No. 129, April 2006

THE COMPUTER CORNER

No. 129. Another New One

- by Stan Kaplan, WB9RQR
715 N. Dries Street
Saukville, WI 53080-1664
(262) 268-1949
skaplan@mcw.edu

Well, I did it again. Just before moving to my new QTH in August 2005, my main machine burned out. All the peripherals were OK, including the new power supply I had installed. But that particular motherboard did not have an auxiliary 12-volt power connection (even though the power supply did have that cable). With the high current draw of newer boards, the standard 20-pin main power connector was overloaded and it burned out a pin on the motherboard. Melted connectors on motherboards are fairly common these days, as higher and higher current draws evolve. Oh well, that motherboard did give me several years of good service.

So, the question became whether to buy or build. Computers are really inexpensive now, and it would have been easy to buy a box all ready to go. But I had other computers that could take up the slack of the dead one, so time was not crucial. Besides, building one can be fun. Also, the case, power supply, CD-ROM, hard and floppy drives were all just fine and did not need replacing. That gave me a chance to do a nice upgrade at a reasonable price. So I started, first considering what I wanted in a motherboard.

The speed of the CPU (in MHz) is no longer the most important characteristic of a computer. Sure, a speedy CPU is great, but more important is the capability of the motherboard to transfer information from the CPU to the memory (through a memory controller chip). This high-speed transfer of information from the CPU goes over a bunch of wires called a bus. Specifically, this is called the Processor Bus, or more commonly, the Front Side Bus (FSB). The speed of the FSB is the most important characteristic of a motherboard. Currently, the fastest FSB available is 800 MHz. That is what I wanted. I picked up a motherboard with an 800 MHz FS bus on Ebay for just over $50 (see the list below). I also made sure it had the extra ATX 12 volt power connector that was missing on my burned out model. The motherboard had several other nice features, such as hyper-threading (like dual processors), on-board video, audio, LAN (local area network) and more.

Although the motherboard supported up to a 3.4 GHz processor (CPU), I opted for a 3.2 GHz Intel P4 (codename Northwood) that seemed the best bang for the buck at the time. This seventh generation CPU sports a hefty L1 and L2 cache right on the die of the processor, over 55 million transistors (!), and lots of other improvements over the P3 CPU. This was clearly the most expensive purchase in my upgrade.

This processor uses a lot of power, over 80 watts! Think of an 80-watt light bulb in a package about 2 inches square by ¼ inch thick! Hot! One must have a cooling fan rated to efficiently move the heat away from the package. If not, the 69°C (156°F) maximum temperature of the CPU will be exceeded, and over $200 worth of smoke will be let out! So I purchased a copper-based CPU cooler rated for P4 processors up to 3.4 GHz.

We hams know that maximum power is transferred between two circuits when the impedances of the two circuits are matched. The same is true in computers. If you have a high speed CPU and a high speed bus, the memory sticks you install had better be able to match the speed of the bus or you will take a marked performance hit. The bus is actually a 200 MHz quad-pumped bus that transfers data four times per cycle, for an 800 MHz effective rate. Since it is a 64-bit (8 byte) bus, the throughput rate is 6400 MBps (millions of bits per second, or megabits per second). I chose two 512 MB Double Data Rate

(DDR) 400 sticks as an exact match for the motherboard and CPU. A megabyte of memory on board, and, the “impedances” are equal.

So, what did it cost? Here is the lineup, all purchased between August and October 2005:

ITEM	SOURCE	COST
PM800-M2 motherboard	Ebay	51.90
3.2 GHz P4 Northwood CPU	Ebay	239.99
Ultra P4 CPU cooling fan	Tiger Direct	26.98
(2) 512 MB DDR PC3200 DIMMs	Crucial	143.16
TOTAL		462.03

I probably could have gotten the CPU and memory a little cheaper by shopping around a bit more, but time was of the essence during part of this process owing to my QTH move, so I chose to go when I found these items. How does it work? Fine, and it is fast! Happy computing!