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Pen Computing

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Fujitsu Stylistic 2300

Pen Computing 27 - April 1999 -- Looks can be so deceiving. For example, when you look at the new Stylistic 2300 mobile decision support computer from Fujitsu Personal Systems, Inc. (FPSI), chances are that you won't notice much of a difference between this new model and the Stylistic 1200 it replaces.

And that's just fine with FPSI and most of their customers. Unlike office systems which can be just about any size or shape as long as they fit on or under the desk, handhelds are highly optimized tools where form follows function. "Collect all five" may well help Apple sell more of its now multi-colored iMacs, but in the field, where standardization matters and where customers may already have invested in millions of dollars worth of peripherals, docking systems, or device protection gear, whimsical design changes are not only frowned upon, they can literally kill a deal.

This is not to say that vertical market customers do not seek to keep their field force computing equipment up-to-date--new technology often has a direct impact on productivity--but it must not come at the cost of changing shapes and designs simply for the sake of it. Fujitsu Personal Systems, the undisputed market share leader in pen tablets, knows that. The company has reached \$100 million in sales per year by knowing what its customers want and by concentrating on one product and one product only, pen-based mobile decision support computers.

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During 1998, FPSI shipped some 35,000 (20,000 Stylistics and 15,000 Points) pen computers, a very significant number in this market. According to IDC estimates, FPSI had a 55% market share in unit shipments in 1998, a number that may have decreased a bit due to a number of new pen products that have come on the market since, but FPSI continues to occupy a leadership position the likes of which are hardly ever seen in hotly contested markets. Think GM in its heyday. In addition, FPSI has been profitable since 1995, a fact that is certain to be comforting to the growing number of FPSI clients (which include, by the way, American Airlines, Nabisco, Nestle, Gillette, Southwest Air, State Farm, and ADP).

Update of a proven design

But to get back to the new Stylistic 2300. Although it looks virtually unchanged from the Stylistic 1200, nothing could be further from the truth. While the 2300's exterior has been left largely unchanged--including the all-important placement of ports and peripheral connectors, the inside is all new. "What do I care what the thing looks like inside," you may say. "So they put in a faster processor and a bigger disk."

Fujitsu did that, and a whole lot more, but the extent of the work that went into making the new Stylistic a better machine in every respect is totally amazing.

We've opened many pen tablets in our lab over the years and have seen many clever solutions and fine quality, as well some atrocities that we'd rather forget about. We never cease to marvel at the complexity of the task--to pack an entire computer into a very small space, place all the connectors in just the right place, and put it all together in a way that can withstand abuse that a regular notebook computer cannot. Open any handheld computer and you immediately see that it's infinitely more difficult to design, and assemble, a good mobile device than it is to build a

desktop computer where space simply isn't an issue, and where it really doesn't matter where the connectors are since you can simply run a ribbon cable to the plug on the back of the machine. Given the huge complexity of fitting all that power into a small package you might expect mobile computers to be less reliable than desktops or notebooks.

At least in the case of FPSI's products, that's not the case. According to Fujitsu's Geoff Walker, the Stylistic 1200 has an annual failure rate of under 7%. According to Ziff-Davis, the failure rate of corporate notebooks runs between 25 and 30% per year. Amazing. Take a look at the insides of the Stylistic and you know where that stellar repair record comes from. Fujitsu literally spared no expense to get every detail correctly designed, optimized for the purpose, and just plain right.

Here are two examples that illustrate FPSI's design approach. First, all too aware that heat is a major problem in small, fan-less devices powered by hot-running Intel processors, FPSI designed the Stylistic 2300's motherboard around a sophisticated thermal heat dissipation model. This approach had worked well in the Stylistic 1200, and the 2300's thermal subframe that carries heat away from the Pentium processor is even more impressive.

The 233MHz Mobile Intel Pentium II processor itself, incidentally, isn't the same clumsy brick you see in desktop machines. Far from it. Fujitsu developed a multi-chip module (including 512KB of L2 cache) sitting on a small 280-pin daughter board that itself is smaller than a standard Pentium chip, dissipates far less heat and takes up 70% less space. The Pentium chip itself is less than a half of an inch square, about the size of your pinky fingernail. The elaborately engineered heat dissipator subframe then passes on whatever little heat the mini-chip generates. As a result, the Stylistic 2300 runs even cooler than its slower predecessor. Second, and here FPSI clearly

has an advantage over most of its rivals, every FPSI pen tablet has close and extensive genetic ties to an existing product of Fujitsu's highly regarded notebook computer division. This may not be immediately obvious, given the big difference between a pen tablet and a clamshell notebook, but put a Stylistic next to certain members of Fujitsu's "Life-book" series of notebook computers, and you'll see many shared components, and inside the resemblance is even greater. This ability to share components, and the significant resources of Fujitsu's notebook engineering staff, quite obviously have a positive impact on the design and quality of FPSI products.

Inside: cleaner and better than ever

Continuing our examination of the 2300's innards, it becomes obvious that the overall design philosophy hasn't changed. Like the successful 1200, the 2300 is built in four "layers," those being, from top, a) the screen, b) the active, electromagnetic Mutoh digitizer (now on a thinner orange Capton substrate instead of a standard circuit board, c) a rigid magnesium subframe, and d) the motherboard with its peripherals. The 2300, however, seems cleaner and more efficiently designed than the 1200 which was a bit of a challenge even for seasoned service technicians. The 2300 seems simpler and more cohesive, and is thus easier to work on if anything should go wrong.

This effort to make things easier to fix, incidentally, didn't stop at the layout and organization of the electronics. Other small plastic bits and pieces that were difficult to handle on the 1200 have been redesigned, undoubtedly lowering repair costs of the new unit. Another impression is how efficiently Fujitsu's engineers used every fraction of a cubic inch inside the 2300 and how tightly packed everything is. Comparing the guts of, say, a MicroSlate Datellite to the Stylistic is like comparing

the power plant in the cavernous engine bay of a 60s muscle car to the way the complex 3.2 liter inline six fills up the engine compartment of my BMW M3 (yes, we love cars almost as much as mobile computers here at PCM).

An analogy to such high performance automobiles is relative, of course. For while the Stylistic 2300 represents a very major advance in power and performance over the 1200, Fujitsu has always placed reliability and functionality higher than bragging rights for the fastest processor. At the time of the release of the Stylistic 2300, Intel had already announced 366MHz and 333MHz versions of the mobile Pentium II processor, "relegating" the 2300's 233MHz chip into the middle echelon of mobile processors. While more processing power is always good, we fully understand, and agree with, Fujitsu's decisions to go with the 233MHz chip. The 266 version of the same chip runs about 8% faster but consumes 14% more power, and waiting for the yet more expensive mobile 333/366MHz chips made even less sense. Given the tasks it is likely to perform in the field, the Stylistic's 233MHz processor is plenty fast enough, and then some.

The choice of the right processor, however, was not the only decision Fujitsu had to make. After the switch from PC Card hard drives (Stylistic 1000) to the larger-capacity and more rugged 2.5-inch drives (Stylistic 1200), FPSI engineers took a look at alternative storage technologies, such as IBM's new microdrive (not available yet, not enough capacity), but decided to stay with the shock-mounted 2.5-inch format, although now using an Ultra-ATA interface that's twice as fast. Storage capacity rose to 4.1GB (Toshiba HDD2914), more than enough to even store entire CD-ROM images, should a client need them. In an additional effort to increase reliability, Fujitsu equipped the 2300 with a "real" RJ-11 jack. Customers had complained about the fragility of PC Card modem connectors (a motion that we would

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