

## Conversion of Computer Server Power Supplies for Stand Alone Operation

This write up will describe what modifications are required to get several different types of server power supplies to run in a standalone mode.

Since there does not seem to be any standard for numbering the small pins on the back of these supplies I have chosen to make my own standard using the same layout as spread sheets where the rows are numbered and the columns are lettered.

### Dell DPS-500CB A

This supply is rated at 502 watts output and 12 Volts at 41 amps. Testing showed this supply to have an efficiency of 82% and unity power factor with a load of 43 amps which is actually slightly higher than its 41 amp rating.

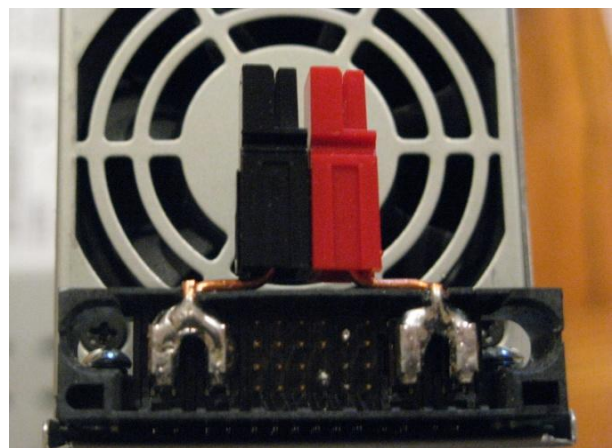
**Power Up Jumpers:** Pin D3 to D4 and E1 to E2. This can be done easily without jumper wires as the pins can be bent together and soldered.

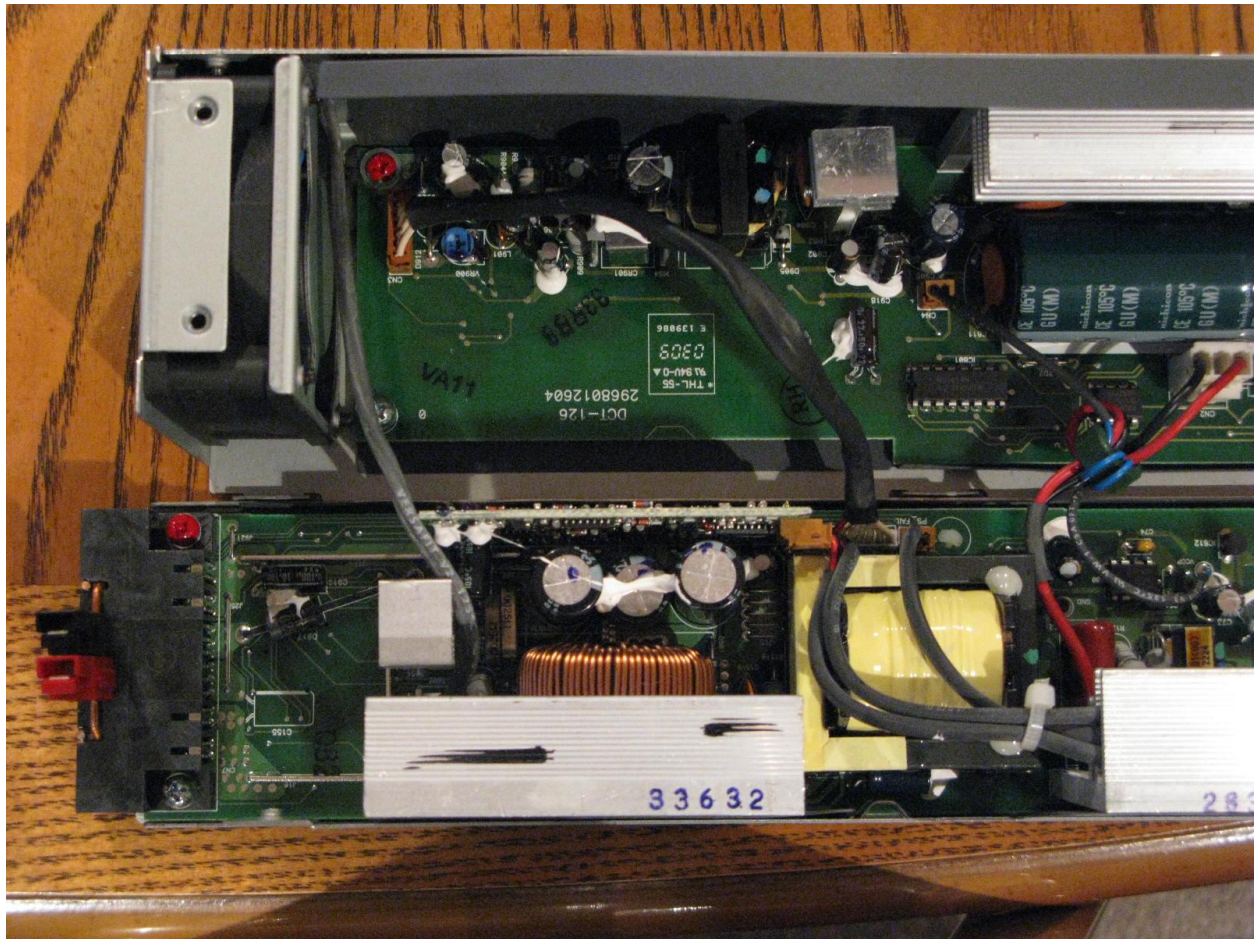
**Power Terminals:** Two left large terminals are - 12V and two right are + 12V. These terminals must be paralleled to be able to handle full load rating of the power supply.

**Voltage Adjust:** There are no obvious voltage adjust potentiometers internally to the supply but I was able to get the voltage to rise from 12.5V to 12.85 by jumpering B4 to E4.

**12V Negative Ground Removal:** In order to isolate the chassis from -12V the supply must be opened and two screws removed and isolated with fibre or nylon washers under the PCB and under the screw head. The attached picture shows the screws in red which must be isolated.

**Fan Speed Control:** This fan has no known external fan speed control but is not required as it is reasonably quiet.





DPS-500CB A Ground Isolation Screws

## HP DPS-600 B:

This supply is rated at 600 watts output and 12 Volts at 47 amps. Testing showed this supply to have an efficiency of 81% and unity power factor with a load of 42 amps. The supply is also known as a DL380 G4.

**Power Up Jumpers:** Pin A4 to B3 to C2. This can be done easily without jumper wires as the pins can be bent together and soldered.

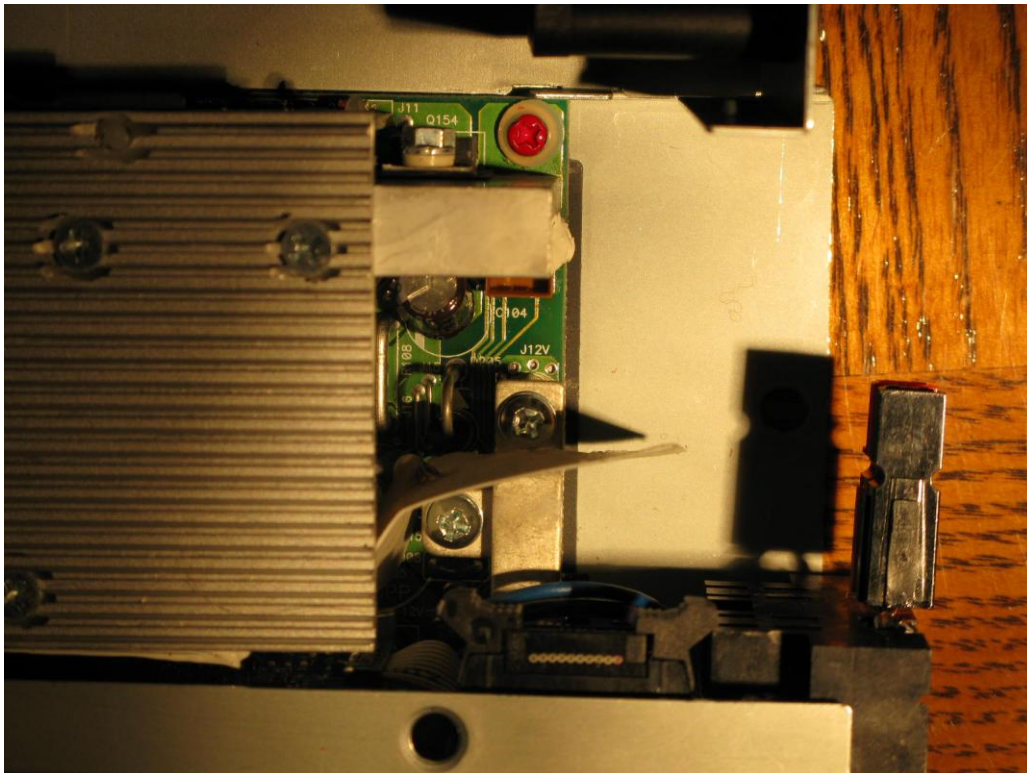
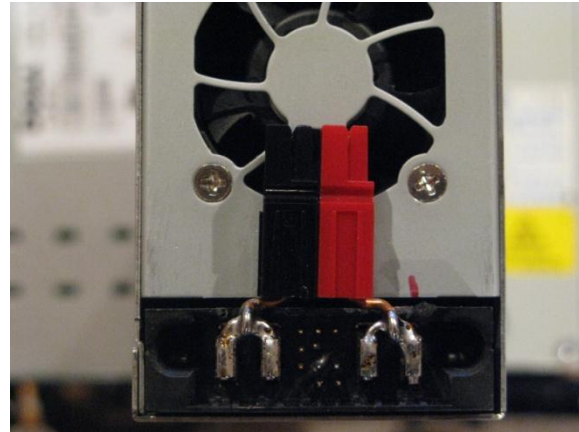
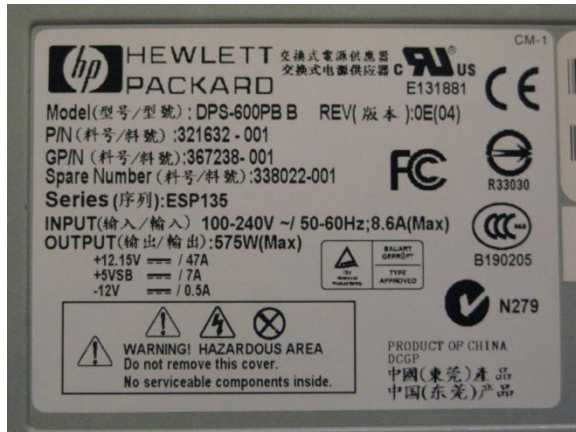
**Power Terminals:** Two left large terminals are - 12V and two right are + 12V. These terminals must be paralleled to be able to handle full load rating of the power supply.

**Voltage Adjust:** A 5k ohm potentiometer connected between C1 to C3 will allow some voltage adjustment. The voltage can be adjusted from 12.5V to over 13.8V but should not be adjusted over 13.5V as the power supply will shut down on overvoltage at 13.8V. A

**Fan Speed Control:** A 5K to 10K ohm potentiometer connected across the 12V output with the center wiper connected to pin A2 will allow control of the fan speed. A better alternative to this would be to install and connect an LM34 temperature sensor as described at the end of this write-up. This will automatically control fan speed dependent on power supply temperature.



**12V Negative Ground Removal:** In order to isolate the chassis from -12V the supply must be opened and two screws removed. The upper screw in Red must be insulated with nylon or fibre washers. The second lower screw which is hidden under the bus bar is left out and a small piece of insulation placed between the PCB and chassis standoff. The attached picture shows the screw in red which must be isolated.



DPS-600 Ground Isolation Screw

## Dell NPS-700AB A or 7000814:

This supply is rated at 700 watts output and 12 Volts at 57 amps. Testing showed this supply to have an efficiency of 82% and unity power factor with a load of 43 amps. Dell has a second version of this supply which is Model 7000814-0000 with identical specifications. These power supplies do not have a fan shield. The fan runs at very high speed and should have some form of protective screen mounted to the case.

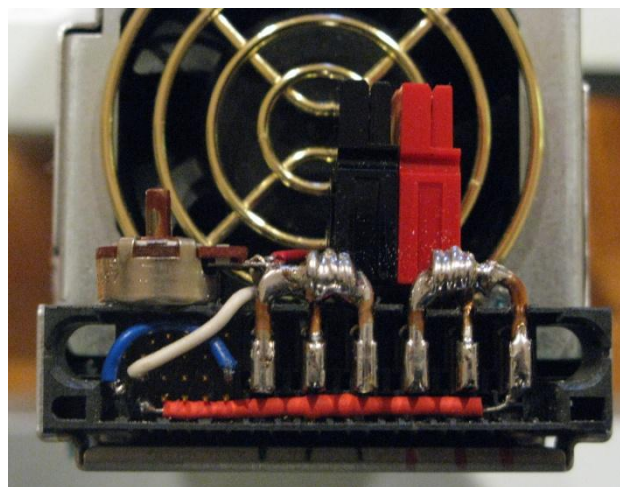
**Power Up Jumpers:** Pin A3 to A4 to F3. A3 and A4 can be joined together and soldered but a short jumper is required to go from this junction to F3.

**Power Terminals:** There are 6 power pins to the right of the small pins. The three left pins are the -12V and the three right are +12V. These terminals must be paralleled to be able to handle full load rating of the power supply.

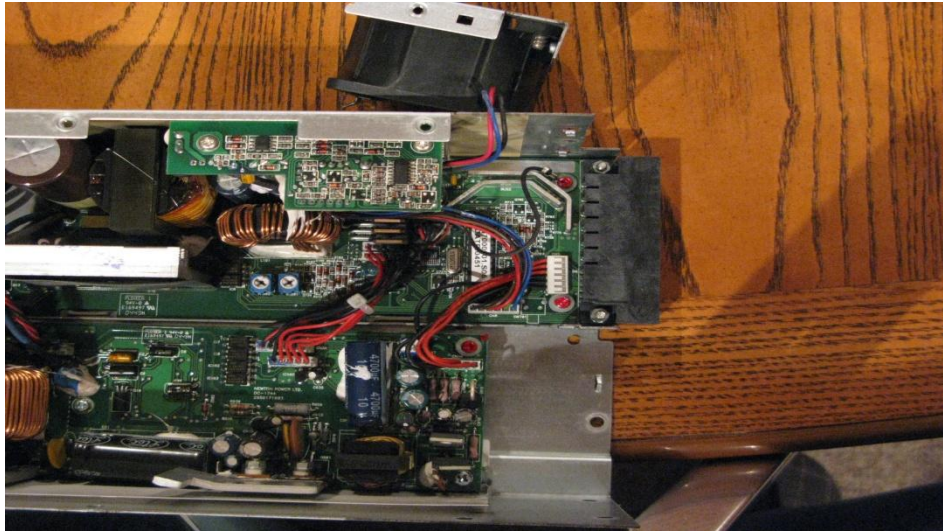
**Voltage Adjust:** There appear to be two ways to adjust the power supply voltage. Jumpering pin B4 to positive will raise the voltage to approximately 12.5V. The NPS-700AB has an internal potentiometer VR601 (right one of two) that will adjust the voltage from 11.85V to 12.85V. If you increase voltage with VR601 I recommend you don't go above 12.5 volts to be sure the power supply does not shut down on overvoltage.

**Fan Speed Control:** A 5K to 10K ohm potentiometer connected across the 12V output with the center wiper connected to pin B3 will allow control of the fan speed. A better alternative to this would be to install and connect an LM34 temperature sensor as described at the end of this write-up. This will automatically control fan speed dependent on power supply temperature.

**12V Negative Ground Removal:** In order to isolate the chassis from -12V the supply must be opened and three screws removed and isolated with fibre or nylon washers under the PCB and under the screw head. The attached picture shows the screws in red which must be isolated.







Dell NPS-700 Ground Screws Isolation

### Dell PowerEdge 6650 Model 7000245:

This supply is rated at 900 watts output and 12 Volts at 72 amps. Testing showed this supply to have an efficiency of 79% and unity power factor with a load of 41 amps.

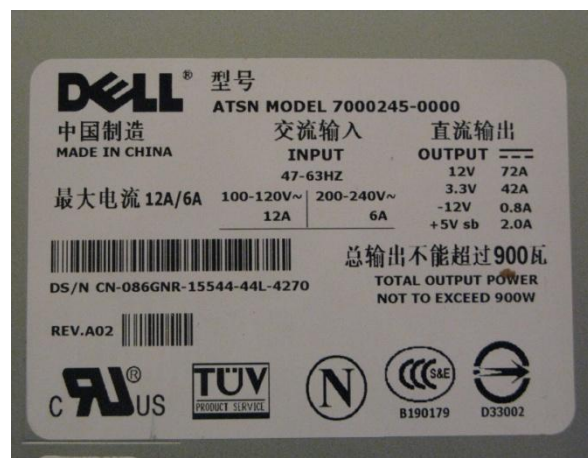
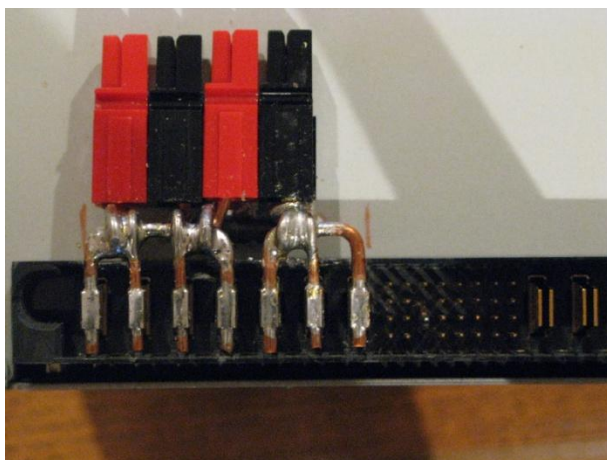
**Power Up Jumpers:** Pin C2 to C3 to C4. They can easily be joined together and soldered without the need for a wire jumper.

**Power Terminals:** There are 7 power pins to the left of the small pins. The four left pins are the +12V and the three right are -12V. These terminals must be paralleled to be able to handle full load rating of the power supply.

**Voltage Adjust:** Connecting a 10K ohm potentiometer from pin A4 to ground will allow you to adjust voltage from 12V to 13.5V. The power supply will shut down on overvoltage at 13.5 volts so do not increase voltage above 13.25V. A fixed 1K ohm resistor from A4 to ground will raise the voltage to approximately 13V.

**Fan Speed Control:** Unknown at this time but fans are relatively quiet so none required.

**12V Negative Ground Removal:** This supply does not have the -12V connected to ground.



## **Optional Fan Speed Control Methods:**

On both the HP DPS-600 and Dell NPS-700AB A power supplies the fan speed can be controlled in a few different ways.

1) This is the simplest way and requires just a switch to jumper A2 to ground on the DPS-600 or B3 to ground on the NPS-700AB. This will reduce the speed to a more reasonable speed for indoor use but you must remember to put the fan on high speed if you plan to draw a large load on the supply.

2) A second method is to connect a 5k to 10k ohm linear potentiometer across the 12 volts and connect the center terminal (wiper) to the same terminals as the ground above. This will allow an adjustable fan speed control.

3) The third and best way to control fan speed is to install an LM34 temperature sensor on the main output transistor heat sink. The sensor is connected across the 12 volts with its center terminal connected to the fan control pin as in the above examples. The sensor will output a voltage of 1 to 2 volts over the temperature range of 100 to 200 degrees fahrenheit which is within the required voltage range required to control the fan speed. Refer to the LM34 data sheets available on the internet for the correct sensor connections.

## **Connecting 2 power supplies in Series for 24V:**

Some of the new larger battery chargers require 24V to deliver their maximum power rating so to do so we simply connect 2 power supplies in series . This does however require that the 12 volts supply DC output be completely isolated from ground.. If the ground is not removed from the DC output then one of the supplies would be shorted out when the cases touch each other. This does not mean that the supplies are no longer grounded as the main AC power cord will connect the case to ground. It is also important that the supplies are of the same size.

I would also suggest that different connectors be used for the 24V output leads so that you cannot connect a 12V charger to the 24V supply.