

The "kMac" project.

Rev.A and Rev.B (233-266MHz) iMac conversions

!

Do you have a dead iMac laying around, are you just bored with the way it is, or would you like to add things such as a **ZIP drive** and **CD writer**, or a second Hard Drive ?

I have the answer, pull out the logic board and build it into a PC case !

The history of WHY ???

I was asked by a friend (Ken) to look into seeing if it were possible to convert a dead iMac (with a blown analogue board) into a PC case with a suitable power supply, he asked this because he comes across dead iMac's (Rev A and Rev B) from time to time and thought it would be good to bring back some of these from the dead, and not only that, make them better than any other "normal" iMac !

So with assistance from Ken by the way of supplying the dead iMacs, various drives, cables and PC cases we began to build our "kMac".

I have done a few conversions so far, (with many more planned), each one allows a deceased iMac to live again, and to have new features, such as a ZIP drive, a CD writer or even a floppy drive (not much point if you can install a ZIP drive though !)

The conversion does cost a bit of money to do, mainly the cost of a new CD ROM / CD writer, the ZIP drive and the new PC case, although, even if you just replaced the original 24x ATAPI CD ROM with a standard IDE version of the same rated speed, it will be about twice as fast, ATAPI is a bit slow you know...

I suppose that you want to know why we named it the "kMac", well, Ken signed his emails to me as "k", so I thought, why not (seeing as it was Kens idea in the first place !)

What is needed.....

All that really needs to be done is to build a couple of adaptors to convert the PC (ATX) power supply to plug into the iMac logic board and to convert the logic boards power on signal (+V) to the one needed to activate the ATX supply (0V), it is not for the non technical types.

I strongly suggest that if you do not have any knowledge of electronics and know how a computer works (at a component level) that you do not attempt to do it yourself, find someone that can !

A PC case !

The case needs to use an ATX power supply, one that has 3.3V,5V,+12V,-12V and constant 5V outputs.

You should look for one that has a 5 1/4" and 3 1/2" drive bay.

An IDE ZIP drive and an IDE CD ROM or CD writer.

An ATAPI to IDE adaptor, you need to be very careful with this, I had to try a couple of types until we found one that worked, after a small modification, the one we ended up using was really basic, it just connected the correct pins together, nothing else, if you get one that has jumpers on it you will have trouble getting it to work, or it may not work at all.

We used one from [Dick Smith Electronics](#), it is designed to convert a notebook hard drive to mount into a 3.5" drive bay, we only used the ATAPI adaptor, I had to remove the power connection from the board to stop it from shorting out some of the pins, seeing as it is being used in reverse (converting a IDE device to ATAPI) having pins connected together is not a good idea ! (unless you like to see your logic board smoke !)

The Basics

Dead iMac's are usually a result of a blown analogue board (the board that drives the screen), although the power supply board does also fail too, to confirm that the analogue board is the problem pull the bottom case from the iMac and plug in an external Apple monitor, if the iMac lives again the analogue board is blown.

OK, now what, you ask ??

All you need to do is completely strip down the iMac, you will need to remove the speakers and microphone, the small PCB on the front panel and the logic board assembly.

A REALLY IMPORTANT WARNING !!!! READ THIS OR DIE (and you think I am joking !)

THE SCREEN AND ANALOGUE BOARDS CAN BE VERY DANGEROUS, THE SCREEN NORMALLY RUNS AT 25,000V, IF YOU TOUCH THE WRONG THING, YOU CAN GET FRIED ! (ELECTROCUTED), NEVER OPEN UP THE IMAC WITH IT PLUGGED IN, ALWAYS LEAVE IT TO SIT FOR AT LEAST ONE DAY TO ALLOW IT TO DISCHARGE THE CAPACITORS AND REDUCE THE CHANCE OF AN ELECTROCUTION !

My procedure to make it safer is to have the iMac turned on (and running), and unplug it from the wall without shutting it down, this helps to drain the capacitors more fully, which makes it a little safer to open the case !

Always avoid touching anything inside the iMac if you can avoid it ! Especially the CRT (screen) and the two circuit boards on each side of it.

One other word of caution, if you make one slight mistake doing the conversion, such as a having single wire in the wrong place, that nice working logic board could be history.

I AM NOT RESPONSIBLE FOR ANYTHING THAT HAPPENS TO EITHER YOU OR YOUR IMAC, YOU ARE THE ONE DOING IT, I HAVE WARNED YOU OF THE DANGER AND THE CONSEQUENCES IF YOU GET IT WRONG !

IF YOU ARE IN ANY DOUBT AS TO WHETHER YOU CAN DO THIS SAFELY, DO NOT EVEN ATTEMPT TO DO IT !

OK, now that you have been warned lets get started.

Remove all of the plastic covers, starting at the bottom cover, then the logic board assembly, then the second bottom cover, front cover, then lastly the main housing (remove the screw covers on top (under the top part of the front cover section) and remove the 2 screws, then you can slide the main housing upwards, you DO NOT NEED TO FORCE ANYTHING, if it does not move carefully check that you have not missed something.

If you want the manual on how to strip it down you can get it from [here](#).

Once the plastic covers are off you can remove the speakers, microphone and front panel circuit board (the one with the power button and LED on it).

You will also need to get the wires for the speakers and mic, the ones that go to the same wire loom as the front panel PCB.

Once you have those bits striped out, you need to strip down the logic board assembly, you will want to remove the hard disk, logic board and the audio and video adaptor PCB (the one that has the video connector on it), you do not need the power filter (the thing the power plug went to under the logic board assembly).

MAKE SURE THAT YOU USE AN ANTI STATIC WRIST STRAP, UNLESS YOU WANT TO RISK BLOWING THE LOGIC BOARD !

You should now be at the stage where you have all the bits in front of you, the logic board, hard drive, adaptor board, front panel PCB, speakers, mic and wiring.

Wiring and connector information

OK, the first thing you need to do is build the adaptor to convert the ATX power plug to one that can be plugged into the logic board directly, or you can use the power filter and slice the wires if you prefer, I did for the first one I built, then decided to try it without it and used this adaptor, it worked just fine, the filter is needed in the iMac due to the proximity to the screen, which produces a lot of electrical noise.

The adaptor is simply a 26 pin box header mounted on a piece of perforated board, the power connector needs to be cut off the ATX supply and the wires soldered onto the perf board (be VERY careful !), you could use an ATX power extension cable, the power wires may need to be a bit longer anyway.

If you decide to use the iMac power filter just cut the power plug off the iMac power supply and splice the wires to the ATX wires, here is the info on the wire functions:

ATX Power Connector:

Pin	Signal	Color	Pin	Signal	Color
1	+3.3VDC	Orange	11	+3.3VDC [+3.3 V default sense]	Orange [Brown]
2	+3.3VDC	Orange	12	-12VDC	Blue
3	COM	Black	13	COM	Black
4	+5VDC	Red	14	PS_ON#	Green
5	COM	Black	15	COM	Black
6	+5VDC	Red	16	COM	Black
7	COM	Black	17	COM	Black
8	PWR_OK	Gray	18	-5VDC	White
9	+5VSB	Purple	19	+5VDC	Red
10	+12VDC	Yellow	20	+5VDC	Red

iMac Power Plug (for power filter connection)

Pin #	signal	color	Pin #	signal	color
1	GND	black	2	GND	black
3	GND	black	4	GND	black
5	GND	black	6	GND	black
7	GND	black	8	3.3VR	green
9	5VR	gray	10	5V	red
11	5V	red	12	5V	red
13	5V	red	14	5VS	white
15	12V	yellow	16	12V	yellow
17	-12V	dark blue	18	3.3V	orange
19	3.3V	orange	20	3.3V	orange
21	3.3V	orange	22	3.3VS	light blue
23	PFW	brown	24	T+5V	purple

These are the connections I made when splicing wires directly together between the ATX supply and the iMac power plug for use with the power filter, where a wire was missing I soldered two to one:

ATX	iMac		ATX	iMac
pin #	pin #		pin #	pin#
1	18+19		11	21
2 (two wires)	20		12	17
3 (two wires)	1		13	2
4	10			
5	3		15	5
6	11		16	6
7	4		17	7
9	24		19	12
10	15+16		20	13

Now you end up with some wires not connected (iMac pins # 8, 9, 14, 22, ATX pins # 8, 18). I just left them dead-ended (and insulated)

Note that pin 14 of the ATX supply (green wire, probably) is not shown, neither is pin 23 of the iMac plug (brown), it is the wire that is used to turn on the supply, we still need to build the inverter for that (details below).

If you do not intend to use the power filter, as I decided not to in the end, here is the pin out of the connector on the logic board:

iMac **Logic Board** Power Connector:

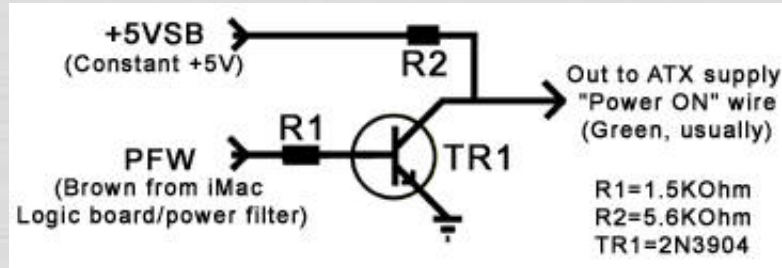
T+5V	GND	GND	+3.3	+3.3	-12	GND	GND	+12	+5	+5	GND	+12
26	24	22	20	18	16	14	12	10	8	6	4	2
25	23	21	19	17	15	13	11	9	7	5	3	1
PFW	GND	GND	+3.3	+3.3	+3.3	GND	GND	GND	+5	+5	GND	+5

See the picture below to see how it looks.

Power supply switch Inverter

The ATX supply requires a 0V signal to go to its "Power On" wire (pin 14 of the ATX connector, usually a green wire), BUT the iMac puts out a +V signal, so we need to make an inverter to convert from the iMac signal to the ATX signal, this is really easy !

All you need is a 2N3904 transistor, a 5.6 KOhm and 1.5KOhm resistor, it is connected up as shown below:

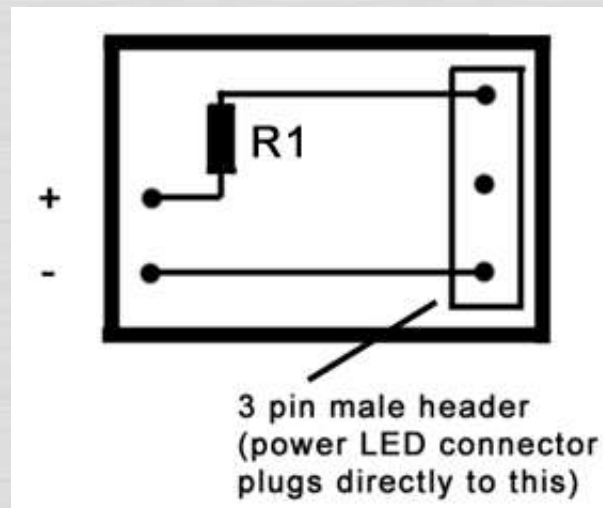


Power LED adaptor

Now, you will probably also want to get the power LED to work on the new case too...

All you need to do is make a simple circuit to reduce the voltage so that the LED can be run off one of the +12V or +5V supply lines.

For a +5V supply use a 180 Ohm resistor, for a +12V supply use a 470 Ohm resistor.



How to do it

OK, to start off with you need to work out how you are going to mount the iMac logic board, if you are lucky it will fit nicely with all of the ports at the back of the case, you may need to either remove the port panel (if it is removable in your case) or cut holes for the ports and reset/NMI buttons.

You also have to ensure that the logic board is earthed to the chassis of the case, I used brass stand off brackets to make sure that there was a good connection, just make sure that all of the screw holes in the logic board that have the connection around them (nice shiny solder) has either a stand off bracket or an

earth strap to the chassis of the case, I had to do both to minimize the number of screw heads visible from the outside of the case.

Once you have the mounting sorted out make the various adaptors as needed, and the power switch inverter, you will also need to mount the audio / video adaptor board and the front panel circuit board from the iMac, make sure that the wires reach OK.

I made a simple extension for the video connector, I got a pair of 15 pin (Macintosh style) HD15 connectors, one male one female, BUT I got IDC ones, so that all you need to do is crimp them onto some 15 strand IDC cable and your done, apart from mounting the female socket on the rear of the PC case, just make sure that you keep this wire as short as possible, if it is too long it may give you display problems.

Mount the speakers in the case somewhere (it does not really matter where as long as it is tidy and the wires will reach from the wire loom that plugs into the audio / video adaptor board).

One thing I also did was to solder some 2 pin male headers to the press buttons for the "Reset" button on the logic board and the "Power" button on the front panel board and then plugged in the power and reset switches from the front panel of the PC case.

Install the hard drive, and any other drives you intend to use, make sure you correctly set the master/slave jumper on each device, you can only boot from a Master device, so the hard drive and CD ROM need to be set as Master, anything else (such as a ZIP) must be set as Slave, you can also only have two devices on each bus, so you are restricted to four devices in total.

Connect up the power supply to either the power filter or the logic board connector (depending on how you decided to connect the ATX supply to it).

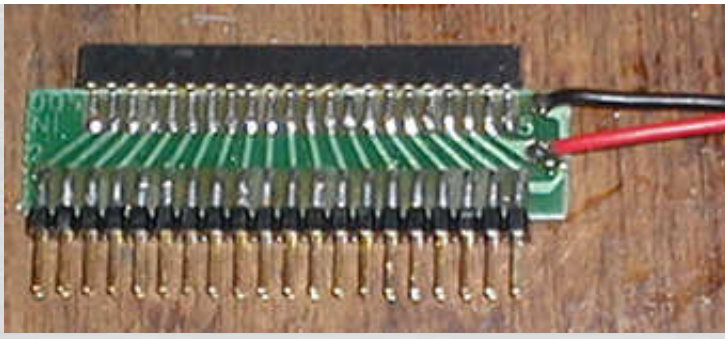
Connect the drives and the ATAPI adaptor, make sure that you have first removed the power wires from it so that the pins on each side of the board are not connected together, take a really good look at the picture below for the correct positioning of the adaptor, it does not just plug in, you have to make sure that there are two pins to the left and four pins to the right of the connector and that pin "1" on the adaptor is to the right hand side (with the IDE connector closest to you, (the ports will be on the right hand side of the board).

The PC case we built our kMac into has front USB ports, so naturally we wanted to make use of them, so I built a small adaptor board.

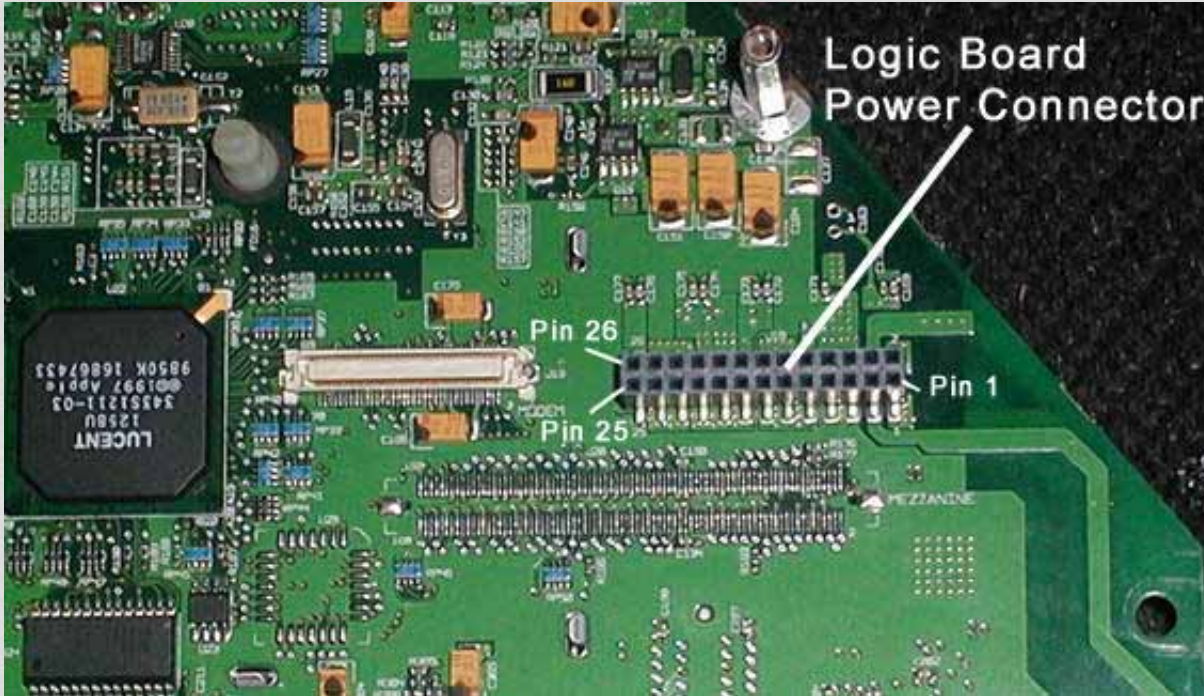
The cables from the front USB ports plug into this board, which has some USB cables soldered to it, they then go out of the rear of the case and plug into the USB ports on the logic board.

Double check everything, ALL connections, power wiring, everything, one mistake can blow the logic board or the ATX power supply, or any of your drives.

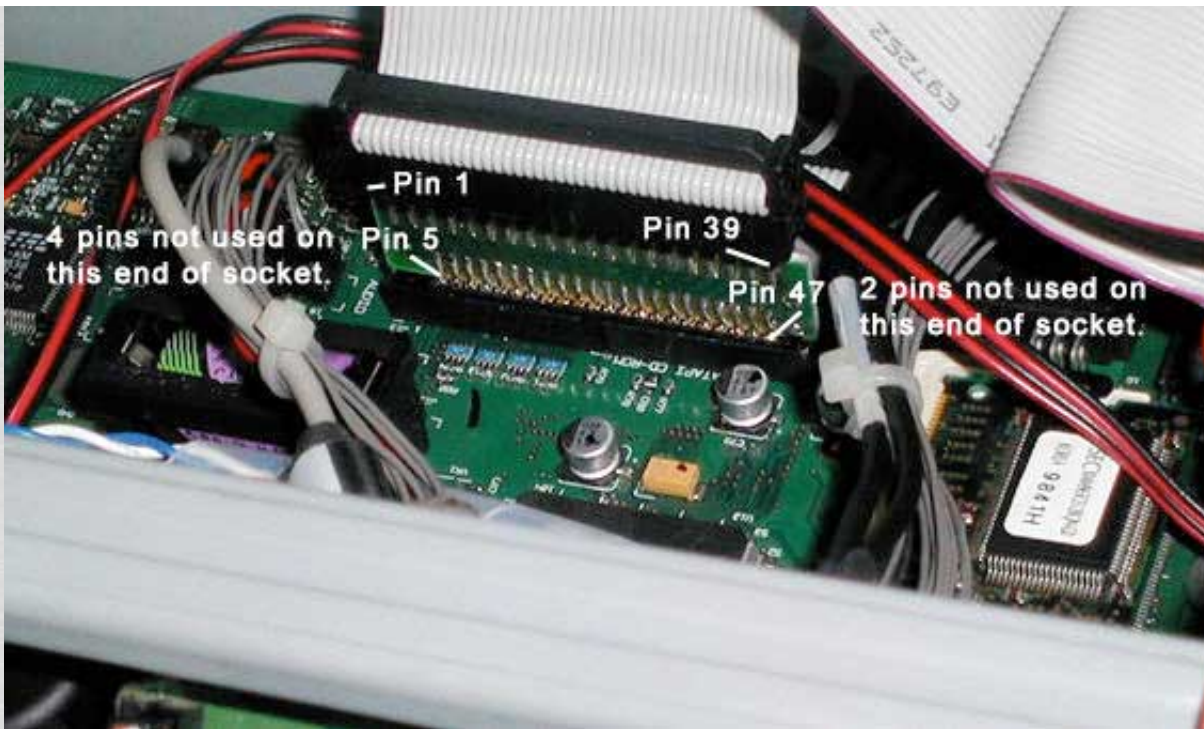
Pictures of the conversion !



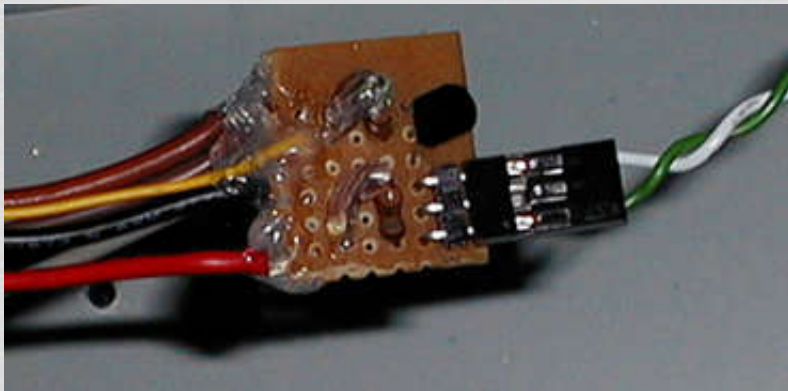
This is the ATAPI - IDE adaptor (shown before removing the power wires).



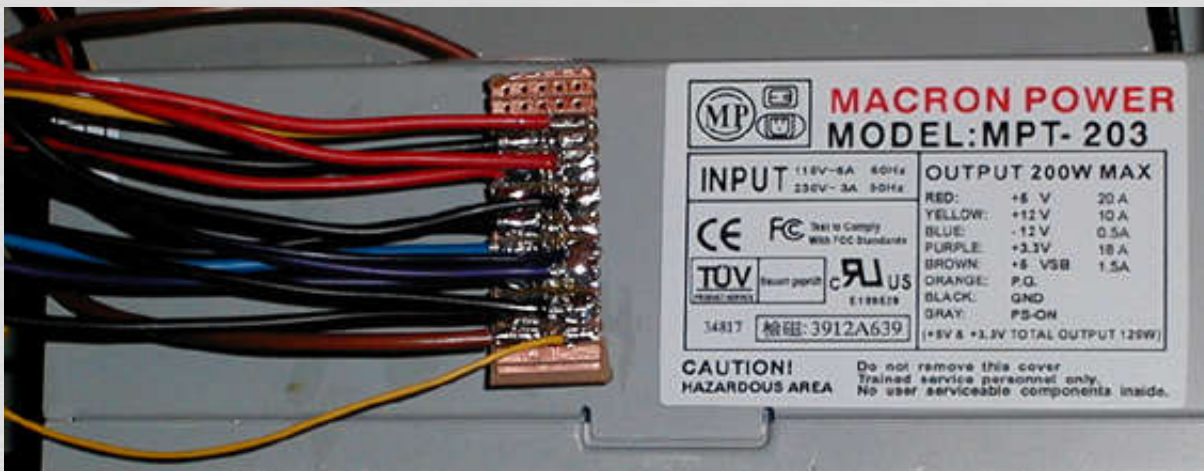
This shows the logic board connector (this is normally where the power filter plugs in).



This shows the ATAPI adaptor installed with a standard IDE cable connected to it.



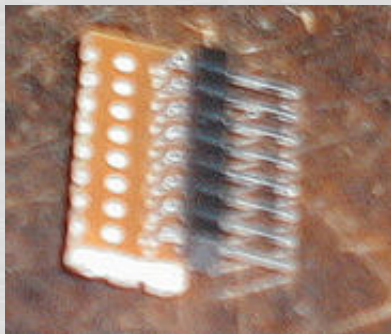
This is the power inverter that converts the iMac "power on" signal to the ATX supply, this particular one also has the power LED circuit on it as well.



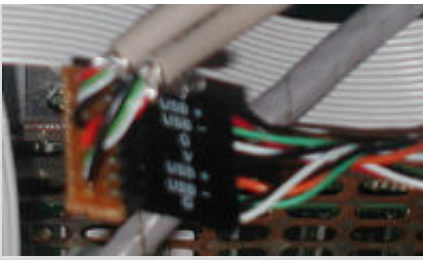
This is the logic board power adaptor that I made for connecting the ATX supply directly to the logic board (shown before being insulated with hot melt glue).



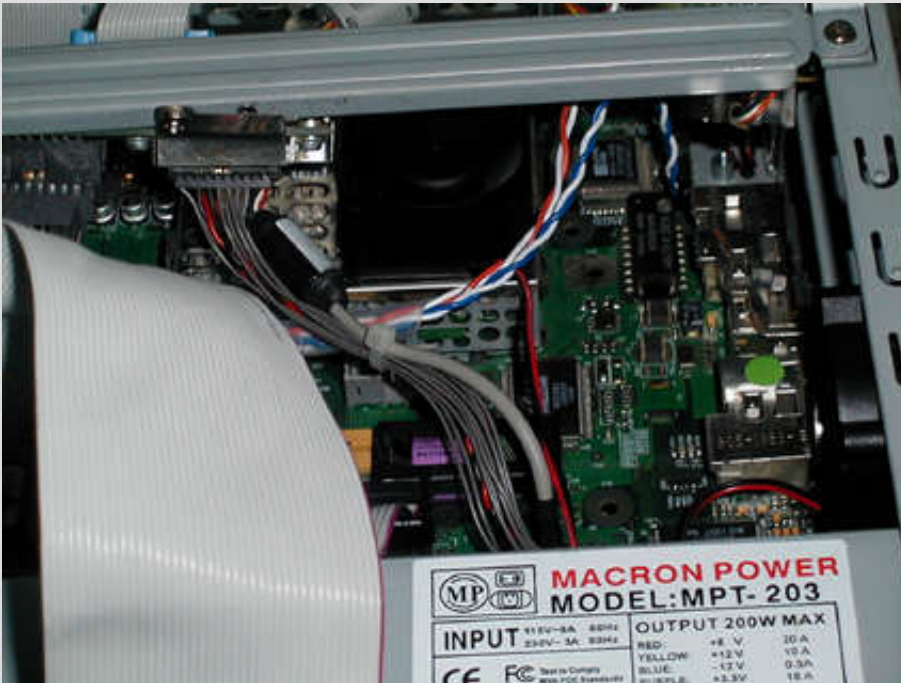
Another angle of the same adaptor.



This is the USB adaptor (sorry about the blur !)



This is the USB adaptor installed in the kMac (before it was covered with heat shrink), you can see the cables soldered to it, they have male plugs on the other end which plug into the logic board USB ports.



This is a pic of an assembled kMac, it shows a CPU cooling fan in place directly over the CPU, it **will** need it !



Here is the "kMac with its front panel closed.



Here it is open, you can see the CD Writer (this version does not have a ZIP drive installed).

NOTE !

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