Weitere Informationen zum Umbau!

The Upgrade

A little while ago, Harakiri (what's in a name) from the German Amilo forums (http://www.amilo-forum.de) destroyed his 6800 card. He arrived at the only place MXM cards are sold, my store. He asked me what his options were. I told him I could set him up with a replacement 6800 or a x1800.

At this point, I had never bothered to take stock of the x1800 as it is just way to expensive for 425€. However, from Harakiri's perspective, it was just 125€ because he had to shell the other 300€ anyway. I'm not sure if I would have done the same in his shoes, but he ordered the card. As all this coincided with the purchase of this notebook (the same as his), we decided I would keep the card for a while, verify everything and send it to him after the evaluation. That evaluation is concluded,benchmarks have run and an upgrade kit is on it's way to him.

Tools required:

A Dremmel, a screwdriver, a soldering iron and a twincer.

You just have to remove a single backpanel. Before you do that, remove the battery as a precaution. A simple, small Philips does the trick. After that, you can lift the panel with your nail. Notice that there's one screw that is longer. Make absolutely sure you place it back in the correct hole when closing your notebook again. It's the hole labeled K/B. Failure to do so will yield the same result as Mr. Harakiri got.

Not that I mind... Also: at this point you have just voided your guarantee.

When the panel is removed, you'll have to remove all screws indicated with the yellow circles. Make sure not too touch parts of the motherboard, as ESD cán kill your notebook. Make sure to discharge yourself every now and then on a well grounded item (water pipes,...)This will allow you to carefully remove the heatsink assembly. Make sure to disconnect the fan plug first. Once again, your nail is the primary tool for this job. I took the time and opportunity to apply AS5 on the CPU, but that is obviously optional .Please notice that some of the heatpads are not the original ones. I currently have no more replacements available, so be careful with yours.

After having removed the heatsink, two more screws keep the MXM on the motherboard. Remove them.

After clicking in the x1800, I noticed I couldn't screw the sink completely back. The heatsink has a small cutout for a coil near the top of the card. As that coil has shifted a bit for the x1800, the heatsink no longer fits. I can't show you pictures of the x1800 mounted in my machine as it is currently speeding towards Germany to revive Mr. Harakiri's notebook, but here's an 'archive' picture...

Enter the Dremmel.

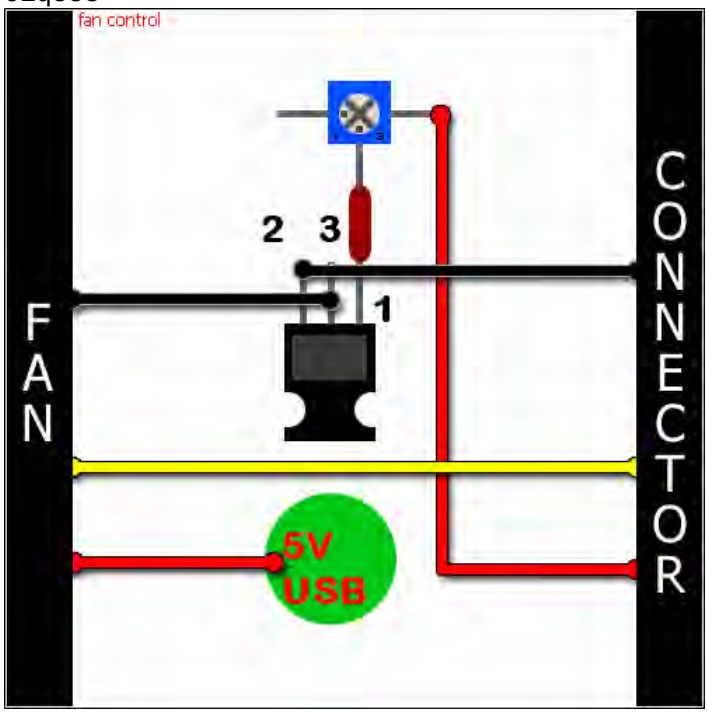
No skills are required (as evidenced by the picture of the heatsink) but some courage is not optional before you put the cutting blade in a part of your brand new 1000€ notebook. It takes about 15 minutes. Make sure to remove the heatpads from the heatsink before starting to cut into the metal as the small metal parts get stuck to the heatpads and can form a kind of conductive metal film on it with a high potential for disaster.

After this the heatsink can be easily mounted. At this point, I closed the notebook and commenced my benchmarks, but you will have to leave it open just a little longer.

When running my first benchmarks, I had a few thermal shutdowns while the CPU wasn't hot at all and the fan wasn't revving up. After some investigation, I noticed that the GPU temperature was unknown to the system. It is my assumption that the fan is controlled by either the GPU or CPU, depending on who needs it the most. Because no GPU temp was available, the system was happily unaware of the GPU nearing his shutdown temperature. I tried flashing the Bios with the latest available, accidentally an Alienware Bios, but to no avail. It only brought me a nice AW splash screen.

As I wasn't able to find a software solution to this problem, I turned my attention to a hardware solution. As the problem was mainly that the fan wasn't running fast enough, I designed a simple amplifier. The fans would still be off when they were off initially but it would be possible to have them run linearly faster once they were on. Consisting of only two resistors and a variable resistor, the circuit is easy enough and requires only some basic soldering skills. And some balls. But if you ever enjoyed 'cutting the red wire' in a McGuyver episode, I'm sure you'll enjoy this.

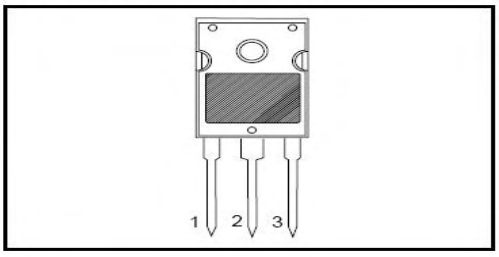
oiq553



PINNING - SOT429

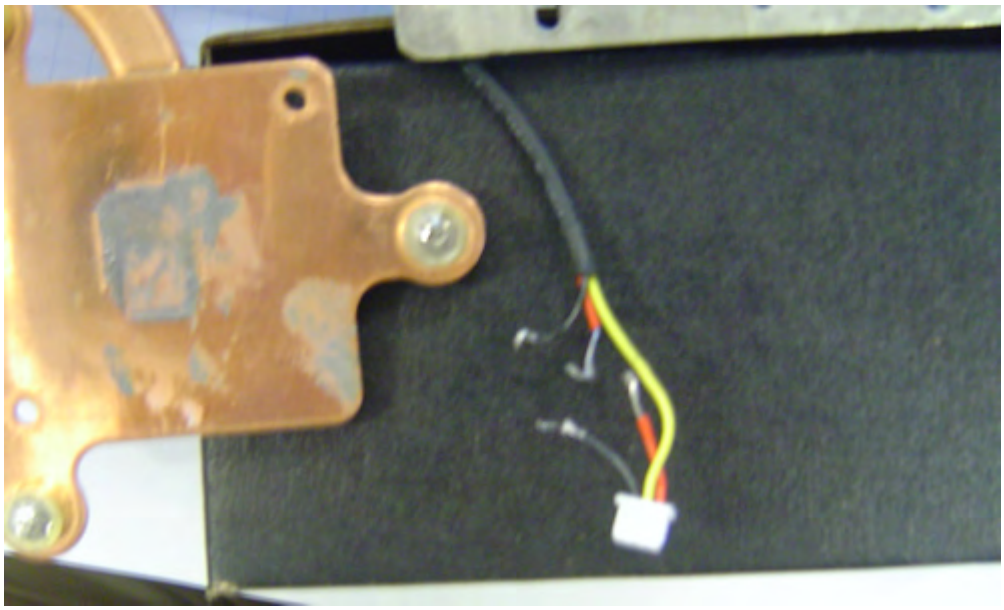
PIN	DESCRIPTION
1	base
2	collector
3	emitter
tab	collector

PIN CONFIGURATION

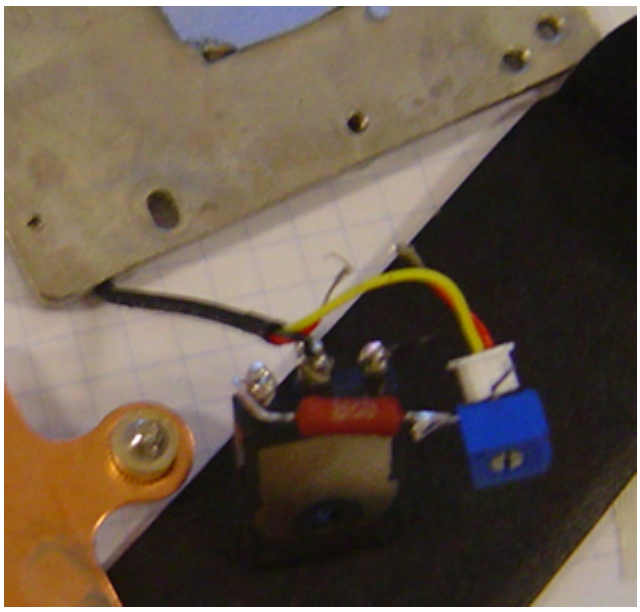


I would like to thank Mr. Harakiri for his Ms. Paint skills!

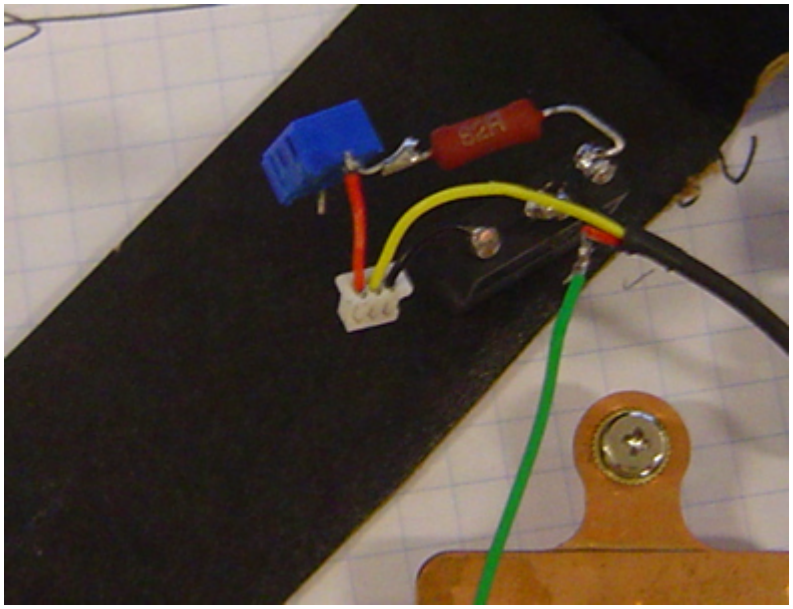
You have to cut both the red and black wire. Make sure you don't cut too close to the edge, as you'll need some room for stripping and soldering the wire, make some bends and... make mistakes! Leave the yellow wire as it is. Once the wire is cut, strip both edges and tin them.



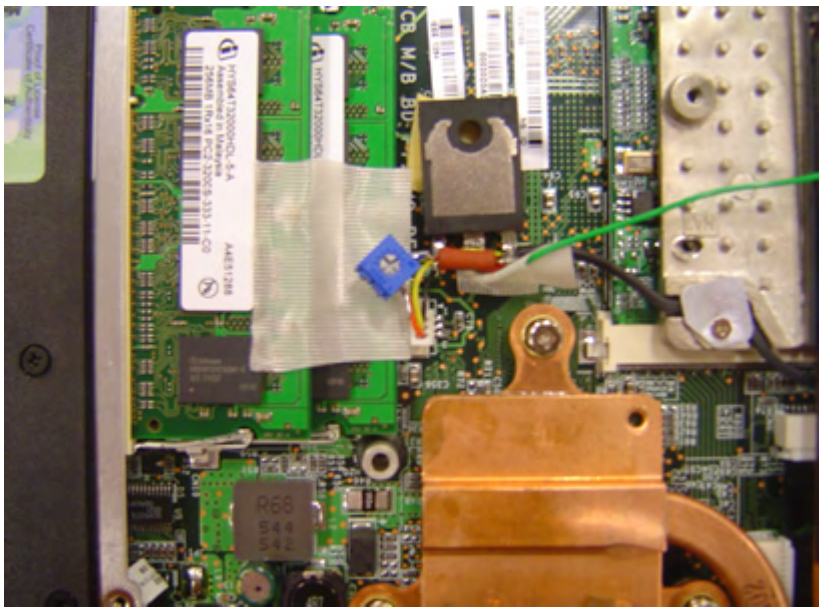
Connect the part of the black wire that is connected to the connector to pin 3 of the transistor. Connect the part of the black wire that is still connected to the fan to pin 2 of the transistor.



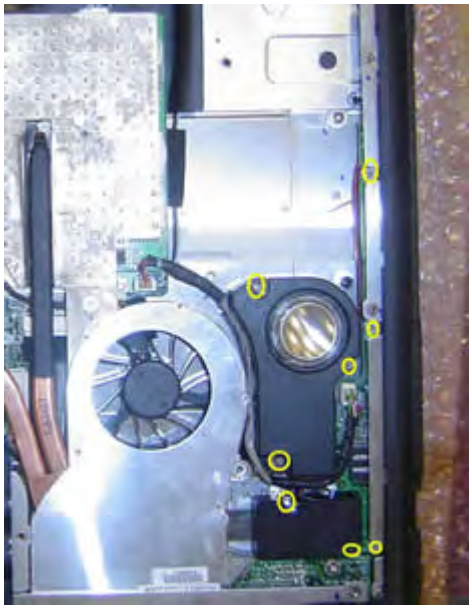
I will have connected pin 1 to both resistors as in series. Connect the loose end of the resistor to the red wire of the connector. I had to solder a wire to the remaining red wire at this point, but I will have done that for you already.



At this point, you can put the heatsink back in. I provided a piece of strong double sided tape to secure the transistor. Make sure none of the metallic parts can touch other metal parts. You'll note that I've taped a few components and surfaces in order to prevent the circuit from making short circuits.

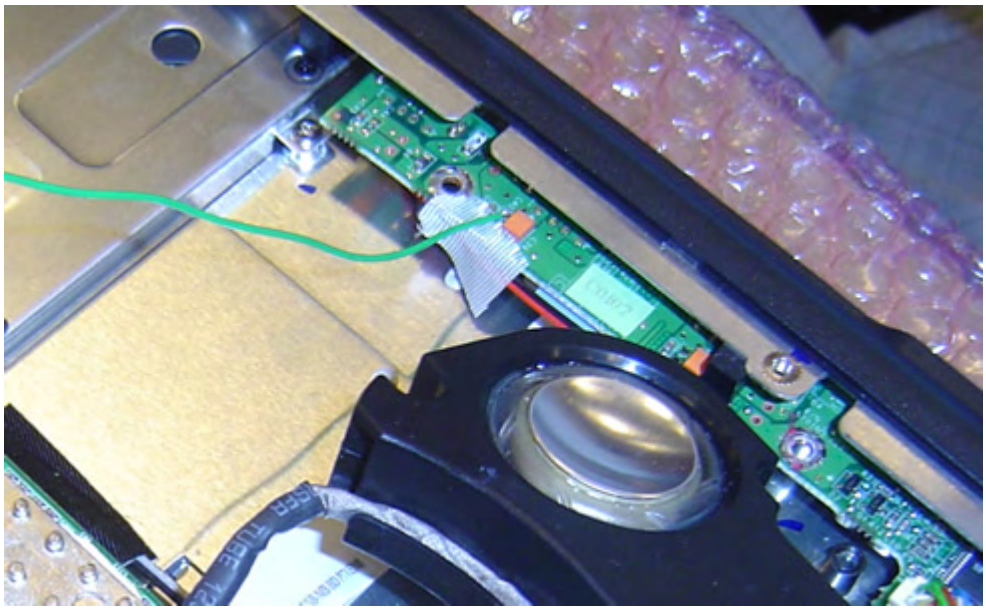


Last but not least, you'll have to connect the red wire of the fan to a 5V source. I took 5V of the USB PCB. It requires you unscrew both speakers and the right hand connector PCB.



You will have to solder the wire to the green dot, not the red one. Make sure the wire doesn't touch anything but the green dot pad. I made an error at some point and the notebook didn't boot anymore. Removing the short remedied this, but I'm not taking bets whether you'll be as lucky as I was. But I'm sure you'll do better given the high quality professional picture I've provided (ahem...)

Your masterpiece is finished! You can now regulate your fans speed over a fairly wide range by adjusting the blue pot. You can try to find all the screws again, close your notebook and enjoy a hefty performance premium. How hefty?



I guess 5161 on 3DMark05 isn't shabby ;)

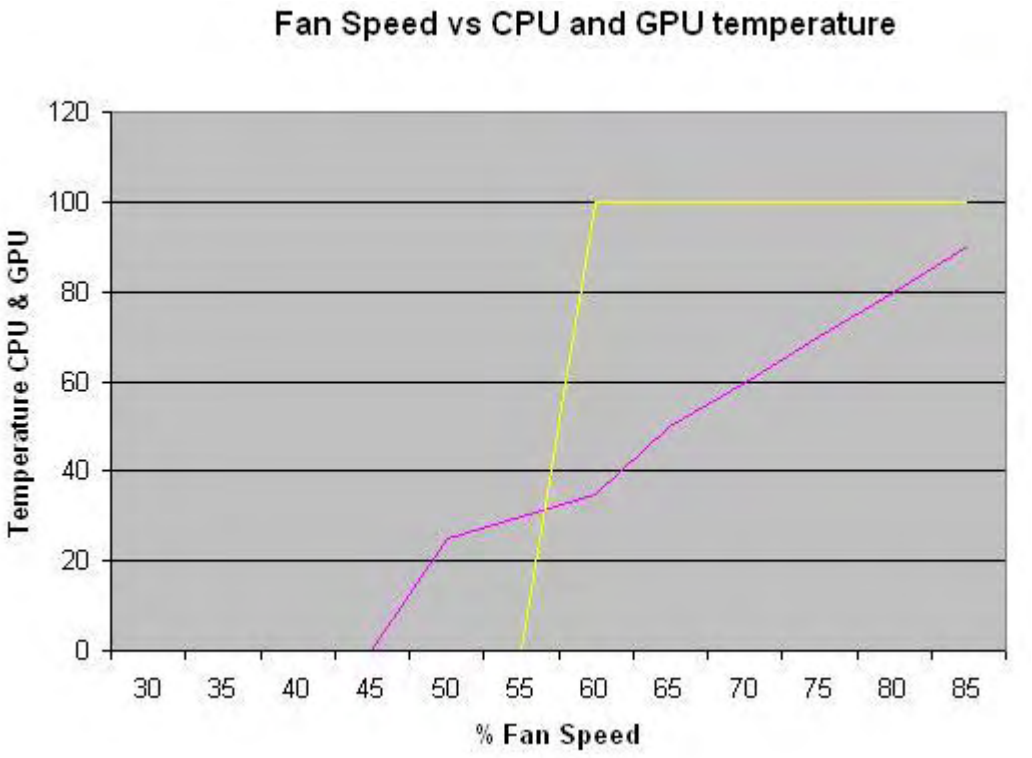
Update on upgrade procedure - 22 oktober 2007

Since writing up the review and procedure mentioned above, a lot have things have changed. My own 3438 died, the x1800 was replaced by the x1900 and the upgrade procedure has changed and improved. Opening the notebook up and modifying the heatsink has remained exactly the same but after this the hardware hack of the fan was improved and we added a new "software" option. Reports on whether this is enough to "cut it" are mixed, but it is worth a shot.

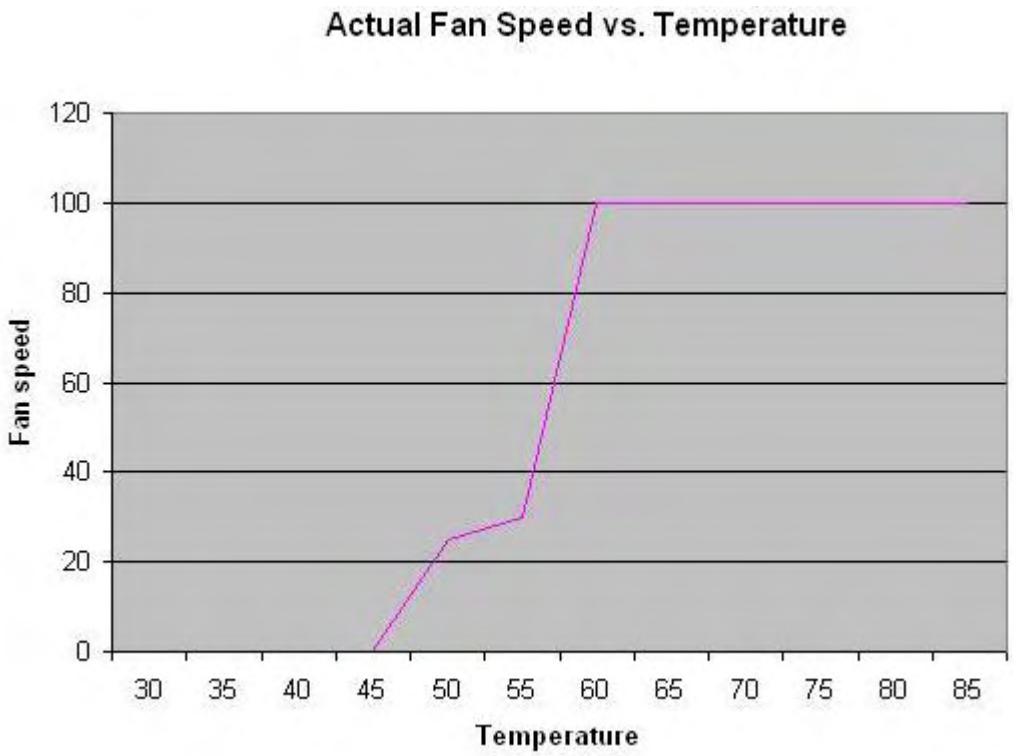
On the software front, we now have a script for NHC that "fakes" the processor temperature. By doing so, NHC tricks the system in to thinking the CPU is very hot so it triggers the thermal system to step it up a notch. Simply install NHC, unzip the script in the ACPI folder of the NHC program and enable ACPI control. There are a few steps, set it to "Hardware3" for gaming. Unfortunately, the actual effect of the script is that the system "sees" an average CPU temperature somewhere between the actual and faked temperature. That means the fan revs up but not necessarily enough

to keep the x1900 cool. If you still suffer from thermal shutdowns, proceed to the hardware side of things..

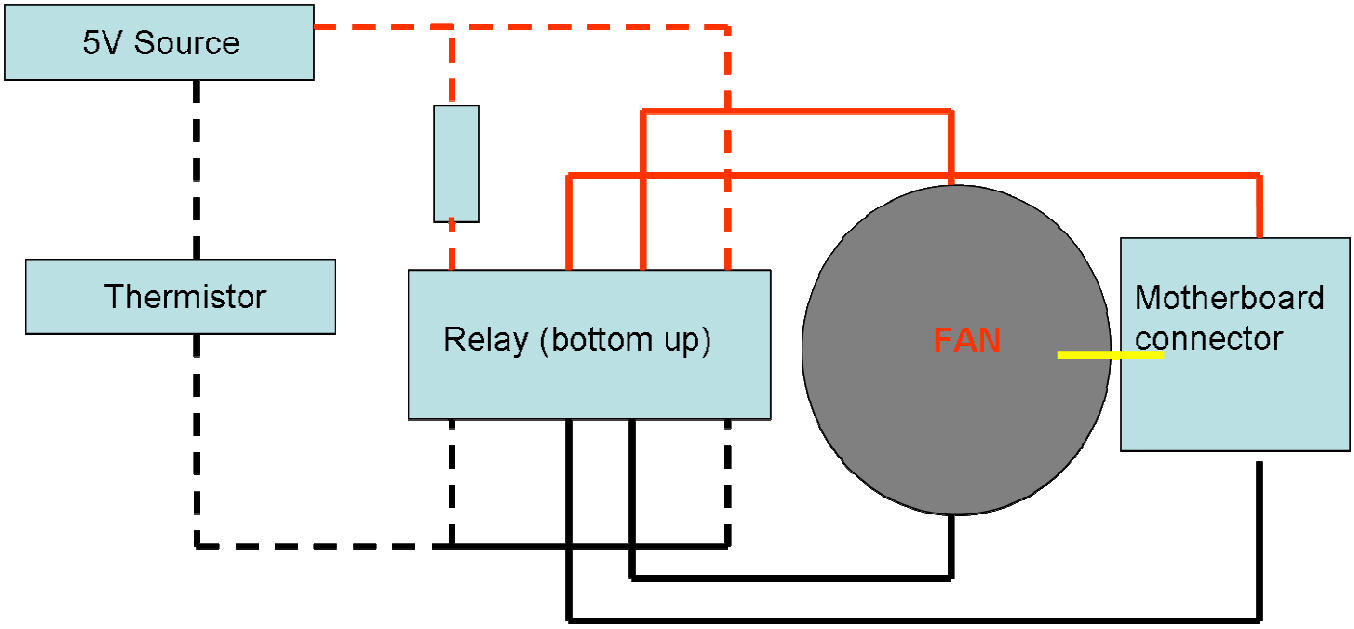
The fan hack was also updated. Instead of a setup where a transistor would amplify the fan speed send by the system, we now have a setup with a relay and a thermistor. The thermistor is placed on the GPU heatsink and will trigger at 60 degrees. Before that temperature, the fan is driven by CPU temperature. During normal desktop tasks, office, browsing, music, movies, this is more than enough to cool both GPU and CPU. However, with intensive gaming the temperature will rise above 60 degrees. The relay will be triggered by the thermistor and the fan will be forced to full speed, which is the right setting for heavy gaming. When you stop gaming, the heatsink will cool down to 40 degrees before normal fan speed is restored. This will allow the system to loose it's heat effectively after gaming.



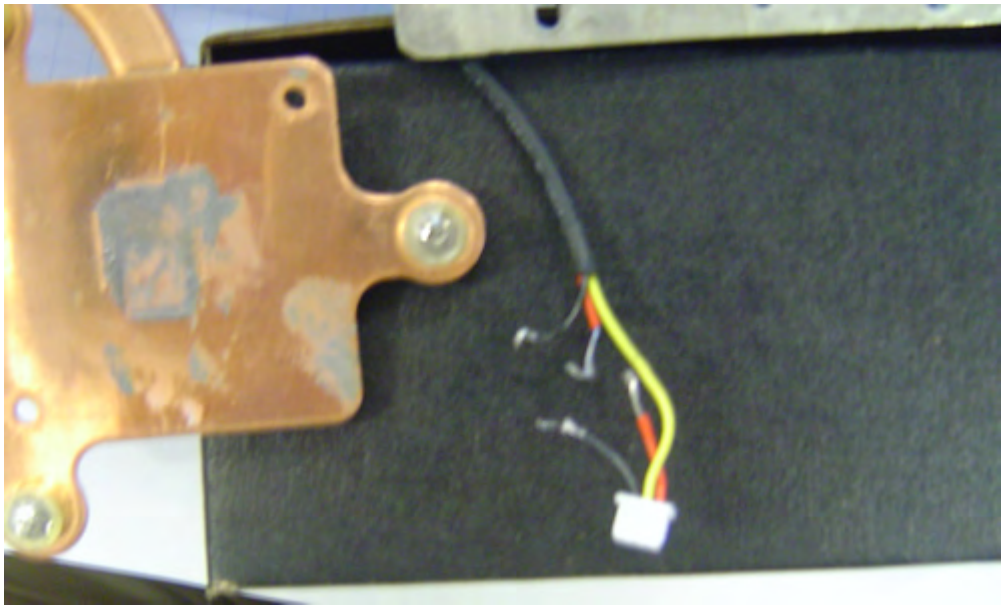
The reaction of the system to the GPU temperature is shown in yellow, the pink is the "normal" CPU temperature curve. Combining the curves is not 100% accurate but it does show more or less how the system behaves.



The fan circuit is build like this...

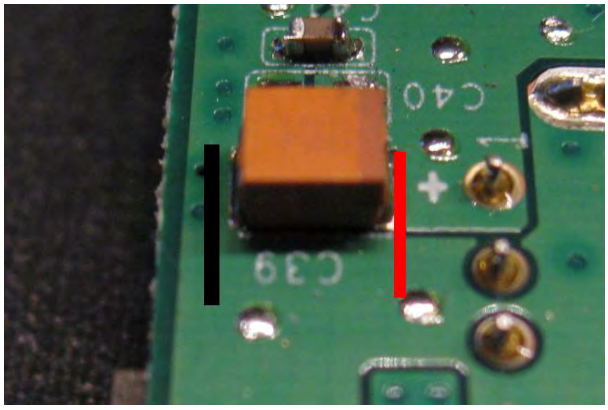


Everything in dashed lines is pre-soldered for you. So, what is left is cutting the fan wires like in this picture...

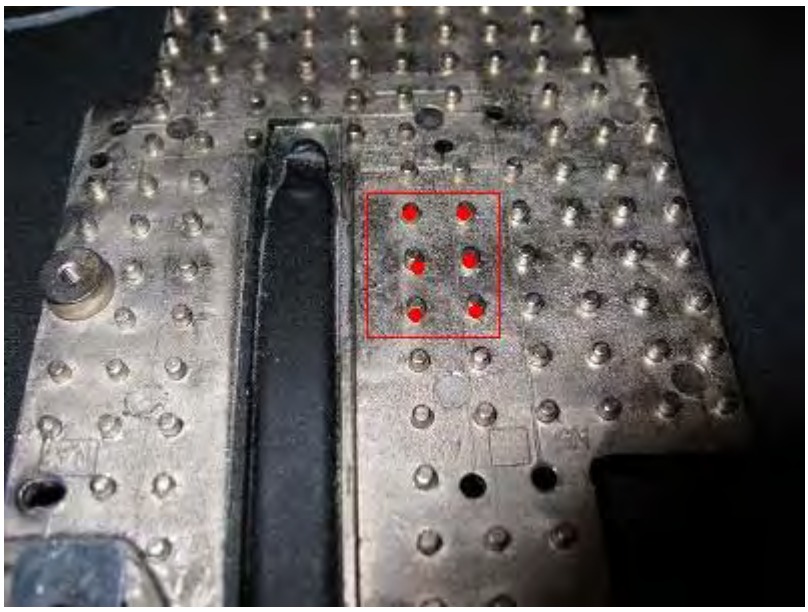


... and solder them to the relay. It is obviously imperative to make sure no exposed wire touches any surface. It is highly encouraged to isolate all exposed wire with (electrical) tape.

For the "5V source" in the diagram, there are two options. One is to strip a USB cable and use that, but this obviously has the disadvantage of having the USB connector on the outside and having to find a way to get the cable connection back inside the cavity (hole in the cover). The other solution is to attach wires to the internal USB 5V. The procedure is already described above, but the actual wire can also be attached like this..



After this, the top of the heatsink must be modified to accomodate the thermistor. For this, the surface should be more or less flat.



Remove the tape liner on the bottom of the thermistor and use the double sided tape to secure the thermistor to the heatsink. Do the same to tape the relay to the motherboard. After making sure no exposed metalic parts can create a short and no components can move around, close the notebook, install new drivers and get your baby ready to rock!

They are not all the same!

MXM Type	Width	Length
MXM-I	70 mm	68mm
MXM-II	73 mm	78mm
MXM-III	82 mm	100 mm
MXM-IV	82 mm	115 mm
MXM-HE	82 mm	100 mm

Each Type can come in two flavors: with a distance of 41mm between the mounting holes of the heatspreader or 46. The 46 version theoretically can handle larger die sizes. The rest of the card stays 100% the same. If your notebook has a 41mm card and the only upgrade available is a 46mm type, don't panic. The heatspreader are often made off solid material and can often be easily modified.

Fujitsu-Siemens	Amilo M3438G	Yes	III	Upgraded to x1800! Upgraded to 7900GS 512MB