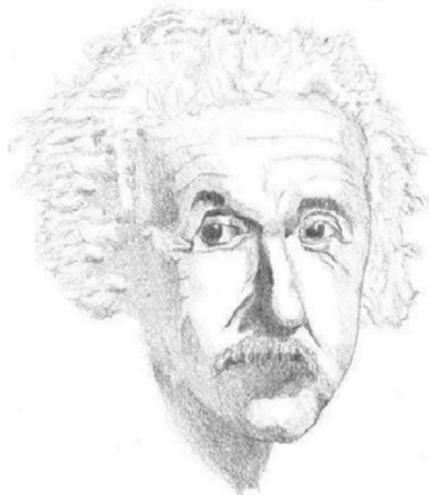


# *Sun X-Terminal Mod*



(c) 2005 Big AI's Computers

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### Overview

The history of Big AI's Computers, known throughout the computer mod community for the past 4-5 years, is built upon the combination of a strict adherence to AMD processor gaming machines and some unusual case designs. Past machines include two HP laser printer conversions (printer-to-computer, and printer-to-computer-deja-vu), an old Inwin full tower opened up in the front to accept a swirling globe of plasma (the globe of retribution), and a dedication to the Unreal gamers with a modified Cooler Master ATC-710 case (unreal machine). Today I present a different approach, but different in only one aspect – this is not a gaming machine. Ladies and gentlemen, I present to you the Sun X-Terminal Mod.



**Figure 1 The Sun X-Terminal Mod, crafted by BigAI's Computers**

The Sun X-Terminal (figure 1) Mod is not a gaming machine, but why? Partly it's because I don't need another gaming machine, but mostly it's due to the machines' intended purpose – browsing web sites, downloading drivers, and updating forums. You don't need the latest \$500 videocard to perform these tasks. You do need style and grace though, and this machine has plenty on tap. The machine resides on the wall next to my basement workbench. The wall mounting affords more bench space along with an excellent way to grab the attention of visitors to my humble abode. Please read on to understand the how's and why's of this project.

## Early Design Issues

So what are we dealing with here? What is a Sun X-Terminal anyway? The Sun X-Terminal was a product of the 1990's, and it was designed to be a remote display workstation that uses limited local processing power to display graphical applications that are running on other, more powerful workstations (remote hosts). Sun equipment is very expensive, but known for high quality and reliability. Hey, these factors are also associated with the machines being built by Big Al's Computers, except that my machines aren't all that expensive. Anyway, my office was going to dump this old Sun X-Terminal, minus its internal SCSI hard drive, along with the 15" Sun monitor and a few Sun external SCSI drive cases. Since Big Al's Computers built its reputation by transforming tired old machines into modern AMD-based computers, this seemed like a good match. And so it was.

As you can see in Figure 2, the Sun monitor is designed to sit on top of the Sun X-Terminal chassis. This makes sense in an office environment, where you want the terminal at eye-level. This doesn't make sense on a workbench however, as it takes up precious space that could otherwise be occupied with computer parts or tools. So, some changes in layout were going to be necessary for this mod.

### Issue 1: Where to mount the chassis?

Idea 1 – Fabricate some complicated brackets, and mount the chassis to the wall.

Idea 2 – Drive two nails into the 2 X 4's on the wall and call it a day.



**Figure 2 Original Sun X-Terminal with monitor and external SCSI drive case**

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Solution: I went with idea #2, using two long nails to hold the chassis to the wall, right next to my workbench. As you can see in Figure 3, I've also added some 3"-wide black duct tape around the chassis perimeter to help it stand out against the silver insulation in my storage room. I couldn't just place the chassis on the workbench and then sit the monitor on top of it, because of Issue #2, how to make this machine stand out.



**Figure 3 Mounting the chassis to the wall with two nails**

### Issue 2: What can I do to make this machine stand out?

Idea 1 – Draw some funky things on the top cover and use LEDs to light it

Idea 2 – Cut out a huge window area to show off the internal components

Solution: I went with idea #2 (Do you sense a pattern developing?), and cut out a nice big window to show off the internal components. Figure 4 shows the top cover with the big hole cut out. I must say that projects like this are much easier with a Dremel tool, and specifically one that plugs into the wall. I previously used a battery-powered Dremel tool, and it was out of gas in about 20 minutes. That doesn't cut it at Big Al's Computers.

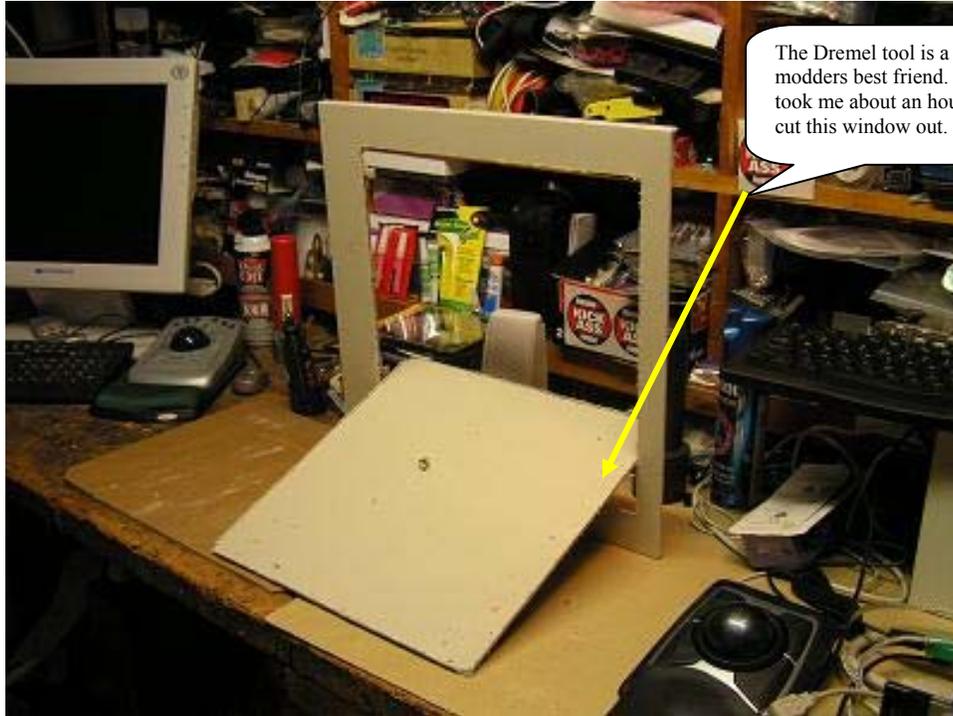
The big hole means I now need a big window to cover it. I tried to get a custom made laser-etched window, but the bloody thing never showed up. So I made my own Plexiglas window, complete with a hole to allow room for the CPU fan. By the way, I chose to use a Cooler Master Aero blower fan for its superior air flow and cool looks. See Figure 5.

# Sun X-Terminal Mod

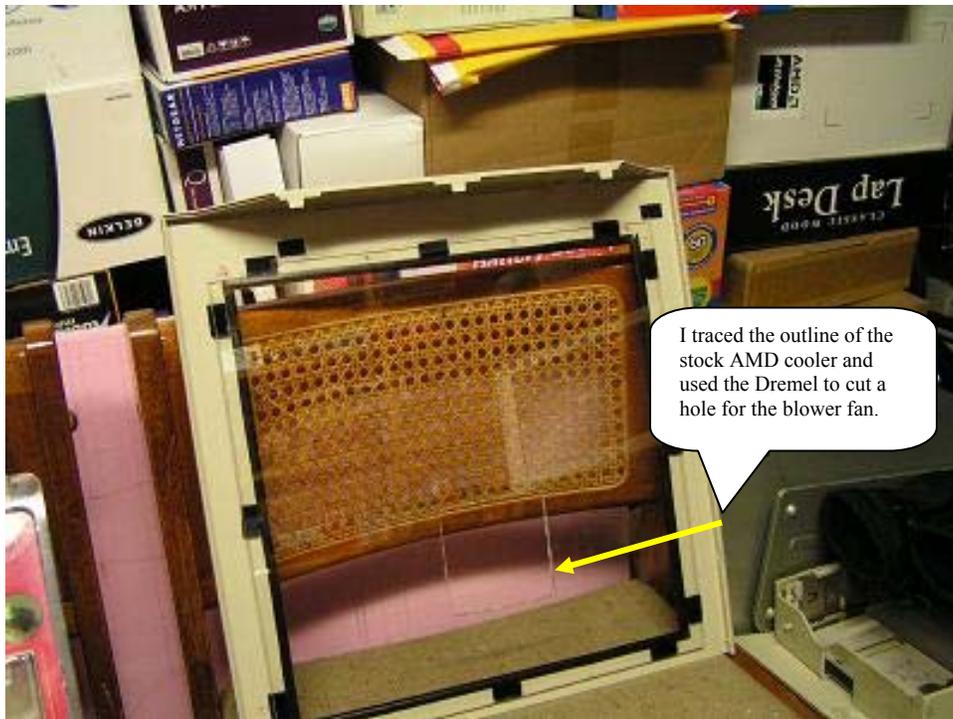
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**Figure 4 Cutting a big window out of the chassis top**



**Figure 5 Making my own Plexiglas window and blower fan hole**

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### Issue 3: So what goes into the chassis, AMD or Intel?

Idea 1 – Go with an Intel Pentium IV, slash my wrists, and end it all....

Idea 2 – Do the right thing; AMD Athlon 64 and lots of pretty lights

Solution: So I decided to build an AMD system with the Athlon 64 3000+ CPU. This became my first Athlon 64 system build, as most of the previous ones were Athlon XPs or T-birds, or Athlon Classics. Anyway, I first had to rip out the Sun components and decide what to buy for the Sun X-Terminal Mod. Figure 6 is a good “before” shot, as in “before I rip it apart”. You can see their power supply fits nicely along one side. I couldn’t buy a good power supply to fit in that tight space and the height of modern-day PSUs would mean that the top cover would no longer fit. That became Issue number 4. Meanwhile, take a look at Figure 7 for the other components I selected – 1 GB (2 X 512 MB) of Mushkin Enhanced DDR3200 (dual channel), an MSI RS480M2-IL micro-ATX Socket 939 motherboard using the new built-in ATI ITX 400 graphics chipset, a Cooler Master 450W Real Power RS-450 PSU, and the beloved AMD Athlon 64 3000+ 90nm Winchester CPU.



Figure 6 Sun X-Terminal internal components before I tore them out

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**Figure 7 Major components going into the Sun X-Terminal Mod**

### **Issue 4: How do I mount the PSU in the cavity? Or do I need to?**

Idea 1 – Squeeze the PSU in right next to the motherboard, then cut the top cover to provide an opening for the big 120mm fan

Idea 2 – Hang the PSU on the wall, below the chassis, and free up some room for all those wires you normally tuck in behind the drive cages in normal cases

Solution: I originally wanted to mount the PSU within the chassis. The more I thought about it, the more I realized how awkward the top cover would look with the big fan and the blower fan poking through. It would have just barely fit next to the motherboard. Once I came up with a custom bracket (figure 9) for the PSU, that was enough to convince me to externalize my plans. So the PSU hangs outside, below the chassis, and it does look nice with that blue LED fan.

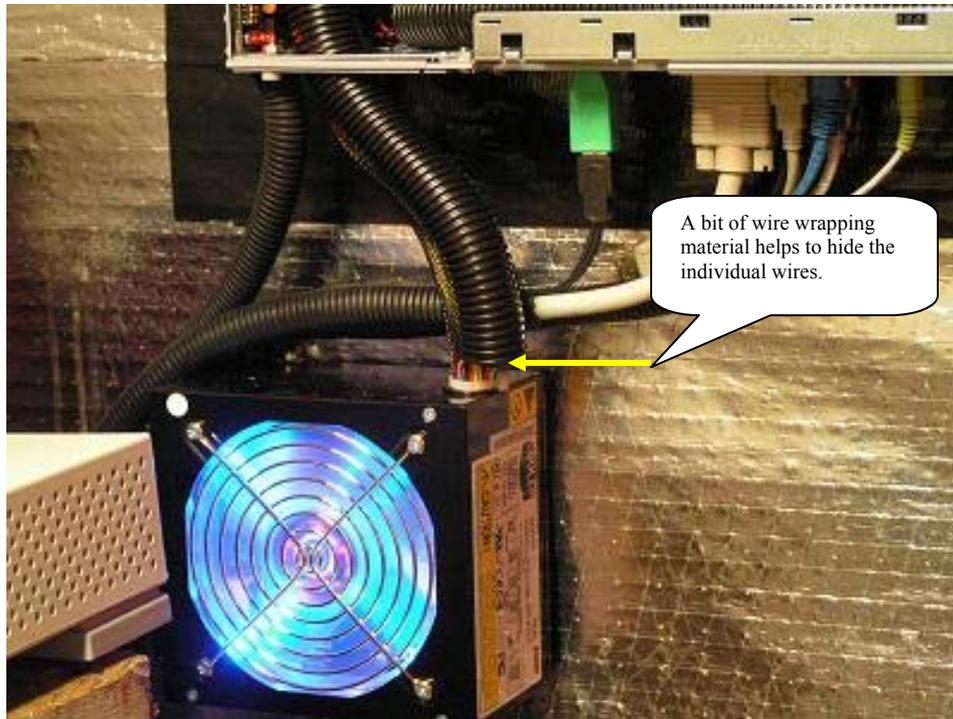
The bracket I made had to carry the PSU weight on just a few nails driven into one 2 X 4, so it was hard to keep flat against the wall. I somehow managed it though, and as you saw in Figure 1, a 6" purple cold cathode light behind the PSU adds to the cool effect.

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**Figure 8 Power supply hangs below the chassis for “optimal” cooling**



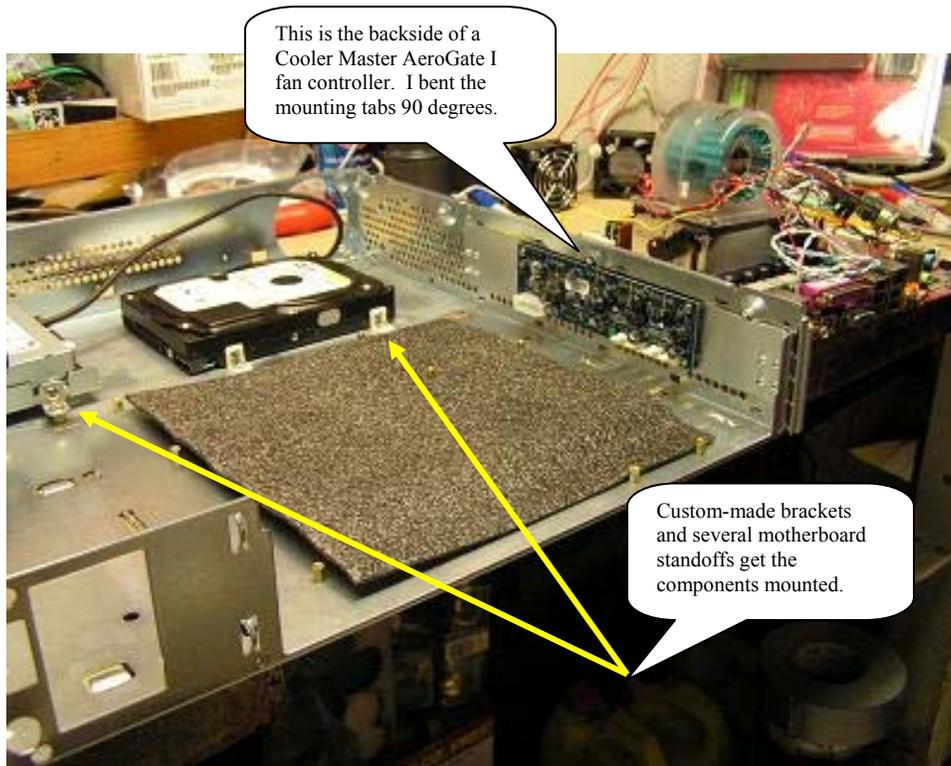
**Figure 9 Custom bracket made to hang the PSU on the wall**

**Issue 5: How do I mount the components into the chassis?**

Idea 1 – Super glue works wonders, but duct tape can handle this job

Idea 2 – Custom fabricate small tabs / brackets / and screw everything together

Solution: This time I did a little bit of both ideas. Well, I didn't use any super glue, but there is some black duct tape in there. Figure 10 shows you some tabs I made out of scraps from the old brackets. I also drilled and tapped the motherboard mounting screws, and I used some of those to mount the floppy / media reader and cold cathode light controller.



This is the backside of a Cooler Master AeroGate I fan controller. I bent the mounting tabs 90 degrees.

Custom-made brackets and several motherboard standoffs get the components mounted.

**Figure 10 Custom fabricated brackets facilitate component mounting**

**Issue 6: How do I move air through the chassis when the cover is on?**

Idea 1 – Use a big air duct and blow air into the case from a box fan

Idea 2 – Mount 60mm fans sucking air in on one side, and one or more fans blowing air out the other side

Solution: Air flow through any chassis is a challenge. It's more of a challenge when you can't even use the standard 80mm chassis fans. Fortunately, I saw a few 60mm Panaflow fans at a local computer show, and I mounted two of them on the CPU side, where the old PSU used to sit. I decided to order a Vantec 60mm stealth fan for the opposite side, top

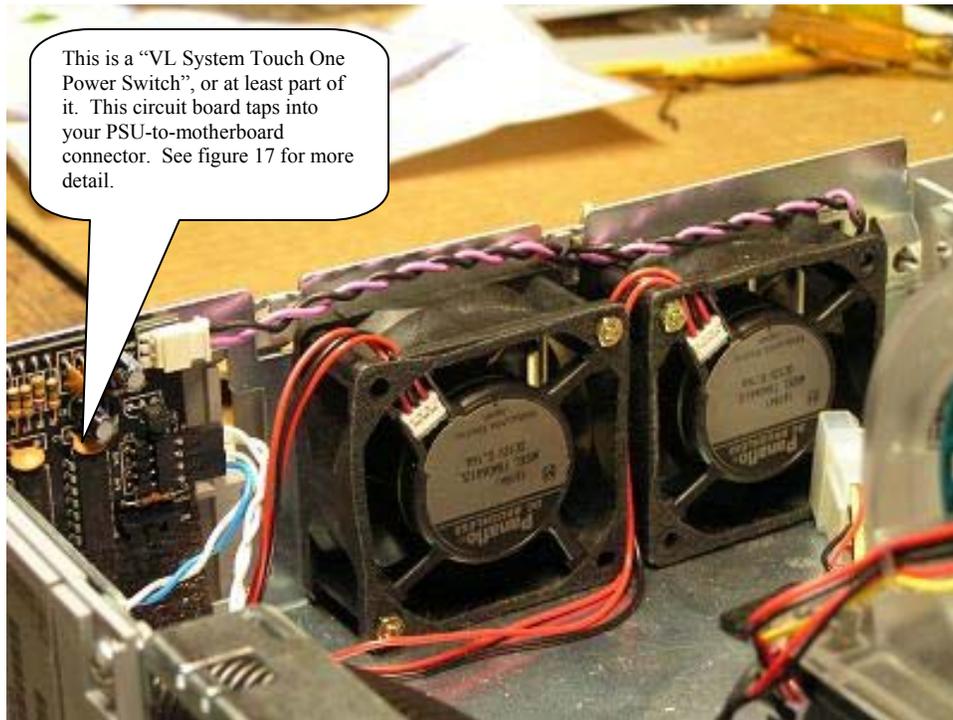
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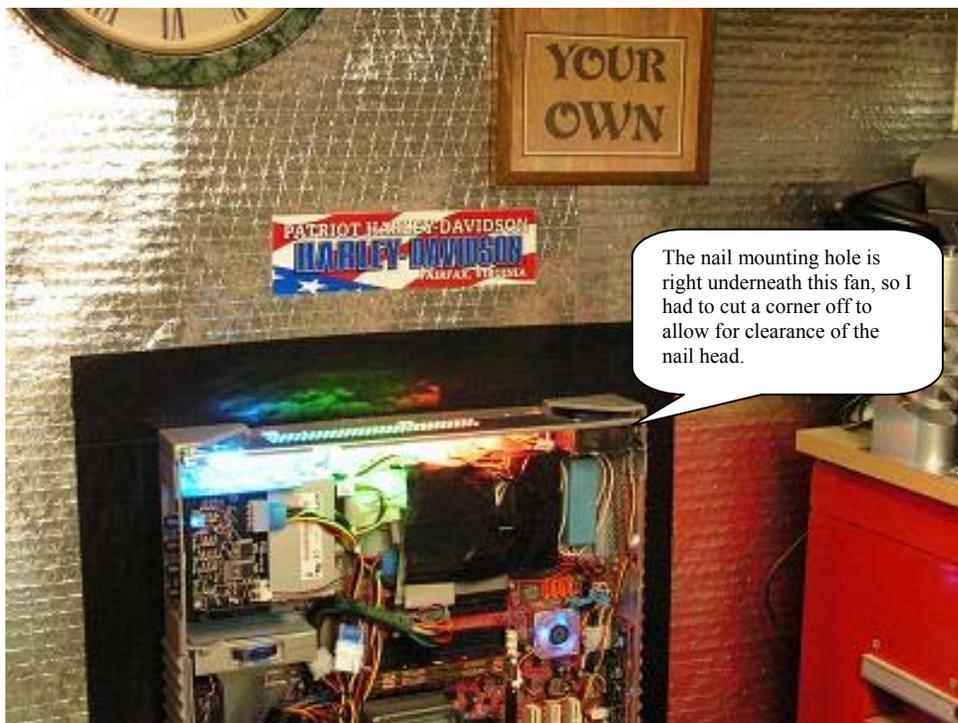
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corner, to exhaust hot air out the chassis. There are vent holes on both sides, so that helps too. Figure 11 shows the two Panaflow fans, and Figure 12 shows the Vantec fan.



**Figure 11** Pair of 60mm Panaflow intake fans



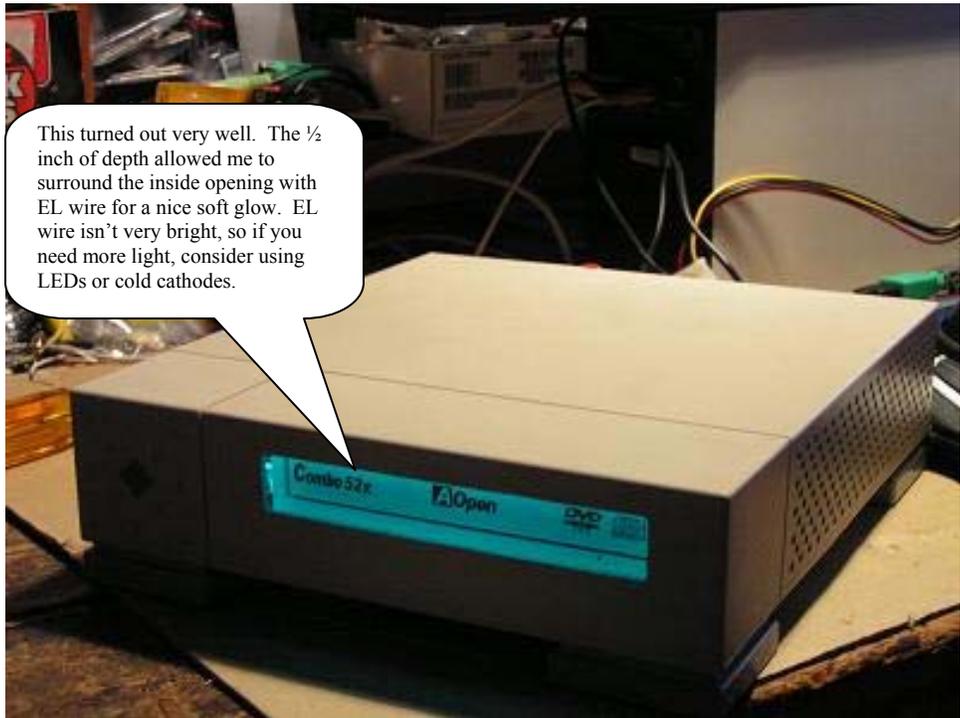
**Figure 12** Single 60mm Vantec exhaust fan

**Issue 7: What about those external SCSI drives?**

Idea 1 – Toss them out; who needs more boxes anyway?

Idea 2 – Use them to house an external CD/RW/DVD and USB hard drive

Solution: Originally, in the conceptual stage, I thought I could get an optical drive mounted within the chassis. It would have gone in the top, on the left side. However, putting a disc into the drive would have been a pain, since the drive would have been on its side when the drawer opened. And then I thought about the external SCSI drives. I could cut a hole in one of them for the optical drive drawer (Figure 13), and the other one could hold an external USB hard drive. Yeah, that works. In addition, I now have a place to mount my custom “Big Al’s Computers” EL panel logo (using a Thermaltake X-View kit). Before you see the completed logo, check out Figure 14 to see how I fabricated the support bracket. Figure 15 is the completed external USB hard drive enclosure.



**Figure 13** El wire illuminates the external optical drive

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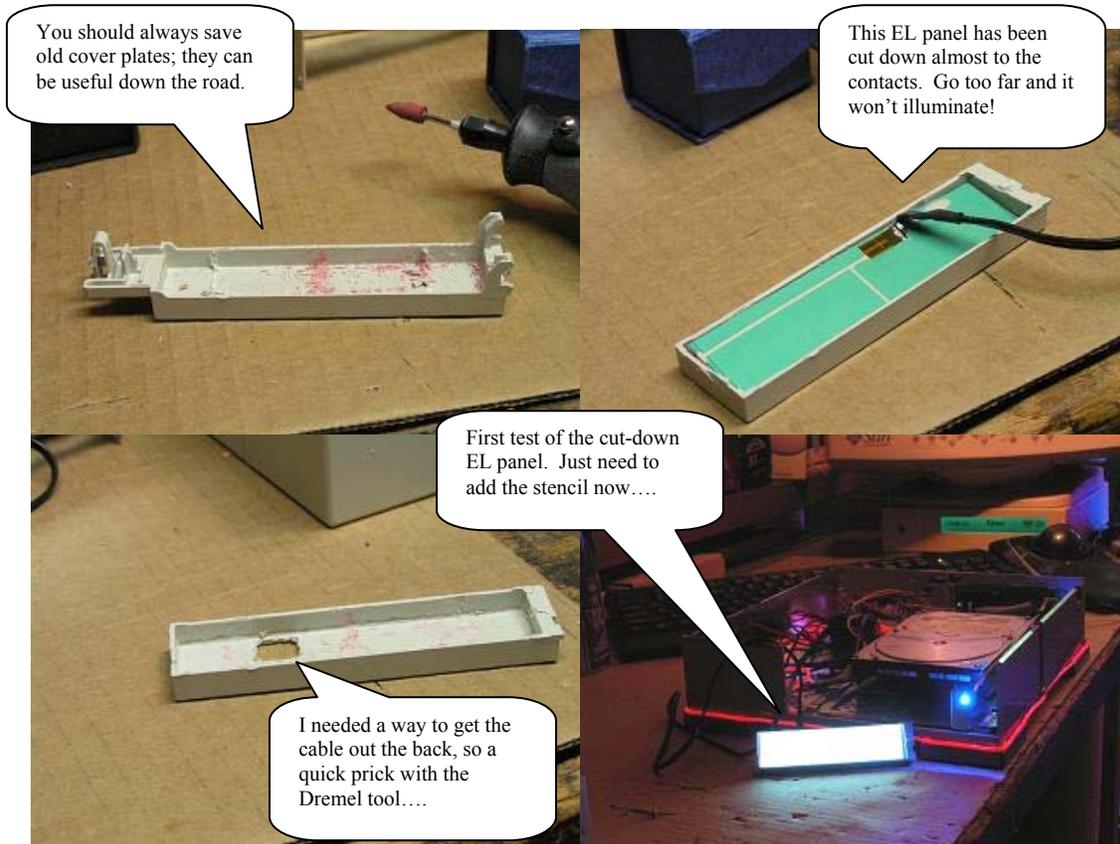


Figure 14 Fabricating the EL panel in preparation for my logo



Figure 15 "Big Al's Computers" logo comes to life in the completed enclosure!

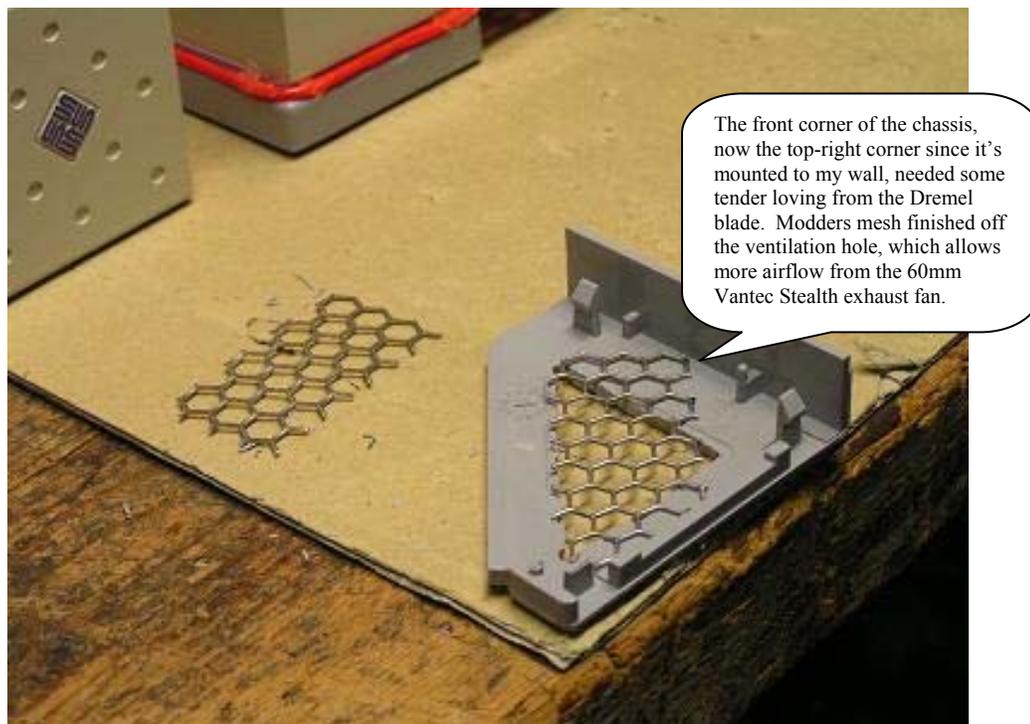
## Late Design Issues

### Issue 8: Cooling concerns with the acrylic panel in place

Idea 1 – Cut some vent holes in the acrylic panel

Idea 2 – Provide better airflow for the top fan

I actually didn't experience "real" cooling issues, meaning problems where overheating would lead to a system crash. I did notice that while things were pretty cool (to the touch) when the plexiglas top was off, these same items did get significantly warmer after the plexiglas cover was on for a while. So, I decided to open up the top vent that covers the 60mm Vantec Stealth fan, and that allowed about twice the airflow as before from the small restrictive holes that were there previously. Figure 16 is a good shot of the modded vent, which essentially a corner piece of the chassis.



**Figure 16 Increasing airflow performance to move more air through the closed chassis**

### Issue 9: What to use, and where to mount a power switch?

Idea 1 – Hard-wire an "always on" switch, and use the UPS to control system power

Idea 2 – Try the new VL System Touch One Power Switch, and tap into my natural capacitance to power up this bad boy

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I saw the capacitive power switch used in another mod back in the fall of 2004, and I figured it was something I just had to try. Custom or unique power switches are the way to go for any mod, regardless of what your design is. Choosing the right power switch is the only issue, at least here at Big Al's Computers! Figure 17 shows you what I ended up doing – essentially mounting the VL switch to the back of the chassis, and routing the capacitive shell to sit near the two external drive cases. After turning the UPS on, you need only to briefly touch the capacitive shell to power up the Sun X-Terminal Mod. There is also a backup switch for this device, which I mounted along the back of the chassis, near the motherboard I/O connectors. The reset switch is also mounted along the back of the chassis, near the PCI slots.

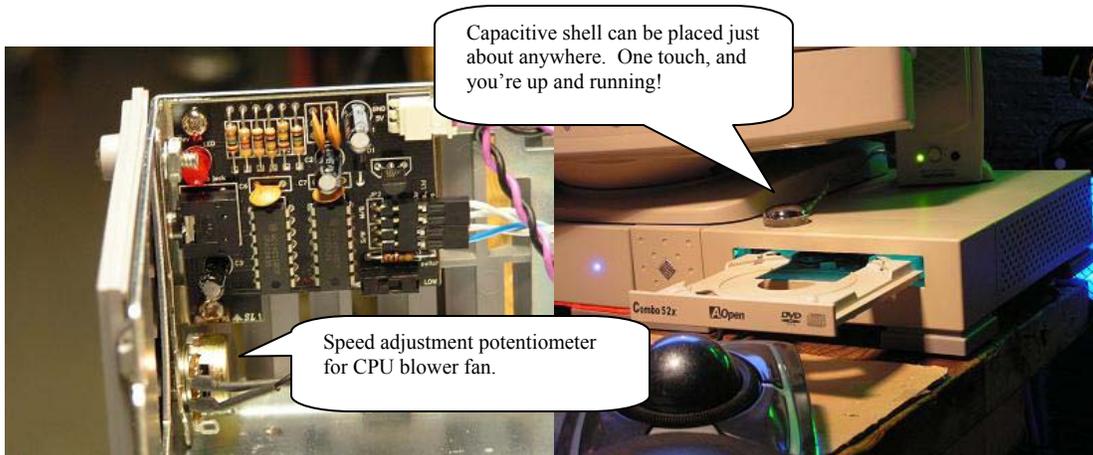


Figure 17 VL Systems Touch One Power Switch

### Issue 10: Where do I mount cold cathode lights?

Idea 1 – Place a 12” tube along each of four edges of the plexiglas top

Idea 2 – Go for a more subdued look that doesn't require sunglasses

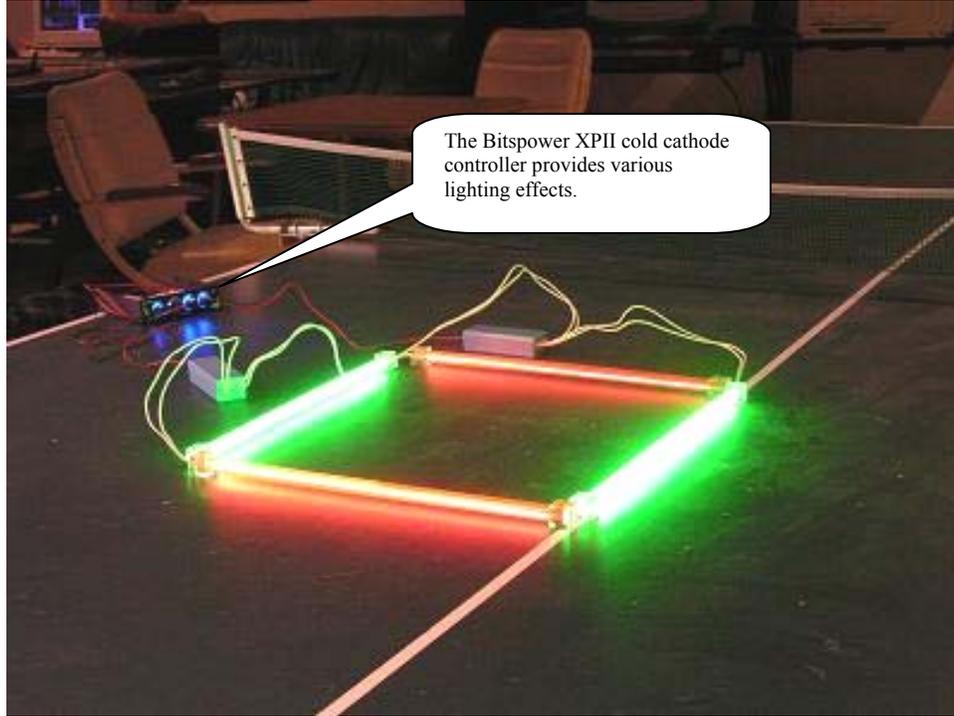
I have tons of 12” cold cathode lights. I buy them by the dozen. Ok, maybe I buy them in twos and threes, but I do have a good selection. I tried several combinations of tubes, all controlled by a cold cathode controller unit. Figure 18 is a good shot of my testing process, where I'm tapping into a power supply I have integrated with a plant stand that controls some fans. I found out, through trial and error naturally, that I could not get four 12” cold cathode tubes into the chassis where I wanted them (along the edges of the plexiglas window) due to various components being in the way. I also found that four cold cathode lights was a bit too much, even for me. So I settled on one 12” cold cathode tube (tri-color), one 6” cold cathode tube (purple), and the assortment of LEDs already integrated into the Cooler Master chipset fan and the Aerogate I fan bus controller. A second 6” purple cold cathode light illuminates the area behind the wall-mounted PSU for a stunning effect. When you see the system running under a dimly lit room, it just looks fantastic. Not that I'm biased, mind you! Figure 19 is a good shot of the overall lighting effects.

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**Figure 18** Let's just see how bright four 12" cold cathode tubes can get



**Figure 19** One 12" tube, one 6" tube, and some LEDs complement each other

**Issue 11: What OS to run, 32-bit or 64-bit?**

- Idea 1 – Use the standard Windows XP Professional OS for the usual experience
- Idea 2 – Live life to the fullest, and try the beta (and free) version of Windows XP Professional 64-bit

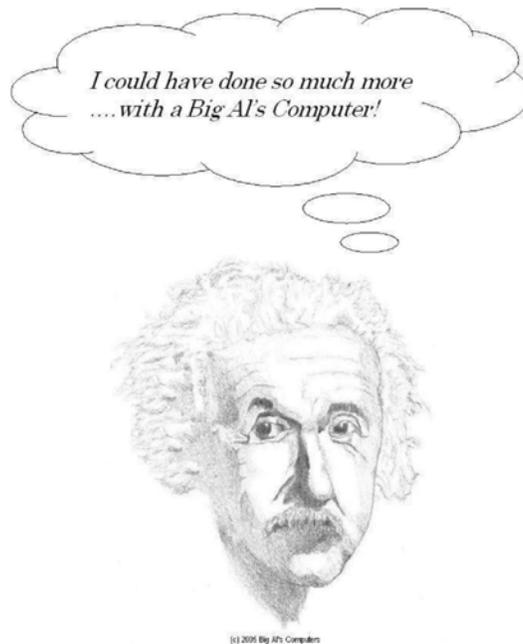
I really wanted to try the new 64-bit Windows XP operating system. The CPU and chipset is capable of supporting it, and since I'm not relying on special software for this machine (other than being able to connect to the Internet), this was certainly an opportune time. So I went 64-bit with the beta Windows release, and it has worked out quite well – but not everything is perfect. The real problem anybody will face during these transitional times (32-bit to 64-bit) is the need for 64-bit device drivers. First I faced problems with the chipset (SMBus to be exact), on-board video (Radeon drivers), and wireless device drivers. As several months passed by in my build cycle, new chipset and video drivers became available from ATI, but wireless device drivers (USB specifically) are still a problem. The only wireless device I could make operational was the Microsoft MN710 PCMCIA card, which I plugged into a PCMCIA-to-PCI adapter card. While that worked for 802.11b wireless access, I could not use a PCI card device in this design because the top cover would interfere with it. So the ultimate solution is a USB wireless device, but I cannot find one yet that works with Windows XP Professional 64-bit. Therefore, I am using a wired Ethernet connection for the time being. Otherwise, I've found 64-bit versions of several programs for anti-virus and related support, and some older 32-bit applications still work. I can perform all the desired activities on this platform, and I can do it 64-bits at a time.

One question you might ask is, "Does Windows XP 64-bit perform much better than Windows XP 32-bit?". I can say that it boots much faster, but running applications not yet built for 64-bit capabilities (larger registers, more data processing per clock cycle) doesn't appear to have any noticeable improvement. Many of my applications are 32-bit, and run under the Microsoft emulation WOW64 environment, so we shouldn't expect to see any speed improvement. The fact that I can still use many of the old 32-bit applications makes me happy. Some utilities no longer work, such as Motherboard Monitor, Wallmaster, etc. Getting screensavers to work is tricky too, but it can be done.

### Is it done yet?

As most modders know, it's hard to leave something alone. You get the machine to a certain state, and if you are happy with the performance or looks, you stop there. I am happy at this point, so I shall stop adding lights, bells, and whistles. I will continue to add software as more applications become available for Windows XP Professional 64-bit, and I might even go out and buy the official released version. The beta release expires in about 10 more months anyway. My only remaining issue is the need for wireless Internet, and that's going to require 64-bit drivers for my USB wireless adapter. In the meantime, I'll be happy with a wired Ethernet connection, and step over the wire when entering my storage room.

In figure 20, we have the official "Big AI's Computers" logo that my oldest son drew for me. I'm sure most of you recognize Albert Einstein. Finally, the following page is a parts listing for the components that went into the Sun X-Terminal Mod. It's been a fun project, and the machine now supports further work at the Big AI's Computers workbench.



**Figure 20 Big AI's Computers logo**

*Components Procured (prices paid withheld to protect my marriage)*

Stock Sun X-Terminal  
Stock Sun 15" monitor  
Stock Sun external SCSI drives (2)  
AMD Athlon 64 3000+ 90nm Winchester CPU  
AMD stock aluminum cooler  
Cooler Master Aero blower CPU fan  
Mushkin Enhanced 512 MB DDR3200 (2 sticks) memory  
MSI RS480M2-IL micro-ATX motherboard  
Cooler Master Aerogate I fan controller  
Cooler Master Blue Orc SLC-S41-U1 chipset fan  
Cooler Master RS-450 450W Real Power PSU  
AOpen 5232 52X/16X dual format optical drive  
Maxtor 80 GB, 8MB cache hard drive  
Seagate 80GB IDE-to-USB external hard drive  
XPanel XP11 cold cathode controller  
Panaflo 60mm fan (2)  
Vantec 60mm stealth fan  
VL Systems Touch One power switch  
Mitsumi USB 2.0 & FDD digital card reader / writer w / floppy disk  
Kensington Expert Mouse  
Plexiglas sheet (24" X 24")  
Altec Lansing Series 100 speakers  
Generic keyboard  
Enermax USB hub  
Black Duct Tape (3" wide)  
Wire wrapping material (3 feet)