

Print Screen

The Newsletter of Stanford/Palo Alto PC User's Group

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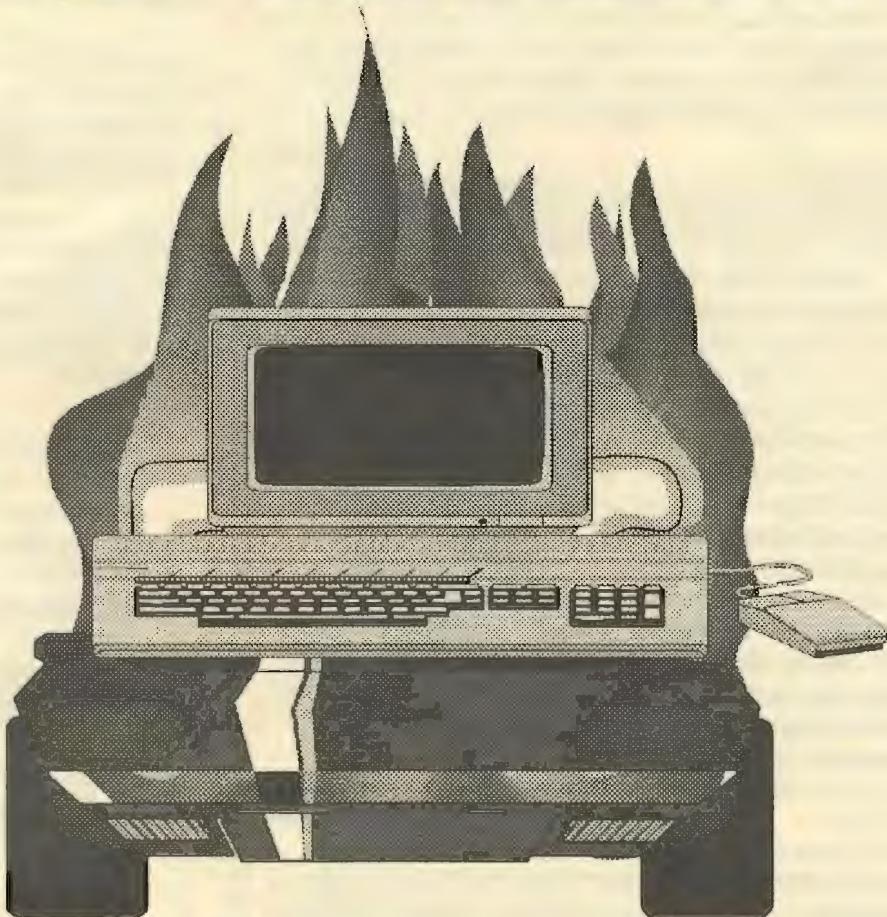
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OCTOBER 1994

IBM The Power PC



Wednesday, Sept. 28th
7:30pm at Varian, Bldg. 7 Auditorium

President's Piece

Jim Dinkey...

had a good idea at the General Meeting regarding the effects of upgrading individual components in a stand alone computer. He suggested we have a presentation by several technical people who could advise us on the likely success of a particular upgrade.

Upgrading...

to a new motherboard and using the old bus boards is a good heart stopper. Replacing a 100 MB C:, D:, E:, F: hard drive with a 550 MB C: drive and still accessing the 270 MB G: drive is a good trick. Adding an extra four megabytes of single 1 meg SIMMs to a previous 4 megs of a different manufacturer can be roulette with a "Parity Error" What are your chances of success? Is a network connecting various computers around the house a good idea? How much equipment is needed? Is a network administrator needed? How stable are the affordable networks? Which CD-ROM drive is easier to install, a SCSI drive or a proprietary bus card drive? Which one is the better deal? Will upgrading to a larger, internal tape drive work with an aging BIOS chip?

Bev Altman...

suggested we have a "live" auction for the Borland Office package. This could be fun with a rap auctioner, hand jivin' and whacking a gavel. Do we own a gavel?

Nancy Helmy...

has joined the PrintScreen production staff. She has a 100mz Gateway computer which will make quick work of a page layout.

The September General Meeting...

with Adaptec and Computer College - Silicon Valley turned out to be an interesting mixture of technical specifications and a warm and fuzzy Internet. The guests played to a full house with a SCSI Sound Card raffled off by Adaptec and free certificates to training classes given away by the Computer College. The free coffee mugs went fast too as the shy folks joined in the arm waving melee of excitement sweeping the auditorium. If you have missed any of the Disks of the Month, we have reprinted them on page 19. A hot pinball game is in the September DOM. Catherine Haynes tried to demo it at the meeting but the video link to the wall screen was down. Larry Weinberg is having a great time giving away a couple of DOM disks to people who can answer simple questions about his DOM presentation.

PrintScreen....

has seen many changes this year. We aimed for a fun interesting newsletter that members read and enjoyed. This project needs your effort and imagination to continue being a living force.

See you on October 26th.....*Brian*

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Thank You to New and Renewing Members

New

David Evans

Renewals

Jim Dinkey

Roger Flores

Zvi Kirschenbaum

October 1994 DOM 9410

11 titles 5 DOS, 6 WIN--1 GAME

DOS

CATDIZK

Disk catalog system

MEMPRO

Memory status/analyser

SABDU240

Copy, format and compare disks

SPIDER10

GAME- keep spider crawling; spider facts

ZIP2EXE

Executable zip files

WIN

CDPLAY10

Play audio CDs on CD-ROM

DAGW

Hard drive usage charts

USWTHRWN

Weather map,ave. sun, rain, temp etc

WHIZNOTE

Super notepad for windows-so says author

WW0335-1

MS app note: 3.1 memory management

WW0524

MS app note: trouble shoot GFPs(UAEs)

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THE INFORMATION SUPERHIGHWAY: Improved Access to Democracy?

by Ellen Weir © 1994, League of Women Voters.
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You've probably seen the television commercial. A woman is using a large-screen computer monitor. The image displayed is a book—its pages flipping by. She touches the screen and, presto!, the display zooms in on several paragraphs. As the woman begins reading, a friendly voice—the announcer's—asks, "Have you ever borrowed a book (pause) from thousands of miles away?"

Quick cut to the next scene: a car's windshield wipers sweep across the glass. It's night. The reflections of tail lights suggest a traffic tie-up ahead. Inside the car, the driver glances at a dashboard computer screen as it maps a route around the congestion. Again, the announcer's voice: "Crossed the country...without stopping for directions?"

A third scene: a man, casually dressed, sits in a beach chair. He jots some notes on a handheld device about the size of a book and then pushes a button, rises from his chair and strolls along the water's edge. The announcer: "Or sent someone a fax...from the beach? You will."

Accessing distant library collections, obtaining travel information from the road, conducting business from anywhere—these are just a few of the images communications giant AT&T is offering what the public appetite for the "information superhighway"—that vast electronic communications network of the future that promises to deliver voice, video, sound, text and computer data to every American school, office, hospital and home.

And AT&T isn't alone in serving up visions of an information-rich future. Other telephone industry titans—along with movers-and-shakers of the computer, information services, and entertainment industries—also are positioning themselves as key players in the headlong rush to provide communications services. Among the blue-sky promises:

- making the best teachers and courses available to students without regard to geography, local resources or disability;
- opening up the world's foremost art galleries, museums, libraries, databases and science and research facilities to anyone, anywhere;
- advancing "telemedicine" to make health care specialists and advanced medical services available to people on-line;
- making business communications speedier and more efficient and enabling more and more people to work from their homes;
- bringing a flood of new entertainment options—electronic program guides, interactive video games, video-on-demand—plus home shopping, home banking and other services into people's living rooms.

Not to be left out, America's political leaders are playing a leading role in the packaging and marketing of the "technology future," promoting emerging communications as the key to rebuilding the nation's economy. Leading the way, the Clinton

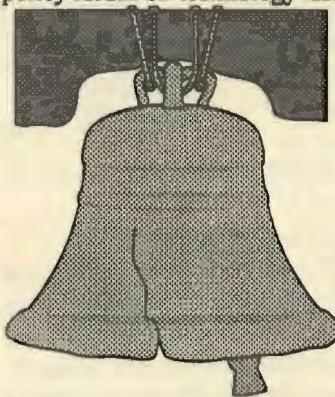
White House is pushing the information superhighway much as the Eisenhower administration pushed the interstate highway system. According to officials in the current Administration, the information superhighway—referred to in government circles as the National Information Infrastructure, or NII—is the best hope for enhancing the competitiveness of U.S. companies and promoting economic growth.

Beyond "The Economy, Stupid"

But White House support for the information superhighway goes beyond economic considerations. The Administration, especially Vice-President Al Gore, has placed technology at the center of plans to "reinvent government." In the future, Gore predicts, Americans will be able to apply for and receive government benefits electronically. Already, Americans participating in ten pilot projects receive food stamps as credits on their government-issued debit cards. Beyond providing all federal benefits on one card, government goals for the information superhighway include: "electronically networked" government agencies able to coordinate actions more effectively across political boundaries and unprecedented public access to government information.

Other examples of how the information superhighway can transform how citizens relate to the democratic process include: televoting (casting electronic ballots using home computers and phone lines); "virtual" town hall meetings (events connecting people in their homes to government experts, public policy analysts, community activists and others for dialogues on important issues); electronic forums using radio, television, computer bulletin boards and other media to enable citizens to weigh in or learn their neighbors' views on the topics-of-the-day; and kiosks—computer-equipped booths that can provide all types of election and candidate information at the touch of a few buttons.

"Used properly, these (new) technologies will dramatically improve the quality of government services; information about public policy will be available to all Americans and the ability to communicate their views to policy makers will be greatly enhanced," stated the Vice-President during a recent public policy forum on technology issues.



Bit Players

Such forums have proliferated in recent months. And there has been a flood of technology coverage in the mass media. Still, many Americans are unclear about what the information superhighway is, who's building it and what role the government is playing. Hang on for a brief technology primer—important because

some of the technical issues will drive the critical public policy debate.

First, what the information superhighway involves. The emergence of new communication technologies, along with trends such as digitization and fiber optics, is transforming communications in the United States. Digitization refers a process that converts all types of information—including voice, data and video—to digital bits, the language of computers.

Are you looking SCSI Lately?

Part 4: SCSI Cable Systems

(By Fred Townsend, fred.townsend@babba.com)

SCSI's good news is its bus can handle a mixed lot of up to seven (or fourteen) devices.

The bad news is, it is difficult to find cables with eight connectors. (The host adapter uses a connector also.) Furthermore, the seemingly simple SCSI cable turns out to be a complex critical system component. This article explains why cables may be the most important part of a SCSI system and how cables can easily be designed and fabricated.

Loose Specs

The SCSI-I and SCSI-2 specifications have few cable recommendations. The only requirement, a maximum length of 6 meters (almost 20 feet), does not address problems created by newer chips.

Without specifications the system manufacturers were free to design their cables however they wished. Typically, the design job was assigned to a mechanical or manufacturing engineer. There was little regard for the cable as an electrical circuit or component.

At first, the haphazard design approach was usually successful. This was because most systems were not sold with seven SCSI devices. Rather, the additional capability was sold as an expansion feature. Also, the first SCSI devices, particular host adapters, were electrically slow.

Speed Kills

Electrical signals travel at approximately two-thirds the speed of light. That should be fast enough for even the most ardent speed freaks, but at that speed, problems occur when electrical signals travel some distance. At some distance the simple passive connecting wires turn into complex electrical circuits called *transmission lines*.

Transmission lines impose additional circuit design considerations. The distance required to invoke the transformation to a transmission line is determined by the electrical characteristics of the SCSI devices: Host Adapters, Hard Drives, Tape Drives, CD-ROM Drives, Scanners, and Printers. The original (relatively slow) SCSI-I devices yielded critical transformation points at distances of two to three feet. At this distance only large systems would be affected.

Faster Chips Arrive

The *Adaptec* company was founded to produce SCSI chips. The smaller the chip, the cheaper the integrated circuit is to produce. Chip manufacturers use a technique known as *Die Shrink* to increase performance while reducing manufacturing costs.

Sometime in the 1991 Adaptec completed the third generation die shrink of their popular 6660 SCSI bus controller chip. The die shrink made the chip significantly faster. The IC is used by many host adapter manufacturers, including Adaptec itself. The change effectively shrunk the critical transmission line distance to eight inches. Now every designer using this chip needed to consider transmission line effects.

Within a few months the networks were alive with messages about *Bad Cables*. What are bad cables? Why did they suddenly materialize? The apparent answer: Bad cables were the result of faster chips and improper system designs, rather than truly bad cables.



Hair Pulling Time

It didn't take Adaptec long to react to the bad press. Adaptec advised manufacturers that adding a capacitor to their host adapters could mitigate the effects of the faster chip. They also warned of the existence in the supply pipeline of many bad cables. *Bad Cables that were not SCSI-2 compliant*.

Manufacturers found that adding the capacitor did little to mitigate their problems. At the same time, they scurried to determine what a *Bad Cable* looked like. Their investigation labeled non-compliant SCSI-2 cables a myth because SCSI-2 does not address cables except for length.

Bad cables are not bad in terms of production quality. They are poorly designed cables or poorly applied cables. Poorly designed cables can produce some very strange characteristics. For instance, plugging in one SCSI device can make another SCSI device appear to be defective or worse, plugging in the seventh SCSI device can make the host adapter appear defective. Poor cables have been known to cause baldness too.

Focus on Transmission Lines

Transmission lines are a well defined science. That doesn't mean they are simple. The transmission line characteristics stem from Maxwell's equations, a complex set of equations that are taught in senior level electrical engineering courses. Maxwell's equations have caused more than one electrical engineering student to change their major.

The problem was also taken to the SCSI-3 specifications committee. The SCSI-3 committee experts successfully dissected the problem and translated the information into simple SCSI-3 specifications that may be used to identify bad SCSI-I and SCSI-2 cables. The two most important parameters are a minimum connector to connector spacing of 0.3 meter (one foot) and the requirement for *Active Termination*.

THE JUNKIE'S GUIDE TO COMPUTER GRAPHICS

Eric Bergerud, Redwood Chips

The following material is a general graphics software overview. Despite all the hype, there's a great deal of confusion over what graphics programs are and what they can actually do. As so often happens, confusion on the part of customers is greatly compounded by grossly overstated claims from companies concerning their products' "power" and "ease of use." Read on, and let me share some ignorance that has taken years to acquire.

The basic distinction is between "Paint" and "Draw" programs—two entirely different beasts. As you read the following try to remember: Paint programs = bit mapped (or raster) graphics; and Draw programs = vector graphics.

Paint Programs

Paint programs (technically called "bit mapped," "raster," or "pixel" graphics) create screen images by assigning a different color dot to each pixel. When running a Paint program, and you zoom in on an object, the dots become large enough to see clearly and edit individually. Indeed, "pixel editing" is crucial to producing top-notch output, and is fun, but slow.

How a bit mapped graphic ultimately looks largely depends on the number of colors

reported (which can be influenced by your video hardware) and the resolution in which you are working. A picture done at 800 x 600 will have finer resolution, but will be smaller than one done at 640 x 480. A good Paint program lets you set your "canvas" size—roughly equivalent to changing resolution.

These factors highlight the major strength and weakness of this program type: because they are linked to resolution, bit mapped images are very tricky to scale. If you have a nice picture and make it much larger, the pixels spread apart, giving it a fuzzy appearance. The more you expand it, the fuzzier it becomes. Soon enough, the image becomes worthless. Contracting a bit mapped image is also touchy. In this case, pixels get shoved together, blacking out the image. Thus, it is very important when using a Paint program to make sure you know how big the final image will be. This is possible, but requires close examination of the manual. It can also require some heavy-metal hardware—more on this in a moment.

Paint programs, however, have some great advantages: You can draw objects automatically with your mouse, with great precision and speed. Pros use pencil-like graphic tablets, but the mouse can do fine work. The latest generation of powerful paint programs (*Fractal Design Painter*, for example) allow incredibly sophisticated effects, blending colors, recreating textures, and simulating the effects of light.

When done well, Paint programs create images with a deep and complex texture. For my money, if supported by the proper hardware, they produce the finest PC graphics available. The good news continues: Paint file formats (the most important having TIF, PCX, PIC, BMP, and GIF extensions) include all scanned or faxed images. The very popular "photo imaging" programs are intended for manipulation of scanned photographs, preparing them for a large number of possible uses (e.g., top-quality slides). Expect to see more software like this as Kodak CD-ROMs begin appearing.

This illustrates another strength of the genre. Bit mapped graphics are very easy to edit. If you import a PCX file and want to change something, you activate the "eraser" tool and literally obliterate part of the image. It is a cinch to "cut" part of an image, save it to file, or paste it somewhere else.

If you never want to create an image from scratch, some excellent shareware programs exist for image manipulation. *Graphics Workshop* (Windows and DOS) is the most famous, but there are others just as good. Most also allow you to transform a graphics format from one type to another, although transforming formats is always hit or miss. Lastly, a huge quantity of public domain and commercial pixel clip art is available for manipulation and import into word processors or desktop publishing programs.

Draw Programs

Although Draw programs share some of Paint programs' tools and techniques, their output and internal design is entirely different. They create mathematical (vector graphics) formulas for graphical objects. These formulas, in turn, are transformed into pixels on screen and for eventual output. However, if you draw a line in *CorelDRAW* or *ACAD*, you can zoom in forever and never see a pixel. You will see instead, a much more detailed view

of a small portion of your line.

This system has huge advantages: you can scale a vector graphic all day long and not harm resolution. Whether you make it large or small, the formula compensates. Furthermore, the clarity of the output is entirely in the hands of the output device. If you print a vector graphic on a 300 DPI laser printer, it will look crisp, precise, and clear, whether it is very small or covers the page. Vector programs also handle text wonderfully: Most come with a large variety of fonts that you can select, scale, and move around the screen at will. For this reason, all business presentation programs like *Harvard Graphics*, *Microsoft PowerPoint*, or *WordPerfect Presentation* are vector-based software, and so are CAD programs and commercial illustration products like *CorelDRAW* and *Illustrator*.



THE WORLD WIDE WEB

By Brian Hayes

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This is the year of Internet fever. Newspaper reporters are prowling "cyberspace" and bringing back tales of wonder and woe. Patrons of your local espresso bar are reading *Wired* and *Internet World* and *Mondo 2000* and chatting knowledgeably of SLIP accounts, kill files, flame wars and emoticons. The espresso bar itself may well have an Internet connection. Any day now, the storefront that once sold CB radios and then became a Computerland and now deals in home satellite dishes will be reincorporating as an Internet access provider. That's when we'll know for sure that the wave has passed, and it's time to move on to the next fad.

I am chagrined to be contributing further to this publicity frenzy. It's as if I were writing a "Computing Science" column about Tonya Harding or the O.J. Simpson case. And yet there is something happening on the Internet that is too important to pass over in silence. It is called the World Wide Web—a name that proclaims its ambitions. I believe the Web offers the clearest vision yet of what computer networking and communication more generally are going to be like in the future.

The Universe in a Box

What is the Web? Is it a place? A program? A protocol? One of the documents in which the Web describes itself offers this assessment: "The World Wide Web (W3) is the universe of network-accessible information, an embodiment of human knowledge." That about covers it.

For something as vast as a universe, the Web is surprisingly easy to find your way around in. It works like this. On a computer connected to the Internet you start up a program called a browser; the browser goes out over the network and retrieves a document, which we can assume for the moment is simply a page of text. Within the text are some highlighted phrases displayed in color or underlined. When you select one of the highlighted words by clicking on it with a mouse, a new document appears with new highlighted "links." Clicking on one of these links takes you to still another document. Each time you follow a link, you may be visiting another network site, perhaps quite distant from your original destination as well as from your own location.

If that's all there is to it, what's the big deal? Well, there is something more to it, which I shall discuss momentarily, but even this one mechanism has a remarkable effect on the way the network presents itself. There have long been protocols for transferring various kinds of information over the Internet, but the Web offers the first seamless interface to the entire network. You no longer need to think much about where things are, either physically ("The file I need is in Geneva, Switzerland") or in terms of the syntax of domain names and addressing conventions ("That file is stored in the pub/ directory at info.cern.ch").

Geography disappears and so does network topology. The Web promotes the illusion that all resources are at your fingertips; the universe of information is inside the little box that sits on your desk.

The highlighted words that serve as links to other documents make the Web a *hypertext* system. The "something more" alluded to above is that the Web is actually a *hypermedia* system because the linked documents need not be text alone. Most Web documents include graphic elements—photographs, drawings, diagrams, and various kinds of ornamental flourishes. Small images are displayed automatically within the document; larger ones can be acquired by clicking on an icon. Other links lead to digitized sounds or video sequences. Web browsers also know how to deal with links to older Internet services and protocols such as Usenet news (a collection of bulletin boards), ftp (for file transfers) and Gopher (a hierarchically organized distributed database).

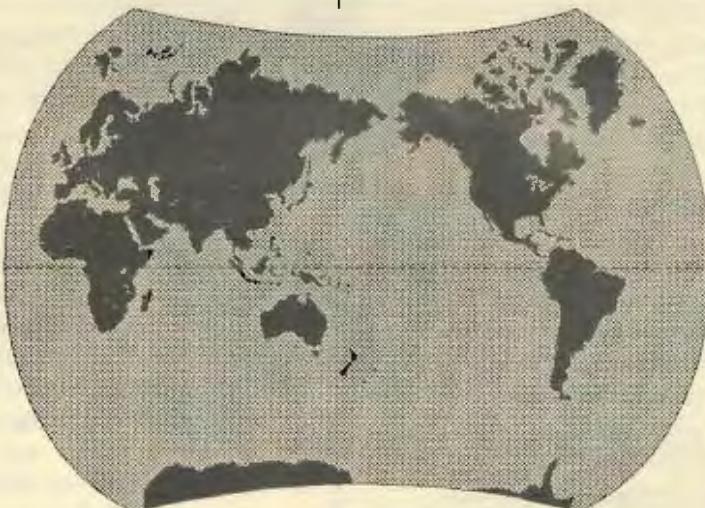
We're Off to See the Web...

Explaining the Web would be a lot easier if I could typographically highlight a word and thereby convert it into a hypertext link. Then you might point to one of the magazine titles mentioned a few paragraphs above and see your copy of *American Scientist* transformed into *Mondo 2000*. Unfortunately, the hypertext printing press is not yet working, and so I can offer only a travelogue, not a real guided tour.

A good place to begin exploring the Web is a document called the World Wide Web Home maintained at CERN, the European Laboratory for Particle Physics in Geneva, which was also the birthplace of the Web. Most such "home pages" include links both to locally stored information and to other sites. In this case the local information has to do with the Web itself—there are manuals, tutorials, histories, software, etc. ("Everything there is to know about W3 is linked directly or indirectly to this document," it says.)

The navigational tools provided at the CERN Web Home include a catalogue of Web nodes organized alphabetically by subject.

Astronomy is near the beginning of the alphabet, and so off we go to the home page of the American Astronomical Society. There we can read abstracts of papers to be presented at the society's upcoming meeting or check a register of job openings. A link from the AAAS page sends us to a voluminous directory of astronomical and astrophysical Web sites compiled at the Space Telescope Science Institute in Baltimore. From this list we might turn in many directions—to the Kitt Peak National Observatory, the Jet Propulsion Laboratory, the European Southern Observatory (want to know the weather in Chile?), or the archive of astrophysics e-prints at the Lawrence Livermore National Laboratory. Back at the Space Telescope Science Institute we can pick up images of the Shoemaker-Levy 9 cometary impacts on



Highway from Page 3

Digitization is spurring the convergence of computer, print, cable and telephone into one "mega-medium." But digital information takes up a lot of space. Images, sound and video require more bits than text. As a result, when they're transmitted digitally, video, images and sound are "wide loads," meaning they need expanded transmission capacity. Wider highways.

Enter fiber optics. A transmission system using thin, glass wires and sending information as pulses of light, fiber optics has a nearly limitless capacity to carry information. It represents a tremendous improvement over telephone's copper wires and cable television's coaxial cables—the transmission lines for the bulk of our communications today.

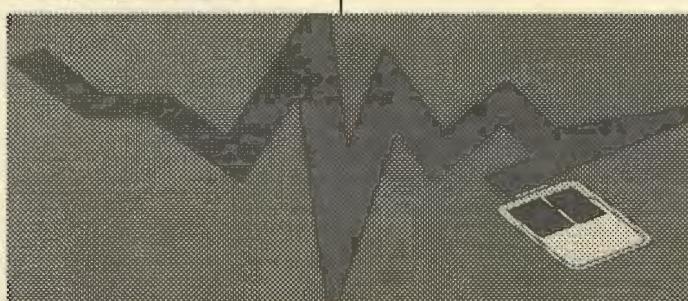
If cost were not a consideration, the information superhighway would be paved entirely paved with fiber optics. Already, AT&T, MCI and Sprint, the major long-distance phone companies, have installed fiber optic cables between major U.S. cities. However, the tremendous amount of rewiring needed to take fiber optics all the way into people's homes is prohibitively expensive—one estimate puts the cost at more than \$14 billion. As an alternative, government and private industry experts agree the information superhighway will involve a hybrid of fiber optics, coaxial cables and copper wires—just as the U.S. road system relies on an amalgam of interstate, freeways and two-lane roads.

Along with digitization and fiber optics, advances in switching technology are crucial to the building of the information superhighway. By allowing information to travel in different directions, switches are the key to making the information superhighway interactive—and to making everyone a potential distributor, not just a receiver, of information.

Blueprint for the Information Age

Because information will travel over different transmission systems, inter-operability—a term used to describe seamless communications set-ups allowing people to transfer information across different networks using diverse media—is crucial in the construction of the information superhighway. Access ramps will need to be constructed linking information transmitted by satellites, telephones, broadcasting and cable to the information infrastructure.

What other important design concerns are on the minds of information superhighway planners and construction crews? One is the need for interactive systems allowing people to be information providers as well as receivers. Promoting more dialogues between citizens and their elected representatives, for example, depends on interactive communications. Advocates of interactive systems point to the rapid growth of the Internet and other computer networks enabling citizens to participate in electronic discussion groups, post messages on bulletin boards, and send and receive electronic mail as proof the public wants two-way communications.



Another design concern is the need for systems that are "user-friendly." For some people, the prospect of using new technology can be daunting. Access to the information superhighway should be easy, say highway designers. Expect an array of menu-driven systems that let people "point and click" to make selections.

The Center for Policy Alternatives' Burck Smith suggested another way to help adults overcome the fear of technology. "Use kids. Often they know more about technology than their parents. Get the kids on-line and have them get their parents on-line."

Construction Zone Ahead

But before anyone gets on-line, the information superhighway actually has to be constructed. One of today's most crucial issues: who will build it? Government and industry agree the superhighway will be built by the private sector, but beyond that all bets are off. The leading contenders are the telephone and cable industries, but other communications companies are devising ways to get involved. The rash of mergers and strategic alliances among telephone, cable and other communications industries notwithstanding, the competition—in both the development and use of the information superhighway—is likely to become fierce.

Driving the Public Interest

Promoting greater competition within industries is a major goal in the government's push for completion of the information superhighway, while visions of tolls and other revenues from new services are driving the private sector's interest. But what about reinvigorating citizen participation? Should improving the democratic process be a principal objective of the information superhighway? "Absolutely," say individuals and groups involved in civic-sector issues.

"The League of Women Voters views the emergence of new communications technologies as an exciting development. We believe the information superhighway can and must play an important role in encouraging great citizen participation in the democratic process," L.W.V. President Becky Cain told *The National Voter*.

A look back at the development of cable television—a medium that grew

rapidly during the 1980s—illustrates both the promise and the peril of emerging communications technologies in boosting citizen involvement. Along with expanding the number of programming channels the average American home receives, cable is responsible for C-SPAN, the cable network airing gavel-to-gavel coverage of congressional proceedings. But large segments of the population, because of economic or geographic reasons, do not have cable and are unable to watch Congress in action.

Turning to the information superhighway and communications technologies of the future, potential problems already are developing. The tension between commercial and public users is

one of the biggest. "The dominant vision of the information superhighway," according to Jeffrey Chester, founder and executive director of the Center for Media Education, "has been a 'virtual shopping mall,' with pay-per-view and home shopping. But what happens when news and public affairs programs are available only on a pay-per-view basis?"

Chester's alternative? Channels on the information superhighway dedicated to news, public affairs and other civic programming produced by public interest groups such as the League. "We have to present a different model, where 'Channels for Democracy' coexist with shopping and video-on-demand," he added.

Many public interest groups and non-profit organizations would agree. And some are beginning to test the feasibility of democracy programs. Some are beginning to test the feasibility of democracy programs, if not full-fledged channels. For example, the League of Women Voters Education Fund's "Wired for Democracy" project is experimenting with the use of emerging technologies to provide important voter services to communities.

The League's ideas about using the information superhighway for pro-democracy purposes are shared by many. *The National Information Infrastructure: Agenda for Action*—the Clinton administration vision paper—noted, "The National Information Infrastructure could be used to create an 'electronic commons' and promote the public interest." The report went on to suggest several approaches, such as community access networks similar to today's public access computer networks, and making sure federal, state and local governments use the NII to expand public access to government information.

On another point the *Agenda for Action* is emphatic: "This nation cannot accept a division of our people among telecommunications 'have' and 'have nots.' The Administration is committed to...giving all Americans who desire it easy, affordable access to advanced communications and information services, regardless of income, disability or location."

Avoiding Information Apartheid

In discussions about the information superhighway, the use of technology to ease divisions between information haves and have nots has emerged as one of the hottest public policy issues. Much of the debate centers around the concept of universal service, a long-held policy goal that everyone in the United States should have access to low-cost basic communications services.

As the United States moves into the information age, the price of full citizenship will be a function of having access to communications technologies. Since these technologies go beyond basic telephone service—the benchmark established by current communications law—the definition of universal service will need to be expanded.

"One compelling argument for universal service is that these (new technologies) will be the tools that are necessary for participation in our democracy. We can't leave anyone out," explained Donna Edwards of the Center for a New Democracy during the League's Wired for Democracy training conference in April 1994. The Center does research and public education on ways to expand democratic representation and civic participation.

Many states have adopted universal service policies to ensure people have minimum telephone and other lifeline services. But questions remain about who will pay for the construction of the

information safety net. One approach: require high-end users to subsidize low-income Americans' tolls.

Beyond universal service, policy makers are setting their sights on other important goals, such as guaranteeing citizens the freedom to communicate, ensuring a diverse and competitive marketplace, protecting privacy, and involving the public in the development of policies for the information infrastructure. These principles are crucial to the public interest, according to the Telecommunications Policy Roundtable (TPR), a coalition of nonprofit groups that includes the American Civil Liberties Union, Public Citizen and the Benton Foundation among its members. The TPR holds monthly meetings in Washington, DC, and is working to create new approaches to building the nation's emerging information infrastructure.



The Government's Role

So, if private industries are building it and if nonprofit groups and symposia are shaping consensus on the public policy questions, what's the role of the federal government in all of this?

According to *Putting the Information Infrastructure to Work*, a report released by the Clinton administration's Information Infrastructure Task Force in May 1994, "The government's role is to set the rules for competition and enforce them, ensure that improvements in public communication benefit all Americans rather than a select few, promote the adoption of standards that allow systems to inter-operate, ensure that intellectual property rights are respected, support research to improve information systems and make them easier to use, be a wise purchaser of information technologies and services, and reduce uncertainty and risk by funding pilot projects that demonstrate the usefulness and economic efficiency of new services and applications."

Whew. And not only all of that, but the government must formulate an updated rationale for requiring the information superhighway to serve the public interest. In the Communications Act of 1934, public interest obligations for broadcasters are based on the idea that radio and television operators are using a scarce public resource—i.e., the airwaves. However, scarcity will fade as a rationale once the information superhighway delivers a near-infinite number of signals to the public.

In the Fast Lane: New Communications Laws?

Congress already has begun work on a new public interest rationale and other related issues. But the real focus of legislation being considered by both the House and Senate in 1994 is allowing more competition in telecommunications. If passed, the measures would bring about the first comprehensive overhaul of

U.S. communications law since the Communications Act of 1934.

According to Rep. Edward Markey (D MA), chair of the House Energy and Commerce Committee's Subcommittee on Telecommunications and Finance, Congress's task is "to unleash the entrepreneurial energy that will bring forth a rush of new products and services, while at the same time ensuring that...industries cannot use their newfound freedoms to beat back potential competitors using unfair advantages."

Dialing for Democracy

Whether Congress will complete action on any of the communications overhaul bills under consideration remains to be seen. But public interest groups and others are pushing ahead on their own.

The Center for Policy Alternatives is just one of the groups working to make certain the needs of citizens are considered as construction of the information superhighway gets under way. A primary goal of the center's Telecommunications Project is to ensure that all citizens have access to the information infrastructure without regard to economic or physical condition.

Another group, the Center for Media Education, is leading a campaign to reserve 20 percent of the information superhighway capacity for democratic uses. "We want public space reserved for democracy channels. There could be C-SPANs in every state, legislatures televised by nonprofit, nonpartisan organizations," noted the center's Jeffrey Chester.

'Electronic red-lining' is a concern being addressed by the Center for New Democracy and others. (Like financial institutions that refuse to make loans to residents of low-income communities, some fear communications providers may engage in electronic red-lining to deny poor communities enhanced communications services.) When Bell Atlantic first proposed to offer video dialtone service to affluent suburbs of Washington, DC, for example, the center raised concerns. As originally proposed, the Bell Atlantic system would skip low-income, inner-city neighborhoods and suburbs. Pressure from public interest groups encouraged the company to "revisit the issue," according to Edwards. And in June 1994, Bell Atlantic unveiled a new proposal that included many low-income areas among those slated to have access to the service, an advanced, two-way video network.

Other groups dedicated to making sure the public interest has a role in the development of the information superhighway include the Benton Foundation's Communications Policy Project, the Electronic Frontier Foundation, the Consumer Federation of America, the Center for Civic Networking and nonprofit communications policy groups such as the Media Access Project.

Proof Positive

Already, even before the information superhighway is completed, there is ample evidence that the principles these groups are fighting for—universal access and interactive communications—work in the real world. A few examples:

- The Internet provides a number of important lessons on how the information superhighway can work. Comprising more than 2,000 smaller computer networks, the Internet connects millions of people in the more than 130 countries into an electronic community. Network users share data, participate in discussion groups, post comments on bulletin board systems, send each

other electronic mail and chat live. What the Internet is for text and pictures, the information superhighway could become for the full range of audio, video and text communication. But there are problems with the Internet as the model for the information superhighway. Many people agree the Internet is not very "user-friendly." They suggest the concept and structure of the information superhighway must be easily understood. If not, they warn, the average person will never bother to use it.

- The Santa Monica, CA, Public Electronic Network (PEN) allows for interactive dialogues between citizens and officeholders through computer forums. With access to PEN through personal computers or publicly available terminals, citizens can use the network to send e-mail messages to city hall.

- Washington, DC's CapAccess is a public access computer network providing bulletin board services and local information to area residents' schools, homes, and libraries. The system includes the "virtual offices" of Senator Charles Robb and Representative Jim Moran, two Virginia Democrats. These electronic offices let CapAccess users read Robb's and Moran's speeches and position statements. Commenting on CapAccess's mission, executive director Taylor Walsh explained, "Our goal is to set up public access sites and provide support and training."

Still more projects are under development to test the feasibility of televoting, electronic information booths and the benefits of fiber optic systems. "The communications revolution has the potential to change our society for the better—if we do it right," noted Rep. Markey.

And doing it right will depend on how successfully the construction of the information superhighway resolves the need for universal service, full interactivity, democracy channels and other issues.

"The decisions we make in the next few years will determine the electronic legacy we leave our children," according to Chester. "This is a critical moment in the nation's history."

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Graphics from Page 5

It is now time to rein in on the vector graphics parade. Although wonderful in their own right, they carry serious burdens. Because you are not dealing with individual pixels, vectors are very hard to edit. There is no equivalent of an "eraser." You can delete portions of a graphic, but putting something in its place is not for the faint of heart.

Because the internal mechanism is complex, screen draws can be very slow. Normally, you work on a wire-frame draft object, and turn to some sort of preview to see the image in full detail and color. If you are working on a complex vector image and you add one tiny part, the entire thing is redrawn. The more complex the image, the longer the redraw. Needless to say, printing a complex vector image can be very time consuming.

Furthermore, you cannot blend colors and manipulate colors the way you can in a paint program. Color support is robust in the vector world, but images normally are constructed for brightness and clarity. Complex coloration is possible, but only by those who know how to ride the pony very well. You can import Paint (bit mapped) graphics inside a vector program, where you can move and scale them. Most programs do not let you see them in any detail, and, with the exception of *WordPerfect Presentation*, editing pixel graphics is impossible inside a Draw program. This is no great handicap, but adds another complication.

Utilities exist to convert bit mapped graphics to vectors. The results, however, are always imperfect and require "node editing" inside the Draw program. Node editing is never easy, and can be beastly difficult. Luckily, vector clip art is available in astounding quantities (*CorelDRAW* comes bundled with 12,000 images), and professional collections are very good. There is also much available on some BBSes, although the quality is uneven. The most common file formats include EPS, CGM, CDR (*Corel*), DFX (*AutoCAD*), and most WPG (*WordPerfect*). In all cases, the result will be crisp output with a very "professional" appearance.

Nothing is free in the computer world, however. Regardless of type, graphics' software imposes some potentially heavy burdens. Considering its power, the software itself is very reasonably priced. Fine Paint programs are available for under \$100, and decent ones are far less. A top-end bit mapped program like *Fractal Design Painter* is around \$250. Some photo-imaging software is very costly, but is for pros only.

Draw programs have traditionally been more expensive, but that is changing fast. Both *Arts and Letters* and *Micrografx* sell very good economy versions of their large Draw programs for around \$100. Full-featured Draw programs like my friend *CorelDRAW* are in the \$300-\$400 range. They include powerful features and sometimes come with associated programs. *Corel 3.0*, for instance, has *CorelDRAW* (the flagship drawing program), *CorelPaint* (a very good paint and photo imaging

program), *CorelChart* (an extraordinary charting program for business presentations), and enough Adobe and TrueType fonts to choke a giraffe. Full-featured business presentation software is in the \$300 range. Needless to say, watch for competitive upgrades.

Now for the bad news. Depending upon your needs, the necessary hardware ranges from minimal to the computer equivalent of a nuclear weapon. Old PC *Paintbrush* used to work fine on XT's, and equivalents exist today. (There are good, small, cheap, Paint programs in shareware.) In general, Paint programs themselves do not require great CPU speed for composition or screen refresh. A healthy dose of memory, however, is very helpful if you want to make a high-resolution image that is also large.

Draw programs want more computer power. The calculations and screen redraws involved are big time and CPU-intensive.



You cannot have too much speed for this type of graphic. Memory requirements are heavier than those found for Paint software. You can find low-level Draw programs that will run on 2 megs of memory, but bring lunch. Consider 4MB the minimum requirement; there is no maximum.

Things get worse. Graphics' programs require good peripherals, more than any other type of software. Unless you enjoy admiring your work on screen, graphics must be output to some device. Dot-matrix and InkJet printers will do for basic purposes, but, in the real world, this means you must buy a laser printer. Make sure that it carries at least 1.5MB of memory. Nothing will make you reach for a cyanide capsule quicker than spending hours on a complex graphic, and then finding that your laser printer cannot quite print it all.

If you are going to use graphics directly, you will also note that the software's awesome color capabilities are wasted totally with a standard printer. Although color printers are still a luxury (the color DeskJet is doing well), this will change as prices drop. I would advise any small business that creates its own graphics to get a color laser printer. The output is very good, and, to say the least, does a far better job of catching the customer's eye.

Naturally, the software needs a good supply of memory in both computer and printer. We are dealing with potentially very big files. This means, you guessed it, a big hard drive. *Stacker* might not help you here either. Some file formats shrink greatly, others not at all. Serious graphics' users will get a basic CD-ROM in a hurry. Professional and public domain images are widely available on CD, and it is the perfect medium for clip art.

Floptical or removable drives of all sorts are common in the graphics' world for graphics' storage. Floppies, believe me, may be fine for the casual user, but easily become a nightmare for image archiving.

We're not done yet. Two more peripherals verge on necessity. If you are going to personalize your graphics (one of the computer's great strengths, after all), you will need a scanner. I know this is heresy, but for most folks, a basic hand scanner will work wonderfully. If you need full-page graphics, you will need a larger model. *Do not forget copyright laws.* (Scanning things from books or journals is hazardous to your legal health, if you use them commercially.)

You also need a good video card. Speed is helpful for redraws. Just as important, however, you want a card that supports all the colors of the rainbow. Many new cards come with chips supporting a 32,000 or 64,000 color palette. A "true color" chip providing 16 million colors is better yet. You may think 256 colors is fine. Trust Uncle Eric -- it isn't if you like graphics. Don't forget, decent graphics' software supports true-color output. If you want to see what you produced (or make it in the first place with a bit mapped program), you need the proper card. You also need the proper driver. This brings us to *Windows*.

Most PC graphics' programs today are on *Windows*, which has one great advantage: excellent video drivers support. (It has a poor PostScript driver. If you need PostScript output and your software does not supply its own, stay away from *Windows*.) If you are transferring simple graphics to another program via Clipboard, *Windows* is nice. Importing graphics from disk if you understand basic file management is not a Herculean task.

Embedding a graphic via OLE is a cute stunt. Using OLE as intended, for "document oriented" computing, is a joke.

However, the main reason for *Windows'* dominance of graphics is marketing. People equate the GUI with *Windows*, and the GUI with graphics. It's funny, really; all graphics programs, by definition, have a graphical interface. All use the Mac-inspired menu system; you know, File on the left, Edit next to it, and so on. What you lose in *Windows* is speed. Speed is not important at a certain level. However, if you are composing a complex graphical image, speed becomes very important. Redraws can drive you nuts, and you see them by the dozens. Don't even think of multitasking a major graphics program with another CPU-hungry application unless you have memory galore or time to blow. *Windows* is fine for basic graphics, but, if you are serious, look for alternatives. They exist in DOS, UNIX, OS/2, and the Mac. All are superior.

Every software company, graphics' producers included, boasts of its product's "power" and "ease of use." *Windows* and, I hate to admit it, OS/2, make the same boast about their interface, implying that the shell will somehow make the application simple.

Well then, is graphical software both powerful and easy to use? This is a very tricky question. On one level, the creators of contemporary graphics' programs have done a wonderful job of making stunning graphics available to a very wide range of users. You could take someone and teach him to use *CorelDRAW* with basic text manipulation and clip art in a very short time. The results would be good. The same is true with a good Paint program. Business graphics' packages all have templates that I

recommend to anyone in a hurry. The outcome is so favorable that I would urge anyone to have some graphics software.

Even if your hardware is minimal, you can do some nifty and simple things. However, do not think you can create something from scratch without a very hefty learning curve. All graphics' software is deep. There are technicalities galore. File formats are odd, but must be mastered. You must know what your hardware can do. If you are using business graphics, you are going to get involved with some type of scripting and output via slides. Above all, you are in the world of professionals. The best hardware and software will never replace the training gained by someone who understands layout and color. Nothing made of silicon will replace the eye of the artist. To tell you the truth, I am glad about that.

Warnings aside, ladies and gents, graphics software is a monument to the creativity of today's computer industry. Give it a shot.

Some Words to Remember

I have never seen more flux in the computer world than exists at present. There are moving targets in almost every field of hardware and software. In one place, however, almost all converge: the need for memory. It makes me queasy to see all the very powerful computers advertised as coming with *Windows* and 4MB of RAM. If you want to do serious computing now and certainly in the future, you *need 16MB of RAM*.

Some hardware pundits extol the importance of graphic accelerators for *Windows* and more advanced systems. They are right, but only if you have enough memory. If you have 8MB, much less 4, you will be in virtual memory very fast in *Windows* if you multitask. Complex programs now coming to *Windows* are memory pigs.

Your hard drive is used to create virtual memory; you don't have to be Steven Jobs to figure out that system RAM is far faster. If you want fast, reliable computing, stay off the disk as long as you can. Doing so requires lots of system memory. You are way better off with a lesser CPU and more memory than vice versa. Remember something else, memory must be installed in banks. If you get 4MB, you can only go to 8 (8 x 1MB SIMMs), unless you squander money on a special card. If you want 16MB, you must do it from the beginning (4 x 4MB SIMMs). Unless you have an EISA or PS/2, however, do not get more than 16MB, but do not get less.

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Simple Specifications

The connector to connector spacing simply says the spacing between any two connectors on a SCSI cable should be least one foot. For instance, a cable to connect three SCSI devices to a host adapter should be at least three feet long. Typically, the host adapter is not located beside the drives so the distance from the host adapter to the first device can be greater than one foot. In this case, it's better to allocate two feet for spacing between the end connector and the first device. Using the stretch factor results in a very simple rule:

The length of any SCSI cable should be equal to the total number of connectors plus one foot.

Applying the simple rule to the above example results in a cable length of four feet. How simple indeed. Now anyone can design their own SCSI cables.

Build Your Own?

Can SCSI cables be fabricated? It's not hard for most hobbyists to do. For many, it may be the only means of obtaining cables when a custom cable can't be purchased at any price. Also, it saves big bucks.

Cables are usually fabricated using Insulation Displacement Connectors. IDC connectors use a type of cable wire with special insulation designed to be pierced by the connector. Attachment is made in seconds using a special IDC or arbor press.

No Press?

A small vise with 3 to 6 inch jaws will serve as a press. A *Sharpie* felt tip pen, a sharp pair of scissors, a few scraps of carpet padding, and a little tape is all that is needed to complete the hobbyist tool set.

Active Terminator Required

Important! The ends of a SCSI cable must be terminated. Terminators, as the name infers, electrically terminate the end of a cable. Terminators absorb excess electrical energy to prevent energy from reflecting back down the cable path. Reflected signals are undesirable because they interfere with normal signals causing signal errors.

Each end of the cable needs a terminator but there should never be more terminators than cable ends in any SCSI system. (Host adapters contain terminators even though they are not always visible.)

What kind of terminator should be used? While it is possible to terminate the cable using the terminator contained within the last device on the cable there are significant disadvantages. The terminators in drives are usually passive terminators. It is far

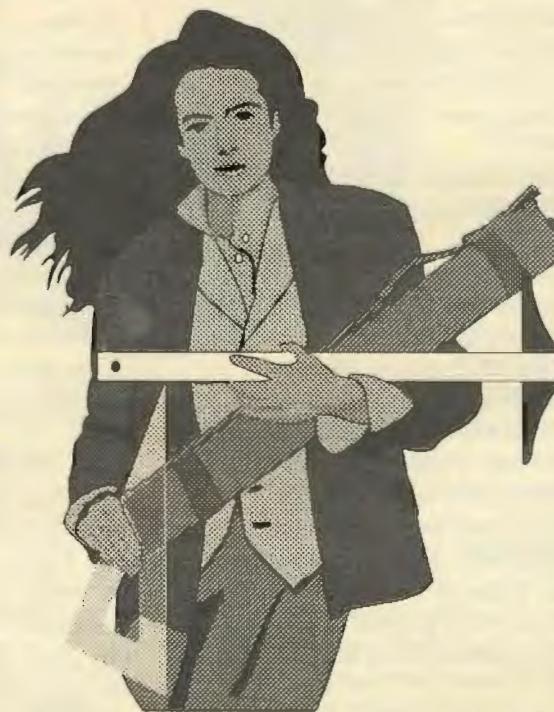
better to add a connector to the cable and dedicate that connector to a plug-in active terminator. This adds another foot to the cable length, but adds utility and enhances the quality of the termination.

All plug in terminators look alike. When purchasing, be sure to ask for an *active terminator*.

When using a plug in terminator the terminators within each device must be disabled. This is done by either switching off the terminator or by removing SIP or DIP resistor networks. Consult the device manufacturer's documentation for details.

Most terminators require electrical power. The power is supplied by the SCSI device and/or via the cable from the host adapter. Most host adapters have a fused source to supply this power. Up to three sources may simultaneously power the terminator. The presence of terminator power may be verified by measuring approximately 4.75 volts between pins 26 and 1 (ground) on any SCSI cable connector.

Document the Design



Before shopping for parts, design the cable on paper. Don't forget to add connectors for the host adapter and the terminator. If connector identification is a problem carry any existing cables to the store or make a sketch or tracings of the mating connector.

Cable component parts can be obtained within Silicon Valley at stores such as Ace, Action, Halted, and Haltek. A recent price check showed best prices at Ace and Action and best selection at Action.

Head Start

Many of the surplus stores have used cables. Used cables are an excellent source of parts and serve as assembly samples. Sometimes used cables can be modified, rather than starting from scratch. Look for the gray connectors (3M part) with metal retainer clips.

Inserting a bent paper clip end beside the metal clips allows easy removal of the retainer. The black connectors (AMP) without metal clips usually are not salvageable.

Whenever assembling or disassembling connectors, it is good idea to mate the connector with its opposite type connector. This prevents pins from bending or falling out and reduces breakage. Don't forget to buy extra connectors for this purpose. Surplus cable parts are ideal for this purpose.

The ribbon cable itself is often the most expensive component. Sometimes buying a long length surplus cable can provide the material. Don't overlook the 60 conductor cables. SCSI cables normally use 50 conductor cables, but the less popular 60 conductor cables are cheaper. Splitting off the extra 10 conductors is easy to do. Surplus stores are a good source of terminators too. The most common terminators use a slightly different connector similar to a (so called) *Centronics* printer connector. If you select this kind be sure it's an *Active Terminator*. Less effective and only slightly cheaper are *Passive Terminators*. A better solution is the IDC AMP terminator offered by *Action*. This terminator allows daisy chaining the cable if it is ever necessary to extend it. Don't forget to buy the mating connector for the terminator.



Build It!

Start cable fabrication by routing the cable along side the already mounted SCSI devices. Orient the cable with the red edge stripe on the right side when viewing the devices from the rear. For each SCSI device, check the device connector carefully. Mark the location of connector to be attached on the ribbon cable.

If device pin 1 is located on the right side and/or the center notch is located on top, mark the location "BACK". If device pin 1 is located on the left side and/or the center notch is located on the bottom, mark the location "FRONT". Don't forget to observe the one foot minimum spacing between the connectors.

Caution: There are four possible orientations for attaching the connectors - and only one is correct. The ribbon cable has a red stripe along one edge. This red stripe must align with pin 1 (normally denoted with a small arrow or ridge on the connector body) on both connectors.

Temporarily mate the first connector with a corresponding scrap connector. (This will protect the pins during the following pressing process.) Separate the retainer back from the mated pair.

If the location is marked "BACK", place the retainer back over the marking. Place the connector body on the opposite side of ribbon. Slowly mate the retainer back to the connector body.

If the location is marked "FRONT", place the connector body over the marking. Put the retainer back on the opposite side of the ribbon. Slowly mate the retainer back to the connector body. Verify that cable connector pin 1 is on the same side as the ribbon stripe before completing the mating procedure.

Hold or tape the connector in place while positng the connector in a vice lined with carpet padding. Slowly compress the vice until the retainer back is completely mated with the body. When completely mated, the ends of the retainer back should snap into place.

Repeat the process by pressing the remaining connectors. Excess cable can be trimmed off using the scissors although this is probably not necessary unless the six meter cable length is exceeded. The terminator must be at the very end of the cable regardless of the length of the cable. (If using both internal and external cables, turn off or disable the terminator on the host adapter.)

Inspect all the connectors for damaged or mismatched parts. If everything is OK, install the cable and test out the system.

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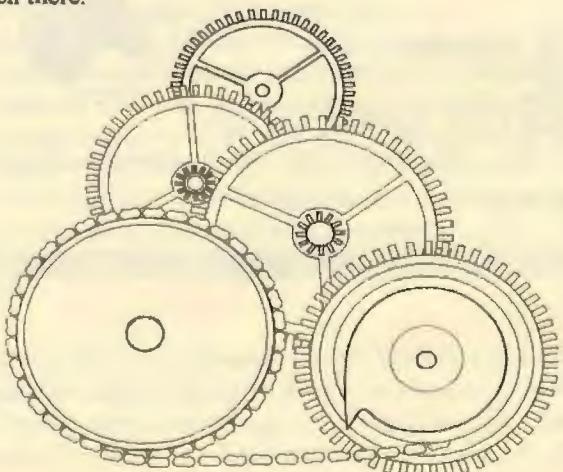
Web from Page 6

Jupiter. (In July, the images were being posted on the Web hours after they were made.)

Astronomers have taken to the Web with particular eagerness, but other disciplines are also well represented. A mathematician might stop first at the home page of the American Mathematical Society which has a preprint archive, or look over the latest issue of the *Electronic Journal of Combinatorics*. The Geometry Center at the University of Minnesota has one of the most carefully tended Web pages. It includes a gallery of geometric images and a facility for running software installed on computers at the center; for example, you could experiment with Eugenio Durand's program for generating quasiperiodic tilings.

For the biologist on the Web a likely starting point is the biosciences list maintained at Harvard University as part of the World Wide Web Virtual Library project. Essentially all of the genomic and protein databases that have become so central to the practice of molecular biology are now accessible on the Web. A site at the National Institutes of Health provides direct access to GenBank and the Brookhaven Protein Data Bank. The Genome Database at the Johns Hopkins University has a hypertext WWW interface, and Hopkins also offers Web access to sequence-alignment software available at the Oak Ridge National Laboratory. Running a DNA query sequence through the Oak Ridge programs yields a list of possible matches, with each item in the list a hypertext link to the database entry on that sequence. For another kind of biology, the Lawrence Berkeley Laboratory has a "frog dissection kit"; unlike the real thing, it's as easy to put back together as it is to take apart.

Perhaps the most important nodes on the Web are those that index and organize resources. Wandering aimlessly from node to node is always engrossing but not always very productive. It is like wandering through the stacks of a large library and stopping whenever a title catches your eye: you will probably find something interesting but not necessarily what you want. The various lists of links mentioned above are analogous to a library catalogue, but the Web also has more flexible search-and-retrieval services. For example, the World Wide Web Worm (at the University of Colorado) and the Web Crawler (at the University of Washington) are programs that periodically explore every node they can reach and compile a database of what they find; when you query the database, the results are presented as a list of hypertext links, so that you need only click on an item to be taken there.



How the Web Works

The inventor and chief architect of the World Wide Web is Tim Berners-Lee, a text-processing expert on the staff at CERN. He first proposed the system in 1989 as a tool for creating and reading structured documents such as software manuals. The first components of the system were working by 1991, but the Web did not begin to spread outside the high-energy physics community until 1993.

The most fundamental technology underlying the Web is the Hypertext Transport Protocol, or HTTP, which is the set of rules governing communication between a browser, or client, and a Web server. The ordinary user of the Web needn't know anything of this protocol.

At a somewhat higher level of abstraction is HTML, the Hypertext Markup Language, which is the notation for writing documents that appear on the Web. HTML is a simplified derivative of SGML, the Standard Generalized Markup Language. A key feature of HTML is that it describes content rather than appearance. Tags inserted into the text identify its component parts—headings, paragraphs, references, etc.—without saying explicitly how those parts should be presented on the page. How a subheading or a quotation should be formatted is a decision left to the browser software. In most cases the browser in turn gives stylistic control to the reader.

The mechanism for creating hypertext links is part of HTML. Just as there are tags to label paragraphs and lists, there is a tag called an anchor that the browser interprets as a link to another file:

```
<A HREF="file.html">Link</A>
```

Here all the material within angle brackets is instruction to the browser and will not be visible in the formatted display. The "A" denotes the start of an anchor, and the "/A" marks the end of it. "HREF" stands for hypertext reference, and it is followed by the name of the file to be opened when the link is selected. Everything between the <A...> and the , which in this case is the single word "Link," is displayed with appropriate highlighting to identify it as a link.

One more bit of essential apparatus is a notation for specifying files and other resources stored on remote computers. The notation is called a uniform resource locator, or URL, and it looks like this:

```
http://machine.domain/directory/file.html
```

The first part of the URL, in front of the colon, identifies the kind of resource; "http," naturally, specifies a document to be accessed with the Web's own hypertext transport protocol. Other possible designators include "ftp," "gopher" and "news." The rest of the URL tells where to find the resource, using a syntax that amalgamates the domain-name system of the Internet with the hierarchical directory structure of UNIX and other operating systems.

It bears emphasizing that you can navigate the Web without learning anything about HTTP or HTML or even URLs. They are part of the infrastructure of the Web and are normally kept out of sight. The component of the Web that is visible—indeed, conspicuous—is the client software. And a major reason for the Web's popularity is that it has been blessed with spectacular

client software. The premier browser is a program called Mosaic, originally written by Marc Andreessen at the National Center for Supercomputing Applications in Illinois and developed further by a team of programmers at NCSA. It is software that works so well and so naturally that you can't help smiling the first time you lay hands on it. Mosaic is so closely associated with the Web that the two things are sometimes confused, but there are several other browsers as well. A new one for the Macintosh, called MacWeb, written by John Hardin and his colleagues at the Microelectronics and Computer Technology Corporation in Texas, is just as impressive as Mosaic. Both of these programs are distributed free over the Internet.

Putting your own information onto the Web—that is, publishing your own home page—requires server software as well as somewhat more technical expertise. Both CERN and NCSA offer versions of the UNIX server called httpd (the “d” at the end of the name is Unixese for a “demon,” a program that runs in the background). There are also servers for Macintosh and Windows computers. You will need to create HTML documents with links to any other resources that are to be available to visitors.

Why the Web Works

Two years ago, the World Wide Web was an unnoticed and almost undetectable presence on the network. Since then it has been the fastest-growing service on the Internet (which itself has been growing at a fearful rate). By September 1993, Web traffic amounted to 1 percent of the data volume on NSFnet, one of the Internet's main arteries. The most recent statistics, for June 1994 show that the Web now accounts for at least 6 percent of NSFnet traffic, more than either Gopher service or electronic mail. The Web volume in June was nearly a trillion bytes, and it has been doubling every two or three months.

The Web has some distinctive properties that set it apart from other Internet services:

- The Web is transparent. You can begin to forget where you are and think of the entire Web as one big file system. Whether a node is in Geneva or New Zealand, it's just a click away.
- The Web is democratic. It is a web, not a tree-like hierarchy. There is no official top node. You can start anywhere and follow any path from site to site.
- The Web is sessionless. Each request issued to a server is a separate transaction, which lasts only as long as it takes to transfer the data. Between requests, while you are reading, the browser consumes no network resources.
- The Web encourages sharing and discourages hoarding. Protocols such as Gopher and ftp help you find a document and then bring home a copy. The Web can be used in the same way, but most Web documents work best when they are left in place. People generally retain only a reference to a document (typically as an item on a “hotlist” that the browser maintains).
- The Web is paperless. Yes, you can print a copy of a document, but all the life goes out of it as soon as it leaves the

screen because the hypertext links become inactive. Sounds and videos, of course, cannot be printed at all. There is a positive feedback loop at work here. If a document makes use of devices that do not work on paper, then people will read it on the computer; if people read documents on the computer, then authors will be liberated to exploit devices that do not work on paper.

- The Web has a degree of formality. Whereas e-mail and Usenet news are media for hasty jottings and rantings, material published on the Web is generally prepared with greater thought and care. Home pages are meticulously designed (although not always well-designed).
- The Web is modular and extensible. Most browsers do not attempt to understand all possible media and file formats. Instead they rely on “helper” programs that are automatically launched when needed, such as when there is a sound or a video to be played. With this mechanism it is fairly easy to accommodate new media and formats.

Other aspects of the Web give rise to misgivings:

- Availability is one problem. There are text-only browsers than can be used with almost any Internet account, but to get the full effect of the Web, you need a computer that is directly present on the Internet. Many potential readers and authors are therefore shut out.
- Solving the availability problem will probably create more serious worries about bandwidth—that is, the information-carrying capacity of the network. The Web protocol is reasonably efficient, but because of the graphics and other hypermedia elements, someone browsing the Web generates far more network traffic than someone reading electronic mail or Usenet news.
- I have concerns of my own about the effect of the Web on the nature of writing. Hypertext offers an intoxicating opportunity to incorporate ideas by reference rather than by quoting or paraphrase. This out to be a good thing. Based on the evidence on the Web today, however, hypertext has an alarming tendency to degenerate into a list, or at best an outline, without narrative continuity. Among Web authors there is too much compiling going on and too little writing.
- The visual presentation of information on the Web is also in a primitive state. Developing the art and technology of printing a magazine like this one [*American Scientist*] has taken a couple of centuries; the necessary skills cannot be transferred overnight to a new medium. The fact that the Web puts typographic controls in the hands of the reader complicates the situation further.

Watching myself browse the Web brings up still another worry. With the excuse of preparing to write this column, I have spent many late nights wandering the Web from one node to the next, glassy-eyed, weary, waiting to be entertained. It is easy to fall into an almost hypnotic state, clicking the mouse on new links in much the same way that you click the button on the television remote control. Thus it appears

Continued on Page 16

we have another addictive, passive medium, ready to kidnap America's children—those few who have not already succumbed to television itself or to video games. If the Web succeeds as I expect it to, the next generation decline in SAT scores may well be blamed on WWW rather than TV. In my view the hazard of immersion in alternative realities is a real one, but our response to it betrays some curious cultural biases. Look at a child reading a book, turning page after page as if in a trance, oblivious to the "real" world. This behavior, too, looks obsessive or addictive, but no one seems to be upset about the menace of all those libraries in the heart of America's cities.

As I was writing this essay and trying to find ways of conveying my enthusiasm for the Web, I kept toying with a half-remembered quotation from an unremembered source: "I have seen the future, and it works." Yes, I thought, that's just how I feel, coming back to the world of paper and faxes and telephones after a few hours on the Web. Finally I resorted to *Bartlett* to find out who said it first, and about what. The actual words are: "I have been over into the future, and it works." They were spoken by Lincoln Steffens in 1918. He was just back from a visit to the revolutionary new regime in Russia.

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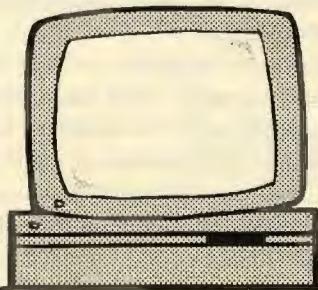
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The Weekend Webster

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There is more to the Web than physics and mathematics and other earnest pursuits. Here are some lighter links. If this were a page on the Web itself, you could merely click on the boldface headings to be taken to each site. Since this is printed on unclickable paper, you will have to type the URLs into a Web browser.

Information on the Superhighway. A color-coded map shows average speeds at several dozen points along the San Diego Freeway system, updated minute by minute. Is your car computer on the Web?

<http://www.scubed.com:8001/caltrans/transnet.html>

Le WebLouvre. Unlike other museums, this one lets you take the paintings home with you—pixel by pixel. The galleries opened in March, and when I last visited in July, I was issued ticket number 73,310.

<http://mistral.enst.fr/~pioch/louvre/>

The Juggling Information Service. See Anthony Gatto juggle eight rings. Get software that teaches the juggler's art.

<http://www.hal.com/services/juggle/>

Internet-accessible Coke Machines. Check the stock of your favorite vending machines at Carnegie-Mellon, Columbia and other caffeine capitals. At Berkeley you can also see who's been eating the HoHos and the Death Muffins. If you have an account, you can buy a Coke from a machine in Perth while sitting at a terminal in Peoria.

<http://www.cs.cmu.edu:8001/afs/cs.cmu.edu/user/bsy/www/coke.html>

LEGO. The history of LEGO bricks; the LEGOLand theme park in Denmark; a tour of the LEGO factory in Enfield, Connecticut; LEGO robots.

<http://legowww.itek.norut.no/>

The Weather. Several weather Gophers can be accessed through the Web, but there is also a native HTTP page at Michigan State. Superimposed on a national weather-radar map are the current temperatures in a few hundred cities; clicking on a temperature calls up a detailed weather report.

<http://rs560.cl.msu.edu/weather/interactive.html>

Recipes. There are several large recipe archives in the U.S., but I went looking for Cajun cooking. I found it in New Zealand.

<http://www.vuw.ac.nz/who/Amy.Gale/recipe-index.html>

Lunch. See what Sho Kuwamoto, graduate student at Purdue University, has in his brown bag today.

http://physics.purdue.edu/~sho/lunch_main.html

Bluedog Can Count!! It's too stupid for words. Woof, woof.

<http://hp8.ini.cmu.edu:5550/bdf.html>

The Cartoon That Was Not Meant to Be

Carol Jessen, Sacra Blue
Sacramento PC Users Group, Inc.

As I write this, it is exactly a year since Bill Clinton was inaugurated as President. One evening back in late January of 1993, my husband Tom and I were dining at a local eatery when the topic of our conversation turned to the new administration.

We concocted a cartoon for Sacra Blue in the spirit of goodwill that accompanied the inauguration around the country, but it also was a pun-type inside joke for computer users. Our fellow diners obviously didn't understand the reason for the mirth at our dinner table.

The next day I set about putting the cartoon idea into form in Picture Publisher. First, I excised an image from a magazine article of Bill Clinton tooting on his saxophone. In the photo, Bill was wearing dark jazz-musician shades. Next, I extracted an image of a vaudeville soft-shoe dancer from a book of archival photos. The dancer was complete with bowler hat, cravat and spats. Then I fused Al Gore's head onto the body of the dancer by scanning an editorial photo of his election victory. Finally I added a couple of musical notes to the background and wrote in the title, "Al Gore Rhythm."

Larry Clark liked the idea enough to use it for Sacra Blue, but he was concerned about the copyrights of the magazine photos. The cartoon never made it to the pages of Sacra Blue, and I began a quest to find out about copyrights and how to get permission to use pre-existing images in computer composite imaging projects.

My experience is instructive for all computer users who scan, copy or edit images from sources other than their own creation. Since both the photos of Clinton and Gore were originally published in Time (although in separate issues), I wrote my first correspondence to Michelle Stephenson, the Picture Editor at the magazine. I outlined my purpose in asking for permission to use fragments of the images in an unrelated context and clarified that the use would be for a limited audience and not for profit. I waited for a reply. And waited and waited.

I gave up waiting. Then one day in June, four months later, I received a phone call from Miriam Wintakor, Ms. Stephenson's assistant. She said that the magazine was willing to grant permission for use of the images, but that I would also need releases from the two professional photographers who shot the original photos, even though they had sold the images to Time. She offered to connect me with both of the photographers. But eight months later I am still waiting to hear from either of them.

Copyright Law



In the meantime, I have collected information about copyrights which I will try to put into a meaningful context for computer users. Some of the following information is based on generalized notes on copyrights for textile artists prepared by Elizabeth Milligan for the SAQA Resources Directory.

A copyright protects an original work, whether text or music or image, two or three dimensional, from being copied by anyone

other than the owner of the copyright by any means of reproduction. Photocopying and scanning top the list of the ways that copyrights are violated. The owner of the copyright has exclusive rights to reproduce the work, produce derivative works from the original work, and distribute copies of the work to the public.

The terminology refers to "the owner of the copyright," not the creator of the work, because the copyright can be sold or licensed from one owner to another. This is why Time was unable to give Sacra Blue clear permission to use the photos of Clinton and Gore. The magazine had only a license to reproduce the images, while the photographers retained the copyrights. This is also why Paul McCartney doesn't own the Beatles' songs; Michael Jackson does -- he bought the copyrights to them.

The recent case of photographer Art Rogers versus sculptor Jeff Koons resulted in other clarifications of the copyright law that are important to computer users. Martha Buskirk, writing in Art in America, makes several points related to the case. First, no copier may defend the act of plagiarism by pointing out how much of the original he did not pirate. In other words, using a fragment of the original or excising a small portion of it does not exempt you from infringement of the copyright. Also, the medium does not preclude infringement.

That is to say, converting the image from a printed page, photograph, or other form of published media into a rasterized computer image does not void copyright protection. The image has still been appropriated; the means by which the appropriation has occurred are not relevant.

Copyright law does allow for "fair use" of images for purposes of critique, parody and other forms of commentary, but the creative expression of the original idea is protected. Also, a not-for-profit motive or the absence of an exchange of money or valuable consideration will not acquit a copyright violator.

In short, the copyright holder has a one-person monopoly on the reproduction and distribution of the work. He also has unlimited rights to sell or assign those copyrights to others. However, the copyright owner also has the responsibility of defending his copyright. Practically speaking, for any new work that you produce and want to protect, you should mark it and any duplicates of it with the three elements of an official copyright notice: 1) the copyright symbol (c), 2) the year of creation, and 3) the creator's name. A registered copyright is necessary for defending your work in litigation. Copyrights are not appropriate for techniques, processes or methods of operation. For those, patents are required, and you should consult a patent attorney.



Registering copyrights is easy and inexpensive (\$20). You can check with the reference librarian at your local library for a master copy of the registration form that is available for photocopying, or you can send a request for registration forms to The United States Copyright Office, Library of Congress, Washington, D.C. 20559. You must specify the type of your original work, as there are specific forms for visual arts, books, articles, music, etc. The 24-hour hot line phone number for the federal copyright agency is (202) 707-9100.

So much for how to protect yourself as the creator of computer art or writings. The most troublesome issue is how not to infringe upon the copyrights of others. Appropriation is rampant among computer users. Business presentations incorporate snippets of pre-published photos and drawings, and composite imaging artwork is embedded with borrowed images without regard to accreditation or remuneration to the creators. As a user you should be on the alert to avoid these kinds of circumstances.

Clip-art software will always include a written notice about the copyright status of the enclosed materials. For small bit-mapped or vector illustrations, you have most likely received a license to reproduce the clip-art by purchasing the software package. You may be limited to a certain number of clip-art images per document.

For photographic or video images, you have most likely received permission to reproduce a limited number of images royalty-free, while the original artists or software producers retain the copyrights to the enclosed materials.

If you are unsure of the copyright status of images that you want to use, consult an attorney. Even better, consult an intellectual property rights attorney. Remember that no project is so small that you can ignore the copyright protection of the materials that you incorporate into your own work. When in doubt, do not copy.

Ziff-Davis Interactive New Service Offering

Interchange is a new online information service and electronic publishing platform in the development stages. User group members may make ideal "beta" participants in a large-scale early release program.

Ziff-Davis Interactive (ZDI), publishers of ZiffNet on CompuServe and Prodigy, is creating a new commercial online service for people with a serious interest in computers.

Since user group members are "seriously interested in computers" they can offer valuable insight and feedback during the beta testing stages. While Interchange will be commercially available in late 1994, user group members can apply for the early-release program -- call 800/595-8555 to sign up.

Membership to Interchange is free during the early release program. System requirements include a 386 or 486 PC, Windows 3.1, VGA displays and a 2400 bps (or higher) modem.

Interchange will feature special interest services -- the first is Computing, with others to follow. The Computing service will present comprehensive information about buying and using PCs, including news and reference material, electronic publications from Ziff-Davis, IDG (and others), plus an extensive library of downloadable software. In addition to the special interest areas, Interchange will carry general news and references services,

financial market and investment information, and weather forecasts.

According to sources, "Interchange is unlike any online service thus far. User group officers are advised to keep ZDI and Interchange in mind for Fall product demonstrations."

For more information or to schedule a product demonstration, contact Jennifer Christensen at 617/252/5477.

Old Drivers on New Software

by Bill Allen, North Orange County Computer Club

Many club members may be aware of the following. I was not. For those who, like me, are still learning I submit this anecdote.

I recently bought the MICROSOFT OFFICE software, which includes WORD, EXCEL, and POWER POINT. When using WORD I could not get any of the TRUETYPE fonts to appear although they were available for EXCEL. My son-in-law loaded his OFFICE package on my computer and was able to use WORD with all the TRUETYPE fonts I had on my machine.

I called the MICROSOFT forum on COMPUERVE for some expert advice. Most of what I got was specifics on how to leave messages on COMPUERVE, which I apparently did incorrectly. The little I got regarding WORD and TRUETYPE fonts was right out of the manual, which I had already read and tried. I signed off after getting no real help.

In groping around to solve my problem it occurred to me that the printer driver might be the cause of the problem. I believed it had to be unlikely that a printer driver could prevent WORD from recognizing WINDOWS TRUETYPE fonts. But that turned out to be the case.

In checking my WINDOWS drivers using my trusty XTREE GOLD, I determined that the HP-IIP PLUS printer driver loaded by WINDOWS was dated 1988. That's a six year old program. Could that be the problem. It was.

A quick modem call to MICROSOFT's bulletin board located a 1993 driver. I replaced the old driver with the new one. That solved the problem. Now I had all my TRUETYPE fonts available for WORD and EXCEL.

It may be that other drivers provided with current copies of WINDOWS, OFFICE, etc., will also be old enough to be incompatible with new software, even from the same manufacturer. This could be the result of a possible lack of quality control at MICROSOFT. So much for TOTAL QUALITY MANAGEMENT!

Hopefully, this story will help another computer neophyte solve a similar problem in the future.



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