Q & A

BY VINCENT O'CONNOR

Density Dilemmas

Discussing double-density diskettes, the DOS SUBST command, dot pitches and more.

Q: I have an IBM PS/2 Model 60 with a 1.44-megabyte (MB) floppy drive and use double-sided, high-density diskettes for back-ups. Recently, I received a sample box of double-sided, double-density diskettes and found that normal formatting of these diskettes allows the same storage capacity (1.44MB) as that of the high-density ones. Does this mean I have been underutilizing the capabilities of high-density disks, or should I forget the high-density diskettes and save money with double-sided, double-density diskettes?

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A: I'd forget the double-sided, double-density disks. These disks, also known as 1.0MB or 2HC for double sided, high capacity, are designed to be formatted to 720K, not 1.44MB. The double-density 720K disks have different magnetic properties than the high-density 1.44MB disks, which are designed to accommodate high-density drives with weaker magnetic fields such as the one your PS/2 uses. Since the double-density disks are not designed to hold the weaker signal or the greater number of sectors (18 for a 1.44MB disk versus 9 for a 720K disk), leaving at best some marginal sectors, they will become bad much sooner than they would if they held the stronger signal. And there is a risk that when the sector goes bad you won't be able to recover the rest of the file to which the sector belongs. Since you're using these disks for back-ups, it's critical to take as few risks as possible. While you can safely format double-density disks to 720K in your PS/2 (using the command FORMAT A:/N:9/T:80 with DOS 3.3 and above), you can't format them to 1.44MB and trust what's written to them. And you can't afford not to be able to trust your back-ups.

Q: I understand there is a danger associated with using the MS-DOS SUBST command. I use it frequently to avoid having to enter long CD commands when changing subdirectories and have never had any problems. What problems (if any) are there in using this command?

A: For those unfamiliar with the SUBST command, it allows you to assign a drive letter to a subdirectory. Thus you could assign drive G: to the directory C:\STUFF\MORESTUFF. This originally allowed users to place applications that did not support path names in subdirectories. It's not used very much these days but still exists in the latest version (4.01) of PC-DOS. There are several dangers associated with the use of the command. First, if you assign a drive that exists, you can't use that drive until the SUBST is canceled. Thus, if you have a drive D: and assign drive D: to a subdirectory, you won't be able to access drive D:. Second, you need a LASTDRIVE statement in your CONFIG.SYS file, such as LASTDRIVE = E:, and the created drive may not be higher than the drive in your LASTDRIVE statement. Finally, the command masks the actual disk-drive characteristics from DOS commands that perform critical disk operations. Thus the commands BACKUP, RESTORE, DISKCOPY, DISKCOMP, FORMAT, SYS, RECOVER, CHKDSK, JOIN and LABEL should not be used with a drive affected by SUBST. They'll work, but with unpredictable and possibly unpleasant results. You also must be careful when dealing with the directory commands PATH, MKDIR, RMDIR and CHDIR. Unless you have some old software that doesn't allow you to use subdirectories and that you can't (or won't) replace, there's very little reason to use the SUBST command.

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Good software doesn't come cheaply. Unfortunately, after spending big bucks on hardware and facilities, school boards and school administrators tended to turn frugal when it came to pedagogical software. Instead of demanding and being willing to pay for the best professional software—let's say in the same way they purchase textbooks—they came to expect freebie or ad-hoc material.

As a result, few major software developers provide teaching software. What is available is usually academic exercises by other schools (colleges and consortiums in particular), quickie jobs by small software houses and home-brewed software from other teachers. There is nothing wrong with this kind of software per se but it should be better. Much better.

This statement will fire the ire of some, but I spend much time reviewing the best professional software so I can safely say that what the schools get is more often than not uncreative in approach, dull and untimely in content, and dreary in presentation. The most notorious example is the so-called "page turner" variety of software, little more than the text of a book coded into a program—sometimes with wretchedly executed or gratuitous illustrations and diagrams.

I've talked with some good teachers who are using or experimenting with computer-aided education. Some of them are embracing the use of "authoring" programs, which allow them to computerize parts of their own lesson plan. Apple's *Hypercard* software is probably the most-used example. Although excited by the flexibility of the computer, they admit that it still takes too much time to prepare the material.

Most of these pioneers share some characteristics: they have widely diverse approaches, they are islands in their school's mainstream and many have arrows in their backs.

So far, I've been critical of computing in education, but I wouldn't bother with the nasty remarks if I didn't think something better could be achieved.

I believe we're at a turning point in the history of computing in education. It's a point where our hardware, software and understanding have matured enough for us to do a much better job. We're getting over the flush of "hardware-itis," the rush to put computers into every little hand. We've learned the hard way that dull software makes for uninterested students. We've also been disillusioned by promises of computers as teachers.

What we have is:

- the challenge to upgrade the way we teach computing or fall behind those that do;
- the opportunityto replace our existing stock of aging hardware and software;
- the experience that should allow us to be less wide eyed and more systematic and creative; and
- a new approach. Above all there is multimedia, usually composed of computerized material using sound, graphics and video, delivered on CD-ROM systems. Some of this has been hyped almost to death before it exists. However, some of the material under development by Apple, IBM and Commodore is becoming real, and it looks like it may change the face of education.

I should be the last one to use a sweeping statement like that. But having seen several demonstrations on the new multimedia systems, I'm convinced that they will do as much for teaching as the advent of the blackboard.

While there will probably never be any optimal computer system for schools—one with a wonderful power/price ratio that is also close to state of the art—computers with a lot more relative capability are coming into the budgetary reach. The computers of *this* generation provide graphics capabilites, which alone could make a big change for educational computing.

The greater power of the micro, now approaching that of the mainframe computer, is opening avenues of educational software that didn't exist before. I'm thinking in particular of programs like Wolfram Research's *Mathematica*, which provides a sophisticated symbolic math package and a powerful graphing capability. *Mathematica* helps students and professionals visualize math as part of the process of manipulating it.

Finally, we are entering a period where programming the computer will become more like manipulating the computer. Programs like Apple's *Hypercard* will make it easier to piece together information, install testing, make presentations and provide students with a means for creating their own learning environment. The trend is object-oriented programming. It won't be learning-curve heaven, but it will be a lot further up the hill.

Even if a district can't give the students the state of the art in equipment or software, it still can keep them informed about what is. This means requiring computer teachers to remain current and supporting refresher courses for them.

It's time to kick computer awareness back into the frontal lobes and rethink what should be done in the schools:

- Promote computer literacy as a major requirement of education.
- Don't deny that the computer field is changing rapidly. Even if a district can't give the students the state of the art in equipment or software, it still can keep them informed about what it is. This means requiring computer teachers to remain current and supporting refresher courses for them.
- Demand better pedagogical software and give as much thought and attention to its content as a textbook. Better still, combine this with teacher training on how to use new multimedia software to develop lessons.

If ever there was a good time to put our money on winners, then now's the time to do it for computers in education. Computer technology has been a good horse for this country so far, but we're just out of the gate. **CU**

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Q: In advertisements and literature for some monitors, I've seen a specification called dot pitch measured in millimeters. I haven't been able to find out what dot pitch is, although I assume it's some kind of measurement of the quality of the screen image. Is this true?

A: Dot pitch is applicable only to color monitors. The image on a color monitor consists of closely spaced red, green and blue dots. The electron gun in the monitor illuminates these dots as they pass over the phosphor-coated surface of the monitor screen. Because these dots are so close together, we see them as a single dot that is a blend of the three colors. Dot pitch is simply a measure of the center-to-center distance between the three dots. The more closely spaced the dots, the smaller the distance between the centers. The smaller the distance between the centers, the sharper the characters on the monitor (all other things being equal). Thus a monitor with a dot pitch of .52 millimeters would not be as sharp as an identical monitor with a dot pitch of .31 millimeters.

Q: I've had an XT clone for a couple of years, but it only has 256K of random-access memory (RAM). I want to increase the memory to 640K, but I'm confused. When I look at memory chips, some are 64K chips, some are 256K chips and they all seem to have different access times. What does it all mean? What should I buy?

A: The chips you buy and their ratings are important when adding memory, whether you have an XT, 286 or 386 system. Let's start by looking at chip-access time. Access time indicates how fast the chip is and thus how fast it is accessed by the CPU. The faster the CPU writes to or reads from memory, the faster the access time must be for the RAM chips. This is based on the clock speed of the CPU and the number of wait states. The documentation for systems will often (but not always) list the recommended access times for replacement RAM chips. If it doesn't, you'll need to contact the manufacturer or a reputable computer service center to get the recommended access time. You can install chips with a slower access time, but you'll see the performance of your system drop significantly. You also can install faster and more expensive chips. There's no reason to do this, because they can't increase how fast the CPU sends data.

Concerning chip size, most boards will accept either 64K or 256K chips. If yours is a very early XT clone, it may only accept 16K DRAMs. Again, the documentation will often (but not always) list the recommended chip size for replacement RAM chips. One word of warning: Some people believe you can tell from the chip sockets what size chip they take, but the socket footprint for 64K chips and 256K chips are identical. If your system will accept either size, there will probably be a jumper or DIP switch that must be set that tells the system what size chips are used. **CU**

(Vincent O'Connor is a Computer User *contributing editor. If you have a question, send it to Q&A,* Computer User, *12 S. 6th St., Suite 400, Mpls., MN 55402. Because of the number of letters received, we cannot personally answer each.)*