

Bits & Bytes

A Publication of the Kern PC Users Group



February Program

Gene Barlow of Powerquest

Meeting Time is 7:00pm, February 8



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Ken's Kompendium Buying a New Computer

*By Ken Hopkins
Sacramento PC Users Group*

If you wander down to your local computer or office supply store, you will be confronted with a bunch of computers that look very similar. The key to differentiating them is in the specifications. The name brand computers like Compaq and HP will have little specification cards. This article will help you understand some of the stuff you see written there. I know some of you are impatient. If you do not care about the whys, you can skip ahead to Recommendations for the whys. If you are buying a computer these days, be aware that profit margins are very thin. The store will make very little money on your computer. For this reason, the prices will not vary much between different stores or even brands. Be aware that the store will try to sell you an extended warranty because that is where they can make some money. The only computers I recommend buying the extended warranty for are laptops. I say that because I seem to break laptops just after they go out of warranty. I generally recommend a name brand computer unless you happen to know a reliable

builder. Be sure to read the return policy before buying the computer just in case you get a defective computer.

First the basics

Each of the specifications will at minimum reveal the following:

- Processor
- Hard disk type and size
- Memory size
- CD drive type and speed
- Video card type and memory

I suppose it is possible to select your choice from that information and the price alone but the following information should also be revealed:

- Data ports (types, numbers, and locations)
- Modem type
- Network card type
- Number of empty drive bays
- Number of empty slots (and type)

The specifications will probably not mention the basic items you get, like the keyboard and mouse. You need to try out the system to see if you like what they are offering. I often end up buying a better keyboard and mouse and shelving the one they include. The system may also include a monitor and a printer. You will have to decide for yourself if they are really giving you a deal.

Processor

The processor is the core of the computer and there have been lots of choices through the years. You currently have a choice between processors made by Intel and processors made by AMD. These are

roughly equivalent processors and the choice is mostly a religious one. I personally always buy Intel-based computers but I have many friends who prefer an AMD-based computer. The price between equivalent speed processors is very close and so is the technology. I cannot give a rational reason to prefer one over the other.

The speed of the processor is measured in megahertz and usually written as MHz. The low-end computers have a speed specification over 500 MHz. What that means is that the processor clock is ticking at 500 thousand times per second. There appears to be little difference in processor price per cycle (i.e., power per dollar) until you reach 700 MHz, and then it gets expensive. You can buy a computer with a 1 GHz (gigahertz) processor (one million cycles per second) but expect to pay an additional thousand dollars for the privilege. Running at those speeds, the processor generates a lot of heat and all computer systems will have processor fans. The best fans have roller bearings, but most manufacturers will not tell you anything about them.

Hard Disks

Unless you are looking at an expensive server-class computer, the computer will have an Ultra DMA hard drive. This is the latest evolution of the IDE drive. Ultra DMA hard drives are very inexpensive these days and this may be the most distinguishing feature of the systems you look at. Drives will range from 10 GB

(gigabytes, a billion bytes) to 50 GB. If you are not familiar with the term gigabytes, think of one GB as 1,000 MB. I know that 10 GB sounds like a lot of storage, but right now there are companies creating programs that you will want in the future that will use up that space. Some folks will tell you that SCSI hard drives are faster. That was once true but these days, they are very comparable. SCSI will cost you two to four times as much money for the same capacity (if it is even available). SCSI is more important in some mission-critical systems and servers. That is the subject of an entirely different article. Most of us do not need SCSI.

Memory

Required memory size has grown over the years. Most of these computers will have 64 MB of memory. I do not recommend anything less if you are going to use Windows 98 or Windows ME. If you want to run Windows 2000, then you want at least 128 MB of memory. You will be happier with double my recommended minimums. Adding memory to the system will increase performance more than an increase in processor speed.

CD Drives

Every computer has a CD (Compact Disk) drive of some kind these days. CD media allows us to store about 640 MB of data on a 5 in multi-layer plastic disk. The CD has taken over as the media of choice for program distribution. This is because the cost of manufacturing a CD

for distribution is less than the cost of manufacturing a two-floppy disk set. High-production CDs are produced by pressing them like vinyl albums were before audio CDs took over. The data (even music can be considered data here) is recorded in the media as holes. The data is actually stored under the label and read through reflection with a laser. You cannot actually touch the data area. Low-production CDs are produced using a specially formulated CD called CD-R. The CD-R has the holes burned into the data layer via a laser. These can be written once and are then considered permanent. A low-production drive is not much different than the drive you buy for a home computer, except that it includes a feeder to insert and remove disks so the computer can make multiple copies unattended. The blank CDs cost in the \$1.00 to \$2.00 range, depending on the brand. A special version of the CD-R was developed that could be erased and then rewritten. This is the CD-RW. The benefit of CD-RW is that you can re-use the CD, but with an overhead penalty. A CD-RW disk must be formatted like we used to do with floppies, but it takes longer. A partial erase just maps around the erased data without regaining the used space. A full erase requires reformatting. This media has dropped in price to an affordable \$2.00 to \$5.00 depending on the brand. In theory, this would be a good media to use for system backups. I prefer to use the less expensive CD-R

media and archive different versions of what I am backing up. Most computers with just a CD-ROM drive cannot read CD-RW media but they will read CD-R media. For a while there were drives that read only CD-R disks, but the CD-RW drives ended up costing the same and manufacturers phased out the CD-R type. CD-RW drives will read all CD-ROMs, so you do not need both a CD-ROM drive and a CD-RW drive. DVDs (Digital Video Disks) look like CDs except they store a lot more data (up to 5.2 GB). They use a blue laser instead of a red laser to read smaller holes, which allows for greater density of data in the same space. DVD-ROM drives can serve as CD-ROM drives. There is even one DVD-ROM drive that can also serve as a CD-RW drive (all three in one). I have not forgotten DVD-RW and DVD-RAM drives. The concept of writing to disks with that capability is enticing, but it is still too early for individuals to invest in. DVD-RW and DVD-RAM are conflicting standards; we need to wait for the dust to settle. In addition, the blanks are about \$50 each. When we get to \$10, then it is time to jump. (I predict third quarter of 2001.)

CD-ROM

It appears that 32X is about the slowest drive currently available, and 40 seems to be standard on entry-level systems. This means it can read the contents of a CD at 32 times the original CD speed (the speed used to play audio CDs).

Some of the faster drives use buffering to gain some speed; the media does not really spin that fast. Do not pay extra for a faster drive unless you have some application that benefits from that speed. I know of none at this time. I expect CD-ROM drives to go away within the next year. CD-RW and DVD drives are becoming standard even on entry-level systems.

CD-RW

Everyone should have a CD-RW drive on his or her system. Data files have gotten too large to fit on floppies, and CD-R and CD-RW media are very inexpensive. I envision that soon there will be no more floppy drives on computers. CD-RW drive specifications confuse people because there are three speed numbers associated with the drive. The numbers on a popular HP CD-RW is 8x4x32. The first number is the speed that the drive can write to CD-R media. The middle number is the speed that the drive can write to CD-RW media. The last number is the read speed. Compare this to the speed of a CD-ROM drive. Consider the center number to be the most important. A 1X drive would require 74 minutes to write a full disk (there are none that slow on the market these days). A 4X would require one fourth that time or 18 minutes. A 10X takes us down to about 7 minutes. The incremental cost for the faster drives is not much; get a fast one when you can. The fastest I have seen is a 16X but I suspect they will get faster.

In the near future, we will see double density CD-RW drives. This will give us more storage and I expect to see some by the end of the year.

DVD-ROM

DVD-ROM drives let you play DVD movies on your computer, which you probably will not do very often. It also can store lots of information (up to 5.2 GB). Some companies that were shipping multiple CDs are now offering DVD as an alternative. These tend to be database-type things where the user needs multiple CDs of information online. If the record companies ever start producing a lot of DVD-Audio standard, you may see DVD-ROM drives become really popular. DVD-Audio provides music that has six channels of 192,000 samples per second using 24-bit samples, compared to audio CD that has two channels of 44,000 samples per seconds using 16-bit samples. DVD-Audio promises to provide very high audio quality. The speed numbers on DVD-ROM drives look slow but really are not. A 1X DVD drive reads a CD at a speed equivalent to a 10X CD-ROM drive. With drives running at 16X, they are fast drives.

DVD-RW or DVD-RAM

There are two standards for writing DVD disks. The standards, DVD-RW and DVD-RAM, are not compatible. When the industry decides which standard is best, it will be worth buying. Until then, hold off unless you are mastering DVDs for some reason.

Video Cards

The video graphic card options available on a pre-made computer are fairly limited and will probably fall into the business class. It will be fine for business applications and web browsing. If you are a serious gamer or graphics professional, you will want to replace that card with a different card. Some hard-core gamers will spend as much as \$600 for a graphics card. Graphic professionals may spend over \$1000. For the rest of us, the standard card will do just fine. Memory and Color Depth The video cards can run in different video mode based primarily on memory limitations. The modes vary in resolution (dots across by dots down) and the number of colors. The more colors, the more realistic the images will be. The color depth at any given resolution is limited by the memory on the card. The number of colors fills up the memory at the following rates:

16 Colors = 0.5 Bytes per Pixel

256 Colors = 1 Byte per Pixel

High Color = 2 Bytes per Pixel

True Color = 3 Bytes per Pixel

Use that number in that following calculation to see the amount of memory used for that setting: Horizontal Resolution x Vertical Resolution x Bytes per Pixel = Amount of Ram Required (in bytes) If you want to run at True Color

with a resolution of 1600 X 1200, your video card must have 5.6 MB of video RAM ($1600 \times 1200 \times 3 = 5,760,000$ bytes).

Interface

If you are happy with the settings available on the video card in the computer you probably do not care how the computer talks to the video card. You will care only if you ever expect to replace it. Check to see if the existing card can be removed, or at least disabled. Many of the low-end computers will have the video built into the motherboard. You may be able to tell by looking at the back of the computer. If all the connectors are in line with each other (including the video port), the video is definitely on the motherboard. In my research, I found that most of the video cards interface through a special bus known as AGP (Accelerated Graphic Port) rather than PCI. Be sure that there is an AGP slot available if you expect to change the video. Note that there can still be an AGP slot even though the video is built into the motherboard. AGP is a special interface developed by Intel that provides a much faster communications channel. In addition, AGP allows 3-D textures to be stored in main memory rather than video memory. This is why you will see shared video memory in some specifications.

Data Ports

Your computer will include several connectors for external devices. These connectors are called data ports. The standard ones you should expect to find are keyboard, mouse, serial, printer, USB, network, and telephone. In most cases,

the data is transmitted one bit at a time (or serially). The printer port is one exception-it transmits multiple bits at one time (or in parallel). Most name brand computers will color code the ports and the cables that connect to them. This way you just match up the colors. It works well for everyone except the colorblind.

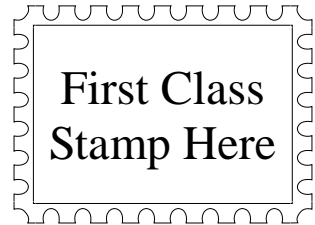
Keyboard and Mouse Ports

The keyboard and mouse port use identical-looking small round connectors. It is easy to get them confused. The good news is they are actually interchangeable; the computer will figure out which device is plugged in where. These ports are normally built into the motherboard.

To Be Continued in the next issue ED.

Ken Hopkins has been involved with computers since the early seventies and has collected more computer information than he is willing to admit. He currently serves as layout editor for Sacra Blue, the magazine of the Sacramento PC Users Group.

This article was written in September 2000, prices may have changed. This article is brought to you by the Editorial Committee of the Association of Personal Computer User Groups (APCUG), an international organization to which this user group belongs.



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Meetings are held on the second Thursday of the month
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