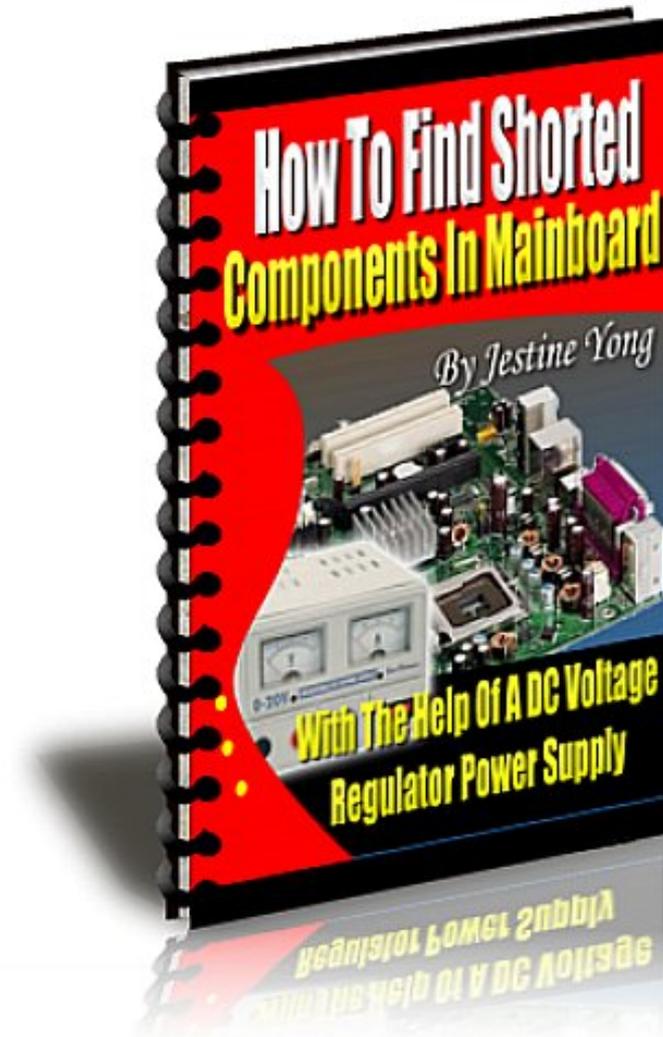


Bonus Report



Brought to you by Jestine Yong

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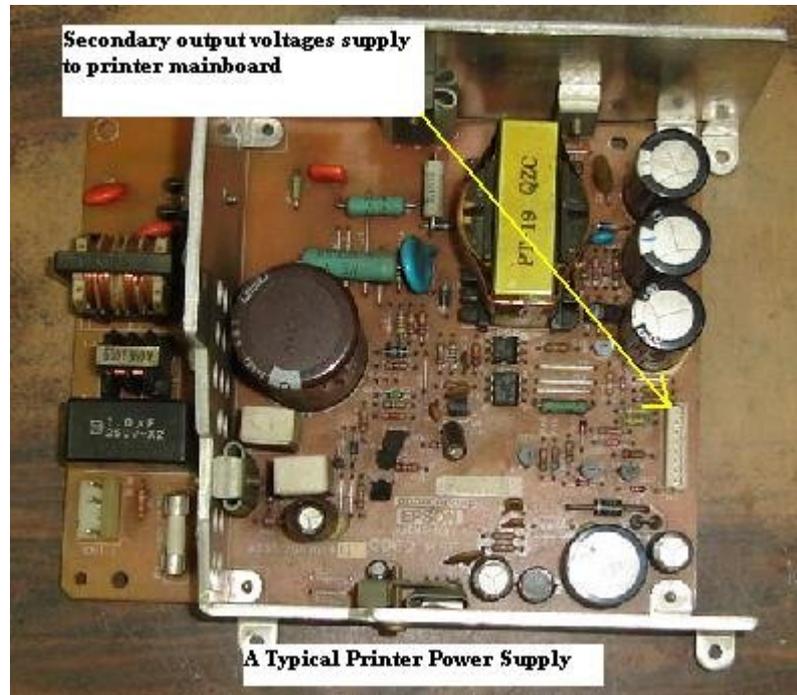
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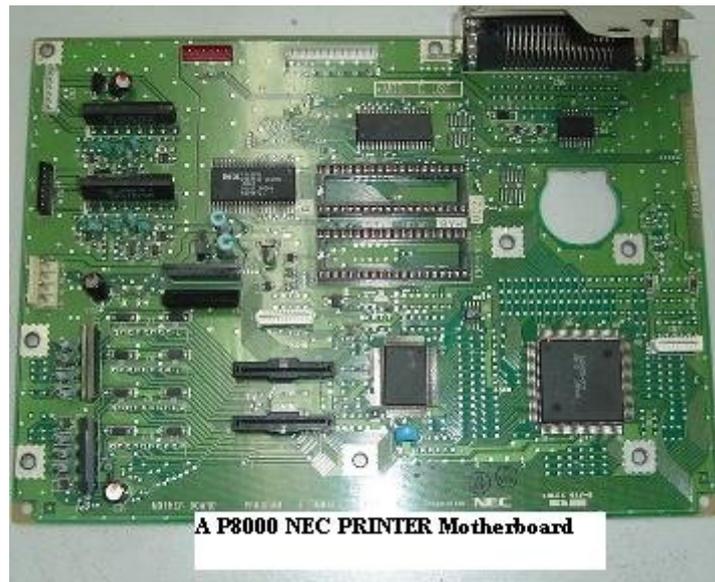
How to Use A DC Regulated Power Supply to Easily Detect Shorted Component in Main Board or Mother Board



Quite often whenever electronic equipment don't function or work, we would immediately suspect a faulty switch mode power supply. But do you know that defective or shorted components in the motherboard or main board could cause the power supply to stop working too?

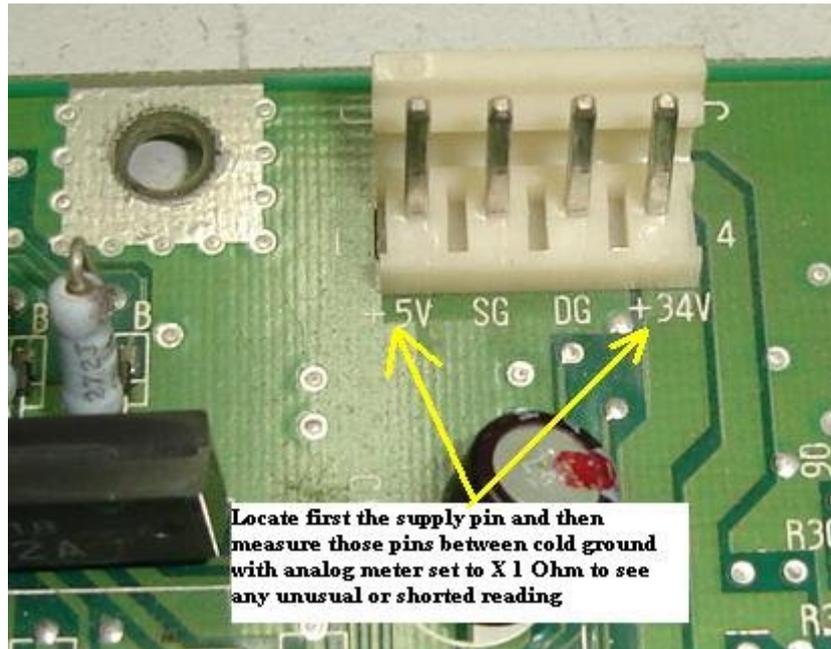
Switch mode power supply (SMPS) are designed so efficiently that whenever there is any short circuit occur in the main board the power supply would shut itself off and totally stop working. If you have no experience about troubleshooting switch mode power supply, you may think that the power supply have problem where in fact the main board is the real cause of no power problem.

Switch mode power supply have a current sense circuit (if you look at UC3842 PWM IC pin 3, it stated I-sense which mean current sense) and if there is short circuit in the secondary side (either in secondary diodes or main board), the current drawn would be increase and this will lead the PWM IC to stop generating output to the power FET and thus the power supply would shut down. All this happen in a split of seconds and you do not have the chance to know if there are output voltages at the secondary side.



Some older design of SMPS power supply do not use the PWM IC, but it do have the circuit to detect over current drawn and shut itself down whenever it detects a shorted component in the secondary side. One good example was the power supply used in printer. Printers usually have two boards; one was the power supply while the other was main board.

If there is any short circuit in the main board, the power supply would not work. In order to isolate at where the problem is, one must remove the connector from the power supply board. Once the supply connector to the main board was removed, you can now switch on the printer and check if there is any voltages present at the power supply connector.



If there are zero voltages measured across all the supply (VCC) pins then we can conclude that the power supply have problem and you can put your whole concentration in this power supply board. What if there are voltages measured across the connector? This means that the main board is causing the no power problem and most probably due to some shorted components in the main board.

For your information, dot-matrix printers usually required two voltages to function. One is the 5 Volts (for logic IC, EEprom and CPU) and the other is 30+ volts for the motors. The question now is how do we know if the main board is the main cause that shutting down the power supply?

Very simple, just use your analogue multimeter set to X 1 Ohm and measure between the supply pin (say 5 volts pin) and the main board ground and then reverse the probes. **A good board should not show two similar reading and if you get two similar ohms reading then this means that the 5 volts line had shorted to ground through some faulty components.**



If you have confirmed that the 5 volts line have problem then how do we find out the culprit since there are so many components connected to this line? TTL IC's, CPU, EEPROM, transistors, diodes and even small filter capacitors are all connected to the 5 volts line. Either one of these components shorted could cause no power to the printer.

You may remove each components lead (5 volt supply) in the main board and hope that the short circuit will be gone. Assuming if you happen to remove one of the filter capacitor pin and the short circuit is gone then we can say that the real culprit is the filter capacitor.

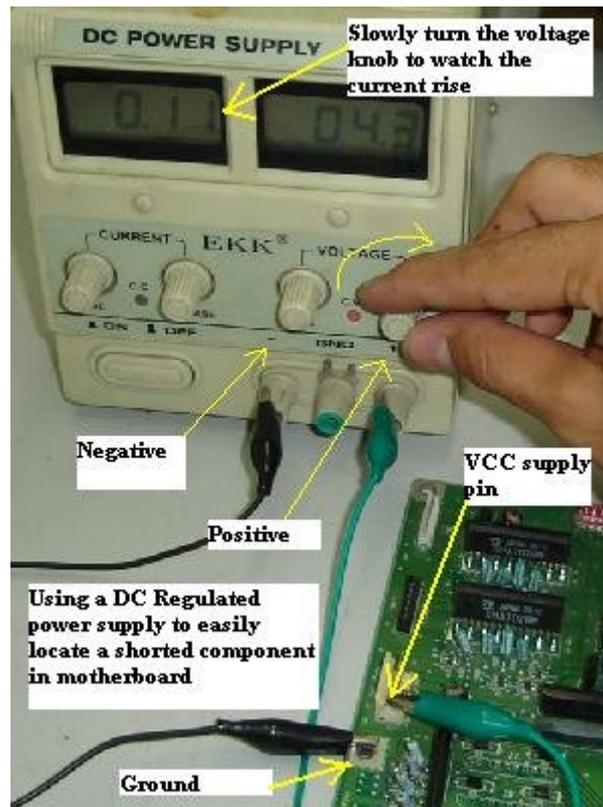
The real problem is what if the board has many components on it and this will consume lots of your time to isolate the problem by removing one pin at a time. It is not easy to identify the supply 5 volts pin to a spider IC that has 100 pins or more. Many spider IC's have more than one 5 volts supply pin. Some even have 4 and some have 6 to 8 supply pins.

Does this mean you have to check one pin at a time until you finally locate the fault? Not only that, to remove the supply pin from the spider IC's and check for any short circuit between the grounds required a very good skill too. If you messed out the circuit board track, the main board can then be considered beyond repair. Even though you can repair the broken circuit track, this does not mean you have solved the actual fault!



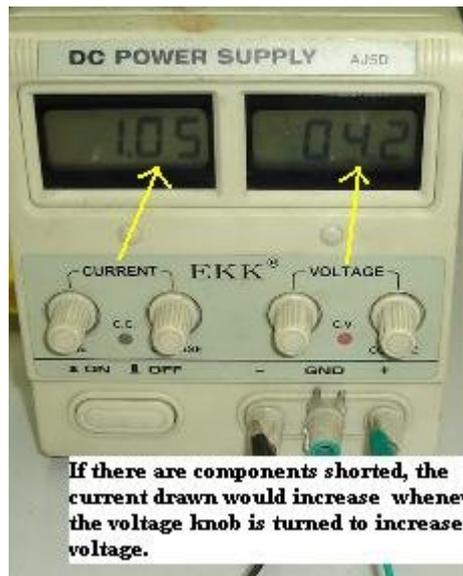
Do you see the extra problem arise when you try to find out the fault? There must be some better way to tackle this kind of problem. Yes it is true that one can use ESR meter to slowly track to the source of the short circuit. You can utilize the ESR meter to locate short-circuits on electronic boards by checking the actual track resistance. One probe connects to the ground and the other to the circuit line and if the measurement rises as you probe further along the track, you know that you are heading to the wrong direction!

If the ESR value decreases as you move along the track then you are in the right direction. The problem is what if the main board has double layers, 4 or even 8 layers? You may be wasting lots of your precious time trying to track to the actual fault using the ESR meter method! After explaining so much about the problems, now is the time that you are waiting for to get the answer on how to solve this kind of fault fast.



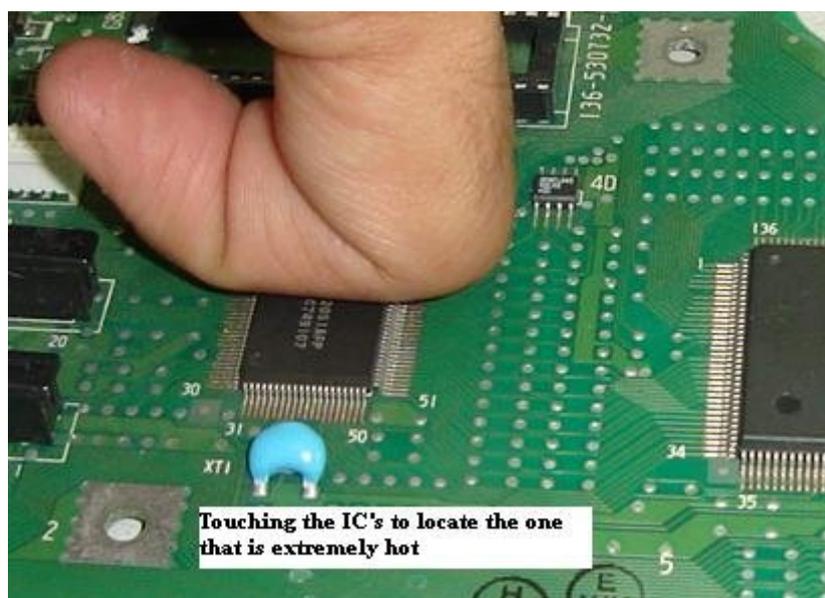
Do you know that the DC regulated power supply besides using it to power up electronic circuit it can also be use to troubleshoot and find out a shorted component in a motherboard? Assuming you have confirmed that the VCC supply lines shorted to ground through some faulty components, you can easily detect it with the use of a variable digital DC regulated power supply. If you don't have the digital one you can always use one with the analogue panel meter which is cheaper.

Now connect the alligator clip from the positive output supply to the 5 volts VCC pin in the main board and the negative output to the main board ground as shown from the picture. Once everything was done, it's time to switch on the dc regulated power supply. Slowly vary the knob clockwise and see the voltage increase. At the same time the current draw can be seen from the current digital meter readout. From experienced, if there is a short circuit in the main board, whenever the voltage is increase, the current will rise dramatically and if no short circuit there would be less current draw.



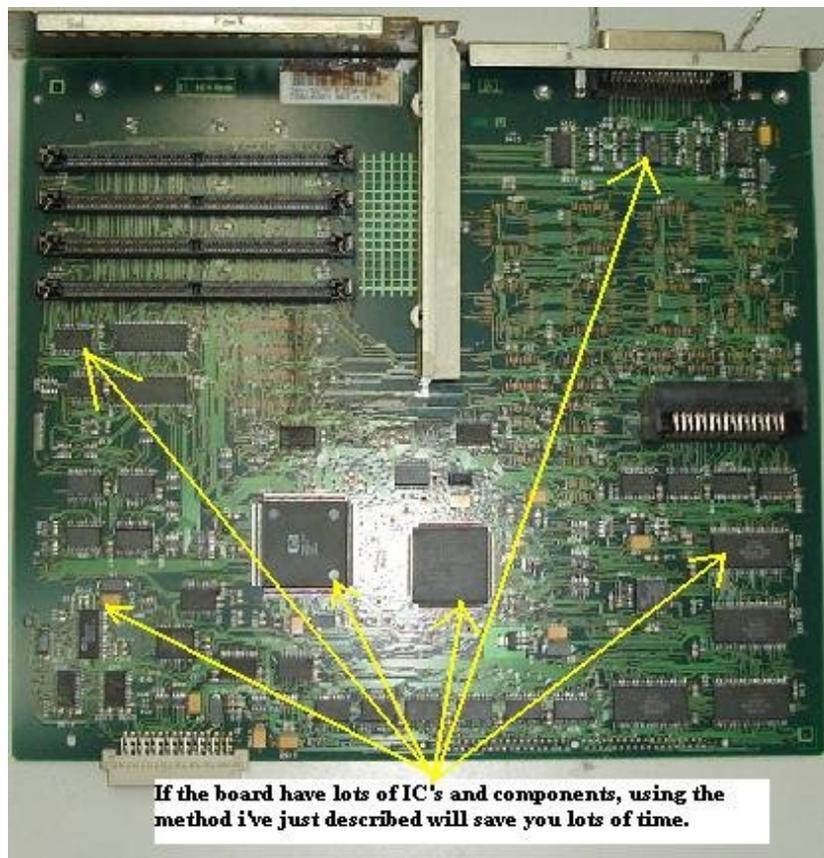
Okay back to this problem, if you observe that the current drawn also increase (rapidly) as proportion to the rise in voltage setting, you are now for sure that there is component shorted in the main board. What does this mean? It is a good news to us, because if the current drawn too much we can know the culprit by touching on the hottest components in the main board. Using your finger you can touch on any components that are very hot.

Touch on the IC's, diodes, transistors, capacitors and etc. Once you located that only one component that is extremely hot to touch then that was the culprit! That's the real cause that you are trying to find! I've used this method to solved lots of main board problem and usually the culprit turned out to be a defective gate array and ram IC.



Why don't I immediately turn the output voltage from the dc regulated power supply to 5 volts since the defective main board is also using 5 volts to run? If I do this and if the faulty components turned hot too fast, I'm afraid this will lead the faulty component to open circuit. If the faulty component open circuit, the current draw will drop and the only clue that you have to identify the culprit has been destroyed!

If this thing happens then you may not have a higher rate to repair the board. Of course you still can by replacing one by one the SMD spider IC's but this will surely eat up lots of your repair time.



The above method I've just mentioned is not limited only to printer main board; it can apply to other type of board as well like the computer motherboard, hard disk, DVD, VCD, industrial board and etc. Get a DC regulated power supply and I'm sure you can detect shorted component in the main board in the shortest time possible! By the way the specification of the DC regulated power supply that I'm using was 5A 30 volts (variable type). Have a good day my friend!

