AUGUST 1999

SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3 7:00	4 7:00	5 7:00	6 Uptown Art Fair	7 Uptown Art Fair
8 Uptown Art Fair	9 7:00	10	11 7:00	12 7:00	13	14
15	16 7:00	17 7:00	18 7:00	19 7:00 / 7:00am	20	21
22	23 6:00 ? / Mac 7:00	24 Club Picnic 6:00 PM	25 7:00	26 6:30	27	28
29	30	31	1	2	3	4
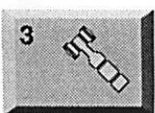
3 — **Board of Directors**
mini'app'les members welcome.
Byerly's
7171 France Ave. S., Edina
Lisa Huston, 612-825-1245
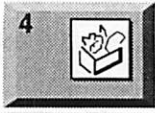
4 — **AppleWorks / ClarisWorks SIG**
Southdale Library
70th & York, Edina
John Hunkins, Jr., 651-457-8949
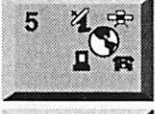
5 — **Telecommunications SIG**
Epiphany Lutheran Church
1414 East 48th Street S, Mpls
Bert Persson, 612-861-9578

9 — **Apple II/GS Main SIG**
Augsburg Park Library
7100 Nicollet, Richfield
Tom Gates, 612-789-6981

11 — **Microsoft Word SIG**
2850 Metro Drive Rm 124,
Bloomington
Tom Ostertag, D 612-951-5520 E
651-488-9979

12 — **Macintosh Main**
Washburn Library;
5244 Lyndale Avenue S, Mpls
Denis Diekhoff,
612-920-2437

16 — **Fourth Dimension SIG**
8200 Humbolt Ave South
2nd Flr. Conference Rm.
Bloomington
David Ringsmuth, 612-853-3024
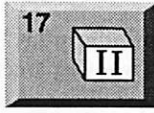
17 — **Apple II Novice SIG**
Ramsey County Library
2180 Hamline Avenue, Roseville
Tom Gates, 612-789-6981

18 — **Photoshop-Digital Imaging**
Washburn Library
5244 Lyndale Ave S, Mpls
Denis Diekhoff, 612-920-2437
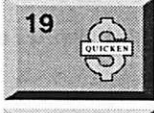
19 — **Quicken/Investment SIG**
2850 Metro Drive, Rm 124
Bloomington
Dale Strand, 612-835-5872
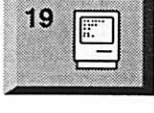
19 — **Macintosh Consultants SIG**
Embers
7525 Wayzata Blvd
St. Louis Park
Bob Demeules, 612-559-1124
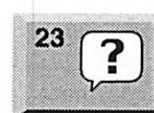
23 — **Macintosh Novice SIG**
Merriam Park Library
Marshall & Fairview, St Paul
Richard Becker, 612-870-0659

23 — **Meet Your iMac / Mac SIG**
Merriam Park Library
Marshall & Fairview, St Paul
Brian Bantz, 612-956-9814

24 — **Picnic**
Minnihaha Falls Park
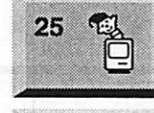
25 — **ResEdit / Programming SIG**
Washburn Library
5244 Lyndale Avenue S, Mpls
Lisa Huston, 612-825-1245

26 — **FileMaker Pro SIG**
Partners, Suite 5
1410 Energy Park Drive, St Paul
Steve Wilmes, 651-458-1513

mini'app'les

The Minnesota Apple Computer Users' Group, Inc.
P.O. Box 796, Hopkins, MN 55343
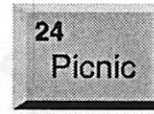
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612-825-1245
macgal84@aol.com

Vice President — Denis Diekhoff
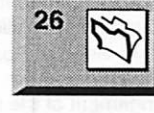612-920-2437

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Mac Software — Bryan Lienke

Apple II — Owen Aaland

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Questions – Please direct questions to an appropriate board member. Users with technical questions should refer to the Members Helping Members section.

Dealers – mini'app'les does not endorse specific dealers. The club promotes distribution of information which may help members identify best buys and service. The club itself does not participate in bulk purchases of media, software, hardware and publications. Members may organize such activities on behalf of other members.

Advertisers – For information, see Newsletter Ad Rates box within this issue.

Newsletter Contributions – Please send contributions directly to our Post Office, Box 796, Hopkins, MN 55343 or upload them to our BBS at 612-595-9404.

Deadline for material for the next newsletter is the 1st of the month. An article will be printed when space permits and, if in the opinion of the Newsletter Editor or Manager, it constitutes material suitable for publication.
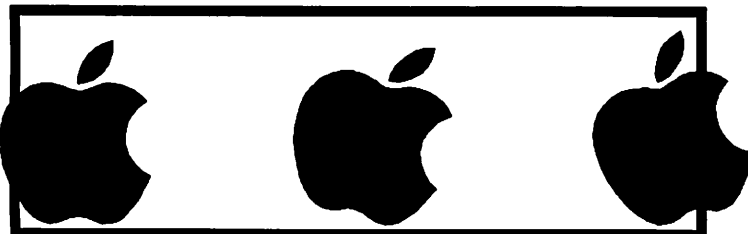
Editor/Publisher: Tom Ostertag 651-488-9979

Newsletter Layout: John Pruski

mini'app'les BBS – 612-595-9404, (co-located on Twin City Interlink BBS), 24 hrs. Settings: 8-1-0.Call in with FirstClass® Client software or any text-based terminal program.

mini'app'les Voice Mail – 651-229-6952

mini'app'les WWW site: http://www.miniapples.org

mini'app'les e-mail: miniapples_info@tcilink.com

CHANGE OF ADDRESS

Moving? Going to be away from home and leaving a forwarding address with the Post Office? Please send us a Change of Address when you are informing others. By using a moment of your time and a few cents to drop us a card, you save the club some money and you get your newsletter delivered promptly to your new address. If you don't inform us, the Post Office puts your newsletter in the trash (they don't forward third class mail) and charges the club for informing us of your new address. Change of Address should be sent to the club's mailing address: mini'app'les, Attn: Membership Director, Box 796, Hopkins, MN 55343.

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September 1999 Preview

Here is the tentative calendar of our Special Interest Group (SIG) meetings for September 1999. Please pencil these events on your calendar. As always, when doubtful of a SIG date, time, or location, confirm with one of the following:
- Our BBS, the Calendar Folder in the Conferences Folder
- Our Voice Mail Telephone number: 651-229-6952
- The cognizant SIG Leader

Wednesday	September 1	AppleWorks nee ClarisWorks SIG
Thursday	September 2	Telecom SIG
Tuesday	September 7	Board of Directors meeting
Wednesday	September 8	Microsoft Word SIG
Thursday	September 9	MacintoshMain SIG
Monday	September 13	Apple II/GS Main SIG
Wednesday	September 15	PhotoShop / Digital Imaging SIG
Thursday	September 16	Quicken/Investing SIG
Thursday	September 16	Macintosh Consultants
Monday	September 20	Fourth Dimension SIG
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Wednesday	September 22	ResEdit / Programming SI
Thursday	September 23	FileMaker Pro SIG
Monday	September 27	Meet Your iMac / Mac SIG, 6:00pm
Monday	September 27	Macintosh Novice SIG, 7:00pm

Members Helping Members

Need Help? Have a question the manual doesn't answer? Members Helping Members is a group of volunteers who have generously agreed to help. They are just a phone (or an e-mail) away. Please call only during the appropriate times, if you are a member, and own the software in question.

Apple II / IIGS Software & Hardware	1, 6, 9
ClarisDraw	3
AppleWorks / ClarisWorks	2, 8, 9, 10
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FirstClass	2
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1.	Les Anderson	651-735-3953	DEW
2.	Brian Bantz	612-956-9814	DEW
3.	Mike Carlson	218-387-2257	D
4.	Eric Jacobson	651-645-6264	D
5.	Nick Ludwig	612-593-7410	DEW
6.	Tom Ostertag	651-488-9979	EW
7.	Ardie Predweshny	612-823-6713	DEW
8.	Owen Strand	612-427-2868	D
9.	Bruce Thompson	612-546-1088	EW
10.	Pam Lienke	651-457-6026	EW
11.	Tom Lufkin	651-698-6523	EW
12.	Ben Stallings	612-870-4584	DEW
13.	Chuck Hauge	651-292-9029	D
14.	Rodney O. Lain	651-452-5821	EW

D: Days, generally 9 a.m. to 5 p.m.
E: Evenings, generally 5 p.m. to 9 p.m.
W: Weekends, generally 1 p.m. to 9 p.m.

Please call at reasonable hours, and ask if it is a convenient time for them. By the way, many of these volunteers can also be contacted on our BBS. We appreciate your cooperation.

If you would like to be a Members Helping Member volunteer, please send an e-mail message to John Pruski on our BBS, or call him at 612-938-2818, with your name, telephone number, contact hours, and the software or hardware areas you are willing to help others.

Macintosh PowerPC CPU Guide

by Geoff Duncan

On the inside, all computers - including Macintoshes - consist of several interacting systems. Some of these systems handle memory, while others handle disks, networking, add-on cards, video, audio, mice, keyboards, and other items. The more features a computer has, the more systems it's likely to have.

A computer's CPU, or Central Processing Unit, is responsible for making these systems work together, and largely determines what software the computer can run. Although some systems can operate alone for a bit, the bottom line is that almost nothing happens without the CPU directing the action. Therefore, there are three basic guidelines when considering a computer purchase:

1. Pick the right CPU for the work the computer will do
2. Pick a CPU fast enough to get that work done efficiently
3. Since the work will usually involve some systems more than others, pick a computer where those systems will best keep up with the CPU

That said, here's an overview of specific things to consider when purchasing a Macintosh.
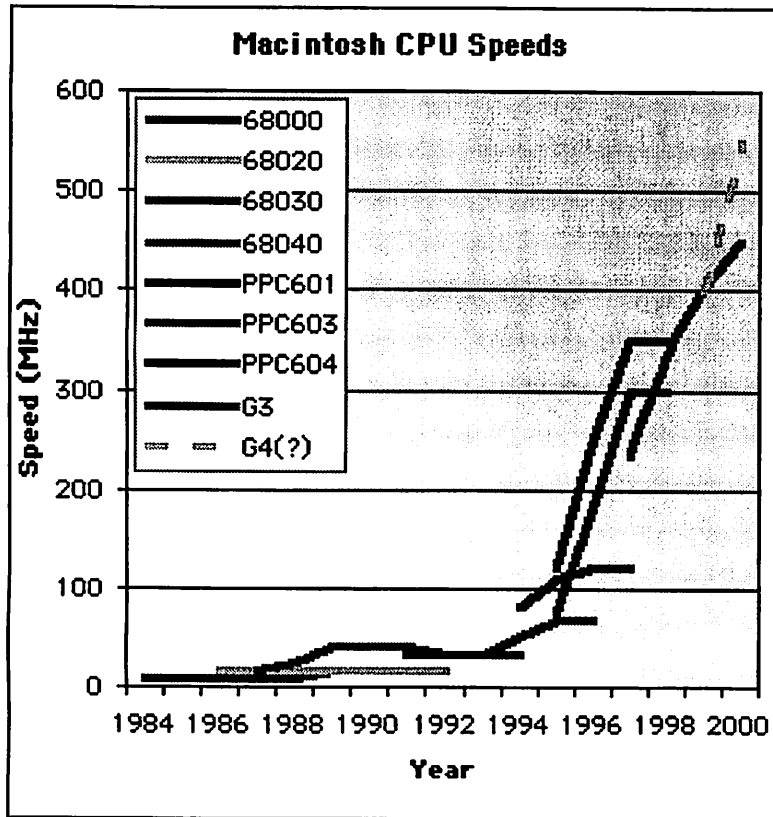
The PowerPC Family

Apple introduced the first PowerPC-based Macintoshes in 1994, based on the PowerPC 601 CPU. More recently, Macs have been using PowerPC 603, 604, and G3 processors. These CPUs are designed for different purposes, and are used in different sorts of computers.

PowerPC 603s: The PowerPC 603 was intended to be a smaller, newer version of the original PowerPC 601 processor that could be used at higher speeds with lower power consumption, making it suitable for use in laptops. PowerPC 603s first appeared in Macs in 1995, and several revised versions (under the collective name 603e) were shipping in current Macintosh models through 1998. PowerPC 603s appear at clock speeds from 75 to 300 MHz in consumer-oriented laptop and desktop computers.

PowerPC 604s: Designed at the same time as the PowerPC 603 series, the PowerPC 604 was intended to be a high-end, powerhouse processor. PowerPC 604 CPUs are larger and use more power than PowerPC 603s (you'll never see a laptop with a 604!), and that extra room to flex helps make them 20 to 33 percent faster than a PowerPC 603 running at the same clock speed. (Faster internal systems also tend to make 604-based machines outperform 603-based systems; see below.) PowerPC 604s appeared in 1995 starting at 120 MHz; revised versions under the names 604e and Mach5 were shipping through 1998 at speeds up to 350 MHz. PowerPC 604 processors appear in high-performance workstations, high-end consumer machines, and servers.

PowerPC G3 (750): The PowerPC 750, or G3, uses design and manufacturing techniques derived from PowerPC 603 and 604 series, combining the 603s' low power requirements with 604s' raw performance. But the G3s have two tricks up their sleeves: they're optimized specifically for the Mac OS and sport a fast onboard "backside" cache (see below), both of which significantly boost real-world performance. The result is a small, inexpensive CPU that outperforms anything previously offered in a Macintosh (or a PC!). Currently, the G3 dominates the Macintosh product line at speeds starting at 233 MHz, with top speeds expected to exceed 400 MHz. Because of their unique capabilities, G3 processors appear in entry-level consumer systems, a

Macintosh CPU Speeds

Legend: 68000, 68020, 68030, 68040, PPC601, PPC603, PPC604, G3, G4(?)

Y-axis: Speed (MHz) — 0, 100, 200, 300, 400, 500, 600
X-axis: Year — 1984 1986 1988 1990 1992 1994 1996 1998 2000

wide range of laptops, as well as high-end workstations and servers.

The Future: The next few years seem to hold the promise of two new PowerPC processors, currently codenamed the G4 and the G2000. The PowerPC G4 will feature multiple processor cores - essentially separate G3 processors - and a new, lightning fast unit called AltiVec that should vastly accelerate graphics and media functions. Further down the road is the G2000, which should be available in speeds surpassing 1 GHz and feature a completely redesigned core plus robust multi-processor support.

(If you're curious about the evolution of Macintosh CPUs, I've made some tables and a graph generally outlining CPUs used in the entire history of the Mac.)

Of Buses, Caches, Disks, Video, and Upgrades

The System Bus: Current PowerPC CPUs generally have more than enough computing power for everyday tasks; however, all that speed doesn't help if the processor spends most of its time waiting for the rest of the computer. The CPU communicates with most other systems in the computer using the system bus. You can think of the system bus as a single, large pathway shared by most of the computer's systems. For instance, when a program needs a file from your hard disk, the CPU sends a request across the system bus to the disk drive. When the hard drive has found the file, it's returned to the CPU across the same system bus. Then the CPU probably places some or all of that data in RAM, again sending the information across the bus.

Two factors determine system bus performance: speed and width. The faster and wider the bus, the faster the CPU can get information to and from various systems,

which increases the real-world performance (and price!) of the entire computer. Recent PowerPC-based systems have system buses that are 64 bits wide running at speeds from 37 to 83 MHz, with the faster buses usually in high-end systems and servers. However, although a computer's CPU speed will almost always part of a its description, the computer's system bus speed may be buried in a technical specification or not mentioned at all. Don't let CPU speed fool you: a computer with a 200 MHz processor and a 66 MHz bus is significantly faster than a computer with the same 200 MHz processor and a 40 MHz bus. When choosing a computer, be sure the system's bus speed is appropriate for your work. If you'll be moving large amounts of data between systems (say, doing audio or video editing), then get as fast a system bus as possible. If a slower system bus will do (say for email, word processing, and typical Web browsing), you can use that knowledge to buy a less expensive computer that still meets your needs. If you don't know a computer's system bus speed, you can check Web sites like the Apple Spec

Database or EveryMac.com.

Caches: To prevent unnecessary trips across the system bus, every PowerPC CPU has some built-in memory where it can store frequently used data and instructions. This is called the Level 1 cache, and varies from 16K in the first PowerPC 603s to 64K in G3s. Most PowerPC systems also use Level 2 (L2) cache, which is another area of high-speed memory used exclusively by the processor, varying in size from 256K to 1 MB. In pre-G3 systems, the processor had to access the Level 2 cache by crossing the same system bus as every other component of the computer. Beginning with the G3s, the Level 2 cache was moved onto a private, high-speed bus only used by the CPU. These "backside" caches generally run at one-half to the full speed of the CPU itself - much faster than the system bus - giving G3 systems a significant performance boost over earlier designs.

If a PowerPC computer doesn't have any Level 2 cache, it needs some: a PowerPC with a 256K Level 2 cache can deliver 10 to 20 percent better performance than a

CPU	Speeds	Years	**Representative Macs**
68000 Ser.	8 - 16 MHz	1984 - 1991	Mac Plus, SE, Classic, Powerbook 100
68020 Ser.	16 MHz	1987 - 1991	Mac II, original LC
68030 Ser.	16 - 40 MHz	1989 - 1994	Mac Classic II, SE/30, IIsi, IIci, IIfx; LCII, LCIII, Powerbook 140—180; numerous Performas
68040 68LC040	20 - "66" MHz	1991 - 1996	Quadra & Centris series; Powerbook 500 series; numerous LCs & Performas

Apple eventually advertised CPU speeds for some 68040 machines as 25/50 MHz and 33/66 MHz; the buses in these systems ran at 25 or 33 MHz, while the CPU used a different clock input to run at twice the bus speed. Although these CPUs are generally considered run at the machine's bus speed, I'm giving Apple the benefit of the doubt

---

PowerPC with no Level 2 cache at all. However, boosting L2 caches to 512K or 1 MB doesn't necessarily deliver significant performance improvements, unless the computer is being used for CPU-intensive tasks like image or video processing, 3D rendering, compiling, or scientific modeling.

Disks: These days, most Macs come with more disk space than most users need, and those disks generally perform well. However, if you need to add hard drives - or move drives from an existing Mac to a new one - you should pay attention to the SCSI speed of the new computer. Think of how slow your computer writes to a floppy disk; having a new machine with a fast system bus and a fast processor won't matter if it just waits around for a hard drive! Nearly every Mac supports external SCSI drives, but at a comparatively slow speed of 5 MB per second. Some systems - especially workstations or servers - support internal SCSI drives at speeds of 10 MB per second. If you need faster drive response - for video capture, serving files or databases, etc. - then consider using internal drives on a computer with a 10 MB per second bus, or using a third-party SCSI PCI expansion card (which can provide speeds of up to 80 MB per second).

Video: When you're using a Macintosh, you don't look at the CPU, system bus, or disks: you look at the screen. Although using a high quality monitor with your system is always a good idea, also keep in mind the speed and quality of the video system.

Almost every Macintosh comes with some sort of built-in video that usually works fine for everyday computing. However, if you're using a very large monitor or doing graphics-intensive tasks like editing photos or playing action games, you may want to consider a third-party video card. Third party video cards can accelerate 2D graphics and/or 3D rendering,

and (with enough video memory) display millions of colors on enormous displays. The speed (or lack thereof) in video hardware becomes more apparent with large displays. While nearly all video systems do fine with a 640 by 480 display, that same system might be more sluggish using a 1024 by 768 display (after all, it has to handle more than 2.5 times as many pixels!) Similarly, a system with 4 MB of video RAM can display 24-bit color on a display measuring 1280 by 1024 pixels (typical for a 20 or 21 inch monitor), but a 2 MB video system would only be able to display 256 colors or greys. If you plan to use built-in video, be sure it has enough video RAM to support your display, or consider a third-party video card.

Don't forget that you can connect more than one monitor to most Macs, combining their displays into one extended desktop. Although this means your system has to display and update a larger screen area (via two or more video systems), I personally find using multiple monitors is the single best thing I can do to make me more productive.

Expansion & Upgrade Options: You need to consider not only the work your computer will be doing today, but the work it's likely to be doing in a year or two. Technology changes rapidly, and if you think your computing needs are going to change with it, you'll probably want a computer that can be meaningfully enhanced. Perhaps the most common upgrade is to add more RAM to a system, so I recommend a computer that can accommodate at least twice the amount of RAM you'll initially use, preferably with at least two memory sockets unoccupied. If you think the machine's function might change radically over time - say become a Web server or a system devoted to desktop publishing or production - be sure you can add PCI cards, which will allow you to enhance the machine's video, networking, and storage capabilities.

Generally, adding storage devices like a Zip drive or CD recorder isn't a problem, since almost every Mac supports external SCSI devices, but if those devices need to offer high-end performance, consider whether a computer can support them internally or

CPU	Speeds	Years	**Representative Macs**
601 Ser.	60 - 120 MHz	1994 - 1996	Power Mac 6100, 7100, 8100, 7500; Power Computing Power 120
603 603e	75 - 300 MHz	1995 - 1998	Performa 5000-6000 series; PowerBook 5300, 1400, 2400, 3400; numerous Mac clones
604 604e	120 - 350 MHz	1995 - 1998	Power Mac 7300, 7600, 8500, 8600, 9500, 9600; numerous Mac clones
G3	233 - 450(?) MHz	1997 - ??	Apple Power Mac G3s; Apple PowerBook G3s
G4	400(?) - 800(?) MHz	1999 - ??	??

whether you need a third-party SCSI option.

Many mid- and high-end Macintosh systems - including Power Macintosh G3 systems - have their CPUs mounted on removable daughtercards. In theory, these daughtercards can be replaced with a new card carrying a faster processor. These cards also replace the computer's main clock chip, so they can also increase the speed of the main system bus, say from 40 MHz to 50 MHz. For instance, it's possible to install a daughtercard with a 233 MHz 604e processor - or a 400 MHz G3 processor! - in a Power Mac 7500, which originally shipped with a 100 MHz PowerPC 601 CPU. Although Apple manufactures some daughtercards, third-party vendors develop most of them, and G3 processor upgrades are even available for some laptops and early Power Macs that don't use CPU daughtercards.

CPU daughter cards can offer a tremendous upgrade value, particularly if you have hardware (like peripheral devices or video cards) that would have to be replaced if you moved to a different type of computer. Although upgrading to a faster version of your current processor is generally quite safe (say, from a 120 MHz 604 to a 233 MHz 604), I generally only recommend technically inclined people consider upgrading to a different type of processor (say, from a 604 to a G3). The reason is that the resulting machine is often a hybrid that may or may not be supported by Apple and other vendors as new operating systems, software, and hardware devices are released

In Conclusion

Choosing the right CPU - 603, 604, or G3 - is an important part of a purchasing decision, but so is making sure the rest of the computer has the capabilities you need. PowerPC 603 systems offer more than enough horsepower for everyday computing tasks like word processing and spreadsheets; similarly, they're quite suitable for most Internet use, since the bottleneck there is usually a modem, which delivers data thousands of times more slowly than your CPU could process it. If you don't need fast subsystems, a variety of expansion options, or you're on a budget, 603-based machines can offer a great value.

If your work is processor-intensive - like graphics and publishing, video and audio production, programming, or database development - consider a mid-range or high-end system with a fast 604 or G3 processor, depending on the intensity of the work you'll be doing. It's hard to go wrong with these systems, and, of course, it's impossible to buy a computer that's too fast.

Finally, if you're technically inclined and already have a Mac with an upgradable CPU, consider a processor upgrade. They're generally less expensive than a whole new system and can offer tremendous performance improvement, so long as you're willing to deal with the possibility of owning a hybrid machine.

[Geoff Duncan is a freelance writer and consultant in the Seattle area, and also serves as technical editor for TidBITS, the long-running weekly Macintosh publication.]

Mini'app'les Annual Picnic in Minnehaha Park

by Bert Persson
SIG Director

The mini'app'les annual picnic will be held on the fourth Tuesday (8/24)
of August.

In past years our picnic was usually held on the fourth Thursday, but in order to avoid a scheduling collision with our File MakerPro friends, it was decided to change the date so they also could enjoy the good food and company that has been a tradition at our annual picnic. I should also mention to our new members that this is an excellent opportunity to get to know other members of our club and everyone is encouraged to bring their family and friends.

What should you bring to the picnic?

Each of us has brought our own food and a dessert to share. In previous years our tradition has been to bring a chocolate dessert, but with the latest dieting craze a large cream pie or a Key lime pie would certainly be appreciated, at least by this writer.

Last year there was some interest in having BBQ pork ribs and I smoked a batch which sold for little over cost, roughly $5 for a half slab. If there is any interest this year you can contact me on the BBS, e-mail at; bpersson@isd.net or call 612/861-9578.

With the corn season in full swing the club may also be able to provide corn on the cob as we did last year, in addition there may be other surprises. All in all we are

hoping for good weather and that the annual picnic will be enjoyable for everyone. Now for the most important part, were will it be held?

On the northwest corner by the Picnic Pavilion in Minnehaha

Mac Main

by Denis Diekhoff
Vice President

The August Mac Main will feature Myron Engle, Advantage One Solution's service Technician who will talk about what to do when bad things happen to good Mac users.

DI / Photoshop

Brad Taylor, Sales Manager for Corel has made arrangements for Wes Pack to present Corel 8 for the Mac. This intuitive paint /draw/layout program from Canada has been an industry standard on the Wintel side for years. It has been ported to, and is being marketed for the Mac. EVERYONE

Park.
Minnehaha Park is located at Hiawatha Ave. and Minnehaha Pkw E. Parking is available by the Picnic Pavilion, but for the frugal street parking is only a block away.

is invited to come and be amazed!

August Newsletter's Color Section.

What started out to be a gratitude gesture for mini'app'les many commercial supporters turned out to be a lesson in file transfer protocols.
We wanted the August Newsletter to be special so we could be handing it out to prospects during our membership recruitment activity during the Uptown Art Fair. A couple years ago Tim Brandt, from Xerox, hosted a DI meeting at Xerox, and showed us their line of commercial color printers. During our visit Tim offered to do a one sided color page for the

Hope to see you all by the Picnic Pavilion at 6:00 P.M on Tuesday, August 24, 1999.

Bert

Newsletter. When he heard about our special August issue he renewed the offer, and there the story begins. Most of the art files were sent to John Pruski, our Publications Director, in different file formats, and from different programs, through AOL who has their own protocols. This experience made it apparent that we soon need to have a Mac Main prezo on file transfer protocols. In addition to the Internet being unregulated, it is also un-uniform. We will be exploring some of the solutions soon.

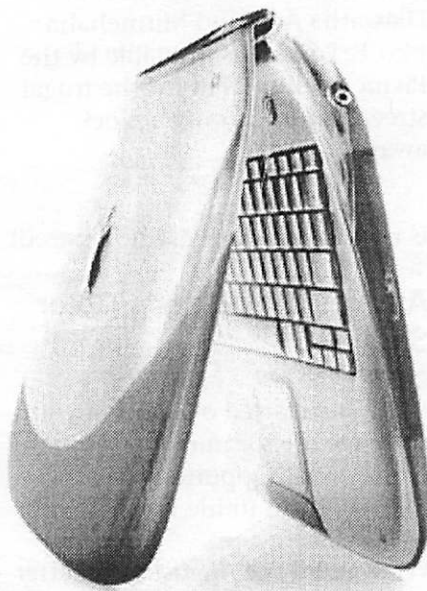John Pruski says he would like to thank everyone who helped with this issue, and appreciates your patience.

Apple Unveils iBook

Consumer and Education Portable is the "iMac To Go" Portable. First to Use New AirPort Wireless Networking

MACWORLD EXPO, NEW YORK—July 21, 1999—Building upon its success in the consumer and education markets with the popular iMac, Apple today unveiled iBook, the "iMac to Go." iBook features "all day" battery life of up to six hours, Pentium-toasting performance*, and Apple's revolutionary AirPort wireless Internet networking for cable-free Internet access (optional), all in a stunning notebook design available in two eye-catching colors—Blueberry and Tangerine.

iBook features a 12.1" TFT display for super-crisp images and video; a PowerPC G3 microprocessor that outperforms the fastest Intel processor found in any notebook PC; built-in 56K modem and 10/100BASE-T Ethernet networking; built-in CD-ROM drive; and two built-in antennas and an internal slot to accept Apple's new AirPort wireless networking card. iBook's design innovations include a rubber-coated translu-

cent enclosure for durability, a pullout handle for safe carrying, and a unique closing mechanism without latches for faster and easier access.

"iBook is the 'iMac to Go' for both home and school," said Steve Jobs, Apple's interim CEO. "And iBook was designed right from the start to use Apple's revolutionary new AirPort wireless networking for cable-free Internet access."

iBook, available in September for U.S. $1,599, features:

Brilliant 12.1-inch (diagonal) active-matrix TFT SVGA display with millions of colors at 800 x 600 resolution; Fast PowerPC G3 processor running at 300MHz with a high-speed 512K backside L2 cache; Up to six hours running time on a single charge of its Lithium-Ion battery; Instant Internet access via 56K modem or 10/100BASE-T Ethernet using EarthLink Total Access; AirPort wireless Internet connection option (antennas already built-in); Full-size, professional-quality keyboard; 24x CD-ROM drive; Great productivity, education and games software bundle; USB port for peripherals such as printers, input devices and storage devices; The world's easiest to use operating system, Mac® OS 8.6; 32MB SDRAM, expandable to 160MB; ATI RAGE Mobility graphic controller with 4MB SDRAM video memory and 2X AGP; 3.2GB IDE hard disk drive; Innovative power adapter that lets you wind up its cord like a YoYo; and Built-in stereo headphone jack.

* Based on industry standard ByteMark processor test.

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