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How To Add A Second Hard Drive

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

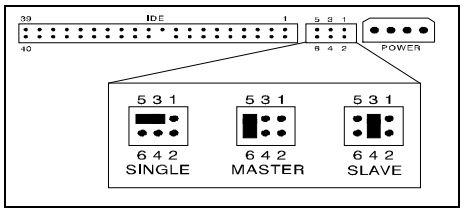
This article was started last May, just after the Ozaukee Radio Club Swapfest (also known as the "Cedarburg Swapfest"). A gentleman stopped by the front table where I act as a sort of barker for the event. He purchased a copy of the First 48, and asked how he could add a second hard drive to his system. I thought my answer might be of general interest, so here it is in some depth. The problem of adding a second drive is certainly solvable, but it brings in several issues that must be addressed for a satisfactory result.

We will assume that you have adequate space inside your case for a second drive. Don't forget that you need to mechanically mount it somewhere in the bowels of the computer - perhaps in an unused drive bay, or even on the floor of the case. If you choose the latter approach, don't forget to raise it a little so that air can circulate around all surfaces. One way is to use a narrow rim of double-stick foam tape around the drive's housing to hold it in place against the sheet metal of the case bottom. Yes, the drive case should really be electrically grounded to the computer case, but I have installed many without a separate ground and have had no problems. The black wire on the power cable seems to present an adequate ground path.

The next consideration is the 40-pin data cable. If your machine is relatively new, the data cable may be plugged into pins on the motherboard. Look to see if there are two sets of pins, labeled Channel A (or 1) and B (or 2). If so, you can simply plug the new drive's cable into B. If the motherboard has only a single 40-pin set, or if you are using an IDE adapter card with provisions for only one IDE cable, then the cable must have a second connector if you want to add a second hard drive. If it does not, you need to replace it with a new cable, but that is no big deal. A new one can be had for well under $5.

Lets assume you have provisions for only one IDE cable and it already has connectors for two hard drives. Take a look at the cable. Note that there are no twists in the wires, as opposed to a dual floppy cable, which commonly does have a twist in the wires between the connector for the A: and B: drives. Well, since there are no twists in the hard drive cable, that means that both drives see exactly the same signals coming down the wires to them from the computer, and either one can use the same wire to send their data to the computer. How does the computer know that data coming to it is from drive C? How does drive C: know that it is C: and not D:?

The answer is simple: jumpers. All modern IDE hard drives have a couple of pins, usually back near the data cable pins and the power cable socket, which designate that the drive is a MASTER or SLAVE. The MASTER becomes drive C: while the SLAVE becomes drive D. For example, here is the jumper scheme for Western Digital *Caviar* Hard Drives:



This view is looking at the rear of the drive. On the left is the 40-pin connector for the IDE cable, and on the right is the 4-pin power connector. Between these two connectors are six pins. In the magnified view of these pins labeled SINGLE, a jumper is slipped on pins 3 and 5, thus shorting

them. This is the configuration if the drive is the only drive in the computer. If there are two hard drives, one (C:) must be the boss and the other (D:) the slave. To configure a drive as C:, short pins 5 and 6 by slipping a jumper on them, as shown in the MASTER inset. Similarly, slip a jumper on pins 3 and 4 if a drive is to be used as the D: drive. Only one drive can be a master, and only one can be a slave.

This scheme ONLY APPLIES to WESTERN DIGITAL CAVIAR drives. If you are using a Seagate, Toshiba, Fujitsu, Connor or even a different model of a Western Digital drive, you must use the specific jumper scheme for that drive. Look to see if the jumper scheme is printed on the top or side of the drive, or it may be in the manual that came with the drive. Otherwise, you will need to surf the web for the data. Knowledge is power, and without it, you are lost. You must have the data to get a second drive to work.

If the added drive is new, it will come with directions and software that will help with the installation, including telling your computer's BIOS that the new drive is in place. However, if it is a used drive, you will need to set your BIOS manually (using the setup menu usually accessed at boot up by pressing the DEL key), unless your BIOS has provisions for automatically detecting hard drives. You must then use the DOS FDISK program to partition the drive, followed by FORMAT to prepare the disk surface for reading and writing data. Be sure you know what you are doing. Both FDISK and FORMAT will destroy data if you accidently ask either program to go to work on your original drive!

So, let us suppose you successfully added that second 800 MB hard drive that you picked up at the swapfest for $20. It is now happily working in your system as drive D:. What are some other issues? Well, for one, your CD-ROM will probably not work anymore. Why? It was probably designated before as drive D:, and now you have added a hard drive, which automatically takes the D: designation! You must go into your CONFIG.SYS and AUTOEXEC.BAT files (if you have them), find every reference to your CD-ROM drive as D:, and change them all to E:. Or, in Windows 95, click MY COMPUTER, then CONTROL PANEL, then ADD NEW HARDWARE and inform Windows that you have a new hard drive. After that, if you want to move any of your applications from the C: to the new D: drive, you will need to enter each application's setup to inform it of its new position in the scheme of things.

Is all this inordinately complex? No, not really. Does it require a nit-picking attention to detail? You bet! Is there an easier way? Yep, there sure is. You can get software that will move applications for you and change all references from C: to D: automatically. It is called Uninstaller Mover, and it comes bundled with Partition Magic, one of the best software values around, as I mentioned in A LEASH FOR WINDOWS 95, Number 43 in this series, June 1997. Indeed, the wonderful Partition Magic program itself can ease the whole task for you. It can partition and automatically format the new hard drive, as well as resize any partitions you might care to change on either drive. Partition Magic is absolutely a Must Have program. Can't find your copy of A LEASH FOR WINDOWS 95? Send me $10 and I will mail you THE FIRST 48, a compilation of the first four dozen articles in this series. The book sports over 100 pages of good computer information, written for hams by a ham, and it even includes an accurate, useful index. The comments I have received by hams who have purchased them are very good. Any profits go to my OZARES group for equipment used in emergency communications. Happy computing!