Performance		
Speed		
Memory-intensive applications	(100)	Good
Disk-intensive applications	(100)	Good
Software compatibility	(150)	Very Good
Hardware compatibility	(125)	Excellent
Expandability	(75)	Very Good *Only 2 megabytes of RAM on motherboard; just one free drive bay after configuration.*
Documentation	(50)	Satisfactory
Setup	(100)	Good
Serviceability		
System design	(50)	Satisfactory
Support policies	(50)	Poor
Technical support	(75)	Good
Value	(125)	Poor
Final score		**6.2**

PRODUCT SUMMARY

Company: IBM Corp., 1133 Westchester Ave., White Plains, NY 10604; (800) 426-2468.
List Price: $7,724 as configured; $9,390 with 4 megabytes.
Features: 16-MHz zero-wait-state 80386 CPU; serial, parallel, and mouse port built in; 80387 math coprocessor support; 225-watt power supply;
Peripherals: Enhanced keyboard; built-in 8-bit VGA board (IBM).
Storage and Memory: 44-megabyte hard disk with ESDI 1:1 controller; 1.4-megabyte 3½-inch floppy drive; 2 megabytes of 85-nanosecond RAM (16 megabytes maximum).
Pros: Built-in floppy, video controllers, I/O.
Cons: Dealer-only support; inferior value to other MCAs.
Summary: This tower system is superior to IBM's other 16-MHz unit, the 55 SX, in performance and expandability. It's the only choice for a 386 file server.

20-MHz 386 COMPUTERS

REPORT CARD INFO WORLD



20-MHz 386 MCA COMPUTER

IBM PS/2 Model 70-121

Criterion	(Weighting)	Score
Performance		
Speed		
Memory-intensive applications	(100)	Satisfactory
Disk-intensive applications	(100)	Satisfactory
Software compatibility	(150)	Very Good *Desqview doesn't run with QEMM.SYS, can't run some programs in background.*
Hardware compatibility	(125)	Very Good *Hayes modem requires extra commands to run Crosstalk.*
Expandability	(75)	Good *Just three free slots, one free drive bay after configuration; lacks large hard drive option.*
Documentation	(50)	Satisfactory
Setup	(100)	Good
Serviceability		
System design	(50)	Good
Support policies	(50)	Poor
Technical support	(75)	Good
Value	(125)	Satisfactory
Final score		**5.9**

PRODUCT SUMMARY

Company: IBM Corp., 1133 Westchester Ave., White Plains, NY 10604; (800) 426-2468.
List Price: $9,390 as configured; $7,790 with 2 megabytes (base model).
Features: 20-MHz zero-wait-state 80386 CPU; serial, parallel, and mouse ports built in; 80387 math coprocessor support; 132-watt power supply.
Peripherals: Enhanced keyboard; built-in 8-bit VGA board (IBM).
Storage and Memory: 120-megabyte IBM hard disk with ESDI 1:1 controller; 1.4-megabyte 3½-inch floppy drive; 4 megabytes of 85-nanosecond RAM in SIMMs (16 megabytes maximum).
Pros: Built-in controllers, video, I/O.
Cons: BIOS causes minor incompatibility with Desqview; dealer-only support.
Summary: 20-MHz Model 70 is outperformed by Tandy's entry, and IBM has higher list price as well.

20-MHz 386 COMPUTERS

REPORT CARD INFO WORLD

20-MHz 386 MCA COMPUTER

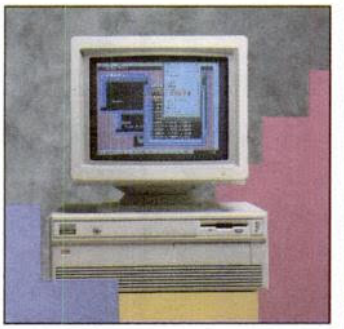
IBM PS/2 Model P70

Criterion	(Weighting)	Score
Performance		
Speed		
Memory-intensive applications	*(100)*	Satisfactory
Disk-intensive applications	*(100)*	Satisfactory
Software compatibility	*(150)*	Very Good
Just one processing speed.		
Hardware compatibility	*(125)*	Very Good
Does not support 8514/A video card.		
Expandability	*(75)*	Very Good
Just two free slots; no free drive bays after configuration.		
Documentation	*(50)*	Satisfactory
Setup	*(100)*	Good
Serviceability		
System design	*(50)*	Satisfactory
Support policies	*(50)*	Poor
Technical support	*(75)*	Good
Value	*(125)*	Satisfactory
Final score		**5.9**

PRODUCT SUMMARY

Company: IBM Corp., 1133 Westchester Ave., White Plains, NY 10604; (800) 426-2468.
List Price: $8,295 as configured.
Features: 20-MHz zero-wait-state 80386 CPU; serial, parallel, and mouse ports built in; 80387 math coprocessor; 90-watt power supply.
Peripherals: Enhanced keyboard; built-in 8-bit VGA board (IBM).
Storage and Memory: 60-megabyte IBM hard disk with ESDI 1:1 controller; 1.4-megabyte 3½-inch floppy drive; 4 megabytes of 85-nanosecond RAM in SIMMs (16 megabytes maximum).
Pros: Built-in controllers, video, I/O; good keyboard feel; well-balanced for carrying.
Cons: Rather heavy for a portable; dealer-only support.
Summary: IBM's latest try at portable computing puts a handle on a lot of RAM and a big hard drive. The Model P70 performs adequately in most areas for a 20-MHz 386.

REPORT CARD INFO WORLD



20-MHz 386 MCA COMPUTER

Tandy 5000 MC

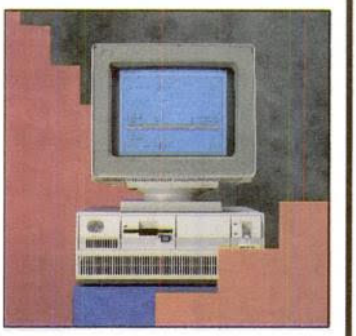
Criterion	(Weighting)	Score
Performance		
Speed		
Memory-intensive applications	*(100)*	Very Good
Disk-intensive applications	*(100)*	Excellent
Software compatibility	(150)	Very Good
Present BIOS does not support OS/2.		
Hardware compatibility	(125)	Excellent
Expandability	(75)	Very Good
Only three slots available after configuration.		
Documentation	(50)	Good
Setup	(100)	Good
Serviceability		
System design	(50)	Satisfactory
Nine patch wires plus one feed-through wire; nice layout on the board.		
Support policies	(50)	Satisfactory
Technical support	(100)	Poor
Value	(125)	Satisfactory
Final score		**6.9**

PRODUCT SUMMARY

Company: Radio Shack, 1800 One Tandy Center, Fort Worth, TX 76102; (817) 390-3700.
List Price: $8,827 as configured.
Features: 20-MHz zero-wait-state 80386 CPU; serial, parallel, and mouse ports built in; support for 80387, Weitek math coprocessors; 192-watt power supply (MS-DOS 3.3 and Tandy OS/2 optional).
Peripherals: Enhanced keyboard; built-in 16-bit VGA board.
Storage and Memory: 150-megabyte hard disk with ESDI 1:1 controller; 1.4-megabyte 3½-inch floppy drive; 4 megabytes of 100-nanosecond RAM (16 megabytes maximum); 32K of RAM cache.
Pros: Built-in floppy controller, video, I/O.
Cons: Numerous patch wires on motherboard.
Summary: Tandy's system beats IBM's Model 70-121 by $500 in list price, and provides the best performance in its class of any machine in this comparison.

25-MHz 386 COMPUTERS

REPORT CARD INFO WORLD



25-MHz 386 MCA COMPUTER

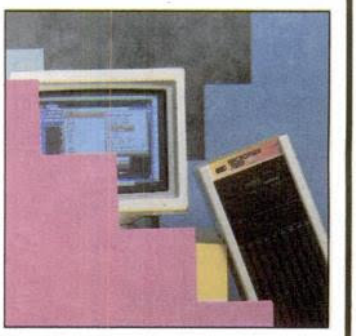
IBM PS/2 Model 70-A21

Criterion	(Weighting)	Score
Performance		
Speed		
Memory-intensive applications	*(100)*	Very Good
Disk-intensive applications	*(100)*	Satisfactory
Software compatibility	*(150)*	Very Good
Desqview doesn't run with QEMM.SYS, can't run some programs in background.		
Hardware compatibility	*(125)*	Excellent
Expandability	*(75)*	Good
Just three free slots, one free drive bay after configuration; lacks large hard drive option.		
Documentation	*(50)*	Satisfactory
Setup	*(100)*	Good
Serviceability		
System design	*(50)*	Satisfactory
Support policies	*(50)*	Poor
Technical support	*(75)*	Good
Value	*(125)*	Satisfactory
Final score		**6.4**

PRODUCT SUMMARY

Company: IBM Corp., 1133 Westchester Ave., White Plains, NY 10604; (800) 426-2468.
List Price: $10,490 as configured.
Features: 25-MHz one-wait-state 80386 CPU; serial, parallel, and mouse ports built in; 80387 math coprocessor support; 132-watt power supply.
Peripherals: Enhanced keyboard; built-in 8-bit VGA board (IBM).
Storage and Memory: 120-megabyte IBM hard disk with ESDI 1:1 controller; 1.4-megabyte 3½-inch floppy drive; 4 megabytes of 80-nanosecond RAM in SIMMs (16 megabytes maximum); 64K of 30-nanosecond RAM cache.
Pros: Built-in controllers, video, I/O; small footprint.
Cons: Desqview incompatibility; dealer-only support.
Summary: Close competition for ALR's Microflex. Reasonably priced 386 flagship makes a fine impression.

REPORT CARD INFO WORLD



25-MHz 386 MCA COMPUTER

ALR Microflex 7000

Criterion	(Weighting)	Score
Performance		
Speed		
Memory-intensive applications	*(100)*	Very Good
Disk-intensive applications	*(100)*	Good
Software compatibility	*(150)*	Very Good
Minor incompatibility between Desqview and BIOS.		
Hardware compatibility	*(125)*	Very Good
Modem, Ethernet card require changing defaults to run together.		
Expandability	*(75)*	Very Good
Largest-capacity system.		
Documentation	*(50)*	Good
Setup	*(100)*	Satisfactory
Buggy setup disk; well-braced case makes for more steps in adding cards.		
Serviceability		
System design	*(50)*	Good
Support policies	*(50)*	Satisfactory
Technical support	*(75)*	Good
Value	*(125)*	Good
Final score		**6.6**

PRODUCT SUMMARY

Company: Advanced Logic Research Inc., 9401 Jeronimo, Irvine, CA 92718; (714) 581-6770.
List Price: $9,349 as configured.
Features: 25-MHz zero-wait-state 80386 CPU; serial, parallel, and mouse ports; 80387 math coprocessor support.
Peripherals: Enhanced keyboard; built-in 16-bit VGA board.
Storage and Memory: 150-megabyte hard disk with ESDI 1:1 controller; 1.4-megabyte 3½-inch floppy drive; 4 megabytes of 80-nanosecond RAM; (16 megabytes maximum); 64K of RAM cache.
Pros: Most expandable MCA system.
Cons: Setup has a few glitches.
Summary: ALR outscores IBM's Model 70-A21 in performance, and at a cost that's about $1,000 lower. A fine machine.

How We Tested and Scored Micro Channel Architecture Computers

Beginning with this product comparison, we have made changes in how we test and score personal computers' performance, setup, serviceability, and support.

PERFORMANCE: Performance is divided into four categories: *speed, software compatibility, hardware compatibility, and expandability.*

We now evaluate *speed* in two areas — using both memory-intensive and disk-intensive applications. Our memory-intensive score combines the times from a test suite that executes a series of routines in Autocad, Release 10; Lotus 1-2-3, Releases 2.2 and 3.0; and Word Perfect, Version 5.0. Our disk-intensive score comprises the times from tests of Dbase III Plus, Version 1.1; Dbase IV, Version 1.0; and either Paradox 3 or Paradox 386, depending on the CPU tested. These aggregate times are compared to the results of computers in the same class; computers with similarly rated CPUs, e.g., 25-MHz 386s, constitute a class. (Our former scoring division recognized just two classes: high-performance, 16-MHz and faster CPUs; and basic, slower than 16-MHz CPU computers.) To receive a good score in speed, a system must equal or better the median, or midpoint, time for that class of computers. Units that perform well above the median receive very good scores; units with outstanding times earn excellent scores. Systems that perform below the median receive satisfactory or poor scores depending on their position.

Our Autocad tests load a large (500K) drawing, mask layers, change zooms, and hide hidden lines.

In both Lotus versions, our tests use the three spreadsheets that form the core of our spreadsheet tests: an *arithmetic model,* which makes mathematically simple projections about the worth of assets over five years; a *financial model,* which amortizes a variable-rate, 360-month mortgage; and a *scientific model,* which constructs a 37-by-37-cell bivariate distribution matrix using a complex formula.

Additionally, in Release 2.2, our tests make a number of financial forecasts using Management Analysis and Planning Software from Management Advisory Services Inc. of Seattle. This macro-menu-driven software uses a variety of templates to manage financial forecasting models. In Release 3.0, we added our page-oriented spreadsheet consolidation model (from our spreadsheet testing) that "rolls up" budget figures for 10 departments. In all cases we performed recalcs based on different values, and added or altered formulas.

The Word Perfect tests reformat three documents ranging in size from 5K to 55K. In the smallest document, our tests alter the fonts for headlines and body text, place a 3-by-5-inch TIFF graphic file, and preview the new layout. With the other documents, our tests reformat the text using a variety of column, font, and other layout settings.

In Paradox, our tests use a variant of the transaction processing model that we first introduced in multiuser database testing. In this test, Paradox logs 3,000 orders for a variety of parts into an invoice database after checking the quantity in stock and price against a master parts table containing 100,000 entries.

In both Dbase III Plus and Dbase IV, our tests perform an unindexed search for a record on a similar parts table that contains 100,000 records. Then it indexes that table to run the Dbase version of the same transaction processing model, but posts only 600 orders.

We also continue to list (though we do not score) results of the *InfoWorld* Automated Hardware Benchmark, which we had used to score CPU and disk-access speeds; thus you can compare present CPU and disk performance with past reviews. Our benchmarks are reported as indexes, with the baseline of 1.0 being the 286-based 6-MHz IBM PC AT Model 99 with a CMI-20 hard disk. Larger numbers in the CPU, hard disk sequential, and hard disk random tests indicate better performance.

Software compatibility: Our software test suite includes many of the most popular and complicated business programs in order to test different aspects of compatibility.

To test software compatibility for the 386s, we ran the following programs: Crosstalk XVI, Version 3.61; Lotus 1-2-3, Releases 2.2 and 3.0; and Microsoft Word 5.0 under Desqview, Version 2.25 with QEMM, Version 4.23; Lotus 1-2-3, Release 2.2 and Word under Windows/386; Dbase III Plus 1.1 and Dbase IV 1.0; Autocad, Release 10; Word Perfect 5.0; Paradox 386; and Sidekick Plus. For the 286s, we use QEMM 50/60 4.03 and run Paradox 3. We test OS/2 compatibility — if the vendor provides its own version of the software — by installing and running that environment with Rbase for OS/2 and Lotus 1-2-3 in the DOS compatibility box.

Systems that run all components of our software test suite, including OS/2, straight out of the box earn a very good score for software compatibility. Systems that require adjustments to enable an application to run lose a half point for each program that needs work. Systems that flawlessly handle the software suite and offer a second, slower processing speed (usually 6, 8, or 10 MHz), for speed-sensitive software, receive an excellent score. (None of the MCA systems offers a second speed.) We drop the score one grade for each program that won't run on the system.

Hardware compatibility: To test hardware compatibility, we first install and then simultaneously test a Hayes Smartmodem 2400P (internal unit), IBM PS/2 Display Adapter 8514/A high-resolution graphics board, and 3Com Etherlink II/MC network board. We then repeat testing with the Smartmodem and 8514/A along with IBM's Token Ring 16/4 Adapter/A network card in place of 3Com's. These peripherals tend to be sensitive to problems in system timing or to hardware address incompatibilities. Systems that run all these without problems earn an excellent score in this category. If the modem or video board doesn't work, hardware compatibility is rated poor.

We also tested a bus-mastering board to see if IBM and the compatibles were benefiting from the claims of the MCA bus' advertised capability. We used Core International's hard disk controller CNT-MCA running a Core HC175 hard disk. All of the MCA systems handled the controller and drive flawlessly.

> *"We tested a bus-mastering board to see if IBM and the compatibles were benefiting from the MCA bus' capability."*

Expandability: An excellent score for the 386s requires the capability to have 4 megabytes of 32-bit RAM installed on the motherboard; support for up to 16 megabytes of 32-bit RAM in the system; at least five slots available after hard disk, floppy and hard disk controllers, video adapter, serial and parallel ports, and 4 megabytes of RAM are installed; two half-height mounting positions after one floppy drive and one hard drive are installed; an AT-style enhanced keyboard; a keylock that mechanically locks the system unit; and some manner of disabling keyboard input (either mechanical or via password).

The system vendor must also offer a 130-megabyte or larger hard drive as an option as well as support for an Intel 80387 math coprocessor. For each item missing, we drop the product's score a half grade. The final grade is rounded down.

(For the two 286s the criteria are the same, except that we require 16-bit RAM, 80287 coprocessor support, and availability of a 60-megabyte hard drive. The portable also requires just a 60-megabyte drive.)

DOCUMENTATION: At a minimum, it should tell you how to set up and use the system and include accurate diagrams to illustrate text. We also look for an index or detailed table of contents, troubleshooting help, and customization information (on topics such as installing expansion boards or math coprocessors). We award bonus points for any of the following: a quick-start guide; an informative on-line tutorial; a glossary; on-line help for the system and MS-DOS; a quick-reference card; a written tutorial; or a technical reference as part of the standard documentation.

We lower the score if the manual is poorly organized, if it lacks both a table of contents and an index, if there are factual errors in the text, or if it does not include information on installing options (such as extra RAM).

SETUP: The new setup criteria combine most of the points of our former setup and ease-of-use categories. Here we evaluate the ease with which one may configure, reconfigure, and use a system. IBM's PS/2 line provides an example: Expansion boards drop in with a minimum of fuss. Most system options are set with software, not switches.

We examine how easy it is to fit add-in cards into the slots, paying attention to the card guides and bus connectors and the position of changeable parts, such as the sockets for the math coprocessor and memory. Units that are easy to reconfigure and operate receive good scores.

Items that boost the score in setup include limiting the number of jumpers and DIP switches, useful front-panel displays, on-line user guides for the system or DOS, and keyboard extras such as macro keys. Items that hinder the setup score include poor slot layout, badly positioned or numerous jumpers and DIP switches, and unprotected or missing reset and power buttons.

SERVICEABILITY: This is a minor issue with well-designed and well-built systems. We divide serviceability into three areas: *system design* (formerly workmanship), *support policies,* and *technical support.*

System design: We carefully examine systems to see how well they are designed and constructed. We also run our applications suite and automated hardware benchmark on each system for 48 hours, which weeds out the weaklings, and we subject the systems to repeated start-up and shutdown in the course of our testing.

We remove each system's motherboard and examine both sides closely. We pay particular attention to how well the printed circuit boards are soldered — a substandard job can severely shorten the trouble-free life of any computer system. We also look for excessive last-minute changes, a sign of planning problems; and for "hot" chips and other components that might limit a system's operation. The system must also be rugged to take the punishment of shipment and everyday use.

We award a satisfactory score to systems that follow standard design and manufacturing practices. We raise the score for systems that use significant amounts of LSI surface-mounted components or PAL chips, particularly clean printed circuit board layout, and static protection on all ports. We lower the score when we see too many engineering changes, oversights in mechanical design, and errors in manufacturing.

Support policies: A one-year warranty covering parts and labor and unlimited (but not toll-free) technical support results in a satisfactory score. We award bonuses for unconditional money-back guarantees, on-site service warranties that are included in the purchase price, extended support hours, bulletin board support (e.g., on Compuserve), and a toll-free number. We subtract points when the vendor provides no technical support or limits the period.

Technical support: Beginning with this product comparison we score this category based on a survey of our readers who buy and use desktop computers. This survey will be updated periodically. For those companies for which we receive a statistically valid sample, our readers will do the scoring; for less well-known vendors, we shall continue our past practice of making several calls to determine the quality of technical support.

VALUE: Value scores reflect the list price vs. the performance and features of each machine, taking into account the competition. Dealers will often sell at discounts much larger than those provided by direct sales vendors. When buying through dealers, your single-unit price may vary considerably, depending on the number of units you purchase.

An excellent value is one that offers top performance at a lower-than-average price; a satisfactory value features reasonable performance for a reasonable price; and an unacceptable score in value goes to systems that combine poor performance with a high price.

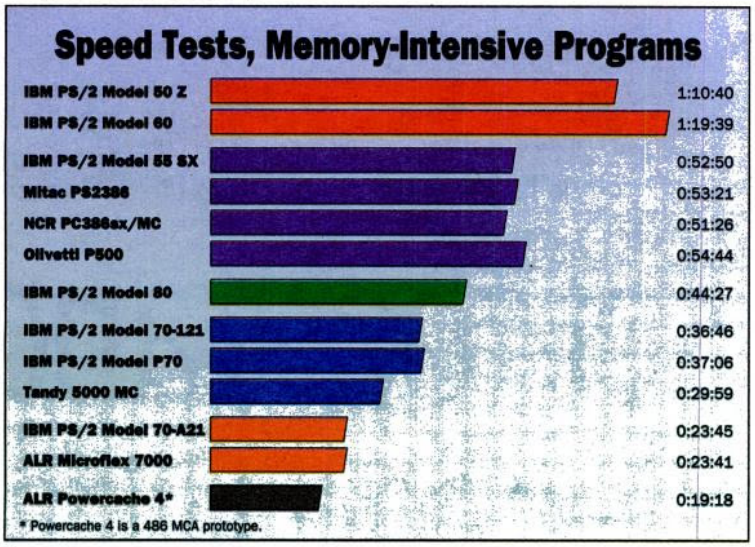
This product comparison was developed by Andre Kvitka and Eugene J. Wong, Test Center Technicians; Gregory S. Smith, Test Development Specialist; Lauren Black, Director, InfoWorld Test Center; Daniel Sommer, Associate Reviews Editor; and Michael J. Miller, Executive Editor.

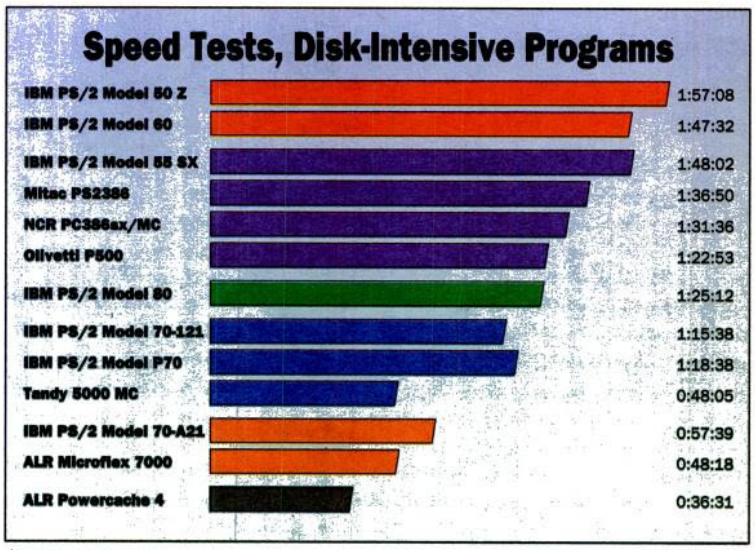
APPLICATIONS TESTS

INFO WORLD

MCA Computers

(in hours:minutes:seconds)





Vendor	Memory-intensive	Disk-intensive	Autocad Release 10	Dbase III Plus 1.1	Dbase IV 1.0	Lotus 1-2-3 Release 2.2	Lotus 1-2-3 Release 3	Paradox 3/386	Word Perfect 5.0
IBM PS/2 Model 50 Z	1:10:40	1:57:08	0:12:15	1:01:53	0:31:34	0:26:54	0:27:24	0:23:41	0:04:07
IBM PS/2 Model 60	1:19:39	1:47:32	0:14:54	0:55:25	0:30:43	0:26:49	0:33:54	0:21:24	0:04:02
IBM PS/2 Model 55 SX	0:52:50	1:48:02	0:09:48	0:54:41	0:28:20	0:17:45	0:22:17	0:25:01	0:03:00
Mitac PS2386	0:53:21	1:36:50	0:09:36	0:47:33	0:24:48	0:17:53	0:22:50	0:24:29	0:03:02
NCR PC386sx/MC	0:51:26	1:31:36	0:09:22	0:45:10	0:21:49	0:17:10	0:21:55	0:24:37	0:02:59
Olivetti P500	0:54:44	1:22:53	0:09:37	0:38:53	0:21:21	0:18:46	0:23:27	0:22:39	0:02:54
IBM PS/2 Model 80	0:44:27	1:25:12	0:08:01	0:43:25	0:21:18	0:15:18	0:18:35	0:20:29	0:02:33
IBM PS/2 Model 70-121	0:36:46	1:15:38	0:06:48	0:38:40	0:18:43	0:12:36	0:15:10	0:18:15	0:02:12
IBM PS/2 Model P70	0:37:06	1:18:38	0:06:53	0:40:46	0:18:49	0:12:43	0:15:13	0:19:03	0:02:17
Tandy 5000 MC	0:29:59	0:48:05	0:05:08	0:23:11	0:11:44	0:09:42	0:13:21	0:13:10	0:01:48
IBM PS/2 Model 70-A21	0:23:45	0:57:39	0:04:07	0:30:33	0:12:38	0:08:00	0:09:54	0:14:28	0:01:44
ALR Microflex 7000	0:23:41	0:48:18	0:04:11	0:25:11	0:10:56	0:07:46	0:10:11	0:12:11	0:01:33
ALR Powercache 4[1]	0:19:18	0:36:31	0:03:26	0:18:43	0:09:17	0:06:34	0:07:50	0:08:31	0:01:28

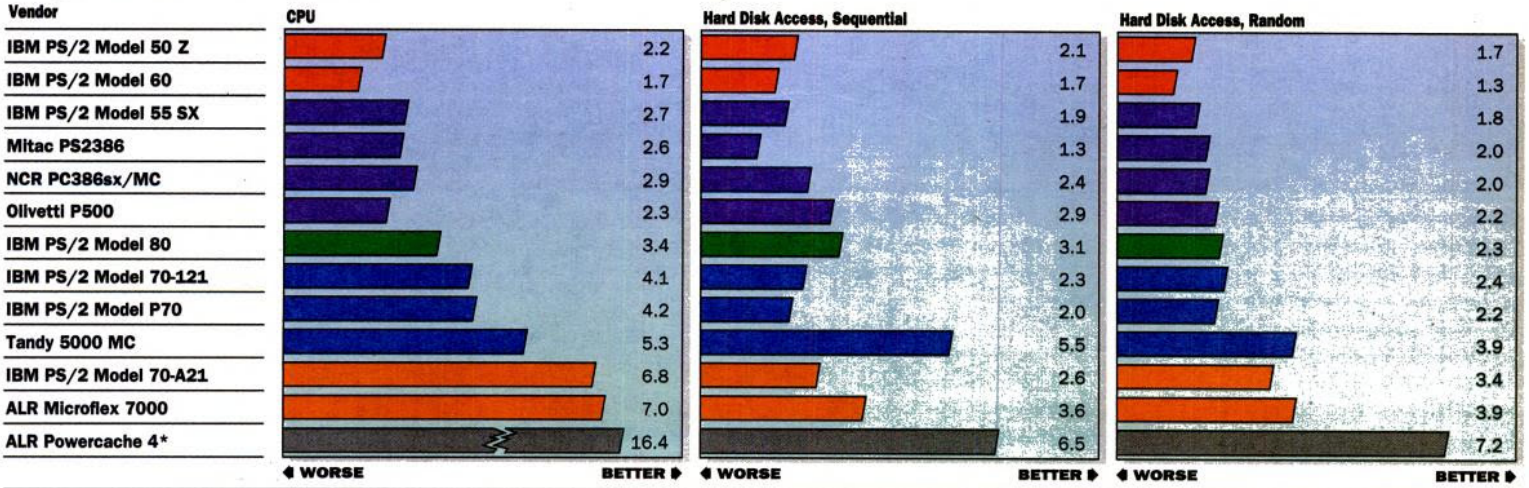
[1] Powercache 4 is a 486 MCA prototype.

AUTOMATED HARDWARE BENCHMARKS

INFO WORLD

MCA Computers

All figures are indexes relative to the 6-MHz IBM PC AT (Model 099) as 1.00. CPU tests measure main processor performance; hard disk is tested for sequential and random data access. Higher numbers indicate better performance.



* Powercache 4 is a 486 MCA prototype.

SOURCE: INFOWORLD AUTOMATED HARDWARE BENCHMARK SYSTEM 2

Putting Micro Channel Architecture Through Its Paces

The IBM Models 50, 60, and 80 had no significant problems. However, the two newer models, the 70 and 55 SX, weren't quite so trouble-free.

We had to change some of the default parameters (the behavior of the DCD and DTR lines) on the Hayes Smartmodem in order to get Crosstalk to function on the 20-MHz Model 70-121. The need to change these settings isn't surprising considering how Crosstalk communicates with the modem. What is surprising is that only the Model 70-121's BIOS forced us to make these changes.

We were further confounded by the lack of documentation on the resulting error message when we put the 85-nanosecond RAM chips in the 25-MHz Model 70-A21. Unlike its desktop PS/2 siblings, the fastest 386 PS/2 uses 80-nanosecond chips only.

The portable PS/2 Model P70 was unable to accommodate Microsoft Word's use of an extended color palette. Since IBM won't alter the P70's display system, Microsoft has made available a modified version of Word.

The Olivetti joined the ranks of the 55 SX and 70 in balking at Desqview when we tried to run certain applications in the background (specifically Lotus 2.2 and Word 5.0). Apparently, IBM has reserved interrupt 15, function C5h for BIOS use, but Desqview and these two applications also make use of this function. Quarterdeck (Desqview's publisher) is working on a fix; in the meantime, don't try to run these applications in the background.

The NCR clone wouldn't allow us to use the Smartmodem with the Etherlink MC card until we changed a line in its adapter description files.

NOTES FROM THE TEST CENTER

For a generation of computers designed to, among other things, make configuration easier, we were not impressed. While these units are free of DIP switches, they weren't free of configuration headaches; thus the struggle for a self-configuring computer continues.

— Gregory S. Smith

FEATURES INFO WORLD

Expandability, MCA Computers Part 1

	Required for Excellent Score	IBM PS/2 Model 50 Z	IBM PS/2 Model 60	IBM PS/2 Model 55 SX	Mitac MPS2386	NCR PC386SX/MC	Olivetti P500
Maximum system RAM	16MB	16MB	16MB	16MB	16MB	16MB	16MB
RAM support on motherboard	4MB	2MB	1MB	4MB	4MB	1MB	4MB
Number of 16-bit slots	N/A	3	8	3	6	7	6
Number of free slots after configuration[1]	5	3	5	3	5	5	5
Number of drive bays[2]	N/A	2	4	2	3[3]	3	4
Number of free drive bays after configuration[1]	2	1	2	1	2	1	2
Keyboard lock/disable	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Case lock	Yes	Yes	Yes	Yes	No	Yes	Yes
Largest hard drive available	60MB/130MB[4]	60MB	185MB	60MB	100MB	100MB	135MB

For discussion of expandability and other scoring criteria, see "How We Tested and Scored Micro Channel Architecture Computers," Page 116.
[1] Configuration comprises video adapter, drive controller(s), serial/parallel ports, memory, one half-height hard drive, and one half-height floppy drive.
[2] Drive bays are 3½-inch half-height; IBM Model 60 has two 5¼-inch full-height bays.
[3] Two of Mitac's three drive bays are 5¼-inch mounts.
[4] 286s must offer 60 megabytes; 386s must offer 130-megabyte hard drive option.

REPORT CARD INFO WORLD

MCA Computers Part 1

	(InfoWorld weighting)	(Your weighting)	10-MHz 286 IBM PS/2 Model 50 Z	10-MHz 286 IBM PS/2 Model 60	16-MHz 386SX IBM PS/2 Model 55 SX	16-MHz 386SX Mitac MPS2386	16-MHz 386SX NCR PC386sx/MC	16-MHz 386SX Olivetti P5000
Test configuration price			$3,650	$5,993	$5,690	$4,019	$5,745	$6,774
Performance								
Speed, memory-intensive applications	(100)	( )	Good	Good	Satisfactory	Satisfactory	Good	Satisfactory
Speed, disk-intensive applications	(100)	( )	Satisfactory	Satisfactory	Satisfactory	Good	Good	Very Good
Software compatibility	(150)	( )	Very Good	Very Good	Very Good	Very Good	Good	Very Good
Hardware compatibility	(125)	( )	Excellent	Excellent	Excellent	Excellent	Very Good	Excellent
Expandability	(75)	( )	Good	Very Good	Good	Very Good	Good	Excellent
Documentation	(50)	( )	Satisfactory	Satisfactory	Satisfactory	Good	Very Good	Satisfactory
Setup	(100)	( )	Good	Good	Good	Very Good	Good	Very Good
Serviceability								
System design	(50)	( )	Good	Satisfactory	Satisfactory	Poor	Poor	Satisfactory
Support policies	(50)	( )	Poor	Poor	Poor	Satisfactory	Poor	Good
Technical support	(75)	( )	Good	Good	Good	Very Good	Unacceptable	Satisfactory
Value	(125)	( )	Satisfactory	Satisfactory	Satisfactory	Good	Satisfactory	Poor
Final scores			**6.3**	**6.4**	**6.1**	**6.8**	**5.4**	**6.6**
Use your own weightings to calculate your score								

GUIDE TO REPORT CARD SCORES

InfoWorld reviews only finished, production versions of products, never beta test versions.

Products receive ratings ranging from unacceptable to excellent in various categories. Scores are derived by multiplying the weighting (in parentheses) of each criterion by its rating, where:

Excellent = 1.0 — Outstanding in all areas.
Very Good = 0.75 — Meets all essential criteria and offers significant advantages.
Good = 0.625 — Meets essential criteria and includes some special features.
Satisfactory = 0.5 — Meets essential criteria.
Poor = 0.25 — Falls short in essential areas.
Unacceptable or N/A = 0.0 — Fails to meet minimum standards or lacks this feature.

Scores are summed, divided by 100, and rounded down to one decimal place to yield the final score out of a maximum possible score of 10 (plus bonus). Products rated within 0.2 points of one another differ little. Weightings represent average relative importance to *InfoWorld* readers involved in purchasing and using that product category. You can customize the report card to your company's needs by using your own weightings to calculate the final score.

FEATURES

INFO WORLD

Support Policies, MCA Computers

	Required for Satisfactory Score	IBM (all)	Mitac MPS2386	NCR PC386sx/MC	Olivetti P500	Tandy 5000 MC	ALR Microflex 7000
Vendor-supplied support	Yes	No	Yes	No	Yes	Yes	Yes
Toll-free line for technical support	No	No	No	No	Yes	No	No
Warranty period	1 year	1 year	1 year	1 year	1 year	1 year	1 year
Support hours[1]	Business hours	N/A	8a-5p, Pac	N/A	8:30a-5p, Eas	8a-6p, Cen	7a-5p, Pac
BBS for technical support	No	No	No	No	No	No	No

[1]Support hours are weekdays unless noted; Eas=Eastern time zone, Cen=Central, Pac=Pacific.

FEATURES

INFO WORLD

Expandability, MCA Computers Part 2

	Required for Excellent Score	IBM PS/2 Model 80	IBM PS/2 Model 70-121	IBM PS/2 Model P70	Tandy 5000 MC	IBM PS/2 Model 70-A21	ALR Microflex 7000
Maximum system RAM	16MB	16MB	16MB	16MB	16MB	16MB	16MB
RAM support on motherboard	4MB	2MB	6MB	8MB	0MB	8MB	16MB
Number of 32-bit slots	N/A	3	2	1	2	2	3
Number of 16-bit slots	N/A	5	1	1	3	1	5
Number of free slots after configuration[1]	5	7	3	2	3	3	7
Number of drive bays[2]	N/A	4	2	2	4[3]	2	5[4]
Number of free drive bays after configuration[1]	2	2	1	0	2	1	3
Keyboard lock/disable	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Case lock	Yes	Yes	Yes	Yes	Yes	Yes	No
Largest hard drive available	130MB	628MB	120MB	120MB	340MB	120MB	300MB

[1]Configuration comprises video adapter, drive controller(s), serial/parallel ports, memory, one half-height hard drive, and one half-height floppy drive.
[2]Drive bays are 3½-inch half-height; IBM Model 80 has two 5¼-inch full-height bays.
[3]Two of Tandy's four drive bays are internal 5¼-inch mounts.
[4]All of ALR's drive bays are 5¼-inch mounts.

REPORT CARD

INFO WORLD

MCA Computers Part 2

	(InfoWorld weighting)	(Your weighting)	16-MHz 386 IBM PS/2 Model 80	20-MHz 386 IBM PS/2 Model 70-121	20-MHz 386 IBM PS/2 Model P70	20-MHz 386 Tandy 5000 MC	25-MHz 386 IBM PS/2 Model 70-A21	25-MHz 386 ALR Microflex 7000
Test configuration price			$9,390	$7,790	$8,295	$8,827	$10,490	$9,349
Performance								
Speed, memory-intensive applications	(100)	( )	Good	Satisfactory	Satisfactory	Very Good	Very Good	Very Good
Speed, disk-intensive applications	(100)	( )	Good	Satisfactory	Satisfactory	Excellent	Satisfactory	Good
Software compatibility	(150)	( )	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good
Hardware compatibility	(125)	( )	Excellent	Very Good	Very Good	Excellent	Excellent	Very Good
Expandability	(75)	( )	Very Good	Good	Very Good	Very Good	Good	Very Good
Documentation	(50)	( )	Satisfactory	Satisfactory	Satisfactory	Good	Satisfactory	Good
Setup	(100)	( )	Good	Good	Good	Good	Good	Satisfactory
Serviceability								
System design	(50)	( )	Good	Good	Satisfactory	Satisfactory	Satisfactory	Good
Support policies	(50)	( )	Poor	Poor	Poor	Satisfactory	Poor	Satisfactory
Technical support	(75)	( )	Good	Good	Good	Poor	Good	Good
Value	(125)	( )	Poor	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Good
Final scores			**6.2**	**5.9**	**5.9**	**6.9**	**6.4**	**6.6**
Use your own weightings to calculate your score								

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Very Good = 0.75 — Meets all essential criteria and offers significant advantages.
Good = 0.625 — Meets essential criteria and includes some special features.
Satisfactory = 0.5 — Meets essential criteria.
Poor = 0.25 — Falls short in essential areas.
Unacceptable or N/A = 0.0 — Fails to meet minimum standards or lacks this feature.

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