

The Y2K (Year 2000) Problem

- by Stan Kaplan, WB9RQR
105 Martin Drive
Port Washington, WI 53074-9654
(414) 284-9346
WB9RQR @ N9PBY.EN63BI.WI.USA.NA
skaplan@mcw.edu

Editor Jim Romelfanger (K9ZZ) of the Badger State Smokesignals asked that I address the Y2K problem for our ham readers. Let me start by relating that the problem isn't a large one for those of us who use home PCs - I promise your computer will not melt into a heap of molten metal when the century rolls over.

On the other hand, every business or governmental or educational or non-profit institution in the world that uses dates in any sort of calculation or accounting will have major problems. Many have not even started to tackle the problem, even though it is just over a year away. At your end, make sure you have paper copies of all your bank accounts, insurance accounts, investment accounts, and so on. The aim is to have proof of what belongs to you, should the Y2K calamity make the commercial world's records unavailable. Moreover, you should begin to accumulate those paper copies right now. If you wait until December 1999, the worldwide last minute rush is sure to prevent you from completing the process.

Now, on to the personal PC - the one you use for logging, writing letters, email, and maybe a little BASIC programming. What's the problem? What can you expect? First, some background. And as background to the background, I will now begin using the new, unambiguous date format that everyone, everywhere will soon be using -- YYYY-MM-DD, or 1998-10-14, for example. Note the 4-digit year. This format for date reporting is an international standard, though it hasn't been used much in the USA yet. Start using it now.

The core of the problem lays in the fact that most PC's hardware and software clocks (there are two - more about that later) do not keep track of centuries. That is, dates are recorded as 98-10-14, not 1998-10-14 (some programs, including DOS, ask you to type in the 19 but then promptly ignore the two numbers). Therefore, when the clock ticks into the next hour after 11:59 p.m. on 1999-12-31, your PC's date may suddenly become 00-01-01. DOS and many other programs do not understand the 00 as a valid date, and will convert it to 1980, the earliest date currently supported by Microsoft operating systems. Therefore, unless you have a "Y2K compliant" computer (most brand new ones are), the date in your machine will become 1980-01-01 on the 1st of January 2000.

What are the consequences? If your machine is not Y2K compliant (able to roll over to 2000-01-01 by themselves) but of relatively new vintage, you may be able to simply reset the system clock by hand after January 1st. If all goes well, your machine's operating system and DOS clock will be fine thereafter. This does not mean, however, that all your software is OK. If you are using a 1988 vintage version of a spreadsheet, the software may balk or show unpredictable results when you try to enter a date past the start of the new century. Indeed, it may provide you with space for only two digits for the year, as many do right now. What are you going to enter? 20? That's 1920, not what you intended. 00? That's 1900, or maybe 1980, depending upon how the software was written. See the problem? Not a big deal for a word processing program, since those dates are really just meaningless characters to the program, though they are certainly meaningful numbers to us humans. But if you use any program that takes actions (such as calculations) based on a date, it may not work or it may work unpredictably. Print hard copies of all your spreadsheets well before 2000-01-01!

Some older machines may well hide a double-whammy. Not only will they not roll over by themselves, but it also may not be possible to manually set the clock to the new century. That is, you might be able to manually enter the date and time from DOS, and so long as the machine is powered it will keep the time and date nicely. However, all is lost when you turn it off or reboot. Once the machine goes through the boot process, the DOS time will likely be set back to 1980. Why?

Today's PCs have two independent clocks. The Hardware Clock (also known as the Real Time Clock) always runs, even when the machine is off. That's one of the reasons why your machine has a battery - to keep the little "wristwatch" in its belly going, even when unplugged. The Hardware Clock keeps track of the time and date, but only two digits of the date. Not centuries. No one really knows why. Most of us guess that some programmer from the 1970s wanted to save a little space, and figured his grandchildren could deal with the problem at the end of the century.

The other clock is the Software Clock (also called the System Clock or Virtual Clock). It is on only when the computer is powered up, and "goes away" when you turn the switch off, just like that letter you were typing and forgot to save before powering down. The Software Clock is just a 24-hour timer, much like the battery-operated timer you probably have in your kitchen. However, unlike your kitchen timer, the Software Clock doesn't keep time in hours, minutes or seconds. At boot up, its counter value is set based on the Hardware Clock. It then starts counting up, 18.2 times per second. When the counter reaches 1,572,480 (the 24-hour value), it starts over again at one.

When you turn on your machine, the Operating System (OS: DOS 6.22 if you are using DOS or Windows 3.xx, DOS 7 if you are using Windows 95) is responsible for managing the time and date for you. It does this by first asking the BIOS (Basic In/Out System) to tell it the date. The BIOS asks the Hardware Clock for this information and then passes the answer on to the OS. The BIOS assumes the years 1900 to 1979 cannot occur, and if given 00 to 79 by the Hardware Clock, it will pass an invalid year on to the OS. The OS will likely then assume 1980. This error does not occur in machines with newer BIOS chips, since they are programmed to also track the century.

Now that the Operating System has the date, it can get the time from the Software Clock. The OS gets the counter value and converts that into hours, minutes and seconds. When the counter value has reached the 24-hour value noted above, the OS rolls the date over by one.

Sound complicated? You bet! At least it seems that way to me. Why two independent clocks are necessary is beyond me. Leaving out the century digits seems like the work of a lid programmer. Oh well, maybe now that computers are starting to design computers (they have been for some years, you know), things will improve. As for now, here is what you must do.

If you are going to purchase a computer, make sure the vendor states in writing that all hardware and firmware (the BIOS chips) are guaranteed to be fully Y2K compliant. Make sure that any spreadsheets or other date sensitive software packages you buy also guarantee Y2K compliance AND they are designed to use the new, internationally accepted, ISO 8601 date format that I have used in this issue. If you are not going to buy a new computer, don't forget to set the Hardware Clock's date and time on 2000-01-01. Thereafter, if the year returns to 1980 every time you boot up, realize that any file you create will be date stamped incorrectly. Some of us remember this happening constantly with older XTs, if we forgot to set the date and time on boot up. Also be aware that software that uses dates in calculations of any kind may be inaccurate if it is not Y2K compliant.

Want more information? It is already a hot topic. Just go surfing on the web for Y2K. Alta Vista came back with over 210,000 Y2K hits on 1998-07-27! There are also several decent programs out there, free for the asking, that will test your machine for Y2K compliance.

You see, it is not so bad a problem with our personal PCs. You can live with it. Maybe you don't even have a problem. On the other hand, your bank statement ... that's a problem of a different order of magnitude!

Next month's column will be by guest writer Jeff Kane, KB9QQE. Jeff will provide you with a comprehensive and foolproof method for detecting Y2K problems with your computer. As an added bonus, his method will also find problems with VCRs, clocks and other programmable consumer electronic devices. Happy computing!