

REVIEWS

The finest 35mm SLR cameras made today are not single products but systems of components designed to work together. Professional photographers pick the components they need to complete a task and buy only those components. When the photographer needs a more capable film back, he doesn't lose his investment in lenses and other attachments — he simply upgrades a component.

Desktop computers offer a similar advantage with their add-in cards, which can be replaced as needed, but Wells American takes the SLR camera body analogy further than anyone we've seen with its new computer, the Compustar.

Instead of offering various models (XT, AT, and 386), Wells American sells a system in which all components work interchangeably — processor, slot type (AT, MCA, and some day EISA), how many slots you want, as well as the more common options such as floppy disk, hard disk, math coprocessor, and amount of RAM. When you need to upgrade your 286 computer with an AT bus to a 386 system with an MCA bus, you change two cards.

FEATURES:

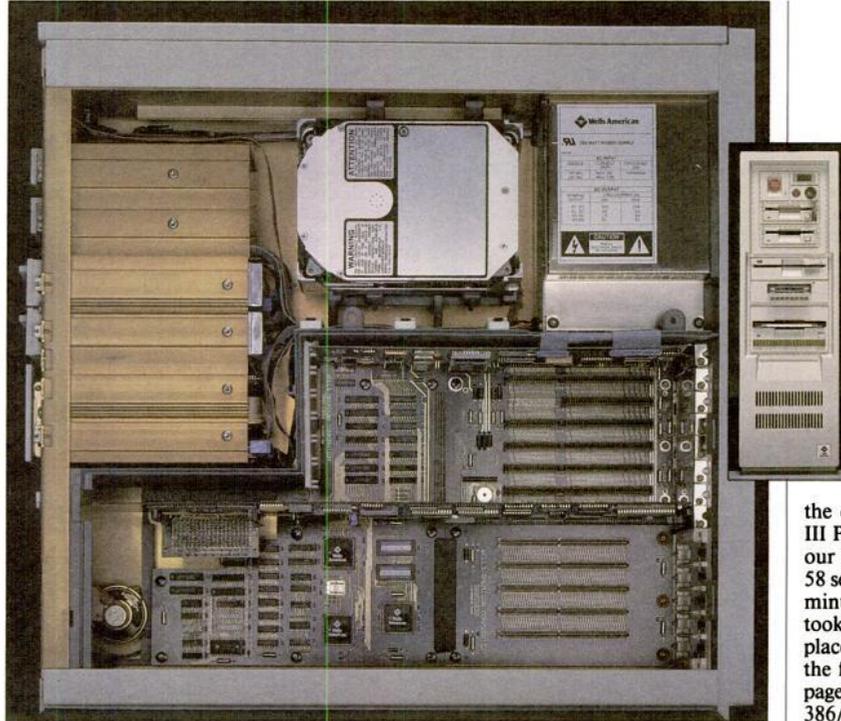
The basis for the system is a 24-by-7-by-26-inch aluminum tower cabinet, which houses all the configurations and contains a 220-watt 110/220-volt power supply, built-in VGA, reset switch, diagnostic display, cover lock, two serial ports, one parallel port, keyboard port, mouse port, a CGA/EGA monitor port, and a VGA monitor port. You also have a choice of keyboards: an IBM-style soft touch, or a Compaq-style firm touch.

We've seen few systems that offer as many mass-storage mounting positions as this one does: two positions for 3½-inch devices, four 5¼-inch half-height positions, and one 5¼-inch full-height position inside. You would have no problems mounting a hard disk, tape backup, WORM storage drive, a 5¼-inch floppy drive, and two 3½-inch floppy drives.

Two openings provide space for two bus slot modules. You can buy seven or 13 standard AT (ISA) slots; Wells will soon give you the option of five or 10 MCA bus slots (which includes one AT slot), or seven AT and five MCA slots.

Change your mind after buying the machine? No problem: You can exchange bus modules easily. The vendor hasn't committed yet to the EISA bus (a proposed alternative to the MCA), but if it becomes popular, the design of the Compustar would make it easy enough to add that bus type as well.

Now that you have selected your bus type, you can select one of three CPUs. The 8086 CPU board runs at 5 and 10 MHz and can hold up to 2½ megabytes of RAM — and EMS 4.0 support is built onto the board. The 80286 CPU board runs at 20 MHz (with compatibility speeds of 6, 8, 10, 12, and 16 MHz) and holds up to 16 megabytes of RAM (the second 8 megabytes require an extender kit). Memory over 1 megabyte can be configured for any mixture of extended (protected-mode) and expanded (EMS) memory. Wells American offers three 386 boards: 16 MHz, 20 MHz, and 25 MHz (each also runs at 10 MHz for



The Compustar has room for a hard disk, tape backup, WORM drive, and one 5¼- and two 3½-inch floppies. You can also employ up to 13 AT slots or 10 MCA slots.

Wells Offers a System With Mix-and-Match Components

Compustar components work interchangeably, making upgrades and customization a breeze.

By **STEPHEN SATCHELL** TECHNICAL EDITOR/TESTING

compatibility). All 386 boards can hold up to 16 megabytes of RAM.

There will be a 386SX board as well, for users who need 32-bit computation without the expense of 32-bit memory.

All the CPU boards accept the standard Intel math coprocessors; the 386 boards can also take the Weitek math coprocessors. The 286 and 386 boards use 80-nanosecond dynamic RAM; the 8086 uses 12-nanosecond DRAM.

You aren't locked into a particular type of floppy drive. Wells American currently offers two styles of 5¼-inch half-height floppy drives (360K and 1.2 megabytes) and a 720/1,440K 3½-inch floppy drive. Up to four floppy drives can be configured in the system.

Wells offers three sizes of ST506 and three ESDI hard disk drives, ranging from 21 megabytes to 650 megabytes. You can pick up an 800-megabyte optical WORM drive, as well as either a 40- or 150-megabyte tape backup unit. During 1989 Wells will offer 160-, 650-, and 1,024-megabyte optical-erasable disc drives with removable media.

Wells also offers a complete line of video monitors, a mouse, a 2,400-bps

internal modem, and IBM's PC-DOS and IBM's OS/2.

PERFORMANCE:

We tested the 20-MHz 80286 system with seven AT slots, 1 megabyte of RAM, 150-megabyte ESDI hard disk, two 1.44-megabyte 3½-inch floppy drives, one 5¼-inch floppy, and built-in VGA. Wells American shows us it's possible to make a highly versatile product that still runs as fast as anything on the market. The Compustar holds its own in just about every one of our performance categories.

CPU speed earns a very good rating, with our automated benchmark showing the Compustar to be 3.7 times faster than IBM's original AT — more powerful than the low-end 386 systems such as the 16-MHz Televideo Tele/386. Not bad for an AT clone. The secret here goes beyond using the new Harris 20-MHz CPU chip; the memory system is designed to keep up without using cache by using interleaving — alternating consecutive memory accesses between the two sets of 80-nanosecond dynamic RAM.

The 10-MHz 80287 math coprocessor performed our floating-point calculations

6.8 times faster than the 6-MHz 80287 on the original PC AT Model 099.

The hard disk — a 150-megabyte ESDI drive with 1:1 interleave — blew the socks off most of the other AT compatibles we've tested. (Though admittedly we've tested mostly 20- and 40-megabyte hard drives.) Sequential performance, measured at 3.8, earns an excellent score, while the 3.4 index earns the Compustar a very good for random access performance.

In our throughput tests with the optional 80287 installed, our Dbase III Plus test took 11 minutes 35 seconds, our Lotus 1-2-3 recalc required 1 minute 58 seconds, our Autocad redraw needed 1 minute 27 seconds, and Word Perfect took 2 minutes 17 seconds. These times place the Wells machine halfway between the fast Dell System 220 (September 19, page 81) and the even faster Compaq 386/20e (October 31, page 65).

Software compatibility is excellent, with the Compustar successfully running Crosstalk XVI 3.61, Desqview 2.0, Paradox 2, Word 4.0, Sidekick Plus, Windows 2.03, and Lotus 1-2-3. Our evaluation unit didn't come with enough RAM to test IBM's OS/2, which requires 2 megabytes. The vendor says it supports OS/2.

In hardware compatibility, the IBM Token Ring Network adapter was the sole nonworking board. This is because IBM's software is incompatible with ESDI drives (also SCSI 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: Hayes 2,400-bps modem, Plus hard card, and Ethernet. Since we couldn't disable the VGA adapter built into the system, we didn't try the Video Seven Autoswitch video adapter; also the Intel Above Board was left out because the system board already supports EMS 4.0. We rate it excellent.

Expandability is excellent. In fact, the Compustar bursts the seams on our standard definition of excellence in expandability. You can install 16 megabytes of RAM without using a second board, 13 full-length AT (ISA) expansion cards, and seven mass storage devices. We add a bonus in expandability here because upgrading to a 386 system is a snap — Wells American will even give you a trade-in allowance for the 286 board.

DOCUMENTATION:

We received a single manual with our system. (Usually included but missing from our package was a manual documenting Speedstor, the Storage Dimensions hard disk diagnostic, partitioning, and formatting package that makes it possible for the entire 150 megabytes of the drive to be used.) The installation section is worth hunting for; the section is well-done, with lots of diagrams. Not only does it describe how to install all the common options, it also describes how to install the options for each CPU board. This is one of the most complete installation sections we've seen.

The section describing how to operate Compustar is spread throughout the manual, instead of being gathered together

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er in one place. Troubleshooting information is plentiful. Good design helps here, with the front display panel showing error numbers even if the video adapter isn't working. The manual says what each number display means. There is also the start of a symptom/cause troubleshooting chart; we can see it will grow as Wells American learns more about the system.

Information on customizing your computer is also very well-handled. We were disappointed, though, that there were no pointers to other manuals supplied with systems with ESDI and SCSI hard disks. It took a while before we realized we were missing documentation.

The readable manual has a table of contents, glossary, and index. We would have liked to see labels in the cabinet for the I/O boards and on the back of each

CPU board describing the location and meaning of each jumper and switch. Documentation earns a very good rating.

SETUP:

Setting up this computer is a breeze. When you initially 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, even a bus expansion card, you are in for a pleasant surprise: Wells American minimizes the number of times you need to use tools and then supplies all the tools you need inside the system. Yes, the Compustar comes with a Torx wrench built into the cabinet, for installing expansion boards, slots, or disks.

The setup program is built into the system's ROM; there is also a setup program on the setup floppy disk. Both programs use a menu-based approach which simplifies specifying hardware configuration information to the system. We would expect boards plugged into MCA slots to be configured with a PS/2-style automatic configuration program. Setup earns a very good score.

EASE OF USE:

A properly designed tower computer has all the operator controls high and on the front panel. Wells American did just this, putting the power switch, reset button, and keylock at the top of the front panel. The floppy drives are next, followed by the rest of the mass storage devices. The power switch and reset button are well-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 score of very good.

SERVICEABILITY:

Not many systems come through our labs as clean as this system. We liked the quality appearance of the Compustar.

The first overwhelming impression you get when you slide off the Compustar's side casing is of solid construction. There is a lot of metal, much of it in the form of cast aluminum bars.

When we opened the card cage, we noticed that Wells believes in grounding — thick ground straps bridge each board to the cabinet. This helps prevent radio interference, even when you have a high-performance CPU card installed.

Few components require tools to remove or install. Most use a pop-lock fastener similar to the one IBM uses in the PS/2 line of computers. 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 soldering job is superb and Wells minimized the number of solder connections by using VLSI chips where possible.

More important, though, is the attention to detail in designing the components to interconnect cleanly. Without question, the Wells American Compustar earns an excellent score for workmanship.

The company offers a one-year warranty, with on-site service by GE available at extra cost. There is also a 31-day money-back guarantee. Factory repairs are turned around in five days. In addition, Wells offers a "swap club" in which you get a new module to replace a defective one; then you send back the old module. Support hours are Monday to Friday, 8:30 a.m. to 5:30 p.m. Eastern time. Support policies are rated good.

We called the technicians with problems with OS/2 and IBM's Token Ring LAN adapter, and we were impressed with the quality of their answers. Technical support is rated very good.

VALUE:

Wells American's CPU replacement program — when you upgrade your system, you can trade in your old CPU board — means easier purchase order and capital appropriation approvals.

To compare prices, we took an average system: a 1-megabyte system with a 40-megabyte hard disk is listed at \$4,010. This is midrange for the high-speed 80286 market. Our system had the 150-megabyte ESDI drive: The total is \$5,390.

But what happens when you need to move up to a 386 system? Then a 16-MHz board costs you a mere \$600 more;

the 20-MHz board is only \$800 more; and the 25-MHz board requires you to spend \$1,800 more. This ignores hard disk upgrades, though. Of course, you can upgrade incrementally, changing the hard disk this quarter, the CPU next quarter.

At corporate sites, you can have one system box and a stack of mix-and-match components, assembling computers to order with a snap here and a twist there. Upgrading, reorganizing, and recustomizing are as easy as swapping a board. For the company with a large installed base, this flexibility could save a lot of headaches.

That fact, along with fine performance and impressive workmanship, raises the value score for the Wells American Compustar to very good. (And just watch what happens when Intel introduces the 80486!) □

REPORT CARD INFO WORLD

PERFORMANCE COMPUTER

Wells American Compustar System

Criterion	(Weighting)	Score
Performance		
CPU speed	(75)	Very Good
Disk access		
Sequential access	(50)	Excellent
Random access	(50)	Very Good
Software compatibility		
compatibility	(150)	Excellent
Hardware compatibility		
compatibility	(125)	Excellent
Expandability	(75)	Excellent
Documentation	(50)	Very Good
Setup	(50)	Very Good
Ease of use	(50)	Very Good
Serviceability		
Workmanship	(50)	Excellent
Support policies	(50)	Good
Technical support	(100)	Very Good
Value	(125)	Very Good
Design Merit (bonus)		0.2
Final score		8.7

PRODUCT SUMMARY

Company: Wells American Corp., 3243 Sunset Blvd., West Columbia, SC 29169; (803) 796-7800.
List Price: \$5,390 (as configured).
Features: 20-MHz, zero-wait-state 80286 CPU; one parallel, two serial ports; support for 80287; 220-watt power supply; battery-powered clock/calendar.
Peripherals: Enhanced keyboard; built-in VGA.
Storage and Memory: 150-megabyte ESDI hard disk; one 360K 5¼-inch and two 1.44-megabyte 3½-inch floppies; 1 megabyte of RAM.
Support: One-year warranty; 31-day money-back guarantee.
Pros: Interchangeable components; support for AT and MCA buses, EMS 4.0; built-in VGA; extensive mass storage positions; fine manual.
Cons: None significant.
Summary: Solid performing, flexible machine makes upgrading simple.

- 1989 TOTAL RETAIL INTEREST EXPENSE -

(Millions of Dollars)

	WAIR:	8.15%	8.10%	8.05%	8.00%	7.95%	7.90%	7.85%	7.80%	7.75%	7.70%	7.65%	7.60%	7.55%	7.50%
bp below 11th Dist:	-35	-40	-45	-50	-55	-60	-65	-70	-75	-80	-85	-90	-95	-100	
\$9.7	791	786	781	776	771	766	761	757	752	747	742	737	732	728	
\$9.8	799	794	789	784	779	774	769	764	760	755	750	745	740	735	
\$9.9	807	802	797	792	787	782	777	772	767	762	757	752	747	743	
\$10.0	815	810	805	800	795	790	785	780	775	770	765	760	755	750	
Avg. \$10.1	823	818	813	808	803	798	793	788	783	778	773	768	763	758	
Retail \$10.2	831	826	821	816	811	806	801	796	790	785	780	775	770	765	
Deposit \$10.3	839	834	829	824	819	814	809	803	798	793	788	783	778	773	
Base \$10.4	848	842	837	832	827	822	816	811	806	801	796	790	785	780	
(\$Bill's) \$10.5	856	850	845	840	835	829	824	819	814	808	803	798	793	788	
\$10.6	864	859	853	848	843	837	832	827	821	816	811	806	800	795	
\$10.7	872	867	861	856	851	845	840	835	829	824	819	813	808	802	
\$10.8	880	875	869	864	859	853	848	842	837	832	826	821	815	810	
\$10.9	888	883	877	872	867	861	856	850	845	839	834	828	823	817	
\$11.0	896	891	885	880	874	869	863	858	852	847	841	836	830	825	
\$11.1	905	899	894	888	882	877	871	866	860	855	849	844	838	832	

Always' formatting options (boldface, underline, double underline, and shading) add flair to spreadsheet printouts.

Always Is Welcome Addition To 1-2-3 Software Arsenal

With the Always add-on, 1-2-3 output no longer needs to take a backseat to Microsoft's Excel.

BY JOHN WALKENBACH
CONTRIBUTING EDITOR

If you've ever used Microsoft Windows, you remember the excitement you felt the first time you displayed text and numbers in varying fonts and sizes. It's likely that a trace of this excitement will return when you attach Always to your 1-2-3 spreadsheet.

With the Always add-on, you can enhance your 1-2-3 worksheets with multiple type fonts and sizes, shading, outlines, boxes, and even integrated graphs — 1-2-3 output no longer has to take a backseat to Microsoft Excel. Always is a welcome addition to the software arsenal of 1-2-3 users who strive to get the most out of their laser printer.

FEATURES:

As a standard 1-2-3 add-on, Always can load automatically when you run 1-2-3 or load only when needed (to conserve memory). When you invoke Always from within 1-2-3, it sets your system to graphics mode and provides a new menu system, which lets you select formatting enhancements for cells or ranges and then immediately displays the selections. If you're using a graphics display, you can preview output before printing. Hard copy output can be printed to a wide variety of dot-matrix and laser printers

and can even be printed in different colors (if color printing is supported by your printer).

In addition to enhancing text and numbers, the Always program lets you specify graphs in the form of standard .PIC files to appear within your spreadsheet. You have full control over the size, proportions, and placement of graphs, and you can use background shading or place an outline around a graph. Always lets you scale the fonts in graphs (from half size up to triple size), a capability not found in Lotus' standard Pgraph program.

Always makes use of your printer's built-in fonts, including font cartridges for laser printers, and comes with three of its own high-resolution bit-mapped "soft" fonts that range in size from five to 25 points. Each worksheet can have its own font set — a list of eight fonts (typeface and size).

Other formatting options include boldface, underline, double underline, and shading (light, dark, or solid), which can be combined for an interesting effect. For example, you can enclose a range of text in a box, add an additional row and column, and then use the shade command to create a drop shadow around the box. Another nice feature lets you enlarge or reduce text or graphs on screen.

Like Excel, Always gives you precise