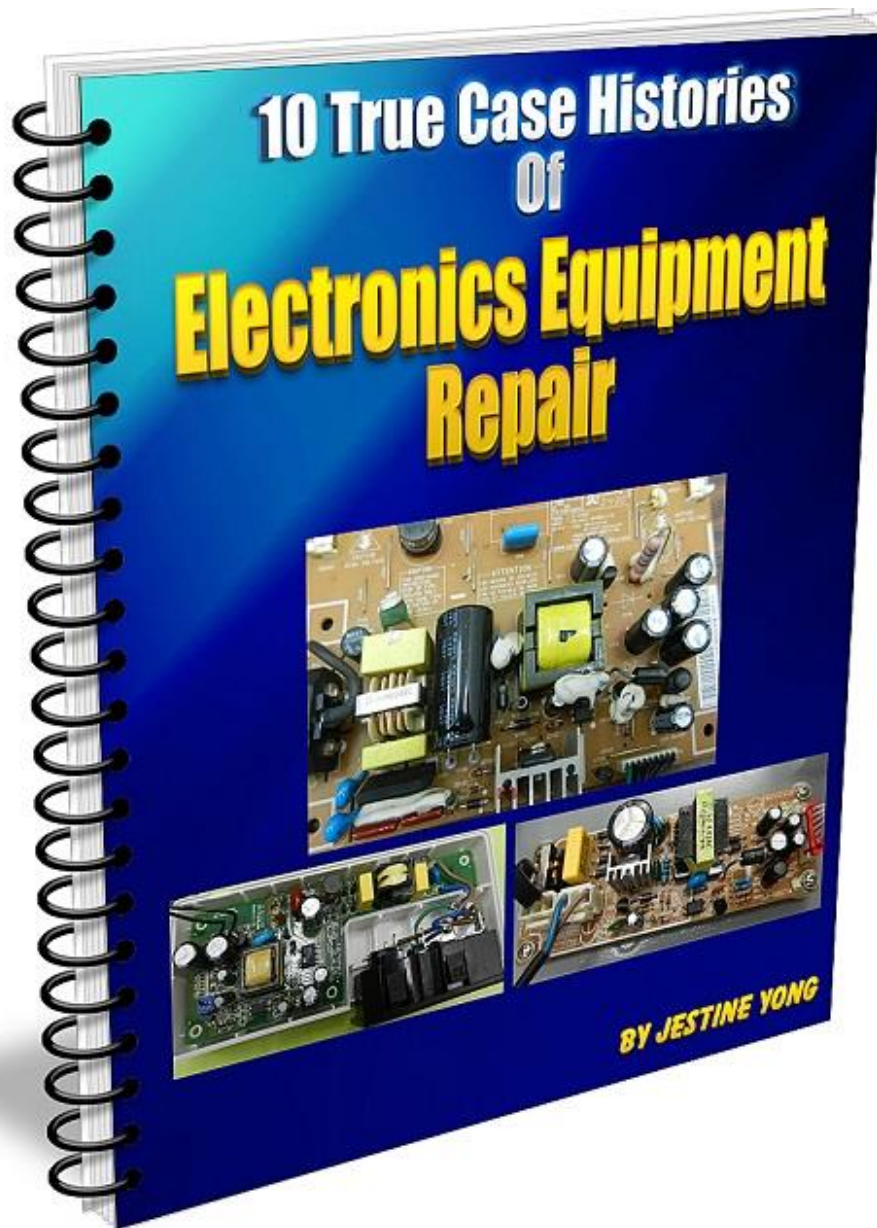


10 True Case Histories Of Electronics Equipment Repair



<http://www.TestingElectronicComponents>

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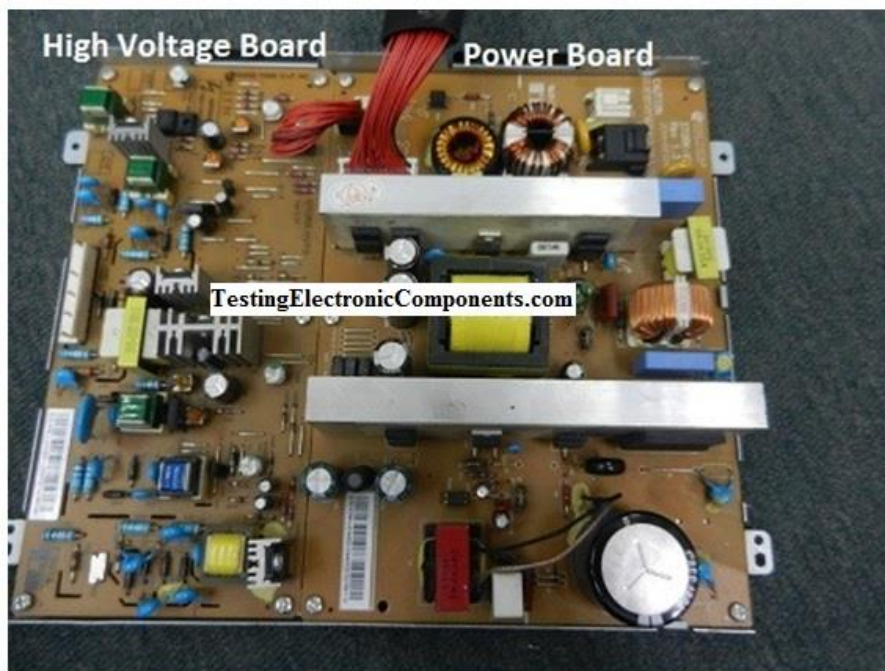
Content

1	No Power in Samsung ML4050n Laserjet Printer Repaired	5
2	Dell 23.5" ST2320LF Widescreen LED Monitor With No Power Repaired	12
3	Panasonic Ceiling Fan Repaired	16
4	Less Than 1 USD To Repair 42" Plasma TV	19
5	No Power In 3Com Baseline Switch 2226 Plus Repaired	24
6	Power Saver Repaired	30
7	19" Philips LCD Monitor Repaired	38
8	Computer Stereo Speakers Repair	41
9	Fax Machine Repaired	45
10	32" LED TV Repaired	52
11	Conclusion	59
12	Recommended Resources	60

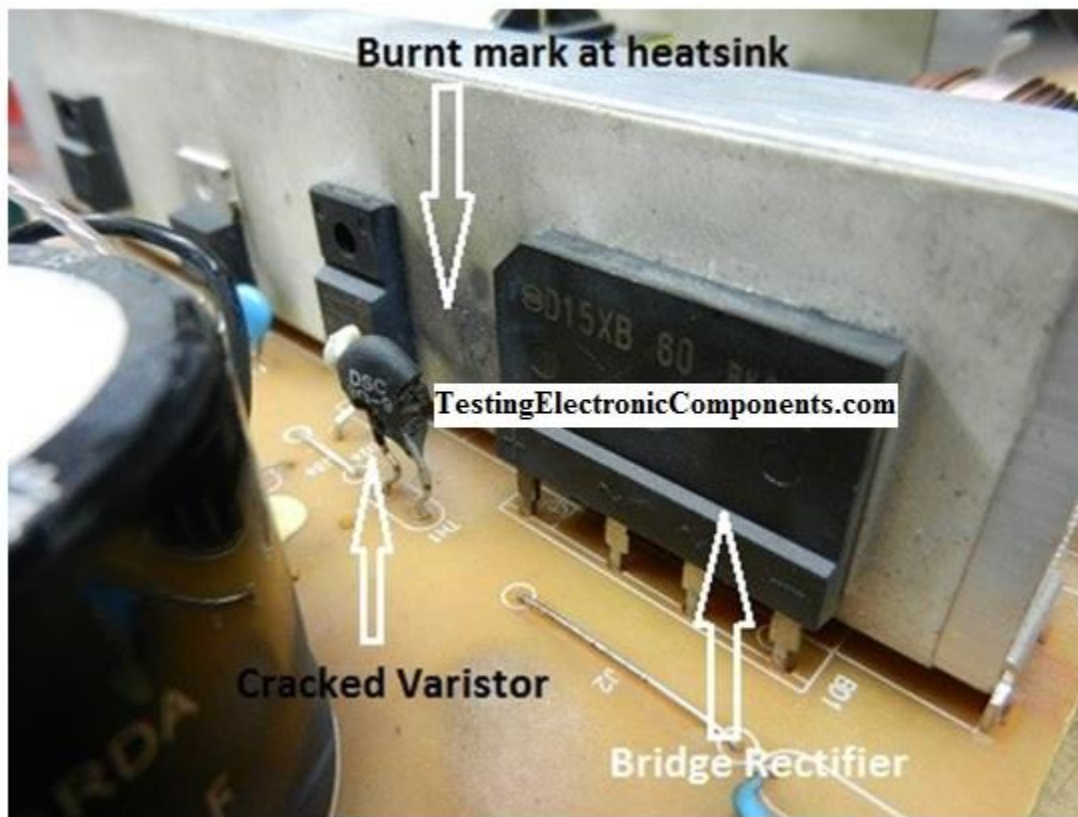
No Power in Samsung ML4050n Laserjet Printer



The complaint of this printer was no power and in order to see the circuit board, one has to remove the cover. It was not easy to dismantle the cover. Remember to use a digital camera to take some photos. If you have a hard time putting the cover back, you can always refer to the photos you have taken. This will simplify your job.



Actually there are two circuit boards-one is the high voltage board and the other one is the power supply board. Since the complaint was no power so I concentrate on the power supply board. The first thing to check was the main fuse and it was tested good. There were no bulged electrolytic capacitors and while trying to search for any burn component I found a component marked as TH1 (photo below) already cracked and hardly could see the whole part number. This component is a Thermistor while to some they refer to is as Thermister. Not only that, the heatsink located just behind the Thermistor had a burnt mark caused by the great spark of the Thermistor when it was exploded most probably due to the excessively high inrush current. Just to let you know that one of the main functions of a Thermistor is to limit the inrush current.

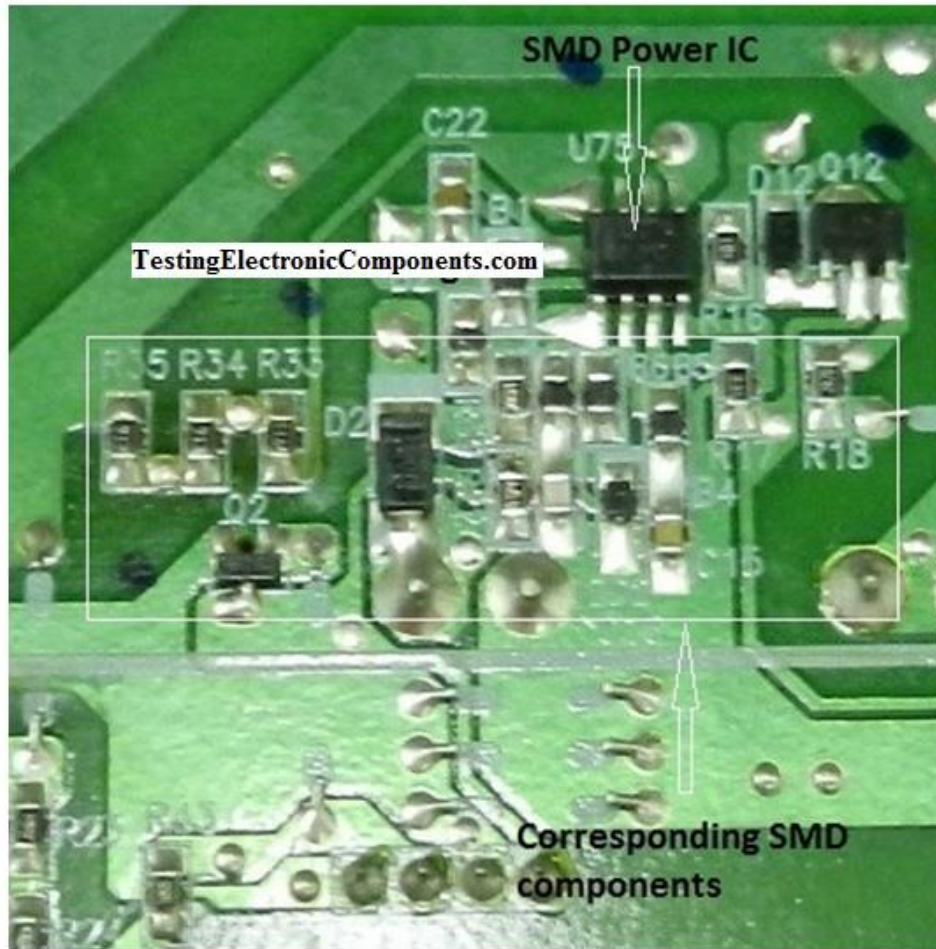


A good Thermistor when testing it with an Ohm meter it should show low Ohms reading (between 3 to 30 Ohms). This particular Thermistor does not show any reading which means it is already open circuit. Please take note on this- whenever you found a burnt or open circuit Thermistor, you need to

check the corresponding components as well. The main fuse did not blow does not mean other power semiconductors are good.



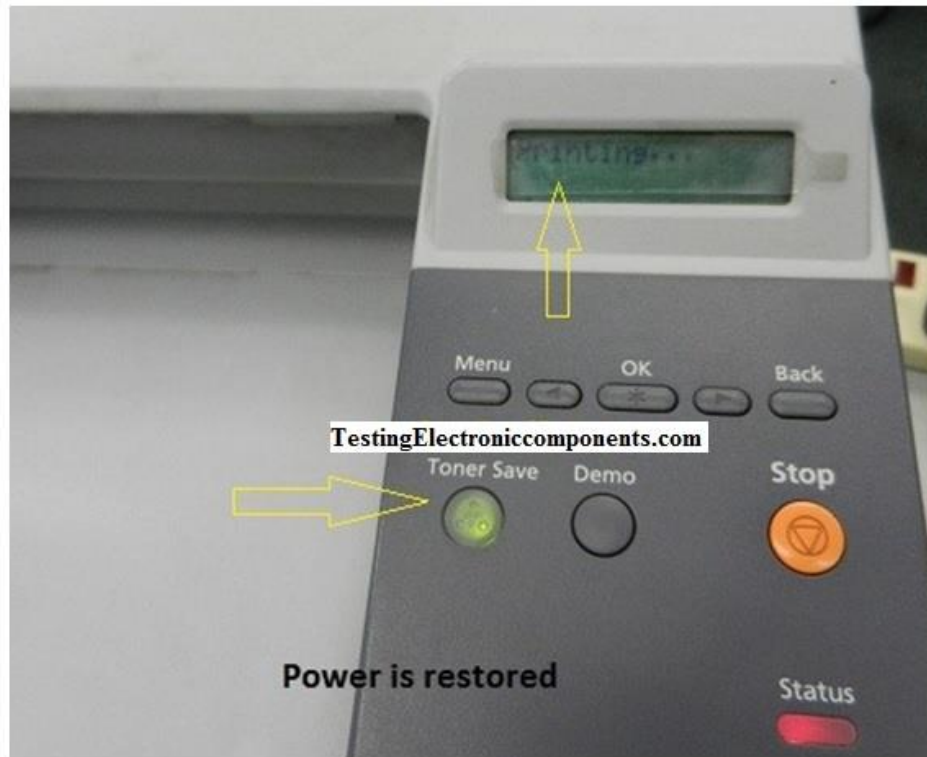
In my case, I did checked on the power FET, primary winding of the transformer and secondary diodes and all of these components were tested good. I'd also put special attention on the SMD power IC (next page) to see if there is any tiny burnt mark on the surface of the IC with the help of my X35 magnifying glass. Well, the SMD IC and the surrounding SMD components were in good condition too.



I concluded that only the Thermistor having problem and I believe by replacing only the Thermistor could solve the problem. The question now is where to find the exact replacement since I could not trace the original part number datasheet? I left only two choices-either just connect a wire across it or use a replacement number. For your information if you use a wire as a replacement, then the power supply no longer have protection against inrush current. In the future if there is any excessive inrush current, many of the primary side components will be badly affected.



Since my store room has some junk Laserjet power boards, I took out a good Thermistor and used it as a replacement. My expectation was correct; the Laserjet came back to life once the AC power is applied. For your information, you need to turn On and Off the power many times to see if the replacement component is stable or not. If the replacement component has a too low spec then it may blow again. So, the best is to try On/Off the power supply many times before sending it back to your customer.



Conclusion- Not all switch mode power supplies are using Thermistor as protection against inrush current. I have seen many power supplies used low ohm wire wound resistor ranging from 2.2 to 4.7 ohm 5 to 10 watt as inrush current limiter. Some does not even have any of these components in their design. In the above case, fortunately only the Thermistor have problem. In some cases, a blown Thermistor could cause the power FET, power IC and corresponding components to blow as well and surely this will take more time and skill to troubleshoot it.

Below is the datasheet for both the Thermistors:

型號 Model	R25℃ ±20%(Ω)	最大穩態 電流(A) Max Steady- current(A)	最大電阻時 近似電阻值(Ω) Approx R of Max. Cur.(Ω)	耗散系數 Power Dissipation coe- fficient(mW/℃)	時間常數 Time Constant (s)
NTC 5D-7	5	2	0.241	10	30
NTC 8D-7	8	1.5	0.436	9	28
NTC 10D-7	10	1	0.572	9	27
NTC 16D-7	16	0.7	0.897	9	27
NTC 22D-7	22	0.6	1.083	8	27
NTC 2.5D-9	2.5	4	0.128	11	35
NTC 3D-9	3	4	0.133	11	35
NTC 5D-9	5	3	0.236	11	35
NTC 8D-9	8	2	0.382	11	34
NTC 10D-9	10	2	0.476	11	34
NTC 16D-9	16	1	0.688	11	32
NTC 22D-9	22	1	0.899	11	30
NTC 25D-9	25	1	0.914	12	30
NTC 35D-9	35	1	1.103	12	30
NTC 50D-9	50	1	1.265	11	30
NTC 60D-9	60	1	1.521	11	30
NTC 80D-9	80	0.8	2.108	11	30
NTC 100D-9	100	0.8	2.576	11	30
NTC 120D-9	120	0.8	3.115	11	30
NTC 200D-9	200	0.5	5.900	10	32
NTC 300D-9	300	0.5	9.150	10	32
NTC 2.5D-11	2.5	5	0.120	13	46
NTC 3D-11	3	5	0.126	13	45
NTC 5D-11	5	4	0.288	13	45
NTC 8D-11	8	3	0.301	13	45
NTC 10D-11	10	3	0.395	14	47
NTC 16D-11	16	2	0.488	14	50
NTC 2.5D-13	2.5	6	0.099	13	60
NTC 3D-13	3	6	0.112	14	60
NTC 5D-13	5	5	0.136	15	68
NTC 8D-13	8	4	0.256	15	65
NTC 10D-13	10	4	0.271	15	65
NTC 16D-13	16	3	0.368	16	60
NTC 3D-15	3	7	0.094	18	76
NTC 4D-15	4	6	0.128	20	76
NTC 5D-15	5	6	0.132	20	76
NTC 8D-15	8	5	0.196	20	80
NTC 10D-15	10	5	0.255	20	85
NTC 16D-15	16	4	0.307	19	77
NTC 3D-15	3	8	0.079	24	100
NTC 5D-20	5	7	0.106	23	87
NTC 8D-20	8	6	0.157	23	105
NTC 10D-20	10	6	0.194	23	118

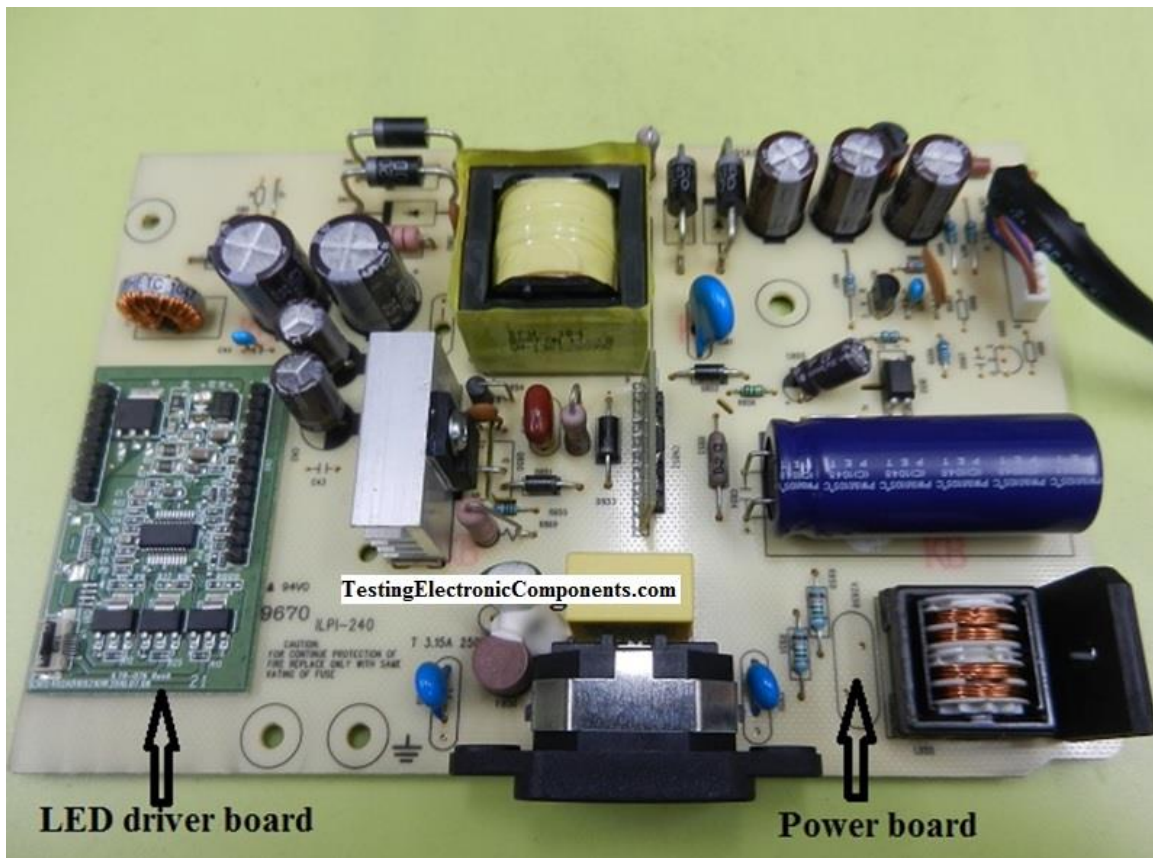
For more information about Varistor and Thermistor function please click on the links below:

<http://en.wikipedia.org/wiki/Varistor>

<http://en.wikipedia.org/wiki/Thermistor>

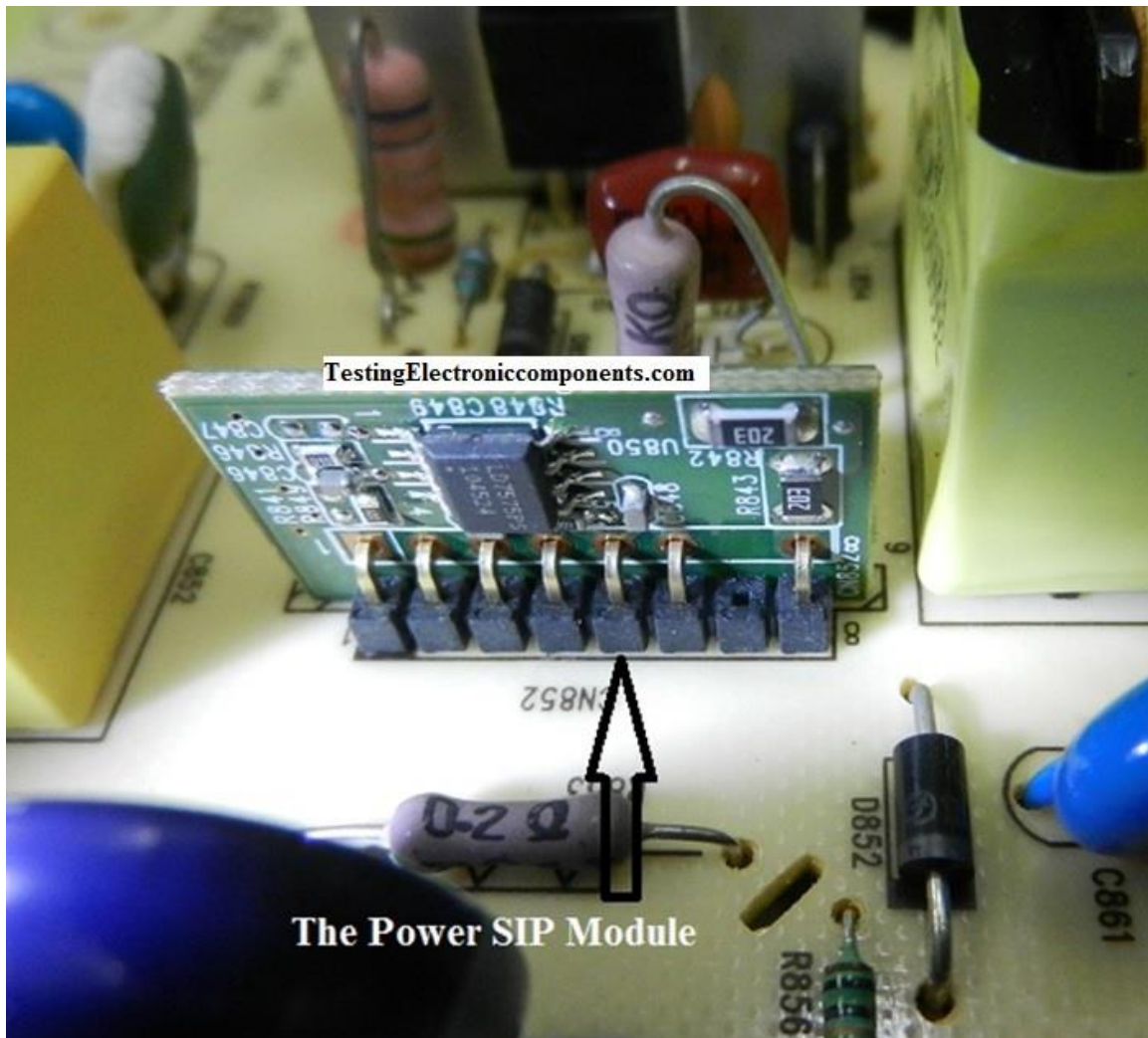
Dell 23.5" ST2320LF Widescreen LED Monitor With No Power Repaired

In fact this is my own LED Monitor. While using the Monitor at home, it just suddenly went dead (power light does not lit). I have a spare LCD Monitor at home and after powering it up I could see the display. This means the LED Monitor indeed have problem. I took it back to my office and started the repair work.

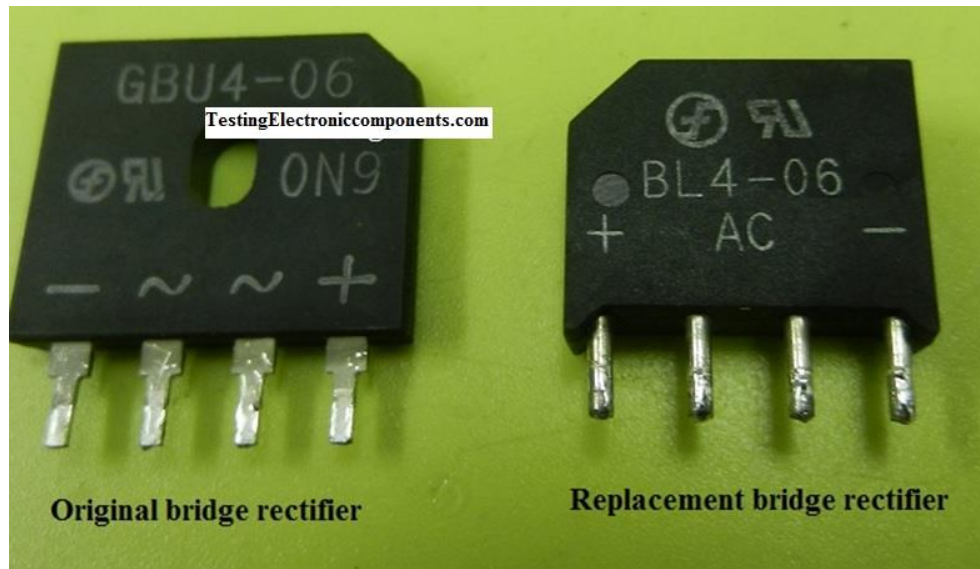


When you want to open LCD/LED Monitor cover, always start from the bottom first. Use a sharp metal plate to peel open the bottom cover. Once opened, you can start to open the side cover. **Please do not use a test pen as this can leave a mark on the cover.** I checked on the fuse first and it was opened circuit. On board testing the bridge rectifier indicated a short circuit. I soldered out the bridge rectifier and retested it again and indeed it was shorted. I proceeded to check on the power FET and the big filter capacitor and both components were good.

Tip-Usually if the power FET is good, chances is very high the power IC is in good condition also.



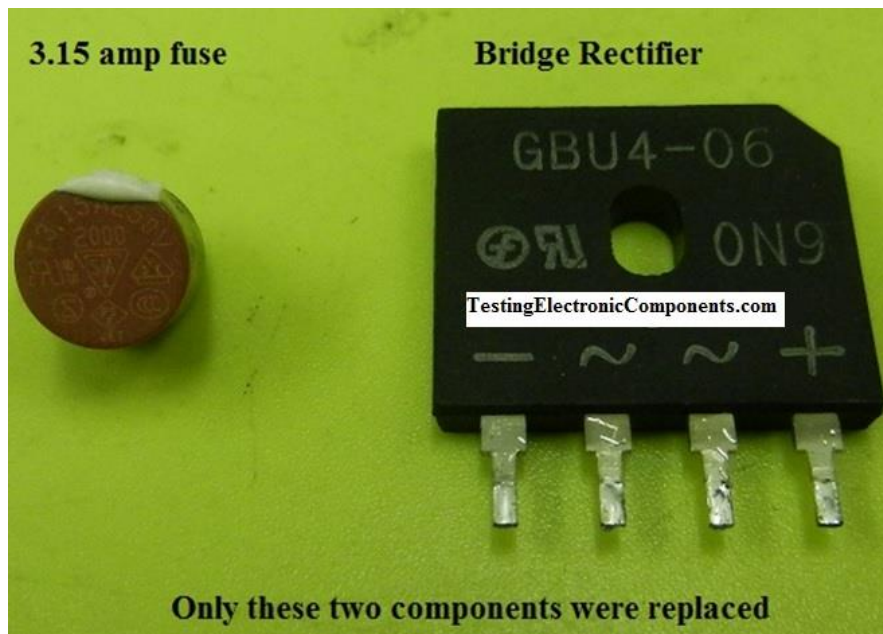
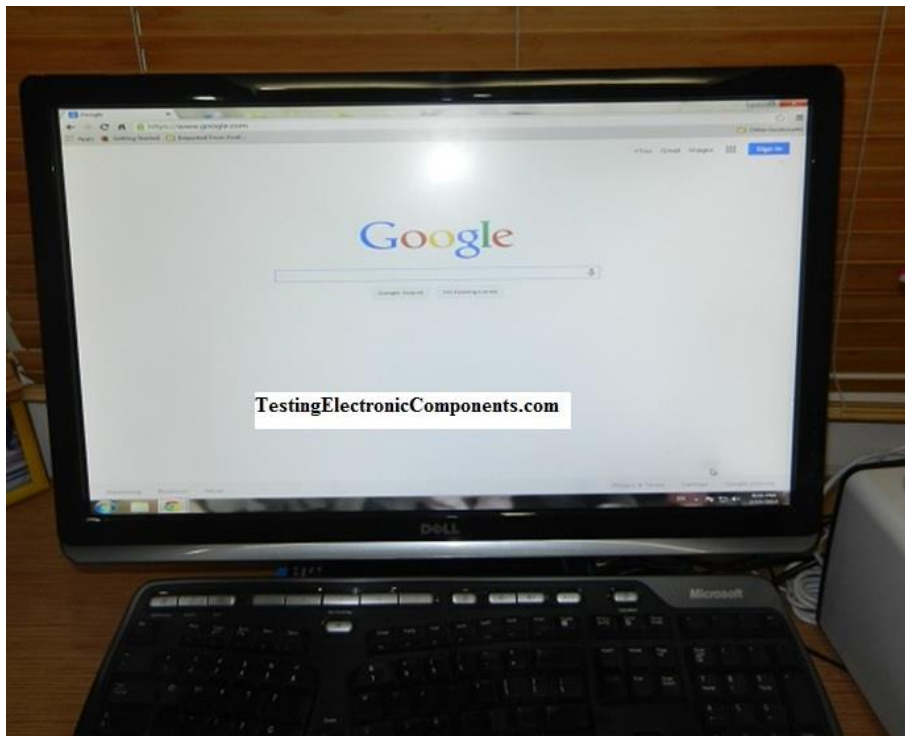
Since I do not have the original part number (GBU4-06) for the bridge rectifier, I had to use a replacement one and found it from a junk LCD Monitor power board. The part number is BL4-06 (600volt 4amp).



The problem now was that the replacement bridge rectifier 4 leads (legs) were much bigger than the original one thus it can't be fitted into the original holes. I had to use a power drill with the right drill bit to make the holes bigger as seen from the photo below:



Once the components were fitted in and powered On, the set came back to life. The below photo was taken from my home.



I told my children that their daddy (me) is a DIY person and managed to repair the LED Monitor and no need to buy a new one and save some \$\$\$\$.

Panasonic Ceiling Fan Repaired

A friend of mine brought to me his friend's ceiling fan circuit board for repair. The complaint was no response when the remote control was pressed. He did not suspect the remote control because he could use that remote control to turn on another similar fan. The first thing I did was to look at the board and see if there is any burnt component and dry joints. There were no burnt components and dry joints.

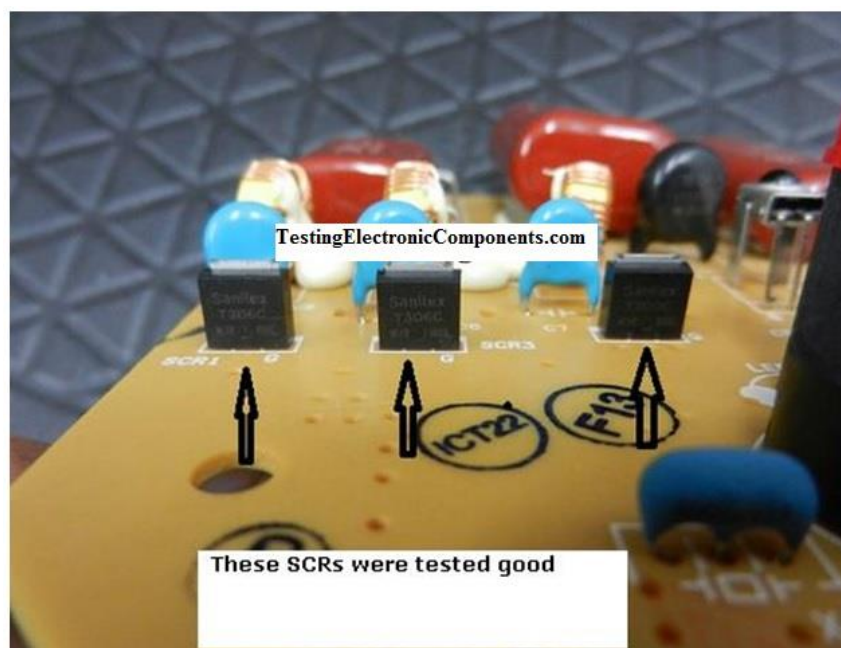


Since I do not have the complete fan with me to hook up for testing, the only thing that I can do is to check some of the suspected components like fuse, capacitors, diodes and transistors. The first component I checked was the main fuse and it was fine. The next component was the big black square capacitor. To my surprise the capacitance value was way out.

It was a .82uf 275v capacitor and it measured only .142uf (see the photo below).

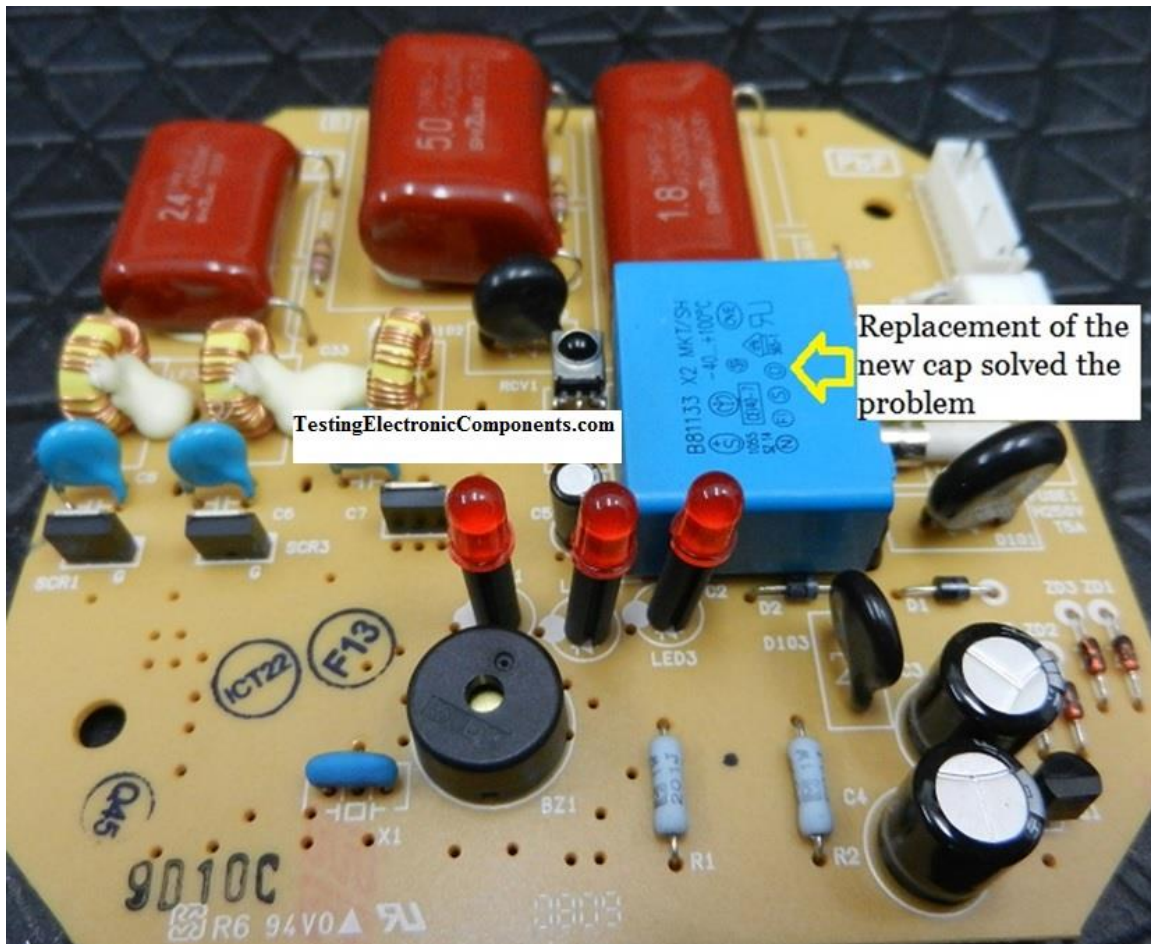


The rest of the corresponding components checked to be good so I presumed only this capacitor was the cause of the problem.



Note: A shorted semiconductor could cause a circuit to cease operation thus it is a good practice to check on other components also.

Since I do not have the schematic diagram, I have to view the circuit from the back and to find out why this capacitor could cause the fan not to function. When I traced this capacitor circuit I found that it was actually connected in between one of the main ac line with another circuit. One of the functions of capacitor is to block DC and let AC to pass through. Since this capacitor value was so low thus there would be very low AC signal can pass through causing no response when the remote control was pressed.



After the replacement of the capacitor was done, I gave it back to my friend. He then sent it back to his friend and fixed it- the fan worked like a charm.

Less Than 1 USD To Repair 42" Plasma TV

It was an older model of Philips 42" plasma TV with the model of 42PF7320/98. The complaint was the power green light would automatically switched back to red light after you have pressed on the power button in the remote control. There was no display.

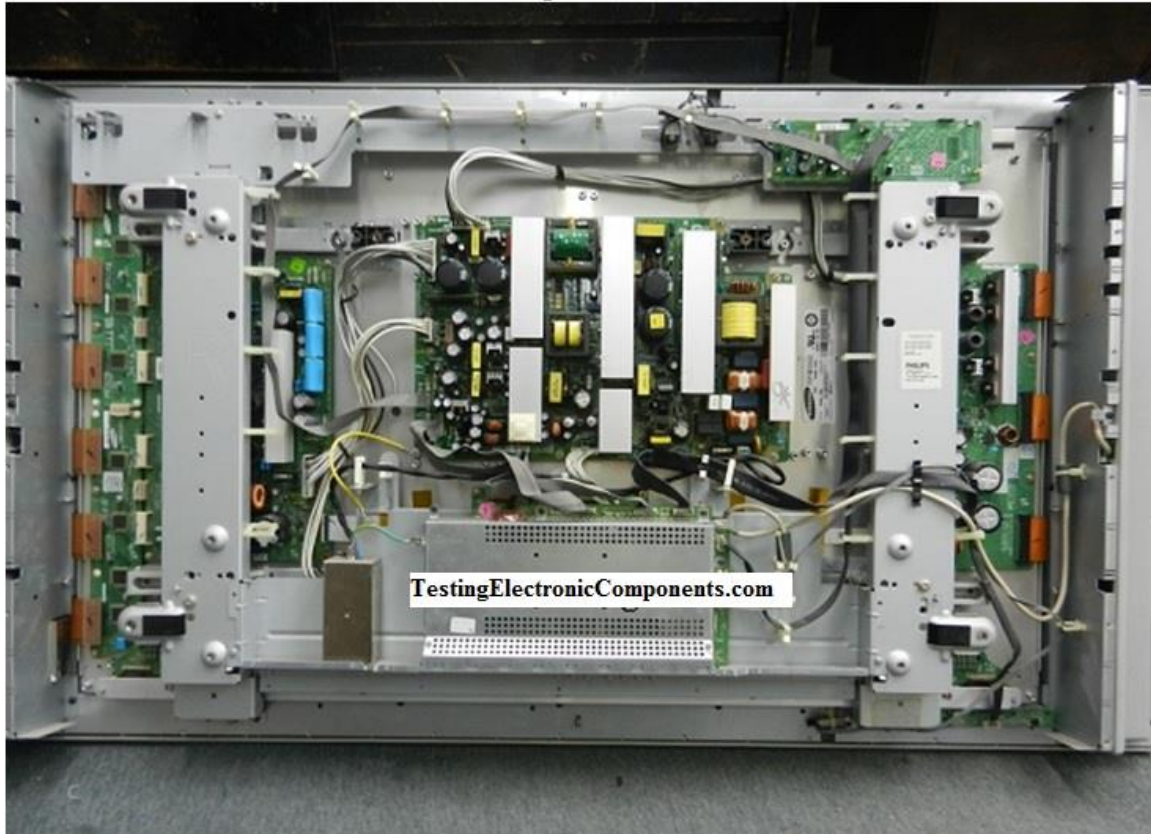


The first thing to do is to remove the tons of special screws (you need a 6 point star tip screw driver) that secured the back cover.

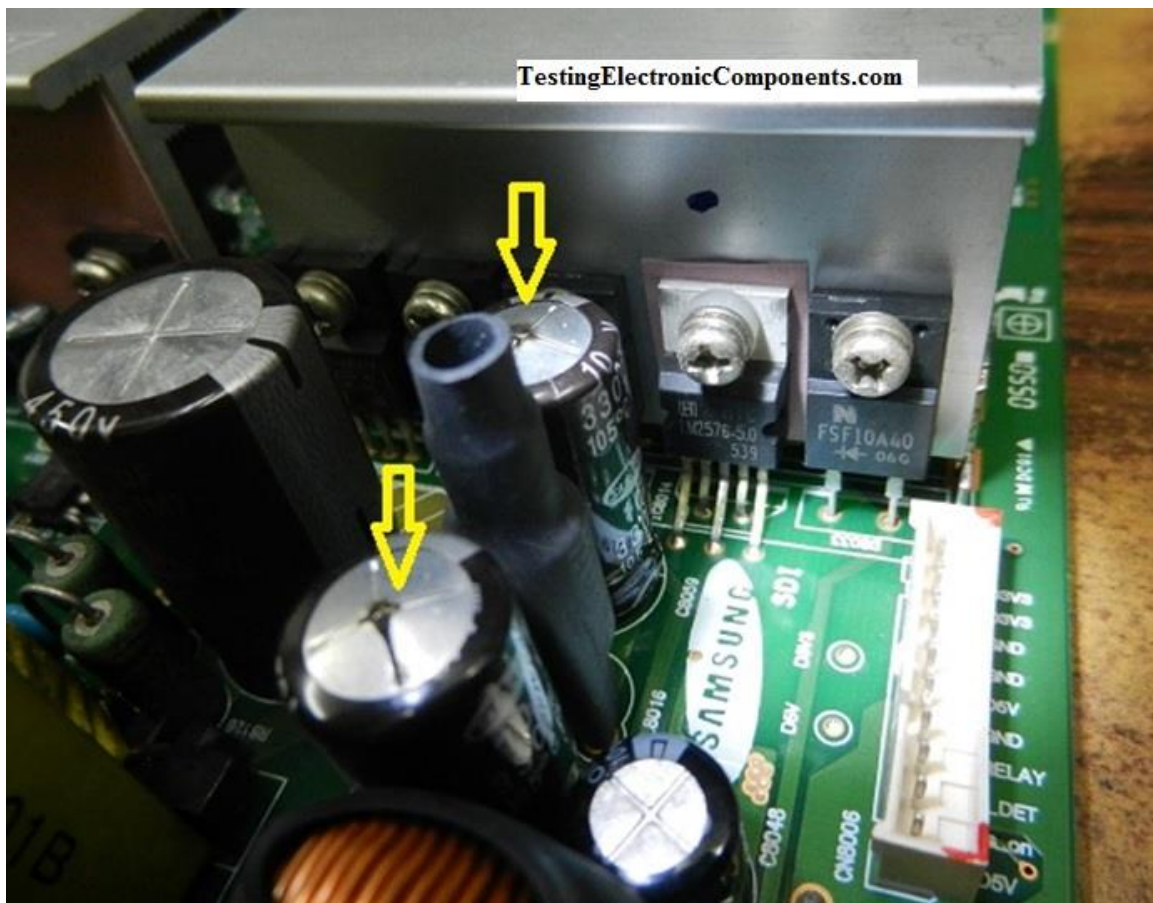
It took me a while to remove all the screws and the big metal cover.



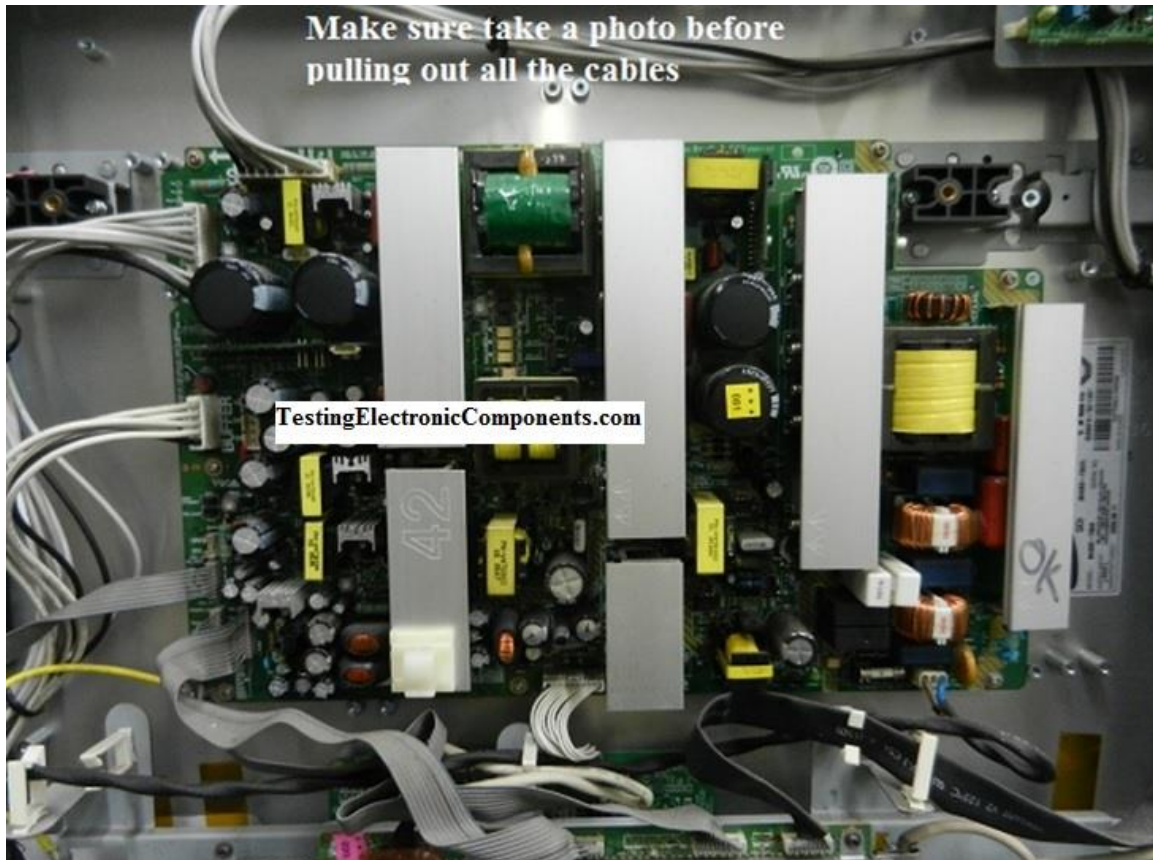
Once the cover was removed I began to check on the boards to see if there is any loose connection, bulged e-caps, burnt mark and etc. Take a look at the photo below the number of circuit boards found inside the Plasma TV:



After scanning the boards for a moment I found there were two bulged e-caps located at the power board-see the photo below:



Before I remove the power board I took a photo of all the cable connectors so that I would not miss connecting it back once the power board is repaired.



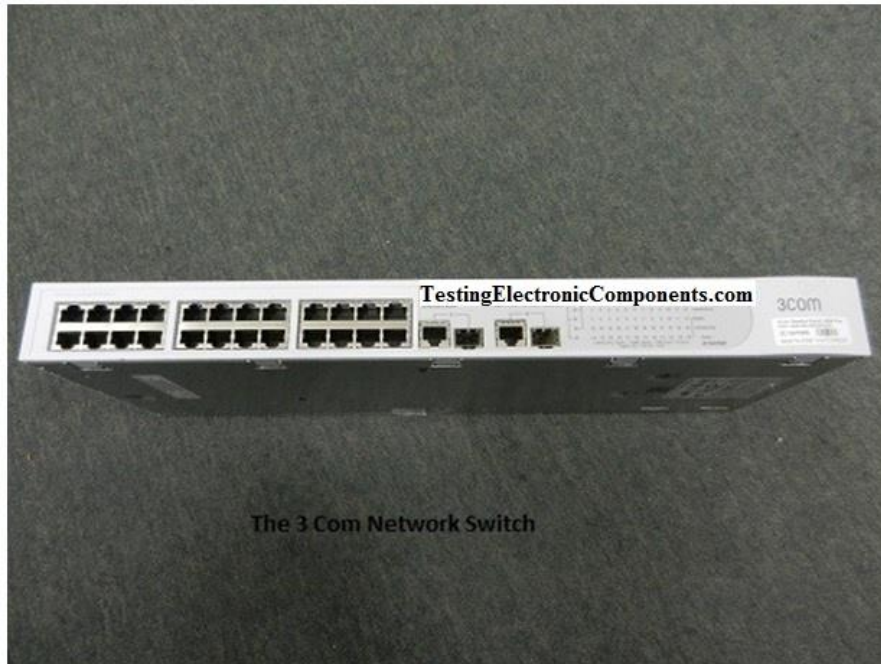
The value of the 2 e-caps were 3300uf 10Volt 105 Celsius. Before I put in the replacement capacitor I cleaned the area first and tried to understand what circuit this dc supply line was going. After careful monitoring, the DC supply line is a 3.3 volt line (stated in the board) and the supply was going to the mainboard most probably to the MCU IC in the mainboard.

This could be the reason why the power LED light will switched back to red once it turned green. The ripple from the DC line could have cause the mainboard to malfunction. With the replacement of only 2 e-caps (cost less than 1 USD) the Plasma TV was brought back to life again.



Conclusion- As mentioned many times before, repairing electronics equipment can be a very easy job or it can also be a very tough job to repair. You just have to take the set apart and scan for bad components. Don't always assume it must be very tough to repair. If you want to be an expert in Plasma TV Repair I suggest that you check on Kent's ebook [HERE](#) on Plasma TV Repair.

No Power In 3Com Baseline Switch 2226 Plus



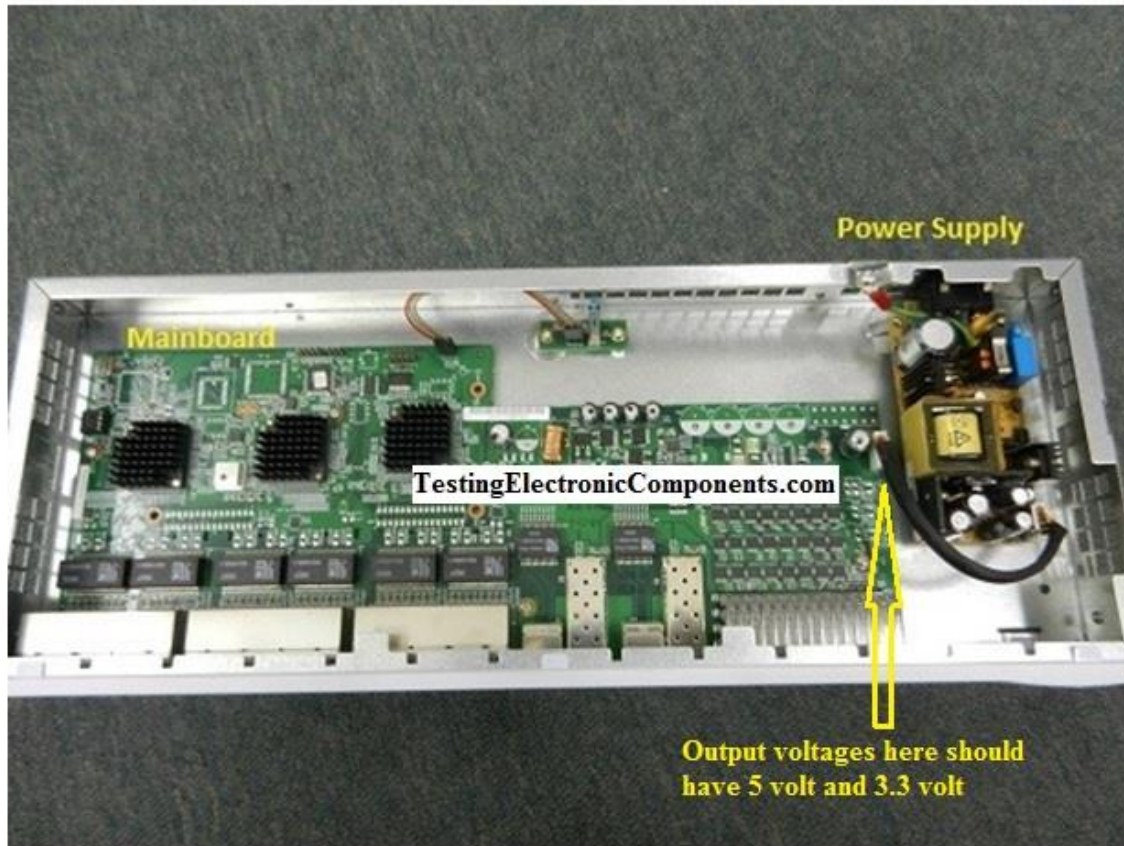
The 3 Com Network Switch

One of my customers called me to check if my company does repair service for computer network switch. I told him that we only repair no power problem because the mainboard parts are difficult to get from the market. He then told me that the problem was no power.



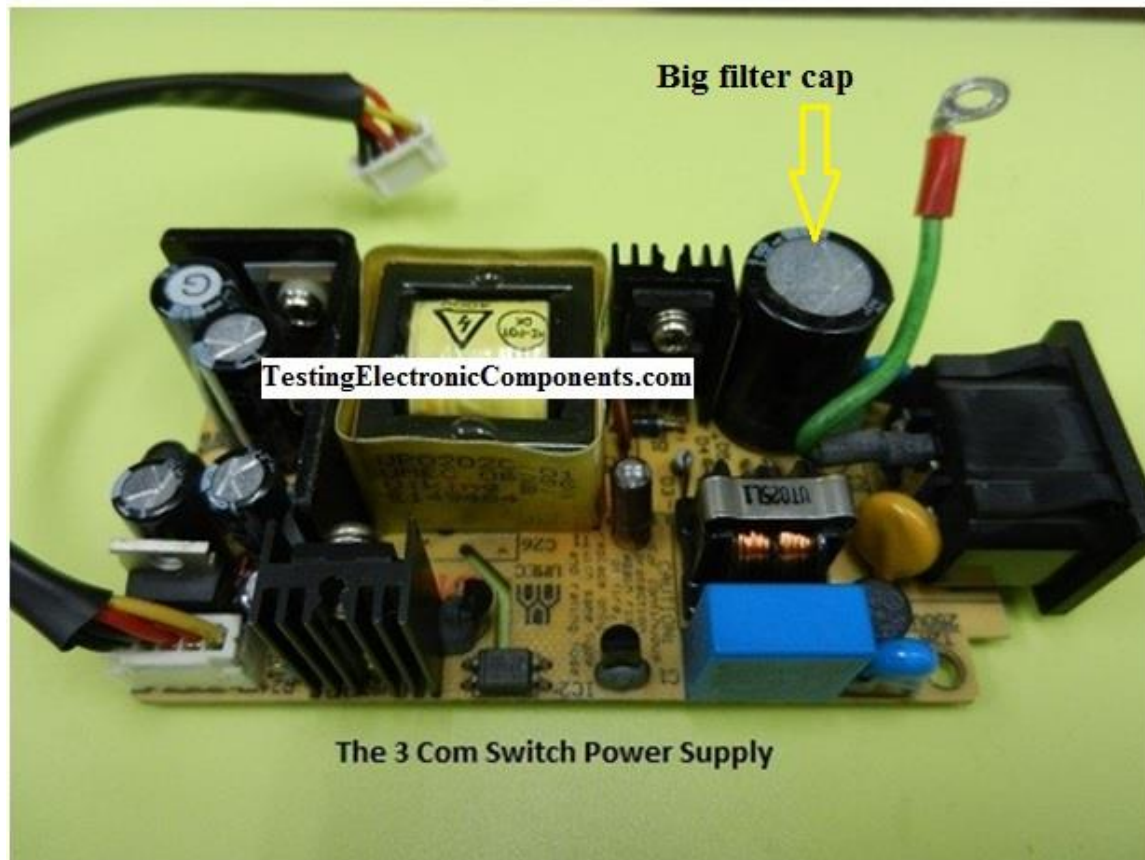
The back section of the 3 Com switch

Once the cover was removed I could see two boards i.e. the mainboard and the switch mode power supply board. Testing the power supply output connector with power on confirmed that the power supply have problem because the voltmeter reads zero volt on the output lines. By right it should have 5 and 3.3 volt outputs.



Before the repair work start, I did scanned through the whole board to see if there are any burnt component and also to see if there is any bulged e-caps. All components seem to be intact and looks good. The first thing I did was to check on the main fuse and it checked to be good. The next step I used was voltage testing method. I placed the voltmeter across the big filter cap and I've got about 300VDC and this indicates the filter cap and bridge rectifier are good.

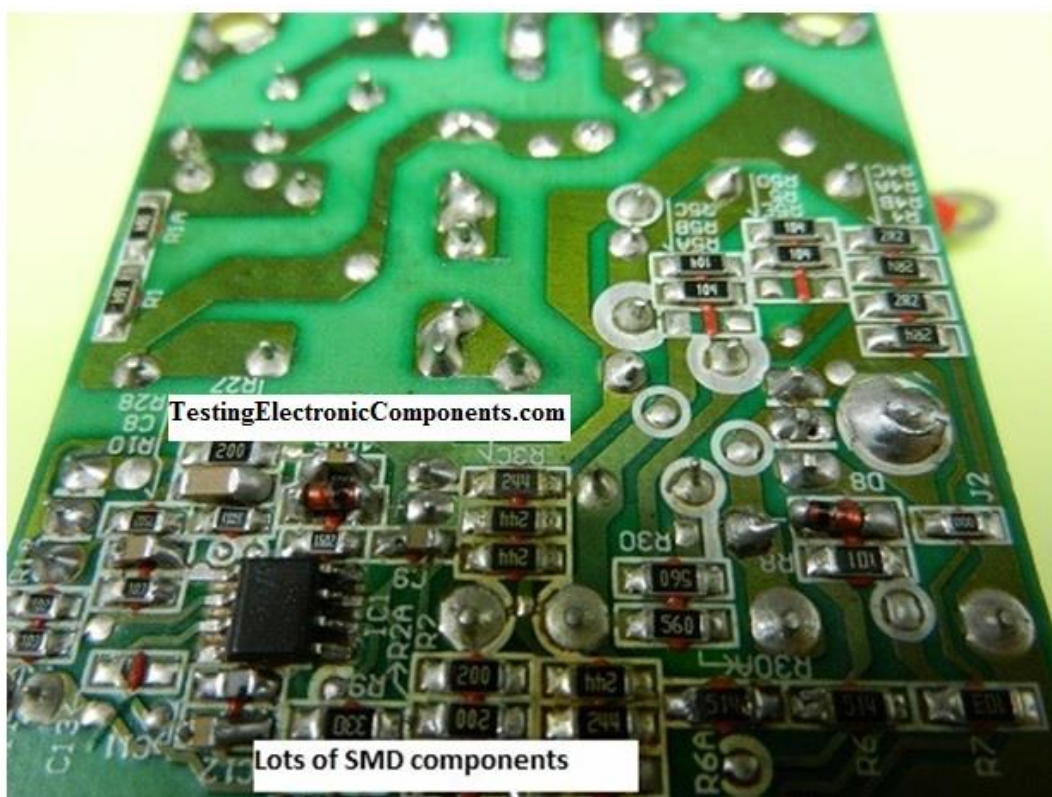
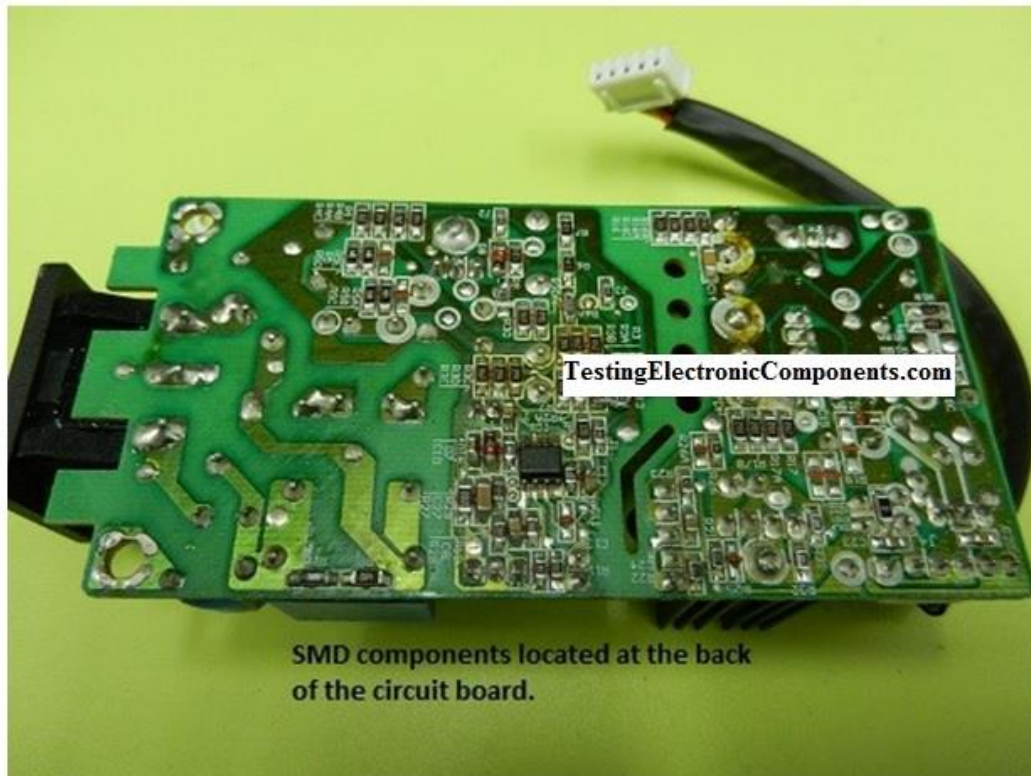
Note: Be careful when do this kind of test because you need to power On the power supply and check on the two pins of the big filter cap.



Next, I checked on the supply voltage of the SMD power IC UC3842 (Pin 7) and the IC had only 3 volts! A-ha this is the clue. This IC should have about 10 to 16 volt in order to function and 3 volts is just too low. There are few possibilities why the supply voltage was too low:

- 1) Shorted or leaky power IC
- 2) High ESR ohm in the small filter cap (47uf 50 volt) along the supply line
- 3) Start up resistor/s had turned high ohm (increase in resistance value)
- 4) Or shorted or leaky component/s around the power IC

Note: I did check on the transformer primary winding, optoisolator IC, secondary output diodes and also secondary filter capacitors but all were tested good.



The first component that I have checked was the small filter cap (47uf 50v) and it was tested good using my faithful [Blue ESR meter](#). The next move was to replace the SMD power IC since I have the stock. The problem was still the same even with a new power IC. So I left only the last choice which is to check on the SMD start up resistors, SMD resistors and corresponding components (SMD diodes and SMD non polar caps). The SMD start up resistors were ok and only the SMD diodes and SMD non polar caps remain. I did not really focus on the corresponding SMD resistors because shorted caps and diodes have much more failure rate than resistors. All SMD caps were removed and checked with my analogue meter set to x 10 KOhm and they were tested good.

The last step was to check on the SMD diodes. True enough there was a SMD diode (board location D2) that has shorted under analogue meter x 10 k Ohm range. It had two low readings either way.

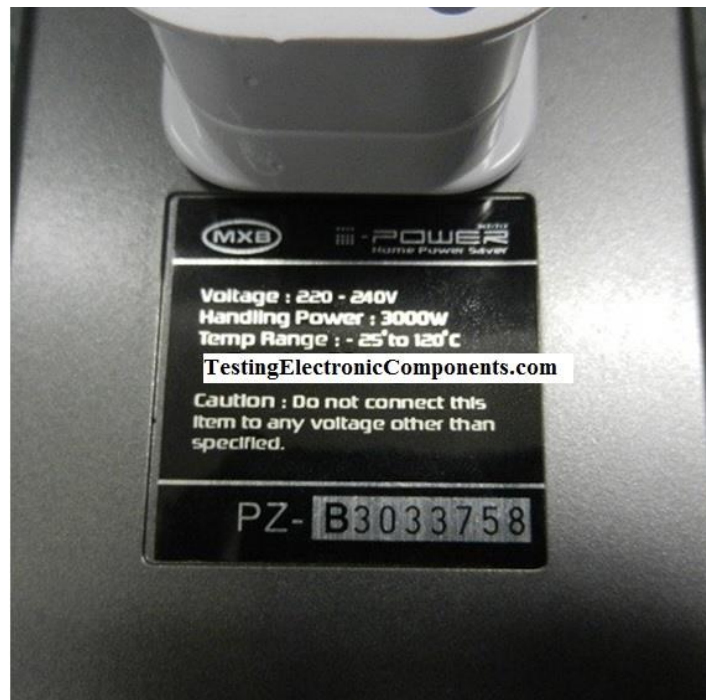


Note: This diode was tested good under x 1 Ohm range. When you check on the SMD resistors, diodes and non-polar caps, make sure you test it off board and not onboard. On board will produce misleading result thus it is not recommended.

For your information I do not have data for the below diode. Since this is a SMD diode, I used a normal signal diode 1N4148 as replacement. It turned out to be working well after running the set for few days. The supply voltage to the SMD power IC now is 10.9volt.

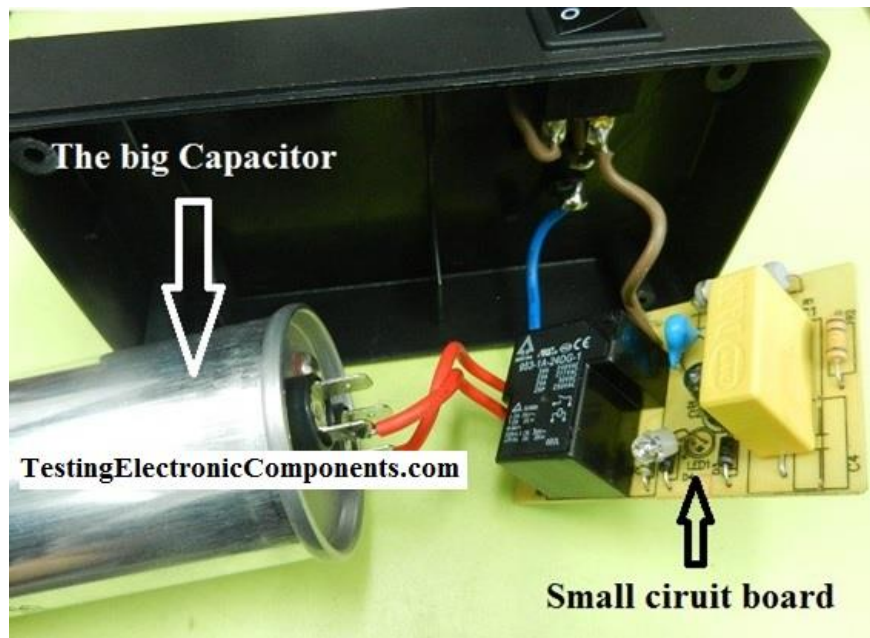
Power Saver Repaired

A friend of mine sent to me a power energy saver device for repair and the complaint was no power. For your information I have not repair such device before. There are four screws that secured the cover.





Once the cover was removed, the first thing I saw was the big silver capacitor.



There was a small circuit board that consisted of some components.

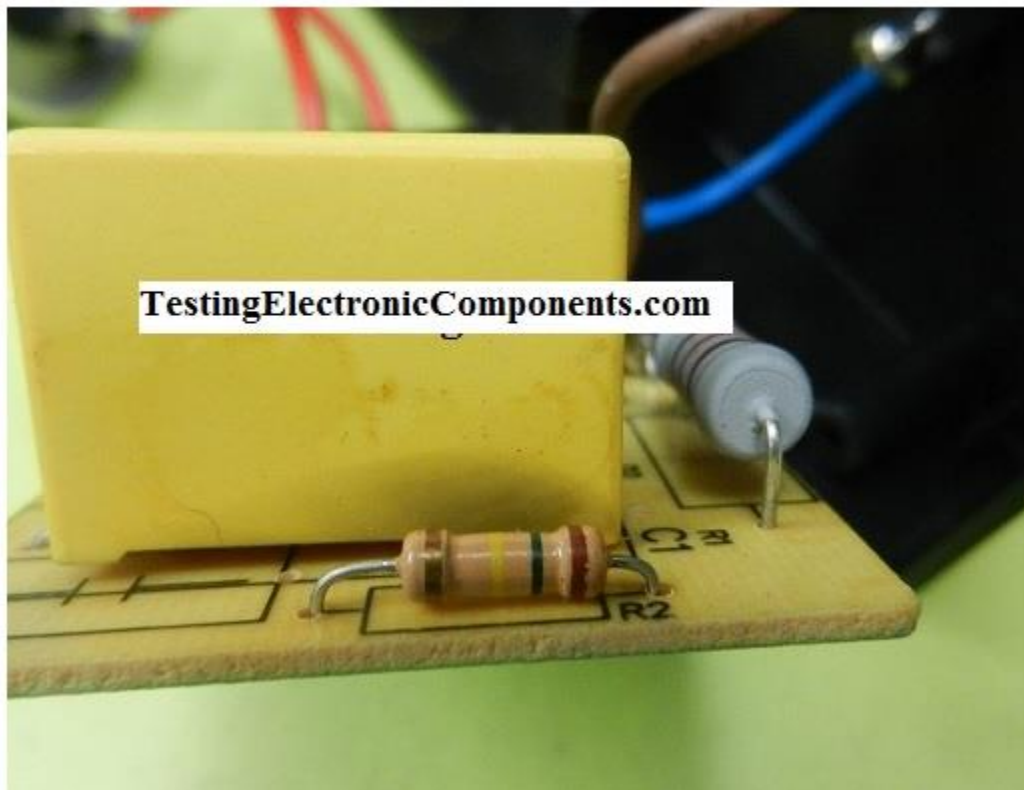
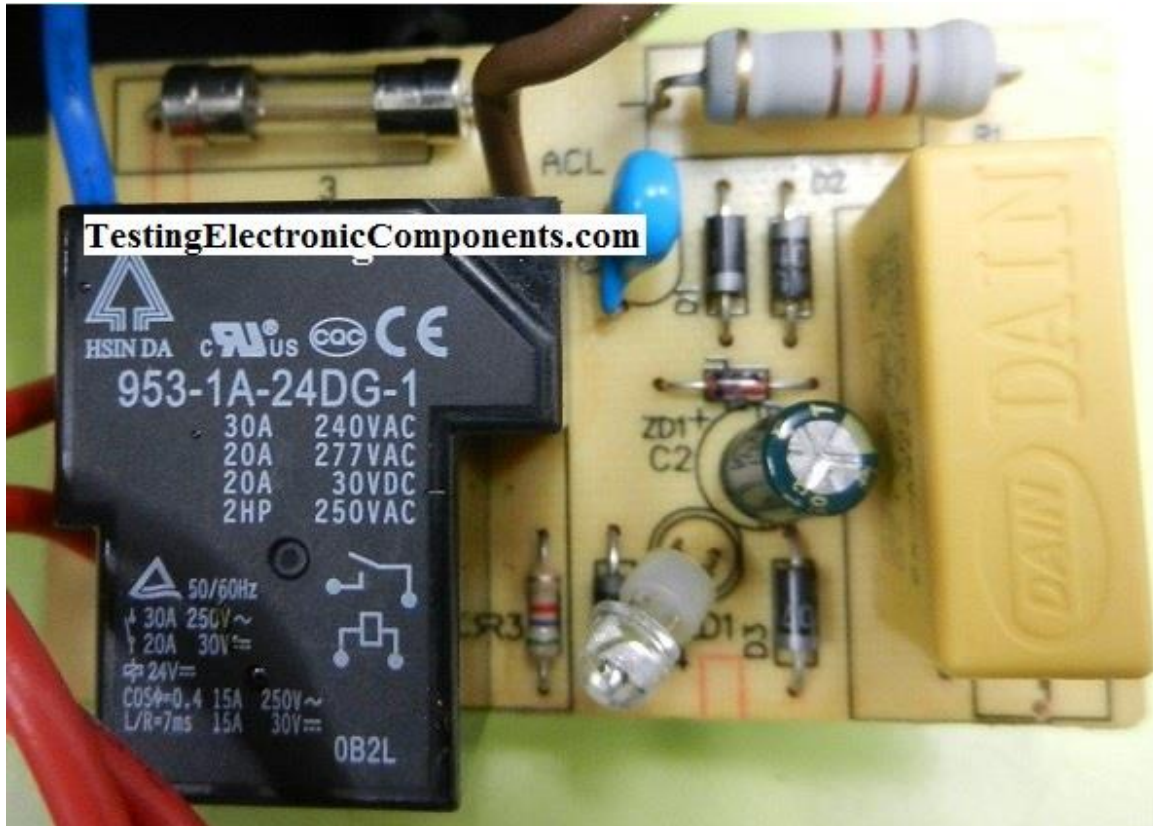
In order to be in the safe side, the big capacitor had to be checked first and I found there was no charge in when measuring it using my dc voltmeter. I tested the capacitance value of this big capacitor with a digital capacitance meter and [Blue ESR meter](#). Take a look at the photos below:



There are 14 components found in the small circuit board:

- 1- Varistor
- 4- silicon diodes
- 1- electrolytic capacitor
- 1- fuse
- 3- resistors
- 1- film type capacitor
- 1- 24 volt zener diode and
- 1- Relay
- 1- LED

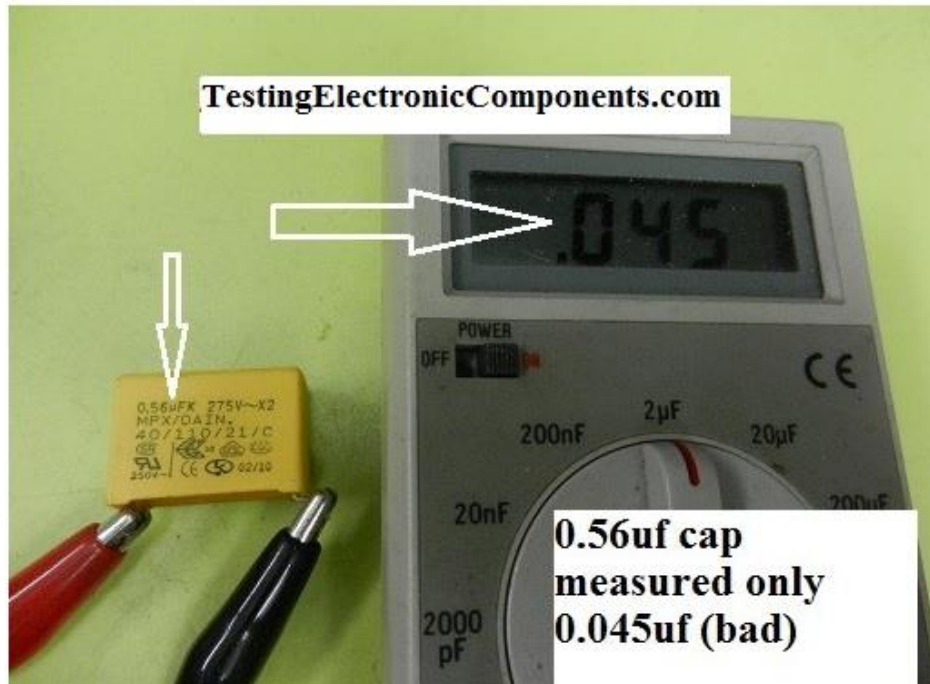
Note: I suppose you know how to check all these components once you have completed reading my Testing Electronic Components Ebook.





The main fuse was tested good so I proceeded to remove all the components and checked it off board. The reason I removed the components to check off board was because I'm not familiar with such circuit. Since it contains only 14 components so removing the components and test them was not so difficult. If you know what you are doing and have the speed in Testing Electronic Components, you can finish testing all the components in less than 10 minutes. Of course you can power up the unit and perform voltage testing- it is your preference.

All the components were tested good except the relay and the film type capacitor. So I continued with the relay test with the help of a DC voltage regulator power supply. The relay was tested good and left only the film type capacitor. I used the TES1500 digital capacitance meter to check on the value and look what I have found (see next page):



The capacitor was open circuit. The function of this capacitor is to filter out harmful EMI/RFI line noise so that the circuit have a cleaner power to work with. An open circuit in this capacitor means no ac wave will pass through it to the next circuitry thus causing no power symptom. A replacement brought the power energy saver device back to life again.

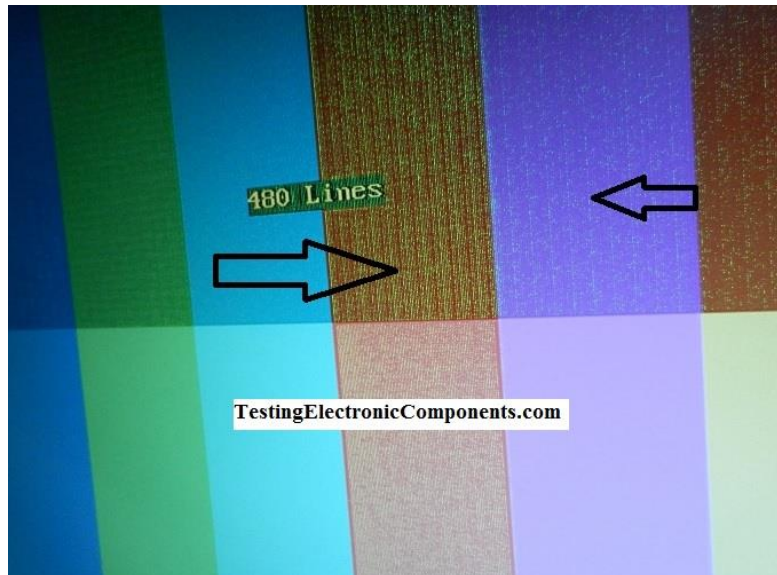




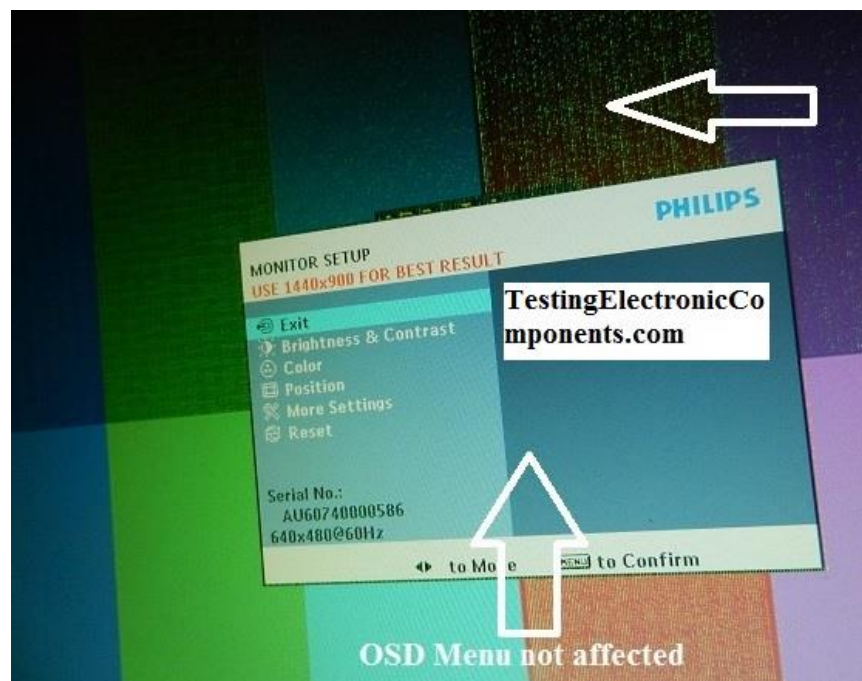
Conclusion- In the future if this device gives problem again I guess it will take lesser time for me to find out the fault. These components are easy to test and finding the parts was not difficult at all. The components can be easily found from any local electronic stores. If you know how to test electronic components this means you can perform such repair work. But of course you must know the safety first such as the right way to deal with AC and undischarged capacitor which can be fatal to you if you are not careful enough.

19" Philips LCD Monitor Repaired

The complaint of the 19" Philips LCD Monitor was display problem. Take a look at the photo below.

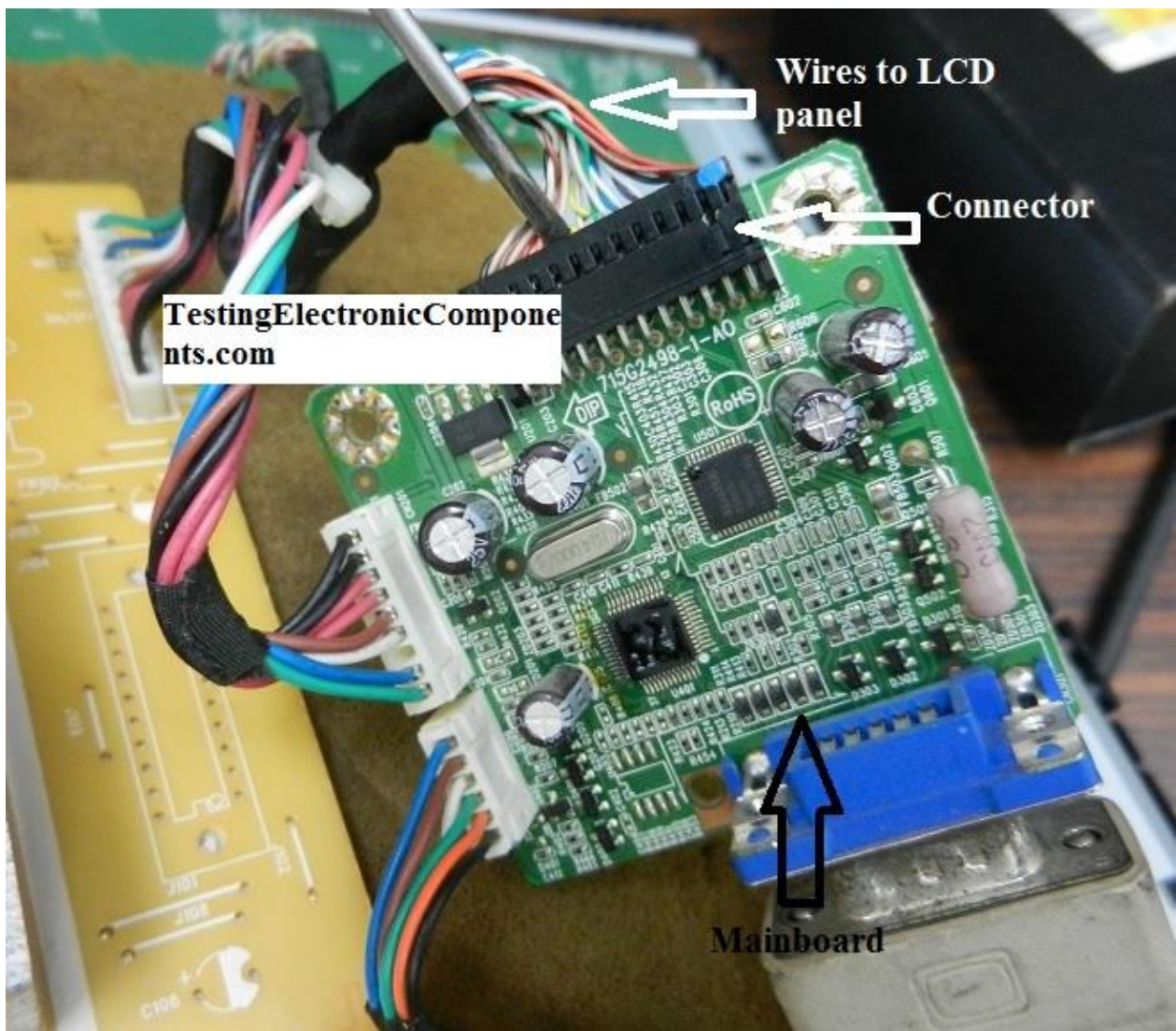


You could clearly see all the color distortion in the color bar test. This kind of problem can be caused by bad LCD panel, cables/wires (some use LVDS cable) or the mainboard. In order to isolate if the LCD panel is good or bad I pressed on the OSD menu. Take a look at the photo below again.

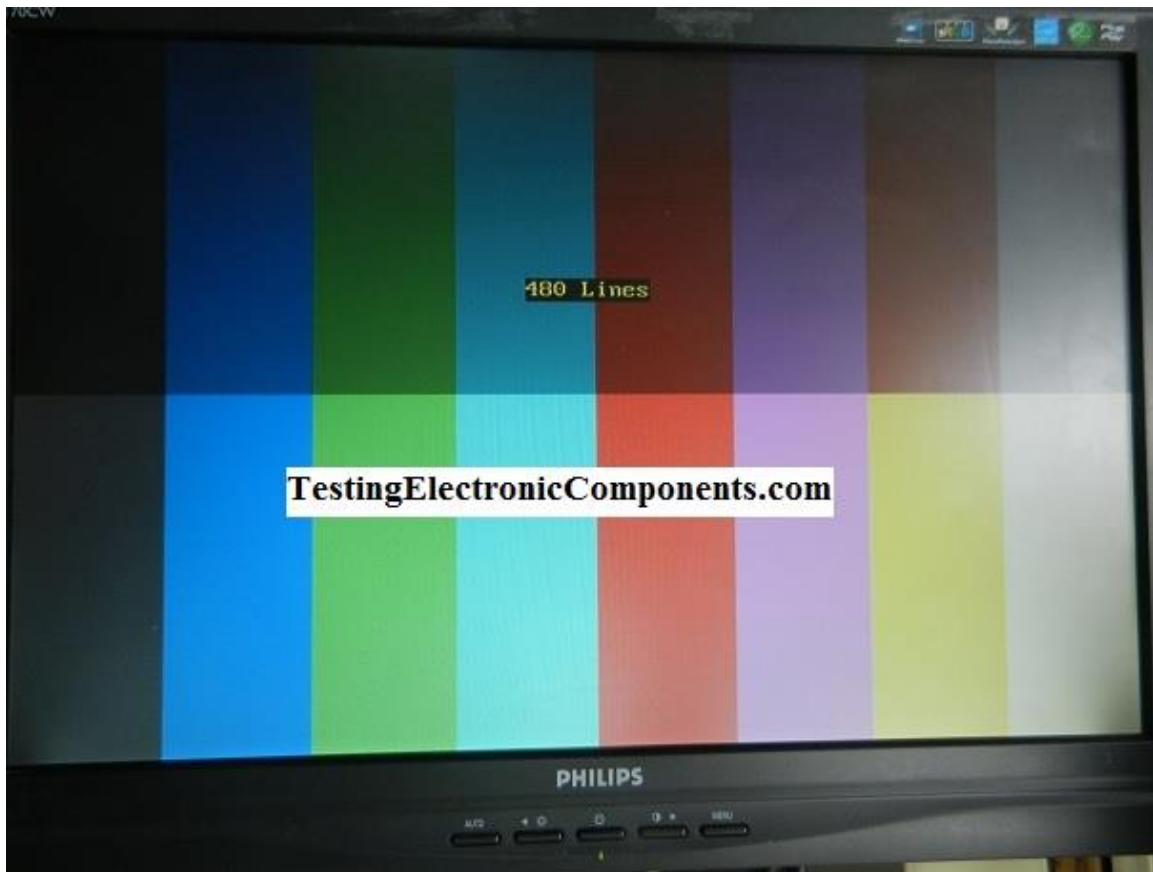


You will notice that the OSD menu is not affected. This means the problem is nothing to do with the LCD panel. If the OSD menu is affected I would suspect a bad LCD panel also. My focus now would be on the cables/wires and the mainboard. Usually I would check on the cable/wires first and if good then I will focus on the mainboard. For your information it is hard to access the cable without removing the metal cover.

Once the metal cover was removed I tried wiggling the cables/wires and to my surprise the display immediately came back to normal. I believe there could be one or two wires that had dried joints/contact problem causing the display problem. If wiggling does not help I would reseal the connector.



Resoldering all the joints at this connector solved the LCD Monitor display problem.



Note: Sometimes whenever equipment has problem, it is not necessary must be the component's fault, it can be caused by dry joints, loose connector/cable, decayed glue and etc. If you have checked that the connection was indeed intact then your next step is to check on the components. If you want to be an expert in LCD Monitor you can check out the website [HERE](#).

Computer 2.0 Stereo Speakers Repair

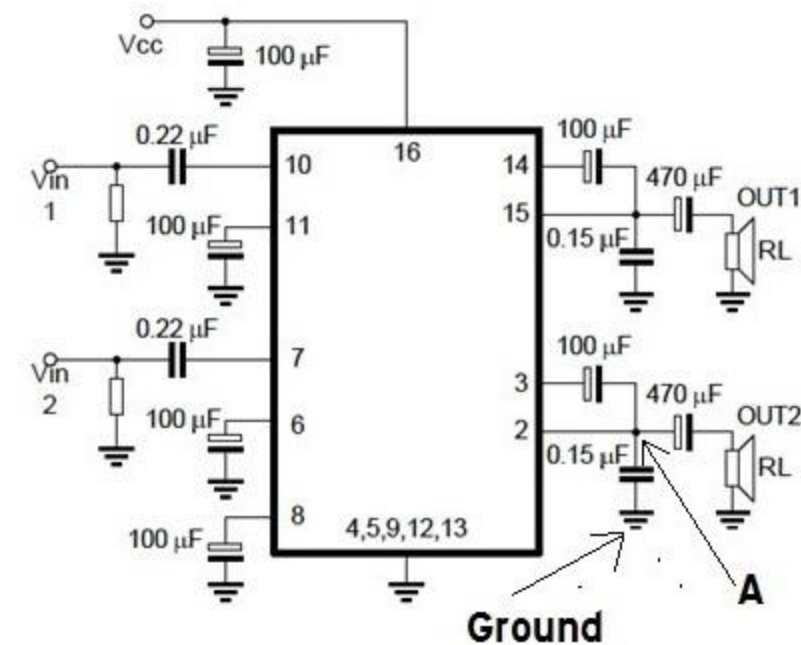


One of my customers sent to me his computer speakers with the complaint of no sound in one side. I tested the computer speaker and indeed the left speaker does not produce any sound.

The troubleshooting begins by comparing (sight) the components between the right and the left channel (speaker circuit). All of the components seem to be in good condition. This led me to check the components in the left speaker circuitry.



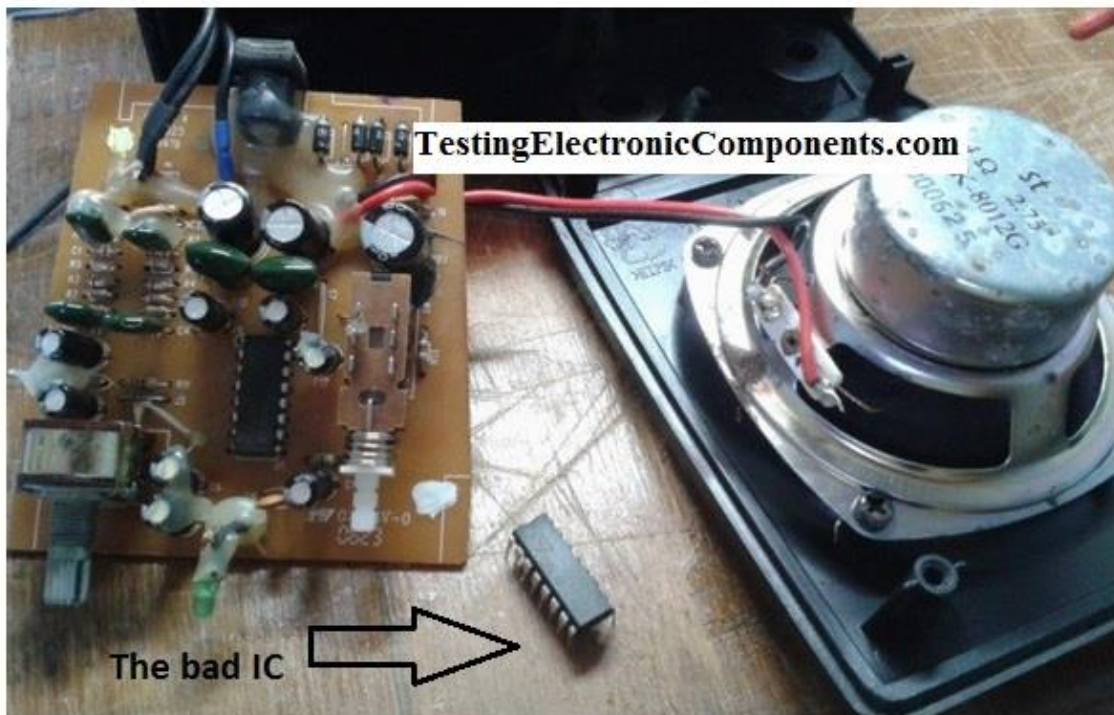
IC USED IN Creative Speakers TEA2025B



Schematic 1

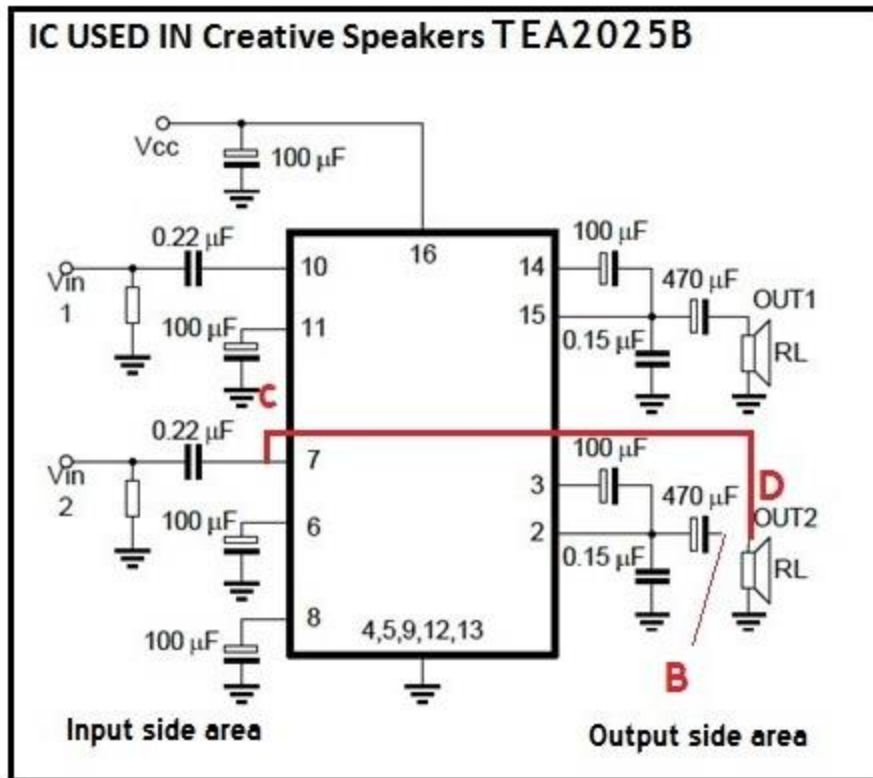
Note: The above schematic diagram does not reflect the true circuitry found in the computer speakers. It is just for your reference purpose.

When I placed my meter probe between point A and ground (previous page schematic 1) the Ohmmeter buzzer sound indicated short circuit. It can be shorted components or the IC. I removed all the corresponding components and found that the short circuit was still present. I then removed pin 2 of the IC and the short circuit gone and the buzzer was silent. When I soldered back pin 2 and powered On the IC, it was quite hot. I should have test the IC first with my finger. A replacement of new IC solved the no sound problem in the left speaker.



Tip 1- For a working unit, when you touch Vin 1 or Vin 2 with your bare finger you will hear humming sound from the speakers. If you did not hear any sound means that particular channel have problem.

Tip 2- Refer to the below schematic. In order to know if the input side or the output side have problem simply disconnect the speaker cable at point B (schematic 2-next page). Then joint point C and D. If you could hear some sound means the input side is good. If you did not hear any sound then the output side is the cause of the problem.



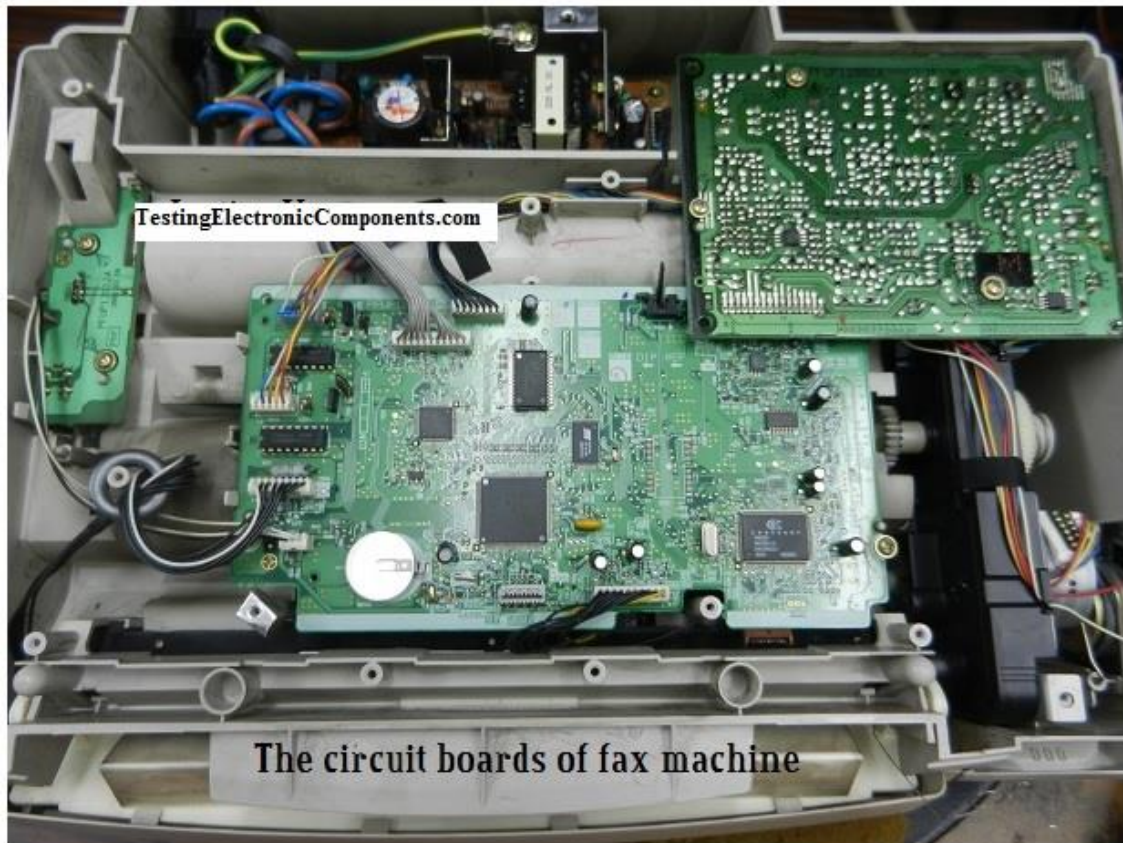
Schematic 2

Note: This is a simple stereo speaker with a small circuit board. If you know how to troubleshoot this kind of speaker system, I don't see why you can't start to troubleshoot a bigger speaker system. If you truly want to understand how to troubleshoot amplifier, audio/sound system fast then you may need to get a book specially only on audio troubleshooting. With this way, you can easily become an expert in this audio repair field.

Fax Machine Repaired



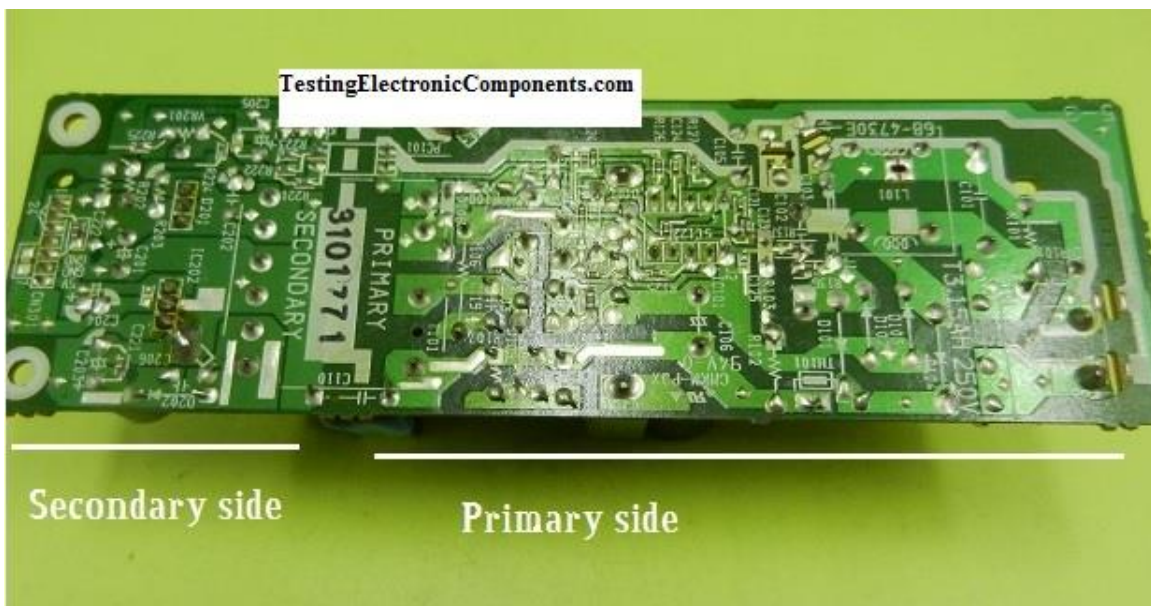
One of my customers sent me a Panasonic Fax machine (Model: KX-FP343ML) and the complaint was no power. In order to see the power supply, one has to remove the cover located at the bottom of the machine. Few screws removed and you could see all the circuit boards and power supply inside as seen from the photo in the next page:



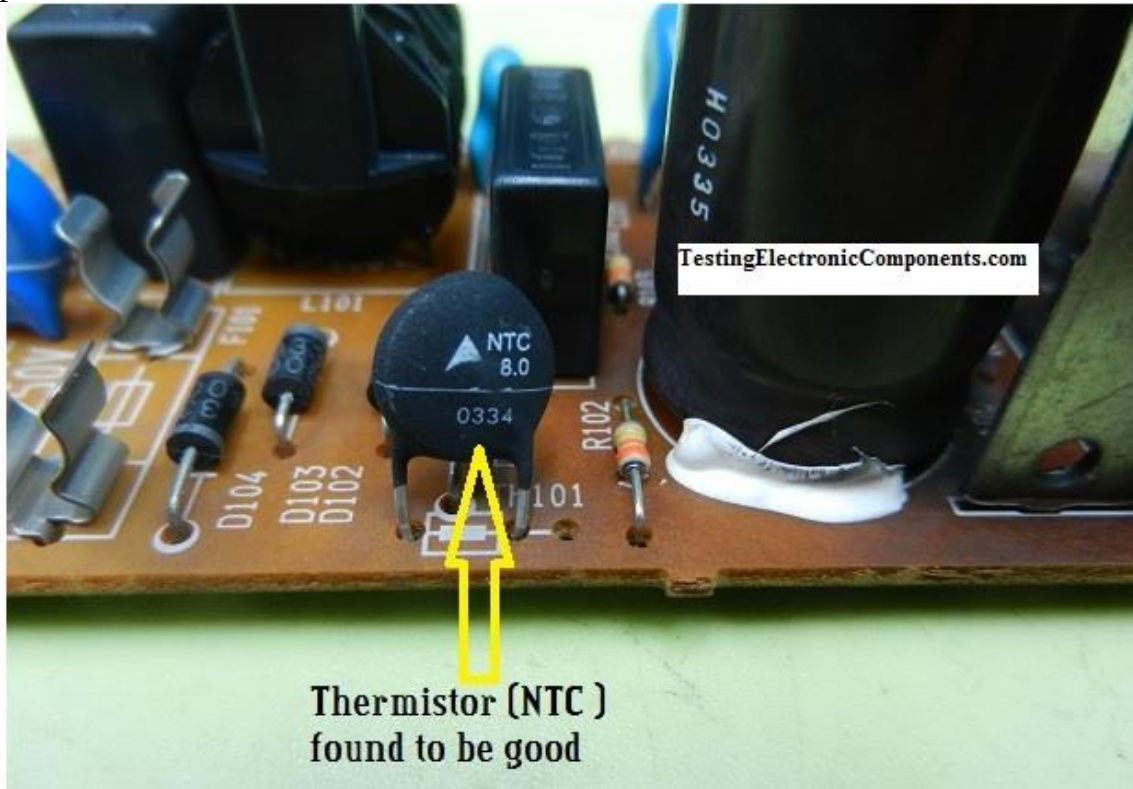
The circuit boards of fax machine

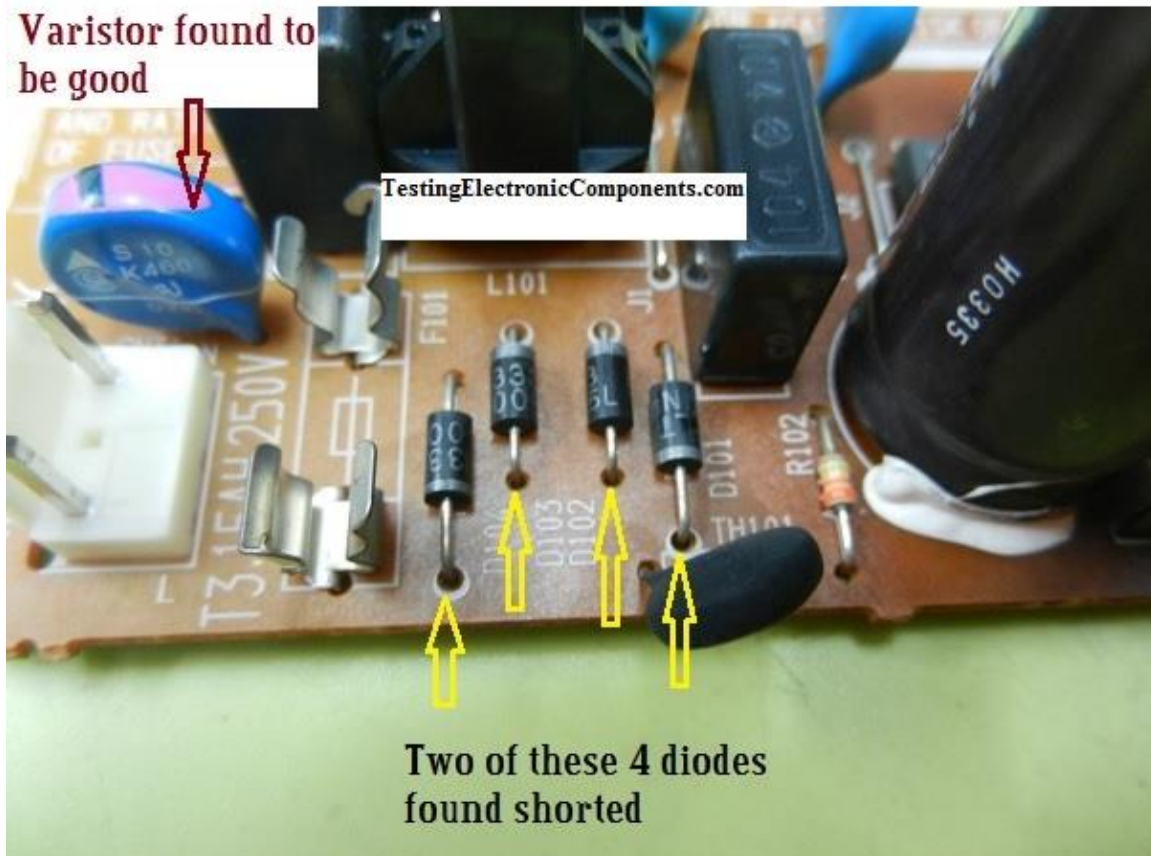


Top view of the fax power supply



The first component I checked was the main fuse and I found it had open circuit. When a fuse have problem it could mean the fuse can break by itself after serving for few years or there are some shorted components causing the fuse to blow. I proceeded to check on some of the major components in the power primary side like the Thermistor,Varistor, bridge rectifier diodes and power FET.



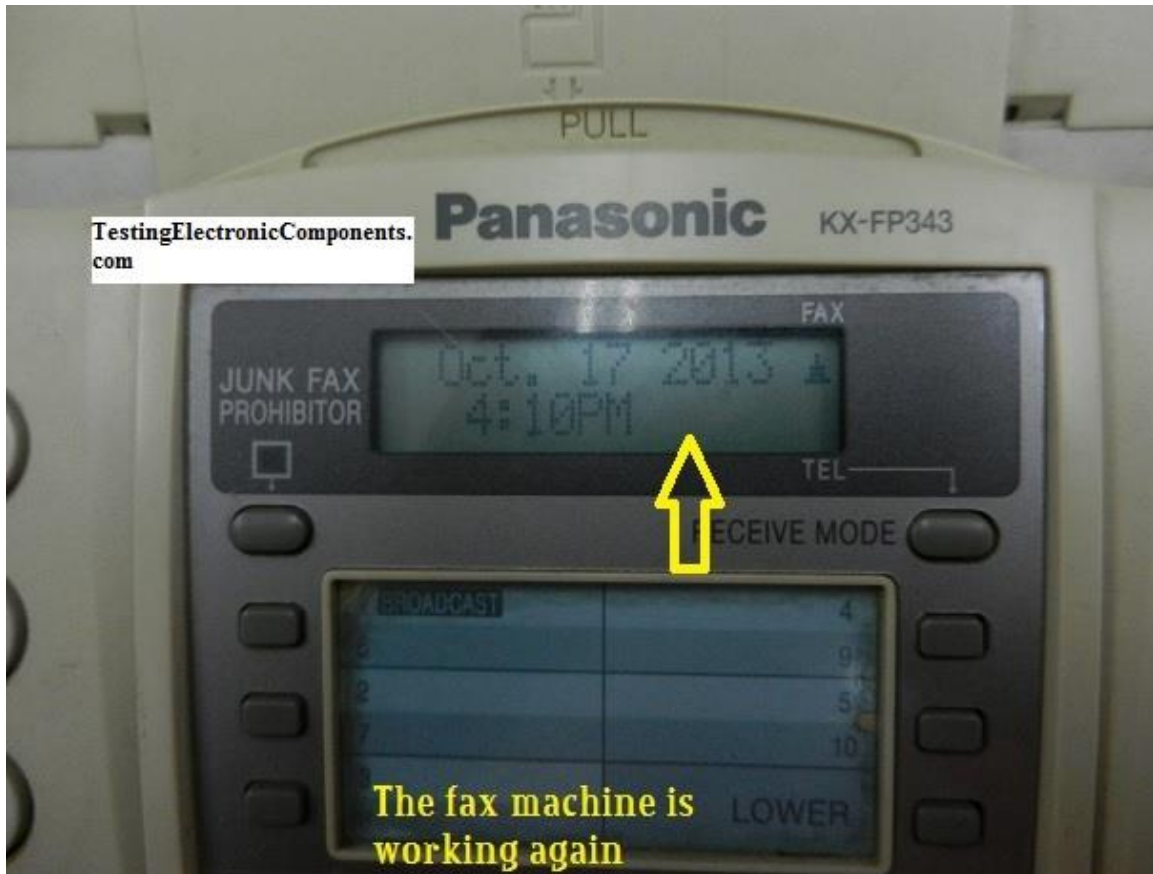


I found two of the four bridge diodes had a short circuit but the power FET was tested good. **Since the power FET was tested good then chances for the power IC and secondary output diodes to have problem will be very slim.** I did not stop there instead I proceeded to check on the main filter capacitors and also secondary side filter capacitors with my Blue ESR meter to see if there is any marginal capacitors. There are no marginal capacitors detected.

Marginal capacitors means they have higher than normal ESR value but have not reach to the bad/critical level yet. If you did not replace the marginal capacitors, most probably after couple of months or a year the capacitors will breakdown and give problem. Worst if those marginal capacitors give intermittent problems. You will have a hard time troubleshooting such faults.

The two diodes that were shorted had a part number of 1N4005 and I replaced all the four diodes with 1N4007 which have a higher voltage but same ampere. For your information you can replace diodes with the same or higher voltage and ampere but not lower. The reason I replaced the other two working diodes is because somehow I believe the other two working diodes will break down again in a short time. I have experienced this before and this is why you need to replace all the four diodes (even if you found one of the four diodes have problem) if you don't want repeated call from your customer. A repeated call means a loss in your repair time. The fax machine was back in working condition after the diodes and the fuse were replaced.



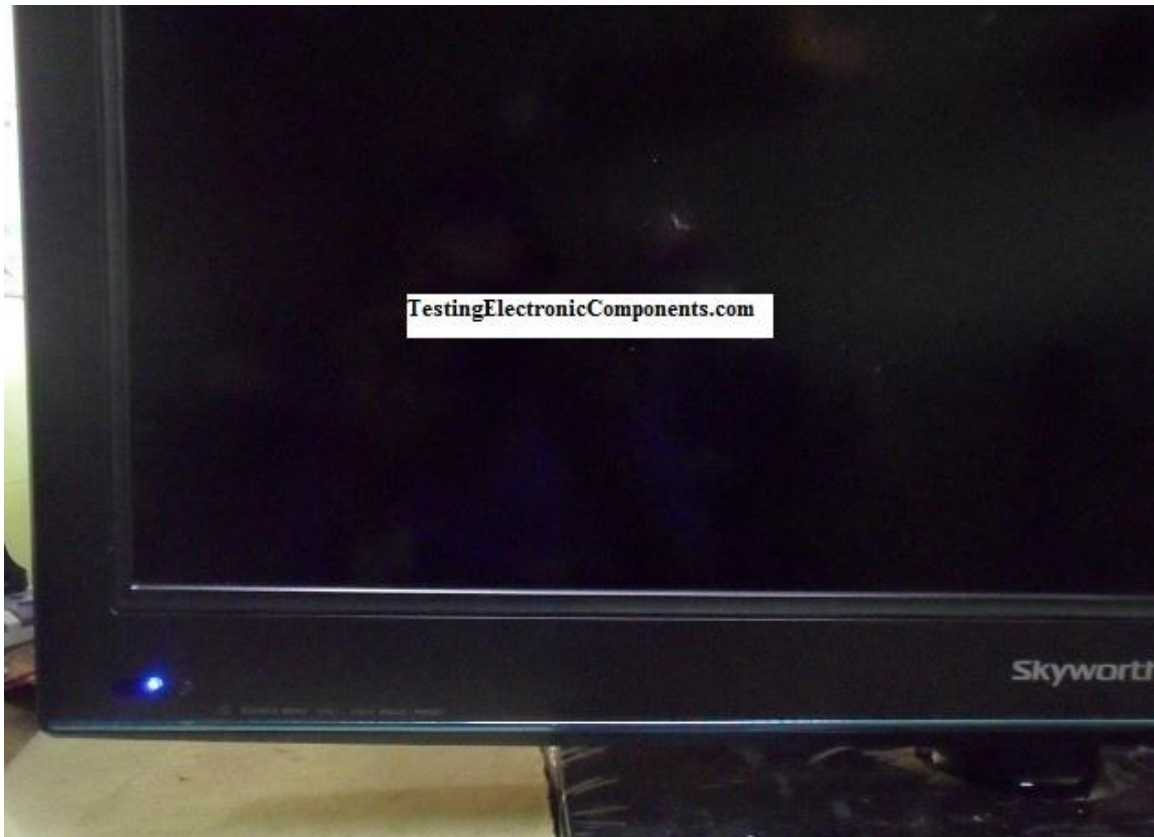


If you already have the basic in electronics repair and would like to increase your knowledge in troubleshooting and repair power supplies, I suggest that you get my Power Supply Repair ebook at:

<http://www.PowerSupplyRepairGuide.com>

It has many repair techniques that can turn you to become a professional in troubleshooting and repairing power supplies.

32" LED TV Repaired



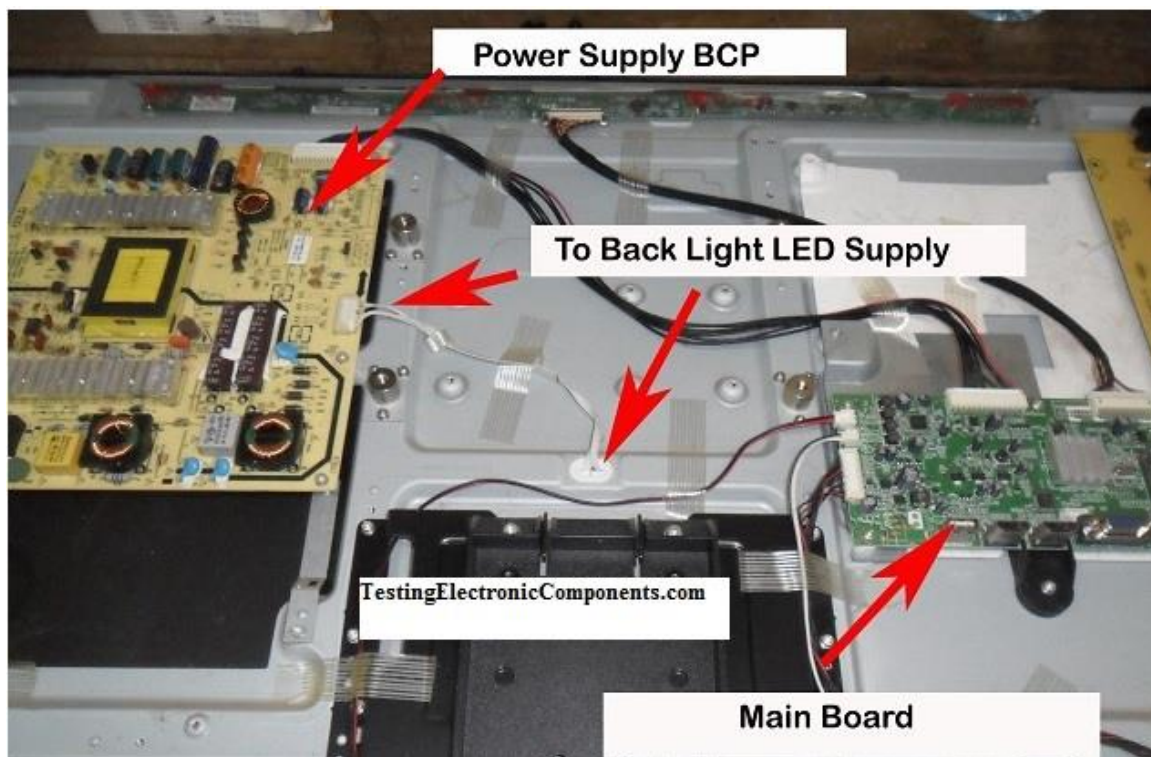
The complaint of this Singer Skyworth 32" LED TV was no display but when I used a torch light to shine at the screen I could see dim display picture. This means the actual fault was dim display and not no display symptom.

The cause of this problem was the LED backlight circuit not functioning-see the photo in the next page:

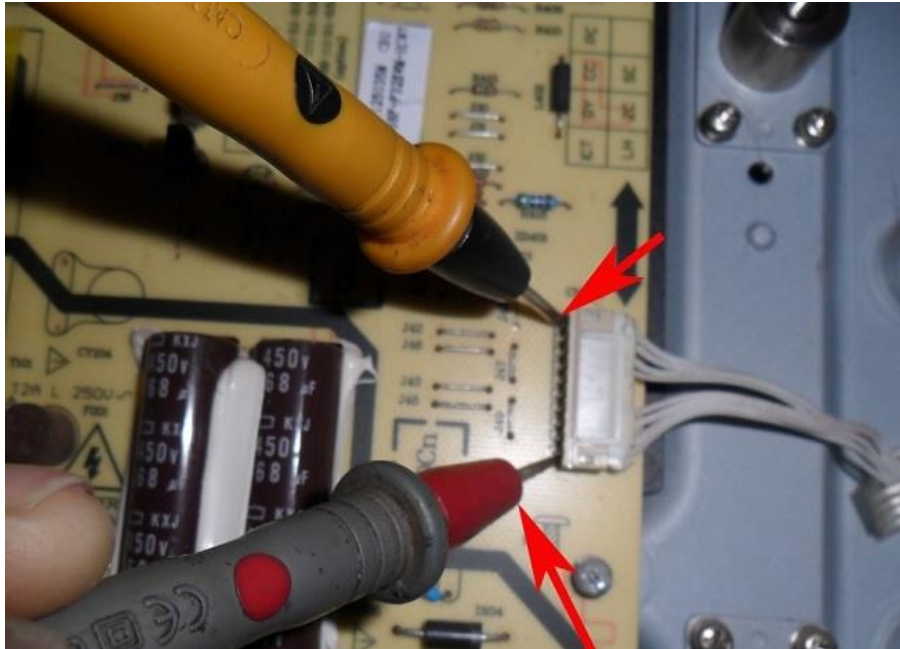


Dim Display Problem In LED TV

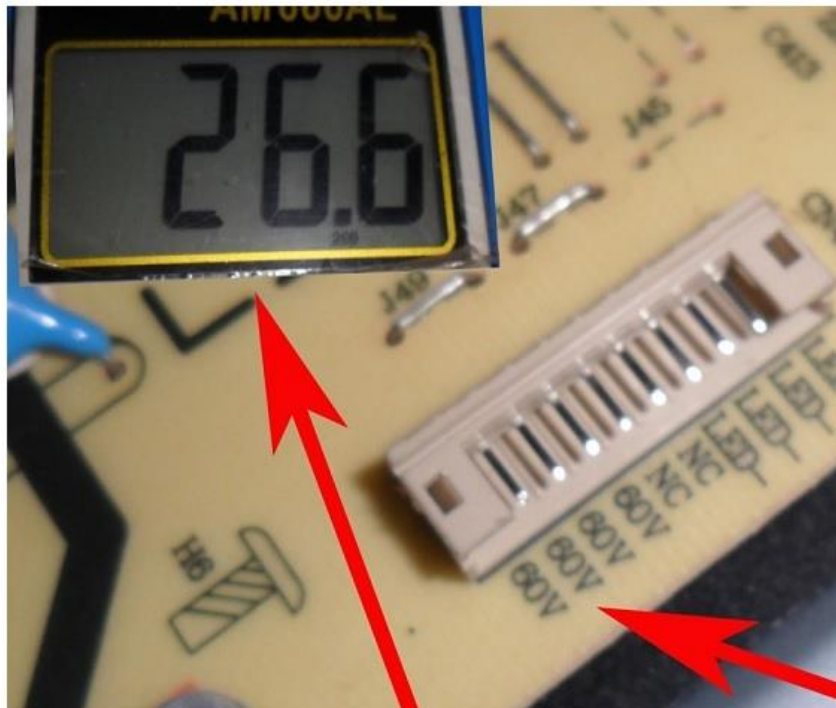
As usual, in order to repair any electronic equipment one has to open up the cover. In this LED TV, it was easy to remove the screws and the cover can be lifted out easily. Once the cover was removed, I could see the mainboard and the power supply/ LED driver board. The LED controller board was located at the top part (long horizontal circuit board).



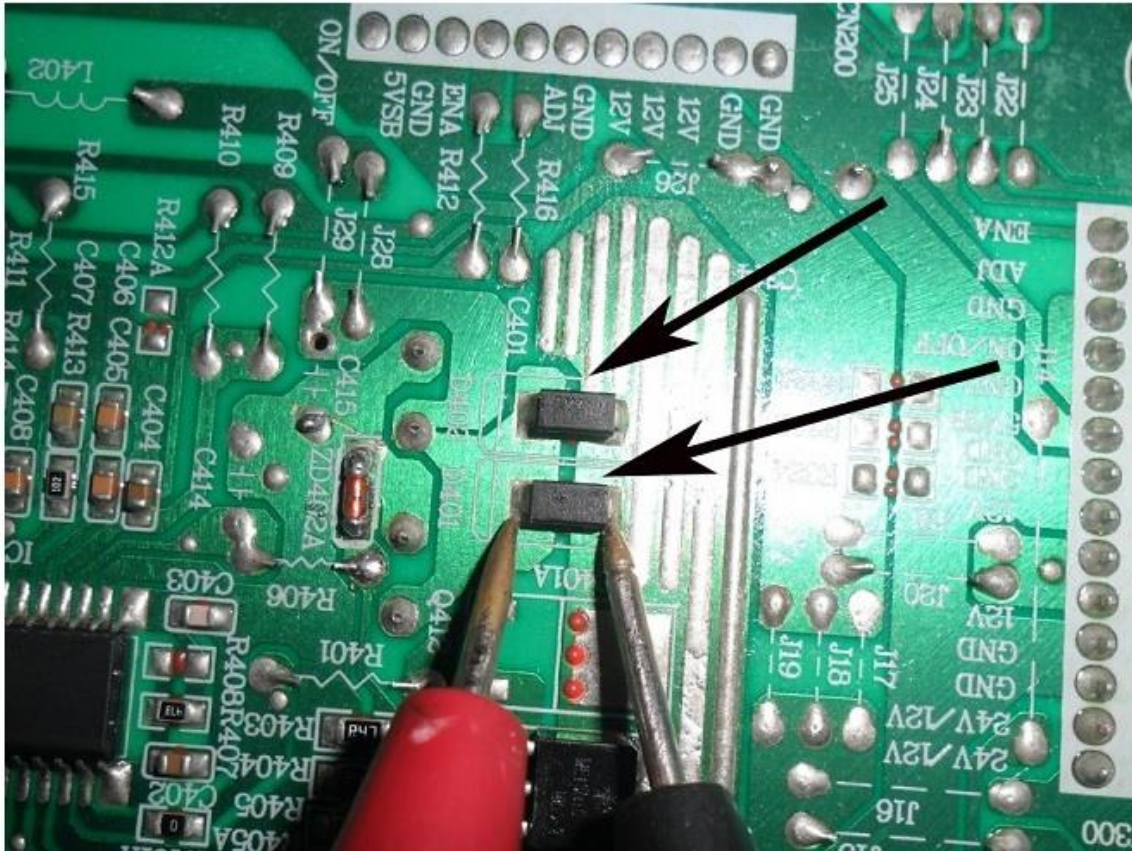
The first thing I do was to check on the output voltage to the LED backlights.



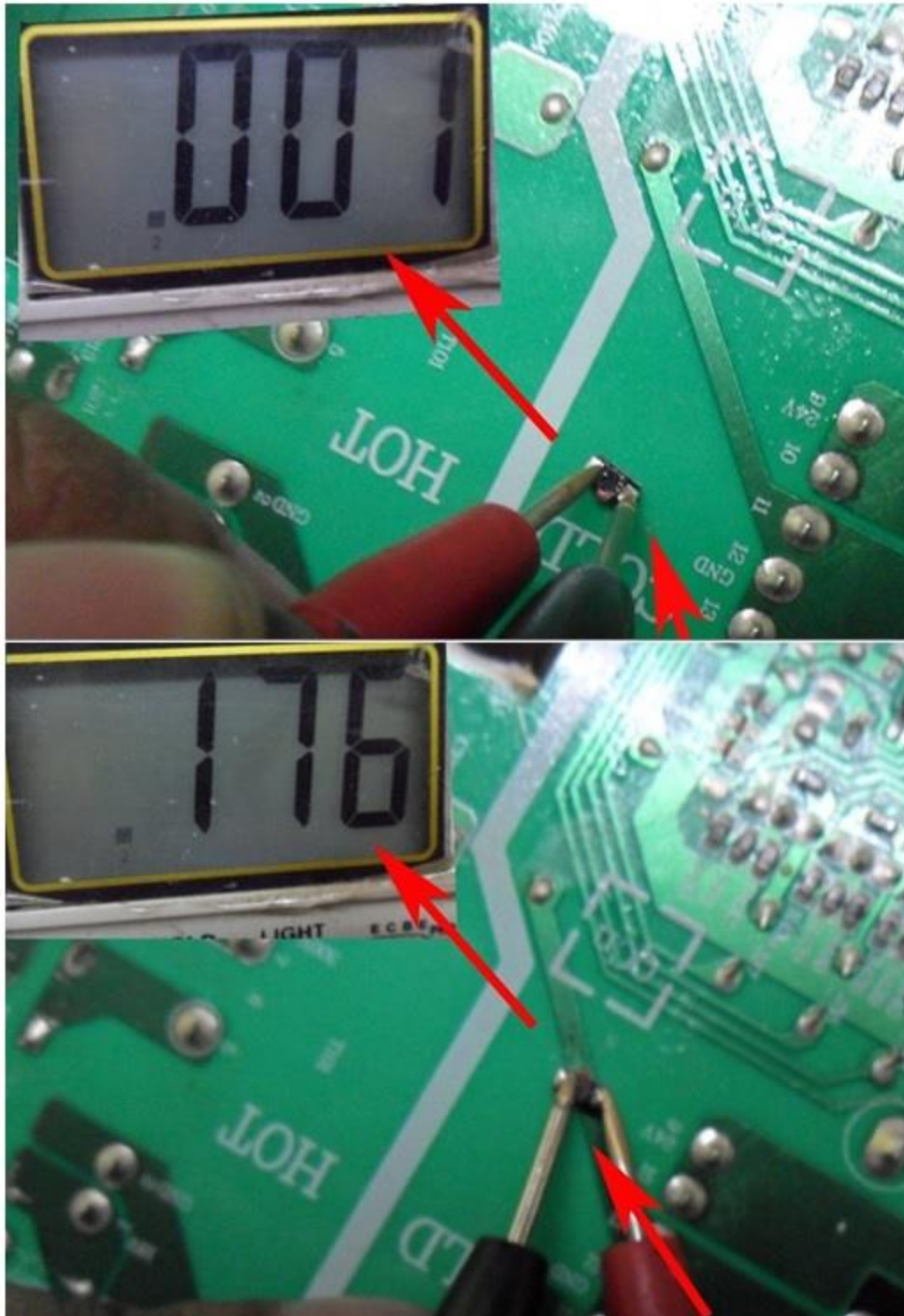
From the board marking of the LED backlight connector, it stated 60 vdc which means 60 dc volt is required to light up the LED backlight. However, from the measurement I've got only 26.6 volt which is abnormal.



So, I proceeded to trace the 60 volts line from the back of the connector and the line brought me to a circuit that has two big SMD diodes-see the photo below:

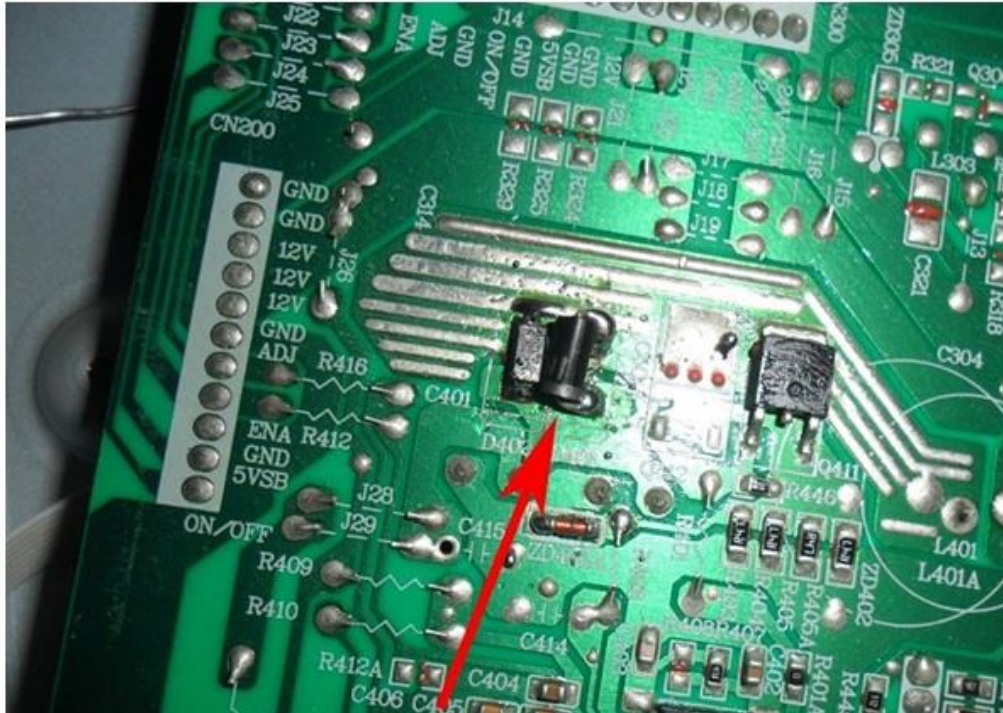


I took out both diodes to check (checking diodes off board is much accurate than to check it on board) and found one was shorted and the other one was good-see the two photos in the next page:



Note: .001 means it is shorted, .176 means the diode was good. This result only applies to the Schottky Diode Type.

Since I do not have this kind of diode, I used an axial lead fast recovery diode with 3 ampere as replacement. I had to cut away the long lead and slowly position the diode onto the original location as seen from the photo below:



After the installation of the diode, I powered On the LED TV and as expected, I've got 62.7 volt at the LED backlight connector.



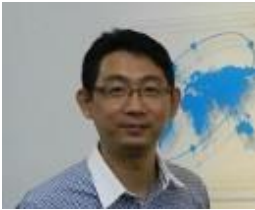
The below two pictures is what I saw when everything were put back to normal. Another job was done and made some profits from this repair. If you wish to learn how to repair LCD/LED TV fast you can check out John's ebook [Here](#) and Kent's ebook [Here](#).



Conclusion

Once you know the electrical safety and able to accurately test electronic components, you can actually start to repair many types of electronic equipment in the market. The more practice you have, the better you will become in solving electronics problems.

To your success,



Jestine Yong
Author of “Testing Electronic Components”

Recommended Resources

Electronics Repair Ebooks

- 1) <http://www.jestineyong.com/resources-2/>

List Of Electronics Spare Part Suppliers

<http://www.jestineyong.com/category/electronic-suppliers/>
<http://www.ebay.com>
<http://www.shopjimmy.com>
<http://www.encompassparts.com>
<http://www.iccfl.com>
<http://www.aliexpress.com>

Electronics Repair Forum

- 1) <http://forum.eserviceinfo.com>
- 2) www.Repairworld.com
- 3) <http://www.tv-forums.com/>
- 4) <http://www.edaboard.com/>
- 5) <http://www.tv.quuq.org/>

Electronics Repair Websites

- 1) www.ElectronicRepairGuide.com
- 2) www.Anatekcorp.com
- 3) www.Epanorama.net/links/repair.html

Kent Liew's Electronics Repair Ebooks

- 1) <http://www.jestineyong.com/repairing-guides-by-kent/>

Damon Morrow's Electronics Repair Ebooks

- 1) <http://www.jestineyong.com/repairing-guides-by-damon-morrow/>