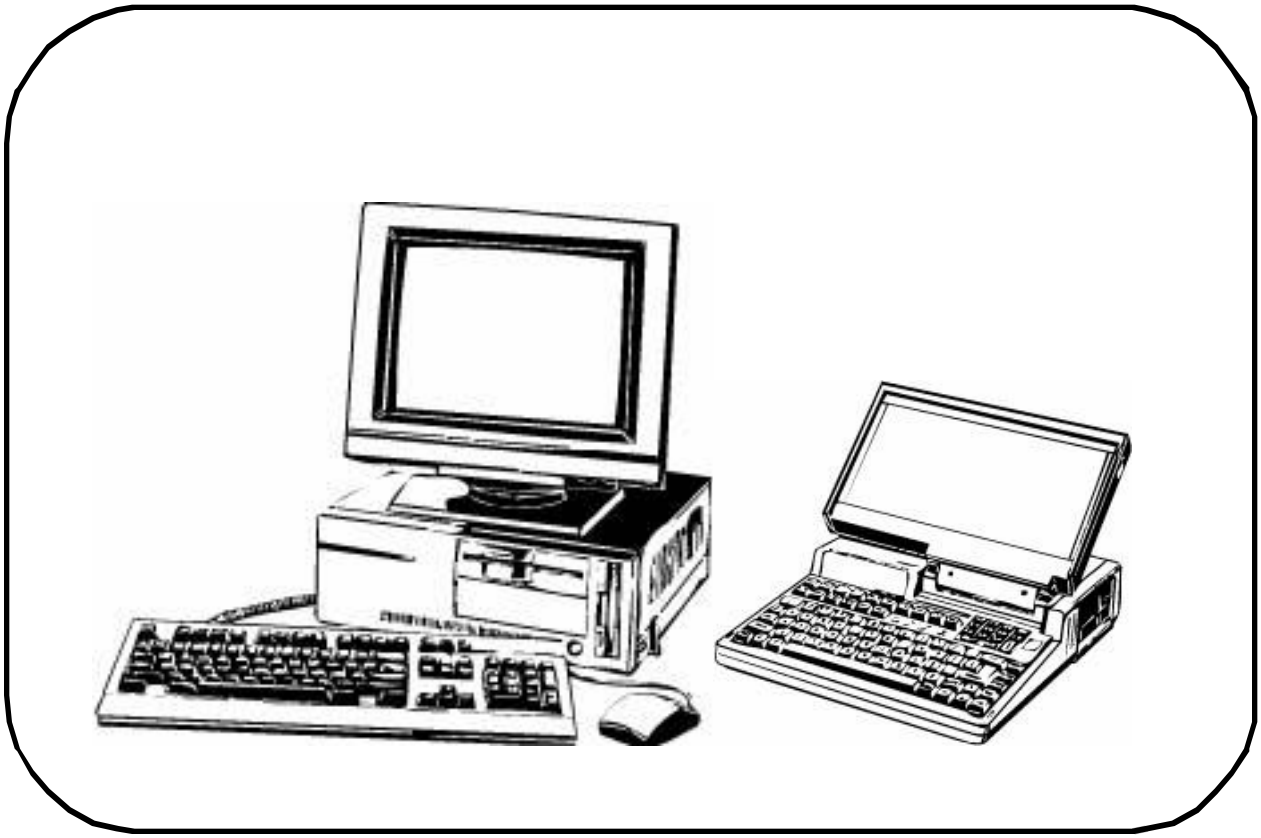
Computer Buying Tips for Beginners



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Computer Buying Tips for Beginners

We often get a lot of questions about purchasing a home computer, a new one here at NIEHS, or for those who want to get one for their children or parents. Before you take the plunge and buy, please take a few moments to read this handout which includes the MINIMUM STANDARDS for computer hardware at NIEHS (+ means "or higher"). Most of the time you won't be able to find a computer with just these minimums--in fact, most will be much higher numbers than what we give here, so don't be surprised. We give the minimums in case you are buying a used computer or getting a hand-me-down and would like to know if it will suit your needs.

Decision #1: Macintosh or PC?

This decision is probably not as important as it was a few years ago. In the past, some software applications were unavailable for PCs, and likewise, some were unavailable for Macs. Graphics and design folks almost universally bought Macintoshes for applications such as PageMaker and PhotoShop, and database users or number crunchers stuck to their PC clones.

However, because of changes to the operating environment and changes in hardware, choices based on application use are not as clear-cut. Microsoft Windows 3.1 made using a PC easier and more like a Macintosh, and for many, Windows 95/98/2000 or Windows NT are as good or better than the current Mac OS. The best way to decide which operating system **you** prefer is to use each operating system (try the Public Mac and Public PC in Bldg. 101, room A258) or stick with the type of machine you already know. And if you know which applications you are likely to use, try them out on both the Mac and the PC before you buy any hardware.

Many people are **very** loyal to a brand of computer (PC meaning a personal computer which runs Windows 95, Windows 98, Windows 20000, Windows NT, UNIX, LINUX, OS2, etc..., or Mac which is an Apple or Apple-clone machine and will argue with you to buy their favorites for many reasons. It is important that you make the decision based on what **you** will be using the computer for, rather than the preferences of one individual. If you are unsure, read this handout, tryout the computes and talk to several people before making your decision to buy a computer.

Decision #2: Desktop or Laptop?

In general, you will pay a premium for a notebook computer. This means that you will spend from $1,000 to $3,000 more for a laptop than for a desktop model with the same speed, memory and hard drive numbers. Think of this as paying for the feature of portability and decide whether portability is a

requirement for your computer. Many of the nicer (and more expensive) PC laptops now come with modular components that you can add or remove from your system as needed (e.g., the CD-ROM, DVD or diskette drives), and both PCs and Macs allow laptop users to add full-size monitors and keyboards for home or office use.

If you just think you **may** need to have a laptop either because it would be convenient to have once or twice a year, (or if it seems like you want to get one because it is cool), that extra couple thousand dollars for a laptop just isn't worth the price. If you do a lot of traveling or if you need to take your computer from home to office and back again, you have a stronger argument towards getting a laptop and spending that extra money.

Remember to consider that laptops are high-theft items and must be guarded closely when traveling. Also remember that they are delicate pieces of equipment and dropping them is a **very** bad thing--even if it is just from your lap to the floor as you sit on the couch while watching television and typing. They can't stand that kind of repeated abuse, or the abuse small children might put them through.

Mac or PC laptops should have the MINIMUMS described below in the PC and Mac sections but usually a modem can be substituted for an Ethernet network card--unless you are using it for home use or traveling a lot with it, then you should choose the modem instead.

If you plan on using the laptop at the home **and** the office on a regular basis, there are combination cards that have both modem and Ethernet connections built into one device as well as docking stations that turn the laptop into a desktop. Also, all laptops should have at least two PCMCIA slots for add-on cards. An additional consideration is that many laptops now come with optional CD-ROM drives since almost all software is now being shipped on CD.

Decision #3: What is the minimum system you should buy?

This should be the driving factor for purchasing a computer. It also allows you to browse around in computer stores and in software catalogs to see what is available and what various software packages require as minimums on a computer hardware setup.

The software is the piece that does things with all those funny parts inside the case of the computer. If it can't find the right parts, it won't work on that computer. So you must first decide what you want to **do** on your computer before you even start looking at what type and brand of machine you will buy.

And always keep in mind what you might want to use your computer for something you can't even image in the future, so go with as much as you can afford to get right now, even if you aren't ready to do that particular thing right now.

What do you want your computer to do?

- Word Processing?
- Home Finances?
- Games?
- Statistical Programming?

Find the software to do the job. This means that you **must** read the side of the box of software or the manufacturer's web page that you want to use and see what it requires as a minimum on the computer. Then you will know how powerful of a computer to buy. If you want to load several very large software packages on your computer, don't forget that there must be room on your hard drive to load them all.

Memory is divided up into two types: Hard drive memory and RAM. Hard drive (or disk) memory is used when you LOAD and STORE the software and your data files onto your computer. RAM is used to RUN (or EXECUTE) the programs once they are installed.

The hard drive is an oxide covered, circular metal disk encased in a box inside your computer while RAM are the memory chips added to the motherboard to allow programs to run. The more Hard Drive storage you have the more programs you can install. The more RAM memory you have the more programs you can run and the faster they will run.

Most software packages will list the minimum requirements.

- ***How much RAM is required to run the program?***

  Be sure to remember that your operating system (OS) will be using about 1G of RAM itself in addition to what other software programs will require to run them on your computer.

- ***How much hard drive space is required to install the program?***

  Be sure to add up the hard drive space that is required of all the computer programs you wish to install before deciding upon how large (or small) a hard drive you need. You can't add software to a hard drive that is nearly full or already full. If you need more space to add programs, you will have to remove or uninstall one of the software packages already installed.

Remember that your computer uses up part of the hard drive just to have the operating system installed:

Windows 95 - Approximately 330 MB
Windows 98 - Approximately 550 MB
Windows NT 4 - Approximately 385 MB
Windows 2000 - Approximately 883 MB

- ***What operating software is required to run the program?***

  When you buy a computer, it will come loaded with the operating system currently being sold as the newest. Sometimes you will see "operating system" abbreviated to "OS" on sales literature. Macintosh computers have OS 9, and PCs have Windows NT, or Windows 98 or Windows 2000 (Millenium Edition or Professional).

- ***What processor speed is required to run the program? (Mac: G3 or G4; PC: Pentium II or III, 400 MHz, etc.)***

  This is **very** important to pay attention to. Macintosh software **does not** run on a PC, and PC software does not run on a Macintosh unless you have either a PC Card (hardware) or one of the the software packages such as Virutal PC installed on it.

  NOTE: Some older games software packages marked for older model PCs or Macintoshes may not be able to run on the newer PC or Macintosh machines because the new machines are so fast it is difficult to control the action even though you have more than what the "system requirements" listing suggests on the box.

- ***Are you required to have a sound card, modem, CD-ROM, etc.?***

  If you don't have some of these parts, then the software may not be able to perform as advertised, or it may not work at all, or worse yet, you may even be unable to install it on your computer! Most new software packages come on a CD so you will at least need a CD ROM, DVD or CD-RW (all three can read software CDs).

  Many games require that they be played from the CD itself and that the CD drive be of a certain speed for the game to work properly (2x, 4x, 6x, 12x, 20x, 24x). Other games require sound as one of their primary attractions, without a sound card installed on the computer, these games aren't much fun!

Example of PC Minimum System Requirements for Roller Coaster Tycoon

- P90MHz
- 32Mb RAM,
- 4XCD
- 50MB hard disk
- 2MB SVGA card
- Windows 95/98
- Windows 95 compatible Sound Card, DirectX 5.0 (included on CD) and Mouse.
- Does not need 3D support or accessories.

Example of hardware requirements for QuickBooks 2000:

- IBM compatible Pentium computer with 32MB RAM.
- Windows 95, 98, or Windows NT 4.0 with Service Pack 3 (or higher).
- Hard disk with 85MB free disk space required for installation. Actual disk usage is less. Additional 9MB for Timer (optional).
- Internet Explorer 5.0 required. Program included; requires 55MB for installation.
- 256-color VGA monitor, SVGA monitor, or better is recommended (minimum resolution of 640 x 480, recommended 800 x 600).
- Works with any printer supported by Windows 95, 98 or NT 4.0 or higher.
- 2x CD-ROM (double speed).
- Payroll updates and all online features/services require Internet access with a connection speed of 28.8 or higher.

Tip: You should always go with the recommended requirements, **not** the minimum. The program will run better.

Once you have these questions answered, you will be on your way to determining your computer's hardware requirements. Take the total of all the hard disk requirements of the software you know you will be using and add the up and double that total. This way you have enough hard drive space to add more programs in the future.

Just the Facts: What are Your Recommendations?

Although these specifications were drawn up for helping employees at NIEHS in purchasing work computers, they are an excellent guide for buying a home machine as well.

IBM PCs AND COMPATIBLES

A standard PC should have a MINIMUM of:

Pentium III processor running at 400+ MHz
(Recommended: 600 MHz or greater)
64 MB of RAM ***(Recommended: 128MB or greater)***
6 GB Hard Disk ***(Recommended: 10GB or greater)***
32 Speed CD-ROM ***(Recommended: greater or DVD or CD-RW)***
15" SVGA Monitor ***(Recommended: 17" or greater)***
56K V.90 Modem ***(for home systems)***
10/100 BaseT Ethernet network interface card. ***(for workplace systems)***
Sound Card with External Speakers
2 or more USB Ports, 2 Serial Ports, 1 Parallel Port

(optional) Zip or Jaz drive for storing/transferring large files

MACINTOSH COMPUTERS

A standard Macintosh should have a MINIMUM of:

Macintosh G4 processor running at 400+ MHz
32+ MB RAM ***(Recommended: 64 MB RAM)***
10+ GB Hard Drive
20X+ Speed CD-ROM drive ***(Recommended: greater or DVD)***
10BaseT Ethernet network interface card (office use). ***(If not included with system purchased for the office)***
56K V90 modem (home use)

(optional) Diskette or SuperDiskZip drive
(optional) or Jaz drive for storing/transferring large files

Note: These newer Macintosh computers DO NOT come with a disk drive and typically have the option of a zip drive instead. If you have old software on diskettes or your own files saved on diskettes, remember to purchase either a disk or SuperDisk drive to use these files.

Decision #4: Should you consider Mail-order or a store purchase?

In addition to offering better pricing than retail stores, on-line web page or mail-order units also allow for greater flexibility than the assembled unit at a retailer's. Let's say you found a machine that meets all of the requirements to run your choice of software, except you are convinced that you need an additional 64M of RAM and you would prefer a 19” monitor instead of the 17” one that comes with a system. Many mail-order places give you a better deal and/or allow you to put together a machine that many retail stores won’t do or will charge you for each piece at a higher rate, or will give you the parts and expect you to be able to put them into your computer!

The following are just a few home pages are popular mail-order houses. Each allows you to configure the system of your dreams and see the bottom line dollars without a salesperson standing behind you. All of them offer technical support and service packages as well, many of which included in-home service.

Dell: **http://www.dell.com/**
Gateway 2000: **http://www.gateway.com/**
Micron: **http://www.micron.com/**
Apple: **http://www.apple.com/**

Software: **http://www.buydirect.com/?btb.buy**

Thing to consider when buying mail-order.

- Get a firm date of arrival. Some less reputable companies will sell you merchandise they don't have in stock, and then take months to get it to you.

- Make sure you get a 30 day money back guarantee when you order a system. Most shoddy computer components will fail during this period, so you need the protection. Quality control is a problem with all companies, even a good company can occasionally ship a dud. You should also check to see if you will have to pay for shipping or if this is included if the machine needs to be returned.

- Be careful with software that comes with your machine. If you do decide to return the machine, any opened software will be debited against the purchase price (even if it was advertised free with purchase). This usually isn't a big problem since most companies pre-load all relevant software on you new machine at the factory. Just be sure to try your new computer and when you are satisfied, then open the additional software. **Always ask for**

the software CDs or diskettes for the software that comes with your computer. Do not assume that they will be shipped.

- Make sure the mail-order company does not have a restocking fee, a charge for returning faulty merchandise.

- It is usually a poor idea to deal with companies that do not have an address listed, do not have a 1-800 number, or charge a percentage penalty if you use a credit card.

- Always pay by credit card (mail order, or retailer). If you are unsatisfied, this affords you a good deal of protection.

- Make sure you get what you order. Some companies have a statement (written in the small print) that they can freely substitute parts.

- Do they provide a 1-800 number for "free" warranty and technical support?

- What is the shipping cost to have the computer delivered?

Service and Support

Don't forget to consider service and support. When you are ready to purchase the computer, ask the dealer and **get it in writing**:

1. How long is the warranty?

Most manufacturers offer a standard warranty from six months to one year. But does this dealer support that warranty and offer additional coverage?

2. Does the dealer fix computers?

It is a real plus to know that your unit does not have to be shipped across an ocean for repair. Many places like BestBuy, Circut City or CompUSA do not fix the computers on-site. They ship them out to be repaired and thus add weeks to the repair time. Computers purchased on-line usually have 24 hour tech support and in-home service packages.

3. Does the dealer or manufacturer offer telephone support?

You just completed a 10 page report but when you try to print it, you get an error message! Or, the next day you go back to revise the

report and you can't find the file! An 800 number for technical support is a real added attraction.

Decision #5: What else will you need?

LASERJET OR INJET PRINTERS

For home use, an inexpensive inkjet will be more than adequate. Laserjets are better quality for those that need such high quality, but we can heartily recommend an inkjet printer for home use if you are doing printing of reports, letters, business or financial software.

Buying a color printer is not a requirement since most of your documents tend to be in black and white. The majority of people use the color feature perhaps only once or twice a year (their children tend to use it as often as they can get away with it). And although the color printers are not that much more in initial cost, the color ink cartridges can be quite expensive to replace in comparison to plain black ink cartridges. **Check the prices of replacement cartridges before you decide if you really need that color printer.** These costs can quickly mount up over the course of the year.

To compare printers, there are two numbers you should look for how many dots per inch (dpi) the resolution is (for example: 1440 x 720 dpi) and the number of pages per minute (ppm) it will print (for example: 6 ppm black and white, 4 ppm color). The higher these numbers, the better quality the image generally. Be warned that the quality of printers do vary from brand to brand just like in television sets.

NOTE: Any laser printer, Mac or PC, purchased for NIEHS should have 600+ dpi capability, but MUST HAVE ON-BOARD POSTSCRIPT SUPPORT AND BUILT-IN 10BaseT ETHERNET NETWORK connections. Any additional ports such as the PC parallel standard or the Mac AppleTalk standard are desirable and normally included.

MICE

Basically there are just three types of computer mice, standard, optical and trackballs. The normal handheld models are what most of us are use to seeing but trackball type can provide more functionality, depending upon the model. Multiple buttons on trackball mice are easily programmable to mimic a variety of keystrokes or mouse actions that you would otherwise have to do from the keyboard or through several steps on the mouse. If you want to go a step further, there are drawing tablets and joystick controls that will work with or in place of your mouse as well. Just something to consider.

MONITOR SIZE

Monitors come in a variety of styles and sizes. Some come with speakers, while others have fancy control switches on the front. What is important with monitors is the fine print in sales ads. Although a company may advertise a 15” monitor at a fabulous price, look closer--it may only say a 13.1” viewable area. So always check the fine print and compare prices on monitors with the same viewable area.

For home use, 17” monitors are more than adequate, but for work, a 19” or larger monitor is much preferred. You will spend much less time at your computer at home in comparison to the one you use here at NIEHS. To decide what to buy for home use, you should weigh the cost difference with the amount of use time and number of software packages you will be running at one time before deciding which to buy.

While 17" (15.7” viewable) monitors are the minimum and cost less, 19" (17.9” vewable) monitors are worth the money in the long run. 19" or larger monitors provide more screen space making it considerably easier to run multiple applications at once. I know you are thinking you don't run that many programs at one time, but when you consider that your word processor, e-mail, and one other are usually up and running, that is enough to justify the larger monitor at work. Also all monitors should support the Multisync standard.

If you have an older computer at home and you just want to upgrade your Central Processing Unit (CPU) portion of your computer and keep the old monitor, please be sure to check that it is a VGA the monitor. If it is not a VGA monitor, the cable to connect it to your CPU will not fit.

FLAT PANEL MONITORS

For those of you that have a substantial amount to spend on a computer, you may want to consider the new flat screen monitors. They range in price from a 15” flat panel display (15” viewable) at $899 to a 30” flat panel video display monitor for nearly $4,000 if you want to go to the top of the line.

If you are considering adding a flat panel monitor to an exisiting computer, please be sure to check if it will work with your machine. Some of the older computers (either Mac or PC) do not work with the new flat panels or you may need to purchase an additional adaptor to make it work.

MODEMS

Modems are only required for home computers, or systems away from NIEHS, or for laptops without network connections. If you need to purchase a modem,

ensure that it is a MINIMUM of 56 kbps bits per second (bps) or higher. Virtually all modems on the market today have faxing capability built-in.

A word of warning: At NIEHS you are used to an Ethernet connection that is very fast, dependable and very expensive. When you first use a modem at home (even if you buy the fastest, most expensive model), you will find that the speed of the connection is so slow that it seems unbearable. This doesn't mean your computer is too slow (the MHz number), it is the speed of the connection to your internet service provider (ISP) via a modem.

Businesses get a discount for volume and can afford the more expensive Ethernets, fiber optics, T1 or T3 lines. Thus they have faster upload and connection times than you will ever get on your state of the art 56k modem. Modems are just slower than Ethernets.

You may have other choices in your area such as cable modem service, ISDN or perhaps the new DSL services. You will have to check with your local telephone or cable company to see if these newer technology connections are an option for you. Be sure to check the monthly price and if there are installation fees and compare that to the standard modem service which is generally much less expensive.

SURGE PROTECTORS

It is highly recommended that you purchase a good quality surge protector for your computer equipment. One with a four plug capacity, a replaceable fuse and phone jack filters will start at around $30.00 and go up from there.

We recommend that you do not use your computer during a thunderstorm even with this extra protection. One ground lightening strike will burn out the fuse and turn the surge protector into a regular power strip. A second strike could ruin your computer. If you are interested in protecting your computer, it is best to unplug the power strip/surge protector **and** the phone line for your modem from the wall (after properly shutting down your computer) during storms or long periods when you are not using the computer in case of regular power surges.

A solid surge protector is an absolutely essential data-protection tool. Surge protectors guard against electrical jolts caused by lightning, as well as against other AC power disturbances. When electrical spikes and disturbances come through your outlet, surge protectors absorb them before they can wreak havoc with your computer.

Plug your computer and all of your peripherals (monitor, printer, fax, modem line) into the surge protector outlet, then plug the surge protector into a

grounded (three-pronged) outlet. Most surge protectors have one light that shows the device is working properly; many have a second light that shows the outlet is properly grounded. Check the indicator light(s) regularly to make sure your protector is in good working order.

Be on static alert: Plain old static electricity, generated both by people and by materials, can wipe out hard drives and erase floppy disks. Some people naturally carry a strong electrical charge, and they tend to shock and get shocked easily. This problem is exacerbated in the winter and in carpeted areas, and by clothing such as fleece sweaters. If you're bristling with static, and your hair is standing on end, your data may be in danger. Ground yourself by touching a metal surface, before you touch your PC.

Carpeting carries dangers all its own--it can build up a charge that will jolt your hard drive into oblivion. You should never put your PC directly on a carpeted floor. If you can't put it on a desk, at least put a board or antistatic mat between the system and the floor.

UNINTERRUPTED POWER SUPPLIES (UPS)

If you live in an area that has frequent power surges, brownouts, or there are times when you really do need to leave your computer on with reliable power, you may want to consider purchasing what is known as a UPS. An Uninterruptible Power Supply (UPS) is a device that protects against power failure. When your power goes out, the battery-powered UPS provides a continuous supply of electricity over a fixed amount of time so that you can safely save your data and shut down your computer. More importantly, most UPSs offer some protection against electrical surges and disturbances that can be caused by home appliances or lightning. Many also offer backup and/or automatic emergency-shutdown features.

UPSs range in price, power, platform, and runtime; the longer it will run after power failure, the higher the price. Read the product information carefully to make sure the UPS you buy is designed for your system's power level and OS. UPSs are sold at most any office supply store; prices start at around $100, but can go as high as $1,000 for high-tech models.

SCANNERS

Scanners are becoming very affordable. But do you really need one? If you are doing some elaborate project like scanning all of your family photos for use in your family tree book, perhaps it is a good idea. If you think that you need one because it would be cool to have, but you don’t have any specific thing in mind, you might want to think twice--especially if the desk space where your computer will sit in your home is very limited.

Just in time for the holiday shopping season, CNET Computers.com reviews the five of the best scanners. We'll tell you which have the best scan quality, the fastest performance, the simplest software, and yes, the most reasonable price. Computers.com is the ultimate destination for hardware shoppers. Go to http://www.cnet.com/ and click on Hardware Reviews for more information.

REMOVABLE MEDIA

Most home computer buyers can skip this section unless they are heavy-duty computer users or work on their office work at home a lot. Some of the most useful devices available in the world of computing are the Zip (100 MB or 250 MB per disk) and Jaz (1 GB per disk) removable media drives by Iomega.

Another option would be the SuperDisk drives that will use both the conventional 1.44 MB diskettes and the new 120 MB SuperDisks. These drives are like high capacity floppy disk drives and usually run between $150 to $400. The disks themselves can cost between $10 - $100 each. They are excellent for backing up large amounts of data quickly and easily or for using as an alternate hard drive. When the disk fills up, you simply just stick another blank disk in for an additional 100 MB, 120 MB or 1 GB.

Mac users are reminded that most of the new computers come without the traditional 1.44 MB floppy drive. Some come with the Zip drive as standard and some with only a CD drive, so if you have old software or you have stored your own files on diskettes, be sure to purchase either a floppy drive or the SuperDisk drive for your new computer.

SWITCH BOXES

Most home computer buyers can skip this section unless they are connecting several pieces of equipment at home. Another excellent discovery we have recently made is electronic switch boxes. These devices can run multiple PCs on one monitor, keyboard and mouse or multiple Macs on one monitor, keyboard and mouse OR MULTIPLE MACS AND PCS on one monitor, keyboard and mouse. Needless to say, one switch box can save dollars and desk space when two or more CPUs are all controlled from one monitor, keyboard, and mouse.

PERSONAL DIGITAL ASSISTANT (PDAS)

For those that are really into technology toys, there are finally several new Personal Digital Assistant (PDA) devices on the market that are beginning to prove their worth. These handheld marvels will synchronize the data with your desktop so that you can have all your notes, addresses, calendar, to-do lists, and even e-mail to take with you in a handheld system that weighs only

ounces. Current models have optional modem and network connections for alternate means of communication.

Since each PDA serves a particular niche, there are several PDA's available and among them are the Palm Pilot, Pocket PCs (Compac iPaq, HP Jornada, Casio E/EM Series) and others like the Blackberry. There are good Web sites to do comparisons such as:

http://www.pocketpc.com/
http://www.mobileplanet.com/

Also consult the following Web pages:

NIEHS Supported Hardware
http://www.niehs.nih.gov/lsp/userguid/recommended/recommnd.htm

Supported Hardware/Software at NIEHS
http://www.niehs.nih.gov/lsp/lspguide/l_ssoft.htm

PC Hardware Tips - **http://www.niehs.nih.gov/guide/pchwtips.htm**

Connections Article on Hardware Guide to Support Priorities
http://www.niehs.nih.gov/lsp/lspguide/l_whatis.htm

We hope this handout will help you in your decision-making when having to select a new computer!

Know Your Computer Jargon

- **Pentium**: Processor, successor to the 486.
- **Pentium Pro**: Processor, successor to the Pentium. The Pentium Pro is optimized for 32-bit software and runs 16-bit software slower than the original Pentium.
- **Pentium w/MMX**: Processor that better accommodates multimedia.
- **Pentium Pro II**: A Pentium Pro with MMX.
- **Pentium III**: The microprocessor that was Intel Corporation's successor to the Pentium II, introduced in 1999 with a 500 MHz clock rate. The Pentim III is very similar to the Pentium II in architecture. Its external bus can be clocked at 100 or 133 MHz, it can have up to 512 KB of secondary cache, and it comes in various packages including SECC2 and FC-PGA.
- **AMD Athalon:** A high quality processor that competes with the Pentium III.
- **AMD Duron:** A cheaper processor that competes with the Celeron.
- **Celeron**: A cheaper brand of computer processor that is about one third the cost of a similar speed Pentium.
- **Megahertz** or **MHz**: Clock Speed of the processor (100 MHz = 100 million cycles/second).
- **RAM**: (Random Access Memory): A data storage device for which the order of access to different locations does not effect the speed of access.
- **DRAM** (Dynamic RAM) This is the most common type of computer memory. DRAM is refreshed hundreds of times each second in order to retain data.
- **SRAM** (Static RAM) SRAM is approximately 5 times faster (and twice as expensive, as DRAM). It does not have to be constantly refreshed. Because of its lower cost and smaller size, DRAM is preferred for the main memory, while SRAM is used primarily for cache memory.
- **SDRAM** Synchronous Dynamic Random Access Memory.

- **VRAM**: Memory designed for storing the image to be displayed. This is especially important for games or high-quality graphics software programs.

- **CACHE RAM** is a small block of high-speed memory located between the Processor and main memory and is used to store frequently requested data and instructions. When the processor requests data, it will check in the cache first.

- **Hard Drive**: (measured in megabytes or gigabytes) 1GB = 1,073,741,824 bytes. A byte typically holds one character. (This information sheet is approximately 9300 characters including spaces.) Faster performance is found on hard drives with higher numbers such as 7200 RPM.

- **CD-ROM**: Compact Disc Read-Only Memory. A non-volatile optical data storage medium using the same physical format as audio compact discs, readable by a computer with a CD-ROM drive. CD-ROM is popular for distribution of large databases, software and especially multimedia applications. The maximum capacity is about 600 megabytes. A CD can store around 640 megabytes of data - about 12 billion bytes per pound weight. CD-ROM drives are rated with a speed factor relative to music CDs (1x or 1-speed which gives a data transfer rate of 150 kilobytes per second). 12x drives were common in April 1997. Above 12x speed, there are problems with vibration and heat. Constant angular velocity (CAV) drives give speeds up to 20x but due to the nature of CAV the actual throughput increase over 12x is less than 20/12. 20x was thought to be the maximum speed due to mechanical constraints but on 1998-02-24, Samsung Electronics introduced the SCR-3230, a 32x CD-ROM drive which uses a ball bearing system to balance the spinning CD-ROM in the drive to reduce noise. CD-ROM drives may connect to an IDE interface, a SCSI interface or a propritary interface, of which there are three - Sony, Panasonic, and Mitsumi. Most CD-ROM drives can also play audio CDs. There are several formats used for CD-ROM data, including Green Book CD-ROM, White Book CD-ROM and Yellow Book CD-ROM. ISO 9660 defines a standard file system.

- **DVD**: Digital Video Disk. A high-density compact disk for storing large amounts of data, especially high-resolution audio-visual material such as movies and software.

- **CD-RW**: A rewritable version of CD-ROM. A CD-RW drive can write about 650 megabytes of data to CD-RW media an unlimited number of times. Most CD-RW drives can also write once to CD-R media. CD-RW media cannot be read by CD-ROM drives built

prior to 1997 due to the reduced reflectivity (15% compared to 70%) of CD-RW media. CD-RW drives and media are currently more expensive than CD-R drives and media. CD-R is sometimes considered a better technology for archival purposes as the data cannot be accidentally modified or tampered with, and encourages better archival practices. Standard prerecorded CDs have their information permanently stamped into an aluminium reflecting layer. CD-WR discs have a phase-change recording layer and an additional silver (aluminium) reflecting layer. A laser beam can melt crystals in the recording layer into a non-crystalline amorphous phase or anneal them slowly at a lower temperature back to the crystalline state. The different reflectance of the areas make them appear as the 'pits' and 'lands' of a standard CD.

- **PCI**: (Peripheral Component Interconnect) A self-configuring PC Local bus. The successor to **LOCAL BUS**. A BUS is a pathway that connects a processor to memory and to other "peripheral" buses.

- **dpi**: Dots per inch. Used in describing monitor resolution or print quality in printers. The higher the number, the clearer the picture.

- **ppm**: pages per minute. Used to list how fast a printer can print in either black and white or in black and white and color.

Additional Guidelines, Specifications, and Information.

- NST National Software Testing Laboratories reviews most brands and lists their retail price:
  http://www.maven.com/Maven/Systems/RateList.htm

- CNET's Beginner's Guide to Computing:
  http://coverage.cnet.com/Help/Beginner/index.html

- If words like RAM, Baud, and Processor are unfamiliar to you, or you just have a need to know, you can use this free on-line computer dictionary:
  http://www.cnet.com/Resources/Info/Glossary/index.html