

# Micro Channel Clones Flunk the Test

**You'll pay a hefty premium for any of these four MCA-equipped systems—and what do you get?**

**Incredibly, every one failed our exclusive compatibility test.**

IBM's Micro Channel architecture (MCA) offers business users a tempting set of features. For most of us, the primary benefit is switchless installation of boards and peripherals. However, MCA also solves another problem: Thanks to more system resources (and better handling of them), you can now install multiple drives, ports, and network boards in your PC with far less danger of hardware conflicts.

Nor is that all. Looking down the road, MCA systems—with their high-throughput I/O and support for multiple bus masters (devices with their own CPUs that can take control of the bus)—should be well suited for multiuser and multitasking operations.

Until recently, if you wanted to buy into the MCA bus, you were faced with a narrow choice of vendors. *Very* narrow: Tandy and IBM. Now, finally, the clones are multiplying—but how compatible *are* these compatibles? Do they offer extra benefits or significantly lower prices? Does it make sense to stick with Big Blue? Or, with the emergence of a rival architecture, EISA, is the correct

answer None of the Above (see the sidebar "Can EISA Live Up to the Micro Channel's Potential?" in this issue's EISA preview)?

This article examines all the production MCA clones we could get our hands on: two 16-MHz 80386SXs (American Mitac's MPS 2386 and NCR's 386SX) and two 20-MHz 80386s (Tandy's 5000MCA and Grid's 386MCA). With National Software Testing Laboratories (NSTL), we ran them through an exhaustive set of DOS and OS/2 benchmarks and a compatibility torture suite.

Clearly, the key issue in buying an MCA system is MCA compatibility. That means, first of all, that MCA boards ought to fit in the slots, and switchless installation should work properly. Once installed, the boards should function correctly: Modems should dial out, network boards should talk to one another, and so on.

We used five MCA boards—all of which worked flawlessly in our reference IBM PS/2 Models 70 and 55 SX—to test MCA compatibility. To our surprise, not *one* of the clones

*Michael  
Goodwin  
and Karl  
Koessel*

was fully compatible. Every one required manual configuration to accept Quadram's JT Fax board; not one would function as a file server with an IBM Token-Ring or SMCA Arcnet PC 100MCA board installed; and they all lacked the MCA floppy disk cable connector required to install an MCA Alloy tape backup unit. Three of the four systems refused to work with the Hayes 2400P internal Smartmodem. Two required you to set switches on the motherboard if you added extra memory.

To simplify price comparisons, we set up each system in the standard *PC World* configuration. Each system was provided with 2MB of RAM; a 1.2MB or 1.44MB floppy drive; VGA graphics and a color VGA monitor; at least one parallel, one serial, and one mouse port; a 101-key keyboard; and DOS 3.3 or a later version. The SX systems were equipped with either a 40MB or a 44MB hard disk; the 80386 systems had a 150MB or 170MB ESDI hard disk.

For all their advanced technology, MCA computers are still very much like "regular" systems in most respects: Price, performance, device and slot capacity, and quality of service and support are all important factors in reaching a buying decision. But since you're paying extra for MCA, keep a close eye on the compatibility issues as you read on.

### **American Mitac MPS 2386**

American Mitac's MPS 2386 is a well-constructed 80386SX system with a clean motherboard (without patch wires); the unit boasts a low \$4189 price tag (in the *PC World* configuration)—over \$1000 less than the NCR 386SX and more than \$400 under IBM's PS/2 Model 55 SX. It delivers good slot and drive capacity, a comfortable 8MB



**The SX-based American Mitac MPS 2386 boasts fine performance for \$400 less than IBM's Model 55 SX. But there's a problem with MCA compatibility.**



**NCR's 386SX is a bit faster than the competition, but it's relatively expensive—and MCA compatibility leaves much to be desired.**



## FEATURES EVALUATION

### MCA Clones Lack the Biggest Feature of Them All

Micro Channel systems from Mitac, Grid, NCR, and Tandy offer the usual array of features. But since not one of the systems delivers acceptable MCA compatibility, any comparison with a True Blue MCA system is beside the point.

- Yes
- No
- ◐ Deficient

	American Mitac MPS 2386	Grid 386MCA	IBM PS/2 Model 55 SX	IBM PS/2 Model 70-121	NCR 386SX	Tandy 500MCA
<b>Standard features</b>						
Price	\$4189 <sup>1</sup>	\$8298 <sup>2</sup>	\$4610 <sup>3</sup>	\$8814 <sup>4</sup>	\$5194 <sup>5</sup>	\$8048 <sup>6</sup>
CPU	80386SX	80386	80386SX	80386	80386SX	80386
CPU speed	16 MHz	20 MHz	16 MHz	20 MHz	16 MHz	20 MHz
Coprocessor support	80387SX-16	80387-20	80387SX-16	80387-20	80387SX-16	80387-20
Disk caching software	○	● <sup>7</sup>	● <sup>7</sup>	● <sup>7</sup>	●	● <sup>7</sup>
<b>CPU-speed RAM</b>						
Capacity <sup>8</sup>	8MB	16MB	4MB	6MB	8MB	16MB
<b>Expandability</b>						
32-bit expansion slots/number free	0/0	2/2	0/0	2/2	0/0	2/2
8/16-bit expansion slots/number free	6/5	3/2	3/3	1/1	7/5	3/2
8-bit expansion slots/number free	0/0	0/0	0/0	0/0	0/0	0/0
Half/full-height storage device bays	4/1	4/1	2/0	3/0	3/1	4/1
300MB or larger hard disk available from manufacturer	○	●	○	●	○	●
<b>Ergonomic design</b>						
Switchless setup	●	○	●	●	●	○
Compact footprint	●	○	●	●	●	○
Complete documentation	●	●	●	●	●	●
Tilt-and-swivel monitor	●	●	●	●	●	◐ <sup>9</sup>
Front-panel reset button	●	●	●	○	○	●
Front-panel on/off switch	●	●	○	●	●	●
<b>Service and support</b>						
Warranty period (months)	12	12	12	12	12	12
On-site service	◐ <sup>9</sup>	◐ <sup>9</sup>	◐ <sup>10</sup>	◐ <sup>10</sup>	◐ <sup>9</sup>	◐ <sup>9</sup>
Toll-free support number	○	●	◐ <sup>10</sup>	◐ <sup>10</sup>	◐ <sup>10</sup>	○
Daily support (hours)	9	9	◐ <sup>10</sup>	◐ <sup>10</sup>	◐ <sup>10</sup>	8.5
Weekend support	○	○	◐ <sup>10</sup>	◐ <sup>10</sup>	○	○
BBS	○	●	○	○	○	●

<sup>1</sup> Price based on standard PC World 16-MHz 80386SX system configuration: 2MB RAM, 1.2MB floppy drive, 40MB ST506 hard disk, parallel port, serial port, VGA video board and color VGA monitor, mouse port, 101-key keyboard, DOS 3.3 or later version.

<sup>2</sup> Price based on standard PC World 20-MHz 80386 system configuration: 2MB RAM, 1.44MB floppy disk, 170MB SCSI hard disk, parallel port, serial port, VGA video board and color VGA monitor, mouse port, 101-key keyboard, DOS 3.3 or later version.

<sup>3</sup> Same as footnote 1 except with 30MB hard disk.

<sup>4</sup> Same as footnote 2 except with 120MB ESDI disk.

<sup>5</sup> Same as footnote 1 except with 44MB hard disk.

<sup>6</sup> Same as footnote 2 except with 150MB ESDI hard disk.

<sup>7</sup> Cache provided with purchase of DOS.

<sup>8</sup> Includes motherboard memory and RAM installable in proprietary slots accessed at full CPU speed.

<sup>9</sup> Available at extra cost.

<sup>10</sup> Via dealer only.

## EXECUTIVE SUMMARY

### American Mitac MPS 2386

16-MHz 80386SX-based computer

Although it's fast, well-built, and relatively inexpensive, this system fails to deliver adequate MCA compatibility.

	POOR	FAIR	GOOD	EXCELLENT
CPU-speed RAM			●	
Expandability				●
Ergonomic design				●
Service and support			●	
Performance				●
Overall value		●		

Reader service no. 615

ceiling for CPU-speed RAM, and excellent SX performance. Its only serious problem is compatibility; along with all the others, this system failed to work correctly with four important MCA peripherals.

The Mitac's motherboard holds up to 8MB of RAM, all of which can be addressed at full CPU speed—as opposed to memory that must be installed on boards in the slower (10-MHz) expansion bus. While OS/2 can address 16MB of RAM, 8MB is a common ceiling for SX systems and should be plenty for nonsERVER applications (at least until a high-performance 32-bit version of OS/2 arrives).

The motherboard also holds six 8/16-bit MCA slots, one of which is used by the hard disk controller. Since VGA, I/O, and a mouse port are built in, you'll end up with five usable slots—a good count. There are four drive bays—two 5¼ inch and two 3½ inch—three of which are externally accessible.

The MPS 2386 performed quite respectably on both DOS and OS/2 tests. It's a bit slower than the (more expensive) NCR, but it outstrips IBM's Model 55 SX in most benchmarks—and took top place among the SX systems in the *AutoCAD* and *Word* events.

Although users must pay any toll charges for calls to American Mitac's technical support number, the quality of support was

quite good. We placed three calls on three different days—one at the beginning of the day, one at noon, and one toward quitting time. Two calls were answered instantly; the third reached an answering machine, and a technician called back 30 minutes later.

The MPS 2386 has a lot to recommend it: a low price, good expandability, and strong performance. Unfortunately, incompatibilities with the MCA standard make it unacceptable.

### NCR 386SX

You'll pay a premium price for the NCR 80386SX system (\$5194 in the *PC World* configuration), but you won't get your money's worth. True, it delivers the best MCA compatibility of any system in the roundup—but that isn't saying much. It's stingy with drive bays, tech support is available only via dealers, and while it's faster than the entries from American Mitac and IBM, it's not *that* much faster.

8MB is a common ceiling for SX systems and should be plenty for nonsERVER applications.

## EXECUTIVE SUMMARY

### NCR 386SX

16-MHz 80386SX-based computer

This system is faster than its rivals, but considering its high price, it fails to deliver value equal to its cost. MCA incompatibilities make it even less attractive.

	POOR	FAIR	GOOD	EXCELLENT
CPU-speed RAM			●	
Expandability				●
Ergonomic design				●
Service and support	n/a			
Performance				●
Overall value		●		

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NCR's 386SX passed one compatibility test that the other systems failed: It was the only machine to work properly with the Hayes internal Smartmodem 2400P. However, like all the others, it came to grief with JT Fax, IBM Token-Ring, SMCA Arcnet, and Alloy.



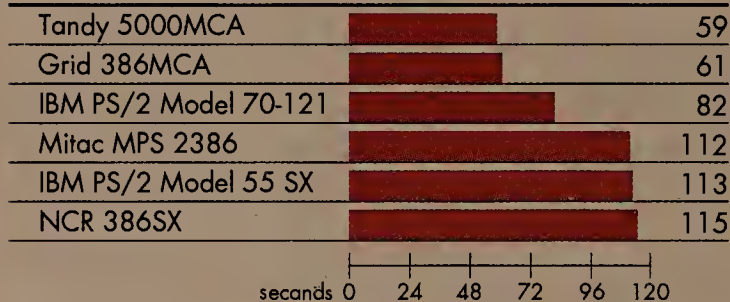
# NSTL TEST REPORT

## MCA Clones Outperform IBM? Not Exactly...

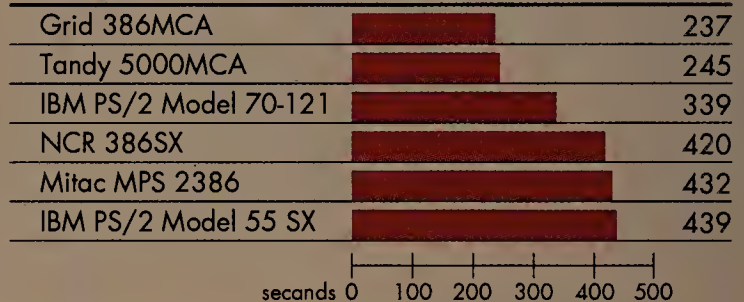
Micro Channel clones consistently beat their IBM competitors in speed tests. But it's a Pyrrhic victory, since none of these systems deliver adequate MCA compatibility.

### DOS

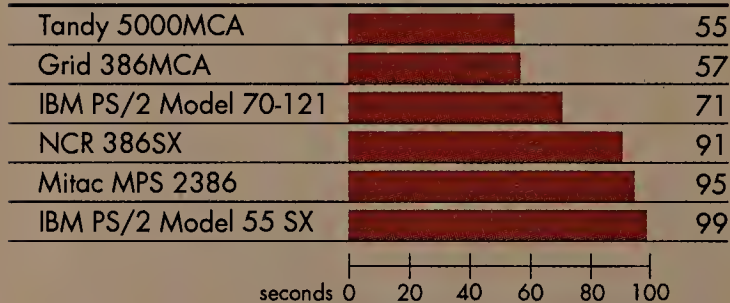
#### Microsoft Word



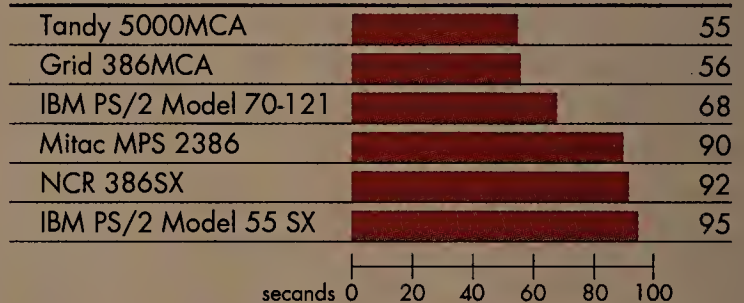
#### Microsoft C



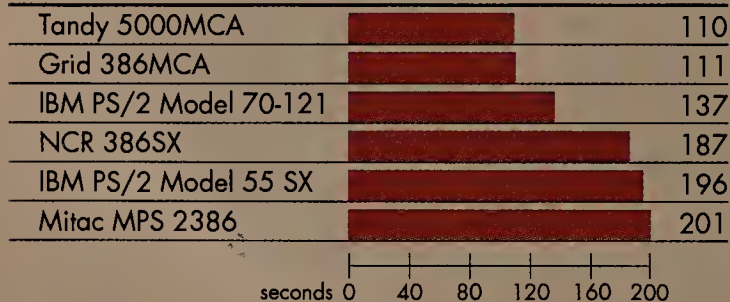
#### dBASE III Plus



#### AutoCAD



### 1-2-3



#### Methodology

All machines were tested with a coprocessor and a 256K extended memory disk cache (except in the 1-2-3 benchmark). Each system was tested with 2MB of RAM. Systems were configured with the following sizes of hard disks: IBM PS/2 Model 55 SX, 30MB; Mitac MPS 2386, 40MB; NCR 386SX, 44MB; Grid 386MCA, 120MB; IBM PS/2 Model 70-121, 120MB; Tandy 5000MCA, 150MB.

#### Microsoft Word 4.0

A Microsoft Word macro loads a 35-page, 140-paragraph document and performs search-and-replace and spell-checking operations. The first page of the document is then printed. Although the results of the benchmark depend primarily on processor and memory access speeds, display adapter and hard disk speeds are also contributing factors.

#### dBASE III Plus 1.1

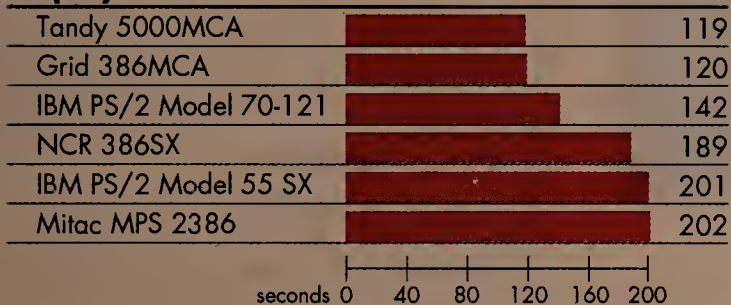
The dBASE III Plus test measures the time required to prepare and print a report of post-due invoices. The report includes calculated fields and is based on three files: a 500-record customer file, a 1000-record invoice file, and a 2000-record item file. When disk caching is not used, the random access speed of the hard disk is, after processor speed, the most significant factor in this benchmark. With disk caching, sequential read performance becomes more important than random access.

#### 1-2-3 2.01

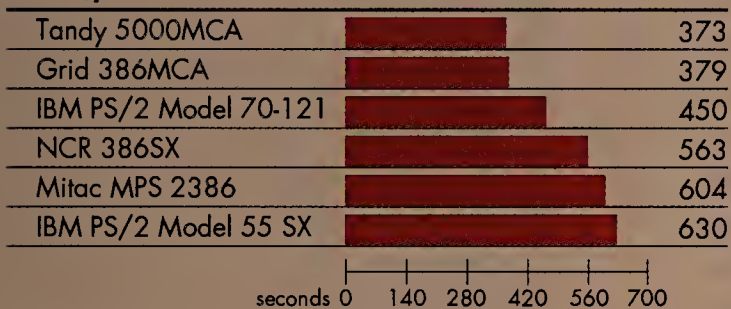
In this benchmark, a 1-2-3 macro executes a series of recalculations using five different formulas within a 75-by-75-cell matrix. Because there are few screen updates and no disk access is required, the results depend almost entirely on processing and memory access speeds.

## OS/2 Single-Tasking

### DisplayWrite 4/2



### IBM C/2



### Microsoft C 5.0

The *Microsoft C* benchmark measures the time required to compile and link *XLISP*. The most important factors in this benchmark are processor and memory access speeds. The performance of the hard disk is also a factor; generally, disk caching has little effect.

### AutoCAD 9

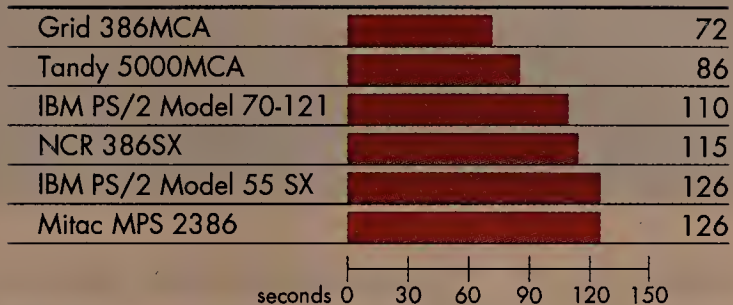
In this benchmark, a three-dimensional sample drawing is retrieved and displayed using AutoCAD's EGA driver. The zoom function is used to display the drawing from various perspectives; then the full drawing is printed. The results of the benchmark depend primarily on the speeds at which the processor and coprocessor operate and at which memory is accessed. The performance of the display adapter and the hard disk also have some effect.

### DisplayWrite 4/2

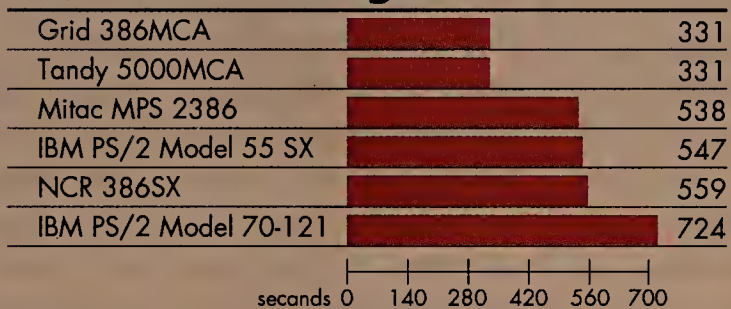
Although the hard disk access rate plays a small part in this benchmark, processing and memory access speeds are the most significant factors. Memory architecture affects memory access speed: Systems that require additional memory in standard expansion slots to run OS/2 exhibit below-average performance.

While *DisplayWrite 4/2* is loading, the keystrokes to start a *DisplayWrite* macro are entered. The macro loads a 35-page, 140-paragraph document, replaces each occurrence of the word *today* with *tomorrow*, uses the built-in spelling checker to look for any incorrectly spelled words (there are none), paginates the document, prints the first page to an IBM Praprinter II, and exits *DisplayWrite*.

### R:base for OS/2



## OS/2 Multitasking



### IBM C/2

In this benchmark, processing and hard disk sequential access speeds are the most important factors. The benchmark measures the time required to compile the 25 source code files that make up *XLISP*, a public-domain LISP interpreter.

### R:base for OS/2

Processing and hard disk random access speeds are the most significant factors in this benchmark. Disk caching dramatically improves apparent disk access speed. This benchmark measures the time it takes to produce a report based on a three-file join, select, and sort.

### OS/2 Multitasking

In two sessions, IBM's *C/2* compiles the 25 C source code files that make up *XLISP*. The results of this benchmark are determined by calculating the difference between the first session's starting time and the second session's ending time.

**Data based on tests designed and conducted by National Software Testing Laboratories (NSTL). All rights reserved.**





Grid's 20-MHz 386MCA is speedier and more expandable than IBM's PS/2 Model 70-121—and costs about \$500 less. But MCA compatibility is unacceptable.

The motherboard (which had a few patch wires) holds a special memory slot with a NuBus-style connector that accommodates 8MB of CPU-speed RAM. There are also seven 8/16-bit MCA slots—two of which are needed for video and hard disk controllers—leaving you with a full five slots. The drive bay situation is less terrific; there's room for only three 3½-inch drives, two stacked for front panel access and one stowed inside.

Both reviewed SX systems (and the IBM Model 55 SX) scored very closely on the DOS benchmarks, but the NCR 386SX still took top honors in three out of five events. It did even better on the OS/2 tests, beating the competition in everything but the OS/2 Multitasking test.

Service and support are handled via deal-

### NSTL BENCHMARK TESTING

The exclusive test facility for *PC World*, **National Software Testing Laboratories (NSTL)**, is an independent organization that specializes in evaluating personal computer hardware and software. A recognized pioneer in state-of-the-art test design, NSTL believes that the most useful benchmark tests measure how well products perform when executing typical business tasks. NSTL testers follow detailed test plans that simulate normal operating conditions. A controlled testing methodology ensures objective, accurate, and consistent results and gives consumers a sound basis for making purchase decisions. NSTL publishes its test results in *Software Digest Ratings Report*® and *PC Digest*.™ Neither publication accepts advertising. NSTL is located in Philadelphia, Pennsylvania.

ers only. While this isn't necessarily bad, it's not necessarily good either—and it makes it impossible to generalize about the quality of support you're likely to get. There's no national tech support line for users.

The NCR 386SX gives you a bit of a performance edge and fewer MCA incompatibilities than any other clone in this roundup. But when you can get an IBM PS/2 Model 55 SX with impeccable MCA compatibility for \$584 less, the NCR 386SX doesn't make much sense.

## EXECUTIVE SUMMARY

### Grid 386MCA

20-MHz 80386-based computer

It's cheaper and faster than IBM's Model 70-121 and offers greater expansion capacity in every respect, but poor MCA compatibility does it in.

	POOR	FAIR	GOOD	EXCELLENT
CPU-speed RAM				●
Expandability			●	
Ergonomic design			●	
Service and support			●	
Performance				●
Overall value		●		

Reader service no. 616

### Grid 386MCA

You can buy Grid's 20-MHz 80386-based system for \$8298 (in the *PC World* configuration, with a 170MB SCSI hard disk)—about \$500 less than IBM's corresponding Model 70-121. What's more, the 386MCA delivers hotter performance, more usable slots, more drive bays, and more than twice as much capacity for CPU-speed RAM. What it doesn't deliver is acceptable MCA compatibility.

In fact, the 386MCA ties for the worst MCA compatibility in the roundup. In addition to the incompatibilities listed previously that were common to all the systems, the 386MCA's motherboard has two switches which you (or a factory technician) will have



to reset if you install more memory; so much for switchless installation.

The motherboard, which had patch wires showing, is designed to accommodate a generous 16MB of CPU-speed RAM via two proprietary memory slots. A dedicated MCA slot holds a processor board with CPU and support chips, cache memory, and a socket for a coprocessor. Five additional MCA slots (two 32 bit and three 8/16 bit) are built in. One of the 16-bit slots is needed for a hard disk controller; with video, I/O, and a mouse port on the motherboard, four slots remain free—not a great count, but better than the Model 70-121's three. The case includes space for four half-height drives, all externally accessible: Two 5¼-inch bays are stacked; two 3½-inch bays are placed side by side.

The Grid 386MCA's excellent performance scores are virtually identical to those of the Tandy 5000MCA—which should come as no surprise, since both machines use the same motherboard. And both systems leave the IBM Model 70-121 in the dust on every test.

Service and support are quite good. Grid is the only vendor in the bunch to offer a toll-free support line. Better yet, all three of our test calls were answered instantly—and an in-house BBS provides help at *your* convenience.

Low price and strong performance (at least compared to the IBM) make this system tempting—until you remember that it failed to support any of our five MCA test boards.

### Tandy 5000MCA

Tandy owns Grid—and aside from a few inconsequential differences (a round hole in the case for the power switch instead of a square one, a 150MB hard disk instead of a 170MB disk, and a price that's \$250 cheaper), the \$8048 Tandy 5000MCA is virtually identical to the Grid 386MCA. Both 20-MHz 80386-based systems share the same impressive performance—and the same poor MCA compatibility.

The only significant difference between these systems is Tandy's service and support, which is not nearly as good as Grid's.



For one thing, you'll have to pay charges on calls to the tech support line. For another, you may not even get through—one of our three calls encountered an endless busy signal; the others were answered after an average of 2 minutes on hold, with the long-distance meter running. (Tandy points out that you can always call your local Radio Shack.)

The 20-MHz Tandy 5000MCA is a virtual twin of the Grid 386MCA—only \$250 cheaper. Both systems share good performance—and poor MCA compatibility.

### EXECUTIVE SUMMARY

#### Tandy 5000MCA

20-MHz 80386-based computer

A virtual twin of the Grid 386MCA, this system delivers the same strong performance—and the same unacceptable MCA compatibility. Tandy's tech support falls short.

	POOR	FAIR	GOOD	EXCELLENT
CPU-speed RAM				●
Expandability			●	
Ergonomic design			●	
Service and support			●	
Performance				●
Overall value			●	

Reader service no. 618



Given the 5000MCA's inferior support, the buying recommendation here is the same as the Grid's, only more so: Don't.

**Not Ready for Prime Time**

Not only are there no Best Buys in this roundup, MCA incompatibilities leave you without the possibility of even a decent buy. Under the circumstances, smart buyers will either hew to the Blue, wait for EISA, or try out these clones *very* carefully, with every board and peripheral they want to use, before buying.

The days are over when companies can get away with building an MCA system just to

prove they have the engineering muscle to pan for gold in IBM's stream. Vendors who want to stake a legitimate claim must deliver machines with true MCA compatibility, or the promise of the future may turn to fool's gold. ●

*Michael Goodwin is associate editor and Karl Koessel is technical editor for PC World.*

**For more information about all products in this article, circle reader service no. 901.**

**WHERE TO BUY**

**American Mitac MPS 2386**

American Mitac Corp.  
410 E. Plumerio Dr.  
San Jose, CA 95134  
800/648-2287,  
408/432-1160  
LIST PRICE: Model 003 with 1MB RAM, 1.44MB floppy drive, 101-key keyboard, DOS 3.3 and GW BASIC \$2695; Model 0344 some os Model 003 except with 4MB RAM, 1.44MB and 1.2MB floppy drives, and 30MB hard disk \$4144; Model 064B some os Model 0344 except with 8MB RAM and 65MB hard disk \$5334  
ACCESSORIES: 1MB expansion RAM \$250; 1.2MB floppy drive \$99; monochrome video adapter \$65; 12-inch amber monitor \$110, 12-inch monochrome VGA monitor \$210, 14-inch color VGA monitor \$549; 30MB hard disk and controller \$600, 40MB hard disk and controller \$695, 65MB hard disk and controller \$790  
WARRANTY: 12 months mail- or carry-in to TRW or Mitac service centers, on-site service contract optional  
EXTENDED WARRANTY: available

TECHNICAL SUPPORT: toll number, M-F B-5  
OTHER SUPPORT: none  
**Reader service no. 615**

**Grid 386MCA**

Grid Systems Corp.  
47211 Lokeyview Blvd.  
Fremont, CA 94537  
800/222-4743,  
415/656-4700  
LIST PRICE: Model 1 with 2MB RAM, 32K static RAM cache, 1.44MB floppy drive, CGA video adapter, 101-key keyboard, and parallel, serial, and mouse ports \$4999; Model 40 some os Model 1 except with SCSI controller and 40MB SCSI hard disk \$6298; Model 80 some os Model 40 except with 80MB SCSI hard disk \$6798  
ACCESSORIES: unpopulated memory expansion adapter \$100, 1MB memory \$600, 2MB SIMM kit \$1299; 360K floppy drive \$200, 1.2MB floppy drive \$280, 1.44MB floppy drive \$300; SCSI adapter \$500; 40MB SCSI hard disk \$799, 80MB SCSI hard disk \$1299, 170MB SCSI hard disk \$2499, 344MB SCSI hard disk \$3499; 150MB

SCSI tape backup \$1299; 80387-20 moth coprocessor \$730; 14-inch monochrome VGA monitor \$250, 12-inch color VGA monitor \$650; DOS 3.3 \$150  
WARRANTY: 12 months mail- or carry-in to company, on-site service contract optional  
EXTENDED WARRANTY: available  
TECHNICAL SUPPORT: toll-free number, M-F B-5  
OTHER SUPPORT: in-house BBS  
**Reader service no. 616**

**NCR 386SX**

NCR Corp.  
1601 S. Moin St.  
Dayton, OH 45479  
800/544-3333,  
513/445-5000  
LIST PRICE: Model 3420-1010 with 1MB RAM, 1.44MB floppy drive, one parallel, one serial, and one mouse port, DOS 4.01 \$3145; Model 3420-1210 some os Model 1010 except with 44MB hard disk \$3895; Model 3420-1220 same os Model 1210 except with 4MB

RAM \$5595; Model 3420-1420 some os Model 1220 except with 100MB hard disk \$6345  
ACCESSORIES: memory upgrade board with 3MB RAM \$1995; 1MB RAM upgrade \$600, 4MB RAM upgrade \$2395; 1.44MB floppy drive \$245; 100MB SCSI hard disk \$1695; 80MB tape drive \$800; 12-inch monochrome VGA monitor \$255, 12-inch color VGA monitor \$699, 14-inch color VGA monitor \$699; Microsoft Mouse \$150; 80387SX moth coprocessor \$799  
WARRANTY: 12 months mail- or carry-in to NCR, on-site optional  
EXTENDED WARRANTY: available  
TECHNICAL SUPPORT: video dealer only  
OTHER SUPPORT: none  
**Reader service no. 617**

**Tandy 5000MCA**

Tandy Corp.  
1800 One Tandy Center  
Fort Worth, TX 76102  
817/390-3700  
LIST PRICE: Model 5000MCA with 2MB RAM, 1.44MB floppy drive, VGA, 101-key keyboard \$4999; with

80MB hard disk \$6999  
ACCESSORIES: unpopulated memory expansion adapter \$100; 1MB memory kit \$649, 2MB memory kit \$1299; 1.44MB or 1.2MB floppy drive \$280; SCSI adapter \$500, ESDI controller \$430; 40MB SCSI hard disk \$799, 80MB SCSI hard disk \$1299, 170MB SCSI hard disk \$1999, 344MB SCSI hard disk \$2999, 150MB ESDI hard disk \$1999; 150MB SCSI tape backup \$1299; monochrome VGA monitor \$200, VGM-200 12-inch color VGA monitor \$500, VGM-300 12-inch color VGA monitor \$629; 80387-20 moth coprocessor \$647; MS-DOS, BASIC, and disk caching \$120; OS/2 \$325  
WARRANTY: 12 months mail- or carry-in to Tandy Service Center or local Radio Shack store  
EXTENDED WARRANTY: available  
TECHNICAL SUPPORT: toll number (or local Radio Shack Consumer Electronics Center), M-F 8-5:30  
OTHER SUPPORT: CIS newsletter, Tandy HQ on PC-Link  
**Reader service no. 618**