Omega Race Switching Power Supply Conversion

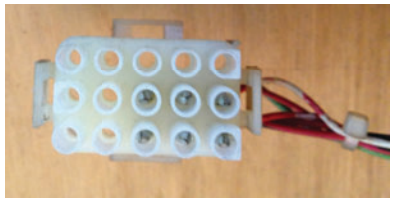
The linear power supply (LPS) in Omega Race may not be the biggest maintenance issue with the game, but nevertheless I did not care to go to the effort of rebuilding it or worrying about it afterwards. Unlike other MCR games, Omega Race does not get a reset signal or battery backup supply from the power supply (maybe that would have been a good idea…) so there's no special circuitry involved - just power. The LPS, the filter assembly that feeds it (with its two gigantic capacitors), the other capacitor that looks like an ignition coil, and the MT89 (smaller) transformer can all be bypassed (i.e., disconnected or removed) and replaced with a switching power supply. Here are the steps to build a harness that plugs right into the two fifteen pin connectors left hanging when the LPS is removed. The only alteration to the cabinet's wiring harness is disconnecting the 120VAC supply to the MT89 transformer.

The MT88 (larger) transformer is still required as it provides power to the vector monitor and to the voltage regulators on the main PCB.

Parts:

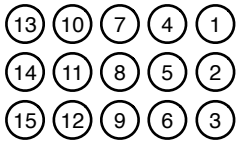
2 female 15 position AMP housings (Mouser part #571-3507841)
5 male pins (Mouser part #571-3505471)
6 female sockets (Mouser part #571-3505501)
8 fork spade terminal connectors (so suit power supply and wire size)
a few feet of black wire for ground, red wire for +5V, and orange (or other color) for +12V, green for grounding the switcher and two leads for 120VAC

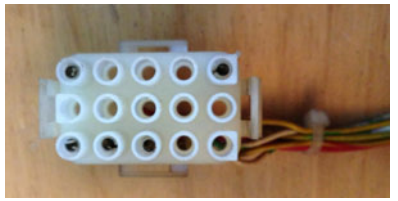
Here are the two connectors unplugged from the LPS. The schematic refers to them as 'Connector D' and 'Connector E'



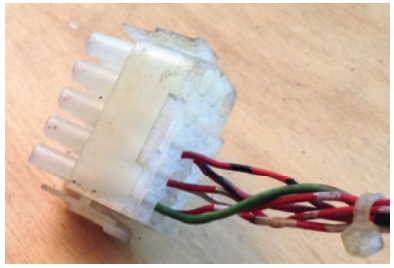
Connector D, six male pins

Here is the pin numbering (for the views shown here)





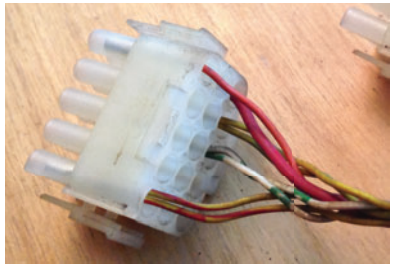
Connector E: five female sockets



Of the six wires in D, three are +5v (pins 3, 5, and 6) and the other three (pins 2, 8 and 9) are ground.

There are eight wires in E but some are doubled up so only five pins. Pins 1, 9* and 13 are +12v and pins 12 and 15 are grounds.

* pin 9 is for coin door lights - schematic says 12v but I run mine at +5v to prolong bulb life and find them plenty bright.



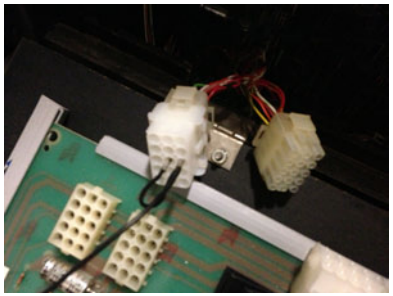
Prepare all eleven wires: five black ground wires (3 female, 2 male) and three red +5v wires (all female) and three orange +12v wires (all male). If you are derating the coin door lights, swap one of the orange wires for red instead (but still with the male connector) - that is, make the three red females plus a fourth male, and only two orange. Hook all the like colored wires together, combining them at the spade connectors or pigtailed together or however you choose. Here is one way to do it (although Amphenol would probably frown). Note that these pictures show the coin doors wired for +5v so there are the four red wires and two orange.

grounds (three female, two male)

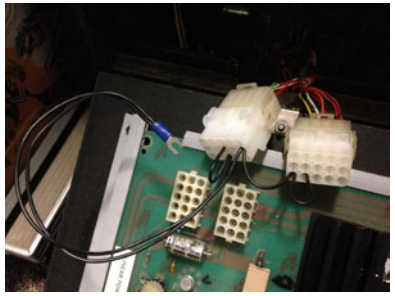
+5v (three female, one male)

+12v (two male)

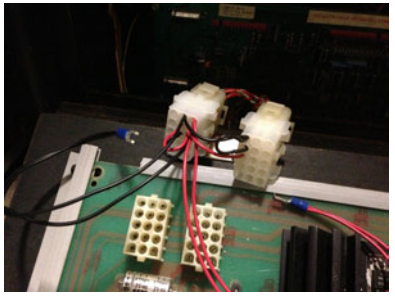
Loosely plug the female AMP connector into connector so the numbers make sense, then insert the pins into the appropriate holes.



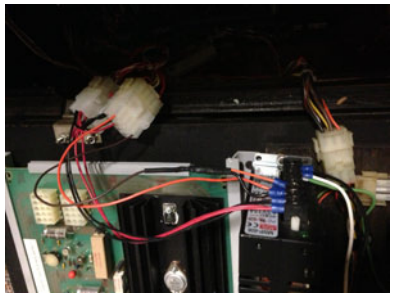
connector D ground pins 8 & 9



D pin 2 and E pins 12 & 15



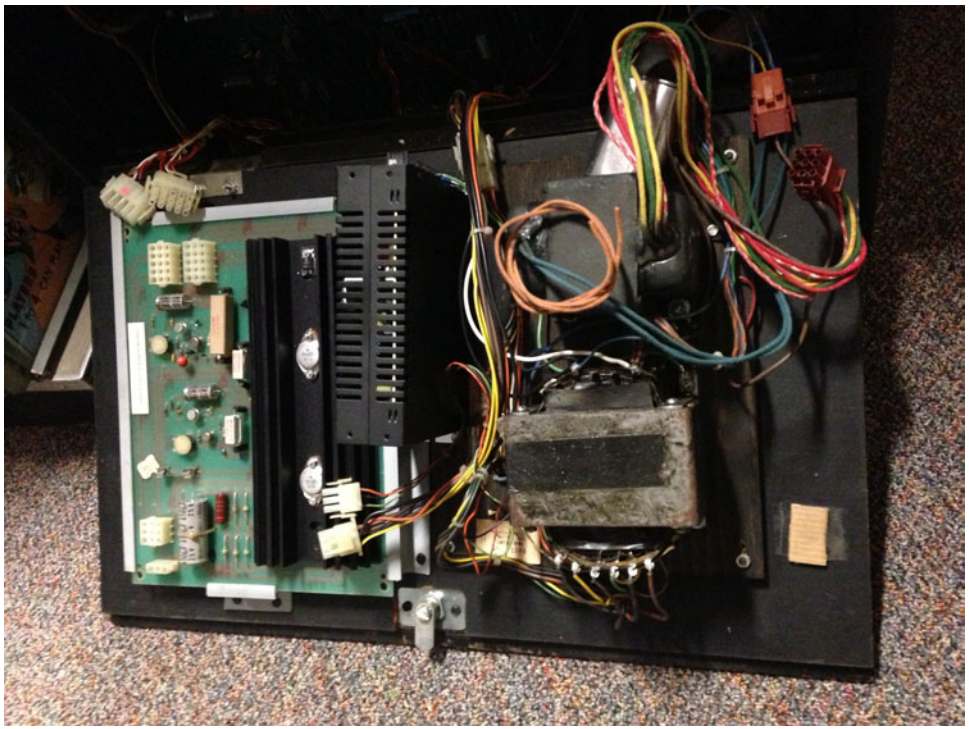
5v to D pins 3, 5 & 6 and E pin 9



conn. E pins 1 & 13 get +12v

The AC in to the switcher can be tapped from a variety of places, including the brown wires that supply the MT89. I clipped mine close to where they attach to the lugs on the MT88 and then coiled them up, and attached the AC leads instead. The ground for the switcher can be had in any number of nearby places.

Clipping the wires disables the MT89 and everything downstream of it; optionally, you can unplug the (brown) 9 pin connector going to the filter assembly and the (white) 9 pin coming from it to the LPS and the (brown) 3 pin connector with the blue wires going to the 3.5Mf cap, but only if you're removing any of those bits. I just clipped the two wires and left it all in there.



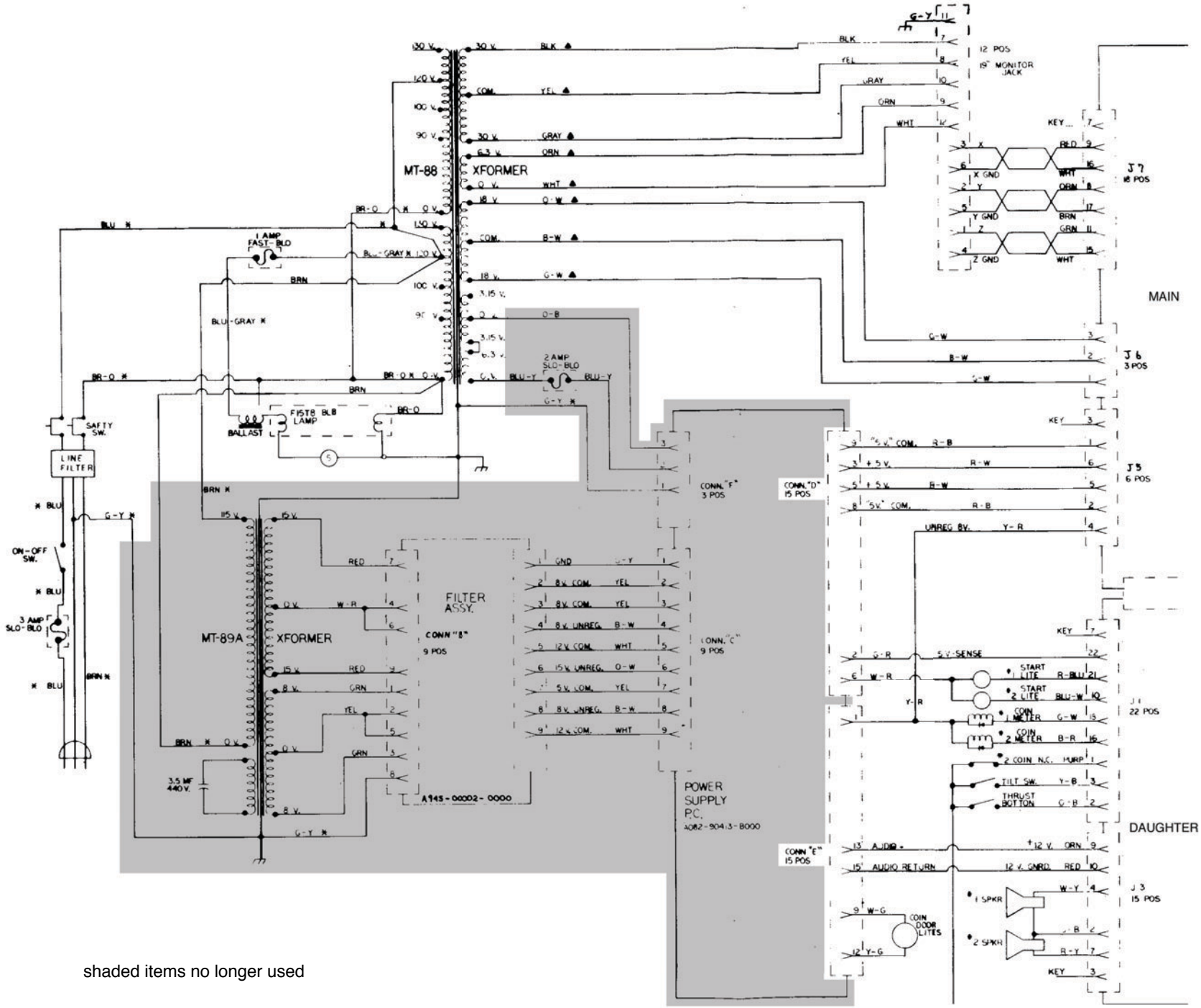
unplugged and clipped

The other connector to unplug is the (white) 3 pin from the MT88 going to the LPS. That is still active so you should unplug it from the LPS board.

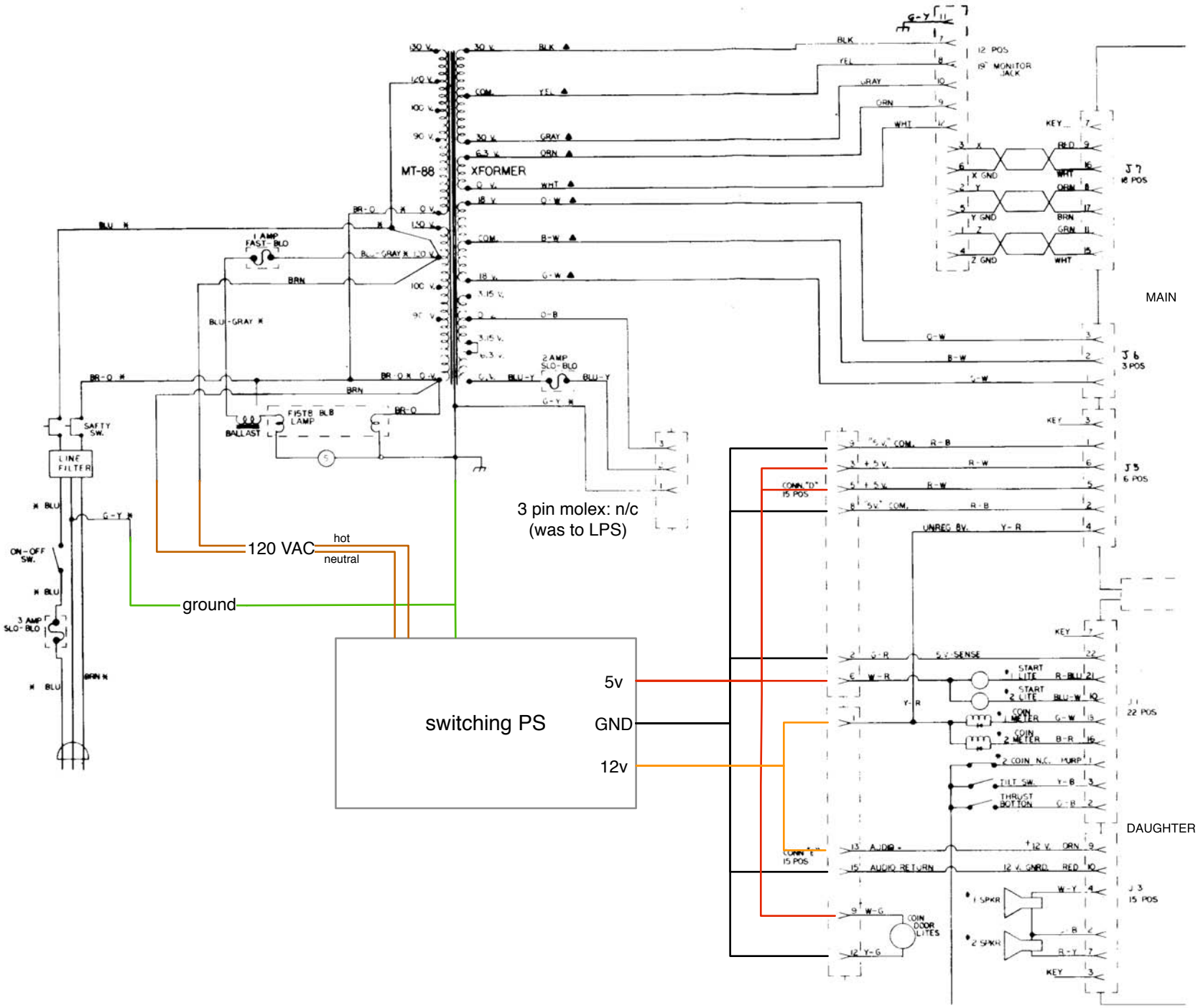
Double check your work, and compare it to the schematics below. If you want to be safe, unplug the J5 connector from the main board and the J1 and J3 connectors from the sound board and turn on the game. J5 should have ground at the two inner pins, no pin 3 (key), then +12v at pin 4 and +5v at the two outer pins 5 & 6. Adjust the switcher to +5v.

Note that pin 1 of connector E originally carried unregulated +8.3v from the LPS to the battery backup circuit of the main game PCB via pin 4 of J5. These instructions send +12v to that circuit. I experimented with wiring up a voltage divider from the +12v supply and sending the original voltage to the board, and... it stopped saving my high scores. I do not have a 3.6v battery pack hooked up to my board nor the 5101 chip. It was replaced with a Ramtron F-RAM on a little adapter board (as sold by pinforge.com). It works perfectly and I do not notice any increased heat or trouble of any kind. If you do have the battery (mounted remotely I hope!) then the R146 resistor on the main board may run a bit warm, but still at less than 50% of its rated power.

Final check is for +12v at pin 9 of J3 for sound. If all is well, power off, plug everything in and turn it on. Readjust the switcher so you get +5v at the 220uF cap near the edge connector on the main board. Done!



shaded items no longer used


MT-88
XFORMER
MAIN
DAUGHTER
120 VAC
hot
neutral
ground
3 pin molex: n/c
(was to LPS)
switching PS
5v
GND
12v