

with a start-up manual there is documentation for DOS and GW-Basic included. A detailed step-by-step guide for beginners is helpful and accompanied by clear diagrams. Troubleshooting is covered in several question-and-answer sections to clarify technical points. An additional technical guide to the computer explains the jumpers and plugs on the motherboard. Both the start-up manual and the technical guide have a table of contents but lack an index. The start-up guide contains a glossary. A new manual will be shipping with an on-line tutorial. Overall, we rate Northgate's documentation very good.

Our 286/20SM machine came with

the hard disk formatted and with DOS installed. A CMOS setup utility is accessible from the computer's keyboard. Getting the 286/20SM going should take less than 20 minutes. Setup for the 286/20SM earns a very good.

The 286/20SM has a standard front control panel with a hardware reset switch, CPU speed switch, and lights for disk access, power, and turbo speed (20 MHz). The power switch is located on the side, toward the back of the unit. The reset button is exposed and easy to push. A key lock will turn the keyboard off, but it doesn't lock the case. Northgate now includes an on-line user guide covering the 286/20SM system and MS-DOS 4.01.

We took a look at the program and found it easy to use and helpful. This extra aid will be a definite bonus for novices and even experienced users. Ease of use earns a very good.

The case for the Northgate's 286/20SM is very sturdy. Internally, we found only one jumper wire on the motherboard. There were no other signs of last-minute changes. Workmanship earns a very good.

Northgate offers a one-year warranty on the 286/20SM system, and the keyboard carries an independent three-year warranty. Repair service is handled through the vendor; customers must pay shipping costs one way. If Northgate's technical support staff determines that you have a failed component, they will ship you a new one for next-day delivery (assuming it's a user-serviceable part). The vendor offers extended support for corporate customers. Technical support is unlimited and free, but the call is not toll free. Northgate support hours are slightly extended: weekdays 7 a.m. to 7 p.m. Central time. Support policies rate good.

We had no difficulty getting through to Northgate's technical support. Our questions received courteous and complete responses. Technical support earns a very good score.

As more competitors have entered the field since our first review of the 286/20SM (November 14, 1988, Page 119), this system's speed has been surpassed. However, the \$3,699 price tag is still a fine deal when you consider that this system includes a 16-bit VGA card, 2 megabytes of RAM, two floppy drives, analog color VGA monitor, and MS-DOS. Another bonus is Northgate's on-line manual for the system. To its detriment, the 286/20SM is on average the slowest 20-MHz 286. On balance we find the Northgate 286/20SM a very good value.

## Wells American Compustar

### WELLS AMERICAN

While Wells American's Compustar fits into our comparison because of its 80286 CPU and 20-MHz speed, it trades on much more than speed. The Compustar is a system designed for extensive interchange of parts, including the processor, slot type (AT, MCA, and someday EISA), number of slots, as well as more common options like floppy disk, hard disk, math coprocessor, and amount of RAM. Upgrading an AT-bus 286 system to a 386 system with an MCA bus requires changing just two cards. (For more details on the extensive options with this system, see our review of December 19, 1988, Page 59.)

The Compustar 80286 runs at 20 MHz with compatibility speeds of 6, 8, 10, 12, and 16 MHz. The Compustar is the only system that we ran with just 1 megabyte of 80-nanosecond dynamic RAM. The system is expandable to 16 megabytes. The CPU board accepts the standard 80287 Intel math coprocessor. Our Compustar also came with a 150-megabyte ESDI hard disk, two 1.44-megabyte 3½-inch floppy drives, one 5¼-inch floppy, and a built-in VGA. They offer two different keyboards that are virtually identical except for the feel or "touch" of the keys. We also got a flat tension mask VGA color monitor.

The Compustar came in with a 3.7 index in CPU access, earning a good for this category. The hard disk — a 150-megabyte ESDI drive with 1:1 interleave — came in with a very fast 3.8 sequential index and earns an excellent. The 3.4 random access rating earns the Compustar a very good.

In our throughput tests the Compustar was second fastest in Word Perfect, and turned in average scores in the other tests.

Software compatibility was a breeze for the Compustar. Multiple processing speeds add to Compustar's compatibility, earning the system an excellent in this category.

Hardware compatibility performed similarly. The IBM Token Ring Network adapter will not run with the Compustar because IBM's software is incompatible with ESDI drives; if you want this system to support IBM Token Ring, order it with a standard drive. The rest of the hardware suite proved to be no problem. Hardware compatibility earns an excellent.

The Compustar far surpassed our standard definition of excellence in expandability. The system we tested came with seven AT slots and 1 megabyte of RAM expandable to 8 megabytes. The base is an aluminum tower cabinet containing a cover lock, two serial ports, one parallel port, keyboard port, mouse port, reset switch, diagnostic display, a CGA/EGA monitor port, and a VGA monitor port. To top all this off there are two positions for 3½-inch devices, four 5¼-inch half-height positions, and one 5¼-inch full-height position inside. Upgrading this system is also a snap. Wells American will even give you a trade-in allowance for the 286 board. Expandability is excellent.

The Compustar receives a 0.2-point design merit bonus for its interchangeable components; support for AT and MCA buses; built-in EMS 4.0; and its unparalleled expandability.

We received a single manual with our system. The installation section is thorough, quite long, and abundant in diagrams. Not only does it describe how to install all the common options, it also describes how to install the options for

On July 27, 1988, IBM researchers became the first to use X-ray lithography to make advanced computer chips. This will allow future IBM memory chips to hold more than 64 million bits of information.

Today's most advanced chip in a computer holds just one million.

© Copyright IBM Corporation 1989. IBM is a registered trademark of the IBM Corporation.

On September 13, 1988, IBM expanded its family of Personal System/2® (PS/2®) products with a new, more powerful entry-level model, the Model 30 286, bringing to 22 the number of PS/2 models available. It is up to twice as fast and offers up to 25 times more memory than the original Model 30.

The writers of these ads found it easier to write, edit, revise, store, retrieve and revise the ads again with the help of the IBM PS/2 Model 30 286.

© Copyright IBM Corporation 1989. IBM, Personal System/2, and PS/2 are registered trademarks of the IBM Corporation.

### PRODUCT SUMMARY



### Northgate 286/20SM

**Company:** Northgate Computer Systems Inc., 13895 Industrial Park Blvd., Suite 110, Plymouth, MN 55441; (800) 548-1993, (612) 553-0111.

**List Price:** \$3,699 (as configured).

**Features:** 20-MHz, one-wait-state 80286 CPU; one parallel, two serial ports; 80287 coprocessor support.

**Peripherals:** 101-key keyboard; 16-bit VGA, analog color VGA monitor.

**Storage and Memory:** 42-megabyte hard disk; 1.2-megabyte 5¼-inch drive, 1.44-megabyte 3½-inch floppy drive; 2 megabytes of RAM (8 megabytes total).

**Support:** One-year warranty.

**Pros:** Low cost; fine support; on-line guide.

**Cons:** Slowest CPU and throughput times of the 20-MHz systems.

**Summary:** Not flashy, but a consistently good performer.

## PRODUCT SUMMARY



## Wells American Compustar

**Company:** Wells American Corp., 3243 Sunset Blvd., West Columbia, SC 29169; (803) 796-7800.

**List Price:** \$4,650 (as configured).

**Features:** 20-MHz, zero-wait-state 80286 CPU; one parallel, two serial ports; 80287 coprocessor support.

**Peripherals:** Choice of two 101-key keyboards, built-in VGA; flat-tension mask color VGA monitor.

**Storage and Memory:** 42-megabyte hard disk; one 1.44-megabyte 3½-inch drive, one 1.2-megabyte 5¼-inch floppy drive; 2 megabytes of RAM (16 megabytes total).

**Support:** One-year warranty; 31-day money-back guarantee.

**Pros:** Flexibility; expandability; compatibility; workmanship; EMS 4.0 support; technical support.

**Cons:** Immense size; expensive.

**Summary:** An ideal machine for multiunit buyers wanting vendor consistency and flexibility.

each CPU board. Troubleshooting information is plentiful. The manual covers each error message code and provides a symptom/cause chart. A table of contents, glossary, and index are included. Overall, documentation earns a very good.

Setting up the Compustar is a breeze. When you purchase your system, Wells American will factory install all your ordered options, test them, and set up the machine so it is ready to use. When you do have to add options, you are in for a treat: The Compustar comes with a Torx wrench built into the cabinet for installing expansion boards, slots, or disks. The setup program is ROM-based. Setup is very good.

Well-designed tower systems have all operator controls set high on the front panel, and Wells American did just this. The power switch, reset button, and key lock are easily accessed but protected. All other features are controlled from the keyboard. Mode-setting utilities are simple to use and they can be called in batch files to fully automate those applications needing special system setup. Ease of use earns a very good.

The Compustar overflows with incredible workmanship merits. The case itself is extremely sturdy, with many cast aluminum bars on the inside. All the Torx screws, which hold replaceable items, use the same driver — and the driver is snapped to the inside of every system. We pulled the entire system apart and found very few loose wires and no other evidence of last-minute changes. The Compustar earns an excellent score for workmanship.

Wells American offers a one-year warranty on the Compustar, with service from GE available at extra cost. Repairs have a five-day turnaround time. In addition, Wells American offers a "swap club" in which you get a new module to

replace a defective one, then you send back the old module. Well American has a 31-day money-back guarantee. Technical support is free but the call isn't. Wells American's technical support line operates from Monday through Friday, 8:30 a.m. to 5:30 p.m. Eastern time. Support policies are good.

The Wells American technicians courteously answered our questions. We got through immediately on each call and were impressed with technicians' knowledgeable answers. Technical support rates a very good.

A 2-megabyte Compustar system with a 40-megabyte hard disk, two floppies, built-in VGA, and VGA color flat-

tension mask monitor costs \$4,650, the second most expensive unit reviewed. A similar version with the 150-megabyte ESDI drive we tested comes out to \$5,355.

Wells American trades on its system's mix-and-match components and easy upgrade path. Buying several system boxes and stacks of components allows a company more flexibility with the Compustar than with any other system on the market. Against the other high-speed ATs in our comparison, the Compustar is in league with Everex, offering quick performance, outstanding workmanship, and expandability. Balancing its assets against its price, we rate its value good. □

## Executive Summary

**A**s in our most recent product comparison of the fastest 386 computers (25-MHz models, November 14, 1988, Page 71), two manufacturers have again achieved top billing in their respective areas of strength. Everex leads the way in CPU and general performance scores with its machines in each of our high-performance 286 categories, and Micro Express takes the cake for lowest price overall — with a 286-20 to boot.

**16-MHz 80286:** In this field, newcomer Blackship Computer Systems is the value leader, charging just \$3,270 for its **Blackship 286/16** with 2 megabytes of RAM, a 40-megabyte hard drive, and VGA.

The **Everex Step 286/16** is our top performer, combining more CPU speed than most 286-20s with full expandability in a small-footprint case. The company also maintains its tradition of top performance at a top price: \$4,628, the most expensive 16-MHz model.

**Mitac's Paragon 286 VE** integrates a compact design without sacrificing expansion; VGA and both floppy and I/O controllers are built into the motherboard. It's a solid package.

The **Arche Rival 286-16** offers the fastest hard disk in a small footprint, did well in our software tests, and has a fine manual. Its price is nearly equal to Everex's, but it lacks the Step's sterling performance figures.

**20-MHz 80286:** Among the fastest 286s we've seen, the **Everex Step 286/**

**20** is on top of the heap. The acme of performance, it employs the first RAM cache we've seen on a 286, earning a bonus. With Everex you get what you pay for; it costs \$5,381 for our comparison configuration — 2 megabytes of RAM, 40-megabyte hard drive, and VGA card and monitor.

The value leaders are **Micro Express** and **Northgate Computer Systems**. The **Micro Express ME 286-20** costs just \$2,649 for our standard system, and it also has the second fastest CPU, after Everex. On the other hand, its hard disk is the slowest, and it offers less in software compatibility, documentation, and ease of use.

**Northgate's 286/20SM** carries the next best price for the 20-MHz group: \$3,699. The company offers very good technical support, and its product, while not flashy, is consistent.

The **Wells American Compustar**, which received our highest rating for a computer in 1988, saw its score slip a bit with our redefinition of high-performance computers, but it still finishes with top report card honors. The **Wells American Compustar** rivals Everex in performance, earns a bonus for its marvelous flexibility of design, and has fine workmanship and technical support.

**Dell's System 220** has the most compact case reviewed here, with limited expansion. The company offers excellent support policies with this unspectacular but capable performer.

On September 13, 1988, IBM further advanced its family of Enterprise System/9370™ computers by adding three new models, all with significant price/performance improvements.

The addition of Models 30, 50 and 80 provides customers with more flexible solutions for the needs of most any size business.

This was very enterprising news for enterprising businesses.

© Copyright IBM Corporation 1989. Enterprise System/9370 is a trademark of the IBM Corporation. IBM is a registered trademark of the IBM Corporation.

With the introduction of five new software products on September 20, 1988, IBM became one of the first U.S. manufacturers to incorporate into their machines systems network programs based on international standards.

Taking advantage of Open System Interconnection (OSI), a set of international standards and protocols, IBM computers are now "multi-lingual": they can talk to networks of IBM machines or any other manufacturer's.

And that's got everybody talking.

© Copyright IBM Corporation 1989. IBM is a registered trademark of the IBM Corporation.