

Clean Up That Power Supply

- by Stan Kaplan, WB9RQR, 105 Martin Drive, Port Washington, WI 53074-9654

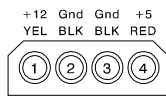
(414) 284-9346 WB9RQR @ N9PBY.EN63BI.WI.USA.NA skaplan@mcw.edu

Lets get back to a hardware topic this month. No need to remind a ham that the power supply is darned important, but there is a need to remind you that it needs maintenance. After only a year or two of use, the power supply can build up a tremendous amount of dust on it's interior, even in your relatively clean house. Not long ago I had occasion to open a computer I had given to one of my OZARES hams for packet radio use only 3 months before. Although it was perfectly clean when I first gave it to him, the interior, including the power supply, was jam packed with dust devils - the worst I ever saw. I am sure the power supply would have failed (if not the motherboard), within another month or two had I not cleaned it thoroughly a second time. Dust is a computer's second worst enemy. It clogs airflow, which permits heat (the worst enemy) to build up to levels that can quickly cause components to fail.

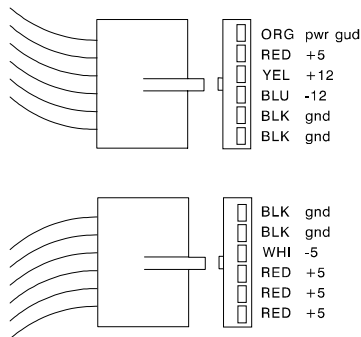
What can the average person do to avert dust buildup in a power supply? At the very least, position your vacuum cleaner's hose flat against the fan grill to suck out what it can (don't do this with the computer on - it may damage the fan). That's something you should do at least a couple of times a year. But many of us hams can do a much more thorough job, and it is really quite easy as well as being a good learning experience. That is the subject of this month's article.

Start by removing the power cables going from the power supply to the drives. Don't worry about the orientation of the connectors; they go into the drives only one-way, as shown here in an end view of the large style connector. Furthermore, they are interchangeable among the same sizes; if you put the back the one taken from the A: drive on the B: drive, it will work fine, so long as both are of the same size.

The smaller style, which is used with some hard and, often, 3½ inch floppy drives, is also keyed so it will fit only one way.



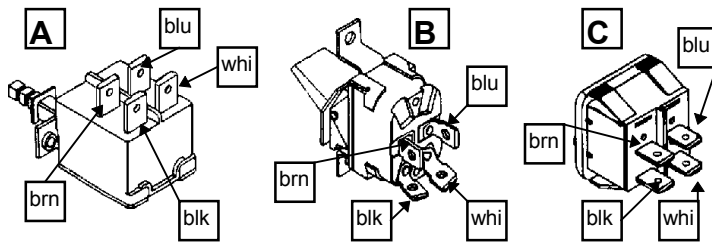
Next, and perhaps the most difficult step in disconnecting the power supply is to remove the power cables going to the motherboard. Here is where paper and pencil is important. There are two connectors. Note which of the two has an orange wire at one end. Note on your sketch where that orange wire goes - generally it is to the back of the case or toward the power supply box. My drawing should help you, but note that some supplies do not have the +5 VDC red wire next to the orange wire shown here. Make a sketch of your setup. After you have plenty of notes so that you can put things back together, remove the two connectors by pulling straight up on the cable. If they slip up but don't come completely off, bend them over (gently! - they will bend in only one direction) until they are parallel to the motherboard. They will come off easily at that point.



It is imperative that you know how to put them back. Remember this: the four black (ground) wires, two on each of the two connectors, should all be next to each other when the plugs are replaced. Also, that orange wire's position is critical. If you screw up on putting these two plugs back, you will most assuredly let the smoke out of the motherboard!

In case you are curious, the orange wire is the "power good" connector. When the power supply is up and running and feeling fine, it sends a digital signal to the motherboard over this line to let the motherboard know it is OK to go ahead with the boot process.

If your power supply has a paddle type switch integrated into the case, you are ready to pull the supply. If your unit has a push button or rocker type switch on the end of a cable, you will have to disconnect the wires leading to the switch first. Again, get out your paper and pencil, and note what color wire goes to what lug on the switch. This diagram shows the most common



connections for the three switch types: A = push button B = paddle C = rocker, but make notes on your setup to avoid any confusion when reassembling the unit.

Finally, take the supply out of the computer's case. Remove the four screws on the back of the computer cabinet that hold it in place. A few power supplies are fastened with another screw or two on the interior, at the end of the power supply toward the front of the cabinet. When all screws are out, slide the power supply toward the front of the computer case a bit to disengage the locking brackets on the bottom of the power supply case if they are present, and lift it out.

Now you are ready to open the supply. The top and, usually, front of the power supply case are one piece. Remove the screws and take off the top/front. Put it in your laundry tub and wash it with detergent, then dry it and set it aside.

AT THIS POINT, YOU NEED TO USE CAUTION BECAUSE SOME VOLTAGES MAY STILL BE PRESENT INSIDE THE CASE! Use an insulated-handle screwdriver to short any exposed metal objects to the remaining case. Especially be sure to short any metal heat sinks. You do not want to get a shock.

Now you need two highly specialized tools: 1) a soft, ½ to 1 inch paintbrush, 2) a vacuum cleaner hose attached to your shop or household vacuum. Start the vacuum and hold the hose end close to the circuit board with one hand. With the other, gently brush loose any dust you see on the components. Brush gently - you just need to dislodge the dust, not the components! Pay particular attention to the colored wires as they go from the circuit board to the bushing in the case wall, since they are a favorite spot for hidden dust. Also get all the loose dust out from between the capacitors and off all surfaces of the heat sinks. Look at the fan. Are its leads soldered to the circuit board? If they are attached via a removable connector, remove it. Take out the four screws that hold the fan in place (but first sketch how it is oriented in both possible planes!). Remove the fan and, sitting in a chair with the vacuum hose between your knees and pointing toward the ceiling, hold the fan over the hose and brush, brush, brush. Use some 70% alcohol (rubbing alcohol) and a soft rag or paper towel to clean it up thoroughly after all the dust is gone. See all that gray goop the towel picked up? Make it all go on the rag and off the fan.

If you have a can of compressed air, blow out the power supply after your vacuuming job is done. Step outside to do this. You will be surprised at the amount of dust you missed with the vacuum that blows out during this step. Also blow out the fan, especially in the crack between the blade assembly and the motor itself. That may well prevent the fan from seizing up and burning out next week.

You are done. Now put it all back by reversing what you did. Remember to loop the fan's leads around the cables before plugging the connector into the circuit board. And, make sure the fan is oriented so that it blows air out of the case, not in. Isn't it amazing how often you have to consult your notes? Where would you be without them? Up a creek!

Use special care to get the connectors back where they belong, especially the motherboard connectors. Finally, when everything is reassembled, plug in your monitor and keyboard and fire the computer up with the cover off. Watch the screen and the computer's interior. Don't let out any smoke. Assuming all is well, turn it off and button it up. Have fun, and happy computing!