R I C H A R D   S .   B U R W E N
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As I can't find a computer magazine that wants to publish the attached article, I have decided to print it myself - about 12 copies. Hope you get a kick out of it. When you have finished with it recycle the paper.

Dick Burwen

HOW TO GET INTO TROUBLE UPGRADING YOUR COMPUTER

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Don't be too tempted by the latest upgrades before you read my tale of woe.

All I wanted was some more hard disk space and the ability to backup data and record audio on CDs. When I bought the new drives for two Pentiums I knew from experience that unexpected problems, learning new software, and reorganizing thousands of files could cause as much as a week of work. Never did I consider that installation would break a motherboard, break a new SCSI hard drive and lose 3.7 GB of files, and require five motherboard replacements. During all this failures necessitated three replacements of the SCSI drive, two IDE boot hard drives, a combination floppy drive, and a CDROM player. A third boot hard drive developed a damaged boot track and had to be low-level formatted. Over a five-month period it took more than 300 hours of booting, reconfiguring, numerous operating system reinstallations, and finally fresh installation of Windows 95 and most of my programs on both machines twice.

Background

On my computer desk at home there are four PCs: a 166 MHz Pentium desktop, a 133 MHz Pentium tower, a 133 MHz XVGA laptop, and an old 386. Professionally I use these computers for designing analog and digital circuits in Orcad Capture, simulating these circuits in IsSPICE, and writing and database design using Microsoft Office. In my hobbies I use these computers to process photos using Adobe Photoshop and to design DSP programs. At my coffee table a fifth computer, a 100 MHz Pentium Tower (my music computer) houses 4 Ariel DSP96 boards used to control the sound character of my 169 speaker, 20,000 Watt hi-fi system, now in its 32nd year of design and construction. Big improvements in the sound resulted from my new tone controls and reverberation, each consisting of a DSP assembly language program, a C program, and an Excel spread sheet. My laptop also remote controls the sound. A coaxial cable and Microsoft Client network links all five computers together and to a sixth in my laboratory for my part-time secretary.

My programs are big and prone to crashing. So the 166 MHz and 133 MHz desk computers each have 96 MB of memory, three and four hard drives, and an IDE CDROM player. One of the principal uses of the 133 MHz computer is a telephone-fax machine. Imagine - a $7000 answering machine for just one person. It took three months to get it working. 28.8kB modems slowed down to a crawl on my phone lines and 14.4kB modems worked OK.

For my paperless office I use an HP 3C scanner connected to the 133 MHz computer. So far I have reduced the filing by roughly 12%, but now I can find in the computer what I have filed. Believe it or not, I actually use all five computers at once. While drawing a schematic on one screen I may run a SPICE simulation of part of the circuit on another,

display a related schematic on a third, and show a parts list on a fourth, all while listening to DSP controlled music. Multiple displays give me a clearer perspective than switching windows on one computer.

I had no intention of becoming a computer junkie. In fact I hate computers. They are such time wasters. Nevertheless I am a real sucker for all the latest hardware and software upgrades. There is no way to accurately perform my work without a computer. For example, the netlist output from my schematic is required for a designer to lay out a printed circuit board.

When I used Windows for Workgroups 3.11 one computer or another crashed and had to be rebooted about five times a day, often during network file transfer. Frequently a crash caused lost clusters on a hard disk that required correction by checkdisk. I tried beta versions of Windows NT that came with my membership in the Microsoft Developer Network and was delighted with NT's crashworthiness - never more than one program at a time. Later I switched to Windows 95 because it ran all my programs that NT did not. Windows 95 also crashes about five times a day. When my programs became compatible, I wanted to install new NT 4.0 on my main computer.

Troubles Brewing

The 166 MHz computer on my desk was originally a Gateway 2000 100 MHz Pentium P5-100XL. It worked fine for a year and then developed a problem. Windows 95 lost printer port LPT1; yet it worked in DOS. After trying unsuccessfully many printer installations, changing cables, and reinstalling Windows 95, I decided to live with the problem by printing over the network to my HP Laserjet III. However, I could not print over the network to my new Epson Stylus Pro color printer. The 133 MHz computer, a similar Gateway 2000 P5-133XL, worked with both printers using similar installations.

As I wanted to copy color photos I had to remove the scanner and its SCSI card from the P5-100XL and install them in the 133 MHz machine. About the same time that computer had developed a seemingly unrelated problem: when I used Compuserve Mosaic to contact a WEB server the program crashed. It had been working for two months.

The 133 MHz computer had only three ISA slots, all filled by my modem, network, and Ensoniq Sounscape sound cards. To make room for the scanner card I swapped the SMC PCI network card in my music computer for the 3Com ISA network card. That fouled up Windows 95 in the music computer, necessitating reinstallation of Windows 95 from DOS which in turn required enabling the CDROM. In the P5-133XL an interrupt conflict developed. Previously in Windows 95 I could change each of the two precious interrupts consumed by the sound card over a range of four values and prevent it from interfering with my other cards. Now I received the message, "This resource cannot be changed." After many hours of rebooting, changing bios settings, reinstalling Windows 95, and trying to change interrupts on various cards to resolve the conflict I temporarily removed the sound card.

These were the states of my P5-100XL and P5-133XL computers at the time I realized the

former was nearly out of 3.6 GB of disk space.

New Drives

To increase the disk space in my P5-100XL by 3 GB I decided to replace the second and third 1 Gbyte Western Digital IDE hard drives with new 2.5 Gbyte drives of the same series. At the same time I considered adding similar disk space and a CDROM recorder to my P5-133XL. Hoping to keep the entire responsibility for my computers with their original maker, Gateway 2000, I called the company's Add-Ons department. Even though Gateway was shipping computers with 2.5 Gbyte drives, Add-Ons could sell me only 2.1 GB. As I learned later, perhaps this was a benefit - it helps keep customers out of trouble.

Determined to buy 2.5 GB, I then called Dirt Cheap Drives who could ship the drives today. When I mentioned digital audio recording the sales person suggested the internal Yamaha CDR100 which both reads and writes at 4X speed, an Adaptec 2940HA SCSI II controller PCI card, and a Micropolis 3243AV 4 Gbyte audio-video hard drive. Audio-video means the drive does not interrupt data flow when it recalibrates for temperature change. He advised against wide SCSI, which is twice as fast, on grounds that the CD recorder cannot keep up. After purchasing these devices I looked in the Yamaha manual and could find no mention of such a problem.

Two days later all the drives and SCSI card were on hand and I began by reading the manuals. It was then I learned the Yamaha CDR100 recorder uses an inconvenient caddy to hold the disc and keep it clean. All my CDROM and hi-fi audio players did not. Dirt Cheap Drives could exchange the CDR100 for a caddyless brand, but the choices were either slower speed or an external box. After reading that most recording disk failures result from dirt I accepted caddies.

With all but the video card removed from the P5-133XL to eliminate interrupt conflicts, I inserted the Adaptec SCSI controller card and mounted the SCSI drive CDROM recorder in two vacant front bays of the tower. The CDR100 was at the top. Upon rereading the unclear Yamaha manual several times I concluded this version did not actually terminate the internal SCSI cable. This meant I had to remove the hard drive to reinsert its terminating resistors, and reconnect the cable placing the hard drive at the end, and the CDR100 in the middle.

The Easy-SCSI installation software accompanying the Adaptec controller card came on a floppy disk and a CDROM. When I tried to install from the floppy it instructed me to insert the CDROM for a newer version. The CDROM said the opposite. I continued installation from the CDROM and the software found both the hard drive and the CDROM recorder. Windows 95 found seven CDR100s and gave them all new drive letters. I removed six of them from Device Manager and rebooted. They kept coming back no matter what I tried.

A technician at Dirt Cheap Drives suggested I had a conflict with other hardware. After booting, changing bios settings, and Windows 95 manual and automatic settings, trying new Windows configurations and even reinstallation of Windows 95, for two days I could not prevent the SCSI controller card from using the same interrupt assigned to either the display

or the network card. In each case Windows 95 System Manager said there was no conflict. Why after many years of development a PC cannot have more than four or five interrupts actually useful with seven or eight PCI and ISA slots puzzles me.

I phoned the Microsoft Developer Network and used one of my two free help "incidents" which Microsoft warned me was valued at $95. After 2 1/2 hours of rebooting and changing settings while the technician patiently waited on the phone, we had made progress. Windows 95 found just one CDR100. Her final advice was: "Reinstall Windows 95 without plug and play and you will be able to choose the interrupts manually." I did that and it made only a slight improvement.

All my cards, network, modem, sound, and display, seemed to be working and the new 4 Gbyte SCSI hard drive and the CDR100 seemed to be working, at least in play mode. The display and SCSI controller were still using the same interrupt. Over the network I filled the 4 Gbyte drive with files from my P5-100XL computer so I could replace two of its hard drives and later restore the files. I then deleted all the files on the two drives I was about to remove. Over the next few days I used the P5-133XL for some real work. Then I used Norton Disk Doctor to scan for errors on all four hard drives. Oddly the new SCSI 4 Gbyte drive had some errors. I allowed Disk Doctor to correct this error, then that error, and on and on for about 50 errors. The following day there were more. This time Disk Doctor said the errors could be cured only by a low level format.

I called Dirt Cheap Drives and learned that I already had a low-level format utility in EZ-SCSI. When I started formatting a blinking display said formatting might take from one minute to several hours, depending upon the size of my drive. After 8 hours it was still blinking and I tried again. No luck. The drive had probably died in an interrupt conflict. Dirt Cheap Drives agreed to exchange the drive for a new one.

While the replacement drive was en route I tried one more idea - a complete new installation of Windows 95 in a different directory. Behold! Everything worked! No conflicts and I could now manually set the interrupts for my sound card. Corruption in the Windows 95 configuration had been passed on from installation to installation even though I had replaced all files. The new 4 Gbyte drive arrived and all I had to do was reinstall about a Gbyte of programs. Much of the lost 3.7 GB consisted of backups of still working disks and programs that had to be reinstalled anyway. Memos, schematics, faxes, magazine articles and other data that I had amassed over several years were safely backed up in at least two other places.

One more minor problem. When I ejected a CD from the Yamaha CDR100 it was almost burning hot. So I removed my IDE CDROM, the combination A and B floppy drive, and my first C, D, E hard drive from three front cabinet bays, moved each up one bay, and placed the CDR100 in the bottom bay where it runs cooler. No mention of heat in the Yamaha manual.

The Disaster

The broken SCSI hard drive was mild compared to what happened to my P5-100XL

desktop computer. After transferring the files to the P5-133XL I replaced my 1 Gbyte Western Digital drive 2 with a new 2.5 Gbyte drive. As the computer bios did not recognize drives that large it was necessary to use the Western Digital EZ-Drive software for installation. This software partitioned the drive into 2.1 GB (DOS's maximum) and 400 Mbyte disks and formatted the two disks in about 1 minute. My first drive had been partitioned into disks C, D. and E and the new drive should have contained disks F and G. When I checked the contents of each disk, OOPS!, disk D was blank. Well, it was not quite that bad. The disk D files were now on E and disk E files were now on F. EZ-Drive had assumed all customers want to make a bootable drive like C and had created a primary DOS partition instead of an extended DOS partition on the new drive. DOS places the second bootable drive right after C and renames the remaining drives one letter higher.

It took only an hour to delete the primary DOS partition with fdisk, create an extended DOS partition, divide it into logical drives F and G, and DOS format each partition. With drive 2 working I then went through this same entire procedure to replace drive 3 by a new 2.5 Gbyte Western Digital.

What I really wanted was a crashproof system and to eliminate the Windows 95 lost printer port problem described earlier. A Beta version of Windows NT 4.0 had just arrived from the Microsoft Developer Network and I installed NT. All three hard drives worked in NT, but the printer port did not. The printer port still worked in DOS. I had finally determined that the printer port problem was a broken motherboard. However, I could print on my HP Lasertjet III via the network.

During installation of Windows NT I had some difficulty and restarted installation. As a result the dual boot option allowing a choice of Windows NT or Windows 95 disappeared. I was able to boot Windows 95 by using the EZ-Drive rescue disk. Windows 95 found my first IDE drive, disks C, D, and E, but all the new disks were missing. Somehow Windows NT had grabbed the EZ-Drive software and prevented Windows 95 from using it.

To solve this problem I figured I needed a bios upgrade that recognized 2.5 Gbyte IDE drives without EZ-Drive. Gateway 2000 offered free bios upgrades on the Internet. To reach Gateway 2000 I had to fix the Compuserve Mosaic crashing problem on my P5-133XL mentioned earlier. I phoned Compuserve. Their technician helped me make several tests, but was unable to solve the problem, possibly due to Windows 95 corruption. I asked if Compuserve worked with an old version of Netscape Navigator I had purchased some time ago and abandoned because it was too hard to install Compuserve. Yes; even better, I could download for free a new version of Netscape in which Compuserve was easier to install. I reached Compuserve's home page and downloaded. When I ran the new Netscape Navigator setup Compuserve installed instantly and I was on the Web.

Two versions of bios for my computer were available. The first was dated February, 1995 and might be too old. The second dated November, 1995 Gateway 2000 clearly stated was not fully tested and Gateway 2000 assumed no responsibility for it. I downloaded both. When I installed the February 1995 version I found that like my old bios it did not recognize drives having more than 4095 cylinders. My 2.5 Gbyte drives had 4960. I decided to take a

chance on the more recent bios which turned out to be a Beta version. The P5-100XL was slow booting and I could not run my programs. What to do? I tried to reinstall the February 1995 version that had worked. Part way through the installation the screen went dark. No video. As one friend put it, "It's a bit like taking a space walk and your tether to the spaceship is cut."

I phoned Gateway 2000 and got the answer I expected. Yes, after 18 months my motherboard was still in warranty. If I could just restore it to its condition before I installed the unguaranteed bios, Gateway 2000 would take care of the broken printer port. Maybe I could get a bios rescue disk from the manufacturer. Slim chance!

About that time I decided I would spend money and buy a newer, faster motherboard. Did Gateway2000 have a better board that would fit? Their technician kindly spent about an hour on the phone researching the characteristics and dimensions of various boards and came up with a 166 MHz Pentium model number. I called the Gateway 2000 AD-Ons department to order the board and was informed they could not sell me any motherboard at that time. No motherboard and no 2.5 Gbyte drives. I was beginning to feel abandoned by my computer supplier.

There was no choice. I had to shop elsewhere for a new motherboard. Prior experience had shown me that motherboards from different manufacturers may work differently with some programs and the dealer may not understand what he is selling. So I knew that for complete compatibility I should spend a little extra money and buy a genuine Intel brand motherboard - but I didn't. I read the mail order ads and called a couple of dealers. It turned out that boards that seemed to be genuine Intel in the ads incorporated an Intel Triton chipset but were made by other companies. Also two people told me the most suitable Intel board had only three ISA slots for my four ISA cards. As I found out much too late they failed to mention a combination PCI/ISA slot for my fourth card.

After reading further I called Micro Xpress and described the board I wanted to replace including its dimensions. The sales person said he had the perfect board for me - a 166 MHz Pentium with 512 kbyte cache for only $650. When I inquired about various features, his board had them all, but he was not sure whether it supported four IDE drives. Call customer service. I got through instantly to a technician who had the answer on the tip of his tongue. That made a good impression on me. I guess what clinched my decision to take the risk of buying a no-name ("made somewhere in the Pacific rim") motherboard was the availability of four ISA slots and four PCI slots. After further consideration I called Micro Xpress and asked the salesperson again about the mechanical fit in my Gateway 2000 desktop. No problem. The board arrived in two days.

While waiting for the new board I removed a vertical drive bay which was just above the motherboard to prevent the memory SIMMs from bumping into it. On my old board the memory was leaning at 45° to reduce its height. All the pictures I saw of new boards showed the memory standing upright. I placed my C, D. E drive 1 in the lowest front drive bay (rear drive bays were filled). Naturally the IDE cable could no longer reach the drive and I had to obtain a longer one from a friend.

When the board arrived I looked at it closely and read the manual. The board had a model number, but no name. Not on the board. Not in the manual. Not even Micro Xpress. It made me wonder if any company would be responsible.

I held the new board above the old board to see if the mounting holes lined up. Surprise! My old board was rectangular and screwed to nine mounting posts. The new board was smaller, nearly square, and had only five mounting holes. It looked as though four mounting holes would line up, so I removed the old board. Of two extra mounting posts, one unscrewed, but the other had to be broken off the cabinet so it would not short circuit the underside of the new motherboard. The round keyboard connector did not line up with its access hole at the back of the cabinet. However a small plate containing the hole could be unscrewed, leaving a larger rectangular hole.

I plugged in my four 16 Mbyte memory SIMMs, screwed down the motherboard, inserted the display and modem boards, and plugged in all the internal cables. Then I went around back to plug in the mouse. Oh, Oh! No PS-2 mouse port. Fortunately a Computer City store had opened recently only a mile from home. It was a Saturday night. I came back with a Microsoft Home serial port mouse. That was too bad because with my mouse on COM1 and modem now on COM2, I had to remove my plotter from COM2 and move it to my P5-133XL along with some software to run it.

Next I tried to plug in the keyboard. Another problem. My keyboard had a small round PS-2 connector and the motherboard had an old-fashioned large DIN connector. Back to Computer City for an adapter. With everything connected I turned on the computer. It worked. It recognized my three IDE drives and CDROM, but not the mouse. After a while I realized I had to set the dip switch on the modem to COM2 and turn off COM2 in the bios to resolve an interrupt conflict. Still no mouse. Finally after replacing the internal COM2 flat cable, the mouse was there. As I later learned, my original cable was OK. Different motherboards use different COM port connections.

Windows 95 found all my disks, but showed an error on the secondary IDE controller and no CDROM although the CDROM actually worked. The network card worked and my Bernoulli drive SCSI card worked. When I added my Ensoniq Soundscape card the computer froze during booting. With all this hardware I could boot Windows 95 in "Safe" mode and try to resolve any interrupt conflicts. However, to install the sound card, Windows 95 had to boot normally and it froze each time.

After booting my computer 100 times or so, fiddling with jumpers, and Windows and bios interrupt settings I decided there was no way I could get my sound card to work.. Also, when I installed Windows NT 4.0, after an hour of installation the computer froze, showing a screenful of hexadecimal numbers. Both NT 4.0 and the sound card had worked with my old motherboard. I called Microsoft Developer Network and learned there is no support for Beta versions of NT except via the Internet. I then tried installing Windows NT 3.51 final version and after an hour of installation it crashed the same way. When I removed every card except the display I got the same results with NT 3.51 and NT 4.0. Having spent over four days booting my computer, I was willing to give up use of the sound card and

Windows NT and simply continue on with Windows 95.

Because of the problems I had with my P5-133XL I ended up installing Windows 95 in a new directory. This meant I had to reinstall nearly all my software. Everything was going fine until I tried to copy a couple of text files to a floppy disk. The computer froze. I rebooted and tried copying the same files in DOS. The floppy disk worked. Again in Windows 95 copying to either drive A or drive B froze the computer. I assumed I had a bad floppy cable or it was plugged in wrong. It seemed to be plugged in the same way as the cable to a similar combination floppy drive in my other computer. As Device Manager was still showing an error on the secondary IDE drive, I called Micro Xpress and ordered a new set of IDE and floppy cables for delivery the next day.

When the new cables were in place I booted the computer and the screen remained dark. After a while I found the end of the video card toward the middle of the motherboard was not fully seated in its socket because the motherboard was a little too low at that point. The same thing happened with my Bernoulli SCSI card. Nothing had changed with regard to the floppy and IDE problems. Then I called a technician at Micro Express. He started to say something about Windows configuration and I informed him I had already gone through that. Wasn't my floppy cable plugged in wrong? No, it wasn't. Did he have another solution? He offered me another motherboard of a different brand for delivery tomorrow.

The new board which turned out to be a $100 upgrade from an Intel Triton I chipset to a Triton II chipset, with AMI bios instead of Award bios, arrived and I went to screw it in. Again the board had no name, was a different size, and the mounting holes did not all match. By adding a metal post at the hole where I had previously broken off a mounting post and inserting nylon screws in two other posts so their heads prevented short circuits, I was able to mount the board using three screws. This motherboard had PS-2 mouse and keyboard connectors; it recognized all my hard drives and CDROM; the floppys worked in Windows 95; and even my sound board worked after installation. Windows NT 4.0 crashed again after an hour of installation and I decided not to spend any more time on that.

After putting the two computers back together, when I tried to move the computer desk back in place a wheel broke off. I got hold of two new metal wheels, propped up the desk and replaced the broken one. The next day it was broken. The wheel was plastic, not metal. More shopping to find a real metal wheel.

Two days after installation of the second motherboard my new 166 MHz Pentium began to lock up when running certain programs. Crashes became more frequent and finally Windows 95 would not always boot. I tried to reinstall Windows 95 several times, thinking it had corrupted files. Each time after a few screens the installation program exited. For a solution to the problem Micro Xpress offered yet another board. This time for compatibility and reliability I asked for a genuine Intel Zappa 2 motherboard using the Triton 1 chipset.

The Intel board was the same larger size and shape as the original board in the Gateway 2000 computer. All nine screw holes matched the mounting posts. Surprise! The genuine Intel motherboard had the same problems as the first board that used the same Intel Triton 1

chipset. There was no way to get the Ensoniq sound card to work and the computer froze when trying to copy to either 3-1/2 or 5-14 inch disks in the combination floppy drive. I could not believe an Intel board was the cause of the problem. After trying three different floppy cables, numerous Windows configurations, and three different installations of Windows 95, I finally called Gateway 2000 and obtained a replacement combination floppy drive under the original warranty. The new drive worked more smoothly than the somewhat worn old drive, but again the computer froze in Windows 95. It worked fine in DOS.

Failures

Without hesitation Micro Xpress offered to send me a fourth motherboard. By this time prices were lower and I was able to obtain a new type using a Triton 2 chipset with 512 kbyte cache for less than the first board. The new board had everything I wanted, even six sockets for increased memory capacity. It worked like a charm with Windows 95, the combination floppy drive, and the Ensoniq sound card. This board even had a name, not on the board or in the manual, but on the sales slip - "Biostar". I loved it. Memory prices were down. So I upgraded to 96 Mbytes in each of the two computers.

When I talked again with a technician at Micro Xpress he informed me that the Intel board I had returned tested perfect in Windows 95 with several different combination floppy drives they had in stock.

Normally I boot to Windows 95 DOS. This gives me a chance to backup or restore configuration files before loading Windows. After four days of operation and booting, the computer occasionally froze at DOS. To isolate the source of the problem I removed every card except the display and disconnected all the drives. When I booted from a floppy drive and left the computer at DOS for an hour it froze again. Another motherboard failure! Micro Xpress replaced it with an identical Biostar. Happily my fifth new motherboard still works perfectly after five months.

With all the turmoil in my computers it took a long time to reinstall all my software, get it working, reorganize data files, and backup everything on CDROMs, at the same time trying to squeeze in some real work for which I originally purchased the computers. Before I was very far along various drive problems arose. First the CDROM player in my 166 MHz computer became intermittent due to mechanical misalignment which caused the CD to scrape on the tray. Next the replacement 4 Gbyte SCSI drive in my 133 MHz machine developed errors, began making clicking noises, and finally would not start. The 1.6 Gbyte CDE drive in my 166 MHz computer developed a bad boot track, possibly due to all the Windows crashes. It had to be low-level reformatted. In my 133 MHz machine the 1.6 Gbyte CDE drive made clicking noises and failed to boot. So did its replacement upon arrival. Later the third 4 Gbyte SCSI drive failed similarly. Then my telephone modem developed a hum. Altogether there were problems with three IDE hard drives, 3 SCSI drives, a combination floppy drive, a CDROM, and a modem - all fixed under warranty. What a waste of time restoring all my files and programs!

A Better Way

In the days of 386s and 486s I used Stacker compression software to gain more disk space. When I bought my first Pentium, Stacker seemed to greatly slow down the computer. So I avoided compression. Recently I tried Drivespace 3 which came with Microsoft's Plus for Windows 95. When copying 40 MB of files it took only 35% longer. When reading compressed files Corel's CD Creator said it was 50% faster. Overall the computer works just as fast with compression as without.

After installing my new 2.5 Gbyte and 4 Gbyte hard drives I was disappointed in the amount of space gained. 640 Mbytes of files occupied 1 Mbyte of hard disk space because every file, no matter how small, uses at least 32 kbytes,. After installing Drivespace 3, I now have 13 Gbytes of disk space on one computer and 16.6 Gbytes on the other - enough for full backups on separate drives. Compression gained 2.2 times the space. If only I had checked out Drivespace 3 I could have avoided months of frustration from changing drives and resultant motherboards.

When I bought my new NEC 6030X laptop I purchased it complete with 48 MB of memory, modem, network, and SCSI cards all configured by the mail-order dealer. No hardware problems. After compressing the internal and 2nd plug-in 1.44 Gbyte hard drives the laptop has 6 Gbytes of space. COM1 worked fine with my Delorme TripMate GPS and with my Olympus D300L digital camera.

Now when I have finished writing a memo, I back it up immediately on another computer - not at the end of the day.

That's it for my computers. I have to stop and do some useful work. No more new equipment or software, except maybe for that Sound Forge 4.0 audio editing program and Digital Audio Labs digital I/O card for connection to other digital audio equipment.