Silicon Graphics Fuel - ATX power supply adapter

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Disclaimer: I take no responsibility for any damages to your equipment, and will not take any warranty claims that were caused by the following:

- Bad ATX PSU choice including bad voltage regulation, (the 3v3 sense line stays connected at the plug level not at the socket level - this may or may not result in variations in 3v3 voltage supplied by the PSU).

- Wrong installation

- Potential incompatibilities with *your* Fuel - it is possible that certain L1 or PROM versions detect PSU signals in a certain way that the adapter may not be able to substitute. The adapters are tested on a L1 version Firmware Image B: Rev. 1.24.11, Built 10/29/2003

The adapter was designed and tested on two different motherboards and two ATX PSUs to ensure maximum compatibility, but there is no guarantee that it will work with your exact fuel and ATX PSU choice.

If the reason you're using my adapter is because your Fuel's PSU is broken - there is a chance that when the PSU gave up it might have broken your motherboard or other components - please keep that in mind - it means there's no 100% guarantee that replacing your PSU with ATX+adapter will solve your problem.

If you have any questions, concerns or need guidance on the installation - please contact me before beginning work.

Prerequisites:

- SGI Fuel, with working motherboard (obviously)

- ATX Power Supply, I recommend one with the following characteristics:

  - 24 PIN ATX connector (20+4 are ok as well)
  - 4,6,8 PIN ATX Power connector (the more the better), please DO NOT use GPU connector, make sure you're using the ATX POWER one - if you use the GPU connector you WILL permanently damage your Fuel.

- 5v rail 30 A current minimum
- 3v3 rail 30 A current minimum
- total power recommended 450-550 W minimum, (more watts DOES NOT mean better, you will notice that modern high power PSUs often have very low rating of 5v and 3v3 rails with most power going to the 12V rails for GPU)
- The Fuel case design causes some ATX PSU's socket plastic shroud to protrude and interfere with the case, keep that in mind, it's recommended to use PSU that has the shroud at least 15mm away from the edge of the PSU
- Original Fuel power supplies were based on ATX models are have corresponding ATX versions - those are the most recommended (this is not an exhaustive list, and you have to make sure you're using an ATX not WTX version):
  * Sparkle FSP460-60PFN
  * Fortron FSP460-60PFN
  * HiPro HP-W460GC33

- Adapter pair, 2 pieces : the 12v converter (small, L-shaped) and the main board (rectangular with a cutout)

- RS232 null-modem cable (and likely RS232-USB converter) for L1 connection - not mandatory but highly recommended for preliminary verification. L1 port is on the motherboard, to the right of PCI slots, below blue airduct.

- You need to know how to use L1 prompt over serial terminal and ideally also serial console

- Please be sure to thorougly read the following two threads:

  http://forums.nekochan.net/viewtopic.php?f=3&t=16730132

  http://forums.nekochan.net/viewtopic.php?f=3&t=16725574&start=45

Overview of the adapter:

- Built-in PSU FAN signal generator, there is a pair of pins - FAN_IN : FAN_OUT (yellow circle) and a separate FAN_OUT. The pair should be jumpered (default) which allows generated signal to be fed into Fuel. If you wish to provide direct FAN signal from your PSU - you need to remove the jumper and connect the FAN_IN pin to the signal.

  The redundant FAN_OUT (green circle) pin can be used to simulate any other FAN signal you wish by feeding it into the motherboard.

- Thanks to the FAN signal generator, the Fuel DOES NOT require disabling Environmental monitoring in L1 - it's highly recommended to keep the monitoring on, verify by running "env" in L1 or "l1cmd env" in the Shell

- Standby LED (D1, blue circle, usually orange color) - it's on as long the power is provided to the ATX PSU

- Power ON LED (D2, pink circle, usually green color) - it's on when the Fuel is actually ON (by pressing the power button, or "power up" from L1 or kickstart button)

- Kickstart button (white circle) - it can be used to help debug your problem, hold the button to force Fuel to boot - with working L1 console you may be able to identify your issue.

- (applies to revision 1,2 only - blue or purple boards) Exposed traces with added solder and exposed wires are by design - to ensure enough current capacity of the board and provide thermal relief.

- (applies to revision 3 only - red boards) The board was manufactured with especially thick copper traces and does not require adding extra solder.

Installation:

- Remove your current PSU from the Fuel and install the ATX one, DO NOT PLUG ANY cables yet including power, if it has a power switch - keep it in the OFF position

- Swing the HDD cage outwards (you may need to undo a screw to do that)

- Remove the blue air duct

- Plug the main ATX cable into the adapter, you will likely need to work with the thick cable bundle so that it bends at all the right places

  ** You can now plug the mains power cable and turn on your ATX PSU (if there's a switch) - in the version 2 you should see blue standby light (that's good news so far). If you do - unplug the power cable again. If you see no standby light - likely your ATX PSU is broken, verify that and contact me.

- Plug the adapter into motherboard, the adapter will fit very snugly and rest against the metal fuel case, it will certainly require some work to insert it into the socket

  ** DO NOT plug the 12v board yet.

- Plug the RS232 cable into the motherboard (just below the scsi socket) and set up serial terminal on your other PC to 38400 8N1

- Plug the power cable into the PSU (and if available turn on the switch on the PSU), DO NOT TURN THE FUEL ON yet.

- Observe the L1 output on the terminal, you should end up with an L1 prompt.
  ** If you do not see the prompt - abort and contact me immediately, DO NOT PROCEED with further steps.

- In the L1 prompt, issue the command "env" and look at the voltages, you should see voltages for 5V aux and 3.3V aux - the levels should be close to the expected values. (version 1 only) Also, look at the FAN speeds - you should see a reading for the PSU FAN (FAN 5), about 1800-1900 RPM). (versions 2 and 3 provide FAN signal only when power is on)

  ** If the voltages are too far from 5v and 3.3v - abort and contact me immediately, DO NOT PROCEED with further steps.
  ** Now you have verified that standby voltages are correct - thats a good sign.
  ** If other (non-standby voltages) show up - don't worry about it, I often see the 12V rails measuring around 3V during standby.

- Turn the PSU OFF (via the switch) AND unplug the mains power cable.

- Now plug the 12V ATX POWER cable into the 12V adapter and install the adapter. (DO NOT plug the cable after installing the board - it will flex too much and you risk damaging it). Removing should also be done by puling the board out first and then removing the cable.

- Plug the power cable and turn on the PSU, repeat steps 8 and 9. Note any differences. There shouldnt be any.

- Now is the time to turn the Fuel ON. (DO NOT PLUG ANY OTHER CABLES YET), in L1 issue a command power up and immediately follow it with "env", you should now see all the voltages and fan speeds show up. note their values and look for potential warnings
  ** If any of the voltages is not showing up or too far from the expected value - power off the fuel, abort and contact me immediately, DO NOT PROCEED with further steps.

  ** DO NOT leave the Fuel on in an opened state for too long, it was not designed to run without air duct and the case removed. (A few minutes is fine)

- Issue "env" a few more times and observe the outputs, then issue power down - the fuel will switch off.

- If everything above went well, you can now plug the HDD and other cables, install the air duct, fix the hdd cage and close the fuel. Now you're ready to turn it on and observe the console. I recommend guiding the L1 serial

cable outside somehow, perhaps through one of PCI openings or floppy cavity on the front.

Troubleshooting:

- Remove all cables except power

- Open serial terminal and ensure you see L1 console output (it should work as long as you have standby power - standby LED should be lit)

- HOLD the kickstart button (it's right by the ATX socket) and observe the L1 console output, note any error messages

- while holding the button, type "env" in the L1 console and note the values - this will give you an indication of all the voltages and fan speeds

** Now you can contact me at kuba@lbl.pl or over nekochan forum and let me know than it went well.

** When everything works, don't forget to write on the main nekochan forum thread with your feedback - this is highly appreciated!
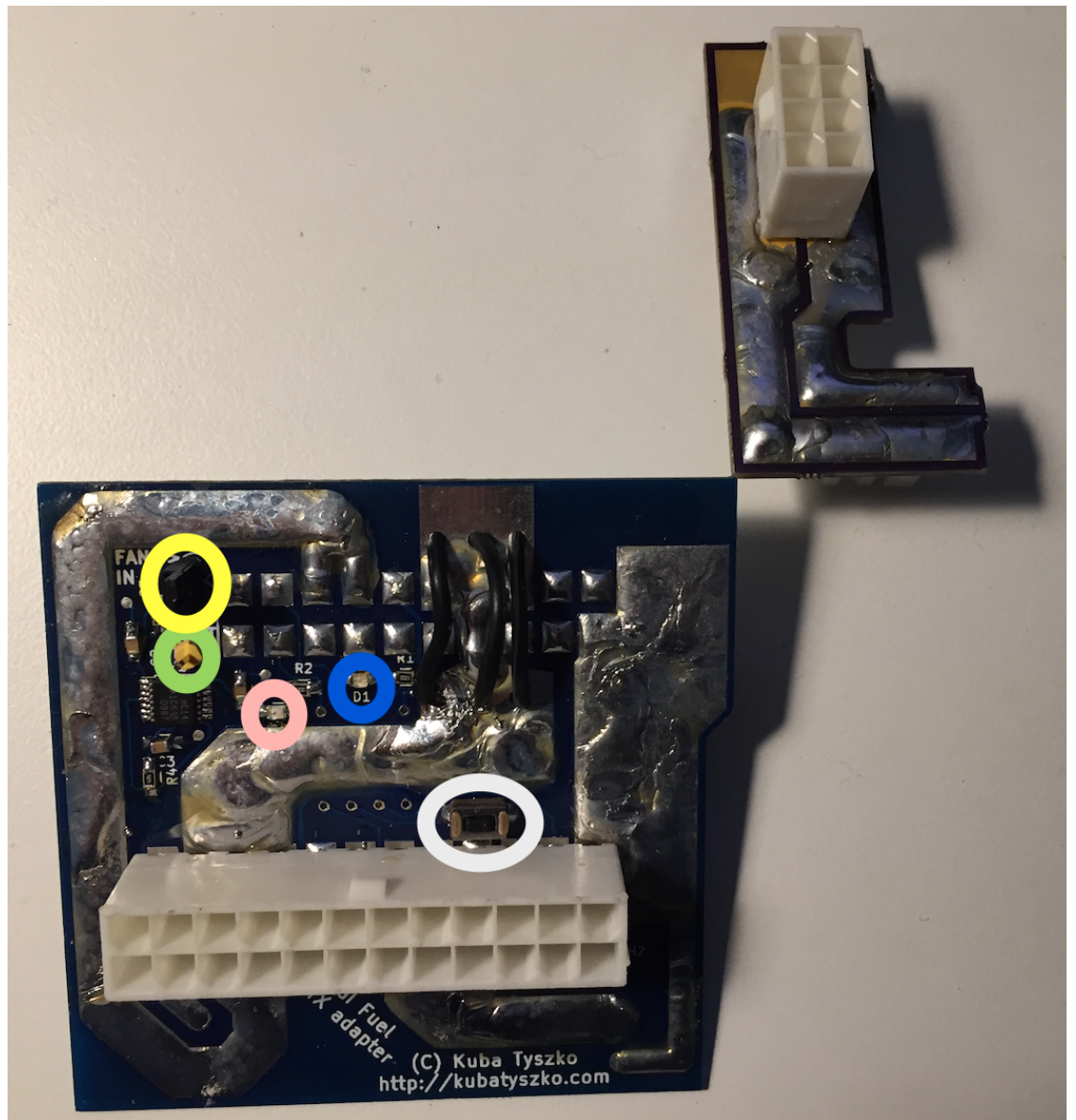
Enjoy, Kuba

Figure 1: Adapter