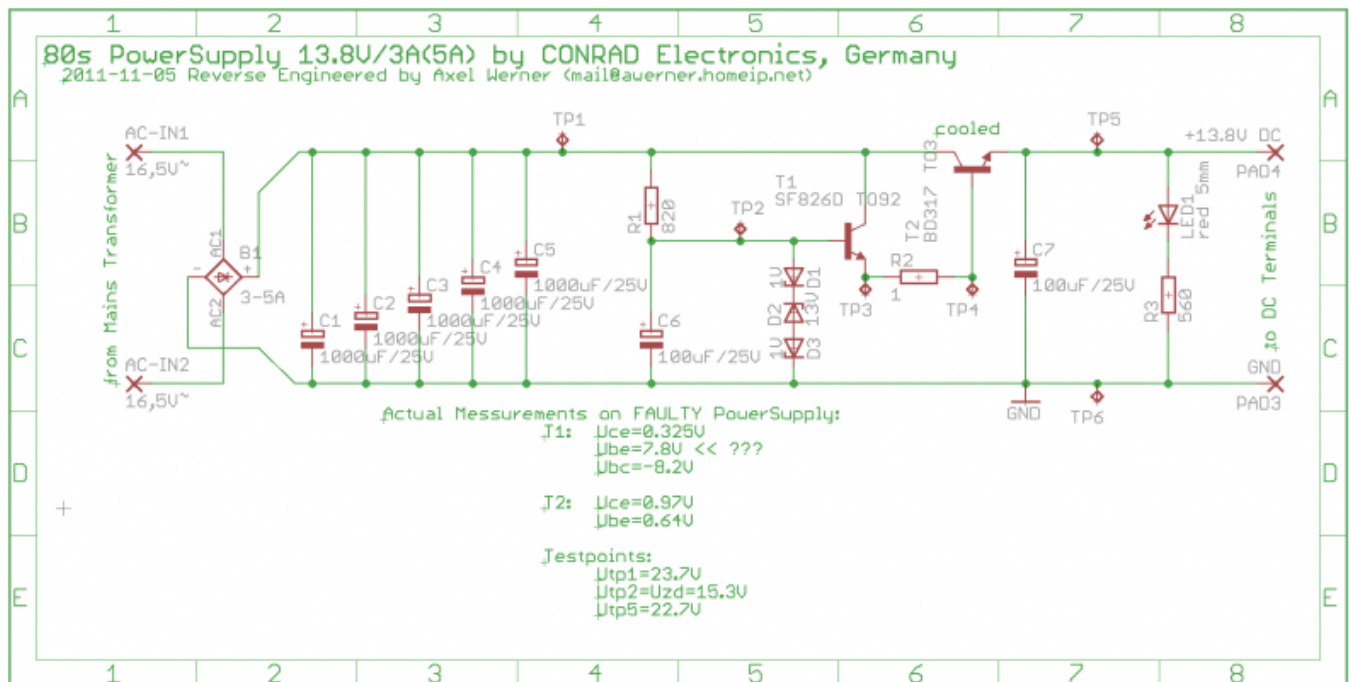


Repairing a faulty 80s Power Supply 13.8V/3A from CONRAD Elektronik, Germany

CONRAD Electronics is possibly Germany's largest and certainly the most popular Electronic Parts Reseller. Some time in the 1980s I bought a stabilized 13.8V, 3A (5A) DC Power Supply that served my needs for decades now. Lately I accidentally dropped it to the floor and after re-checking it, it seems to send out pretty much "unregulated" 22.7V DC Power to the output jacks. Since it's still handy to have a regulated little PS around I want to try a repair action on it.

Sadly neither CONRAD nor the Internet seems to have the Schematics online, so I started to investigate and reverse-engineered it. I put all Parts as far as I was able to identify into a EAGLE Cad Schematic incl. Values and all. Those Parts I was not able to identify I unsoldered and measured manually. Like the strange looking Zener-Diodes with their ugly pretty much non-speaking Labeling.

Here are the Schematics I finally hammered together in EAGLE. Click on Image to enlarge or download PDF or Schematics.



- Download High Resolution PDF here: [80s-powersupply-conrad-schematic-2011-11-05.pdf](#)
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UPDATE: The Schematics now should be pretty much CORRECT. The T2 Transistor BD317 (TO3 Casing) is a NPN type. Don't get confused by some obscure DataSheet on the Internet saying it would be a PNP. The SF826D (T1) is also a NPN universal purpose Transistor. However if you still found a mistake, please let me know by sending me an eMail to mail@awerner.myhome-server.de.



UPDATE: **The Power Supply meanwhile has been fixed.** Thanks to some gentle Users on

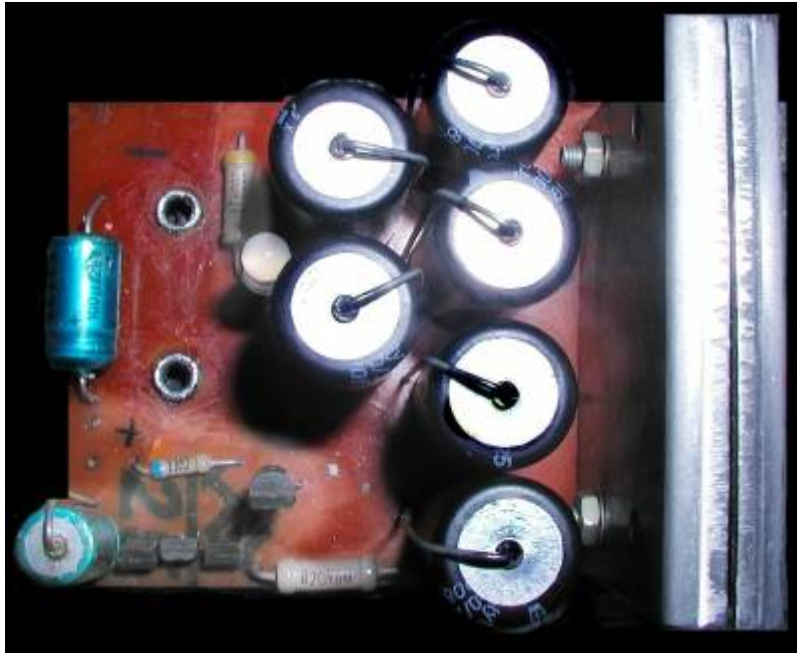
Dave Jones's EEVBlog Forum who gave me the final hint, i was able to measure a DEAD T1 which been conducting all the time. The Transistor seemed to conduct from Collector to Emitter and vice versa without any Base-Current. I replaced it with some rotten desoldered BC338 i had lying around since the 80s :). The Circuit is not very good on stabilizing compared to modern Voltage Regulators. Without a LOAD it provides round about 14Volts while on pulling about 2.5-3A it drops down to about 13V. However, its good enough for most everyday Apps.

What is done yet?

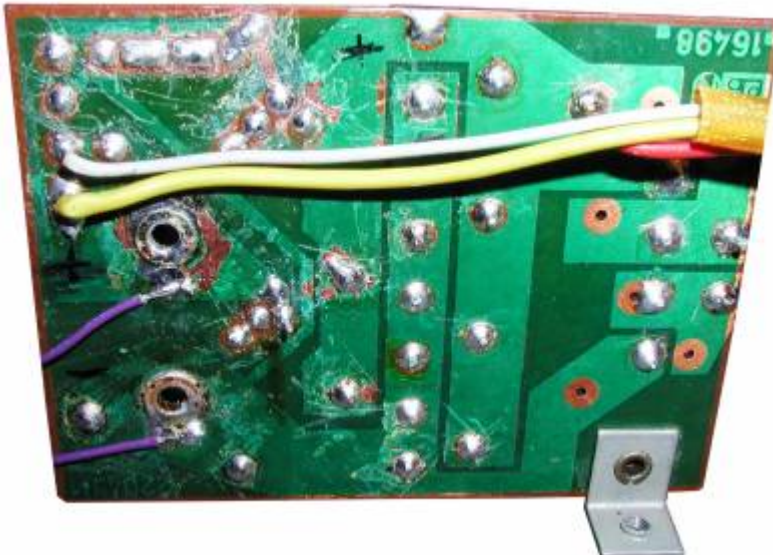
1. My measurements at T2 tells me that the Transistor is pretty much conducting/switched on (T2 Uce and Ube). Therefor the Output Voltage on TP5 is almost the Input-Voltage at TP1. (Uin - Uce Voltage Drop at T2). So the Problem is somewhere around T1 who controls T2.
2. I unsoldered T1 (SF826D) and tested it with my Multimeter in Diode-Testmode. It seems to be a NPN Transistor with around 0.6-0.7V voltage drop Ubc and Ube. So in "unsoldered mode" it looks normal to me.
3. When T1 is soldered in i measure some "strange" voltages i would not expect there. T1 Ube seems to be  7.89V  Shouldn't it be around Silicon Forward Drop like 0.7V ?? Here is something strange!
4. Ubc on T1 is around -8.2V (or 8.2V lower than rail TP1). Seems to make sense. Since Utp1-Utp2=8.4V
5. After getting some expertise form the Users of Dave Jones's EEVBlog Forum, someone gave me the Tip to desolder T1 and measure conduction between Collector and Emitter and vice versa.  **BINGO!** As predicted by one gentle Forums User there the Transistor was conducting no matter which direction. So the T1 is considered DEAD or BLOWN.
6. I searched the internet for some replacement Model for the old SF826D transistor which should be a BC337. Since i didnt had those, i replaced it with an old desoldered BC338 instead. The Peoples on the EEVBlog Forum dont recommented that, but i had no other handy.
7. The replaced T1 (now a BC338) works OK. The PSU now outputs round about 14V without and load and about 13V with 2.5-3A. Thats good enough for me.
8. Reassembled the whole box and Job is done! Old 80s Style CONRAD (Voltcraft) 13.8V DC Power Supply has been successfully repaired.

Some Photos of the mid 80s Power Supply (internals)

1. pcb-top-view



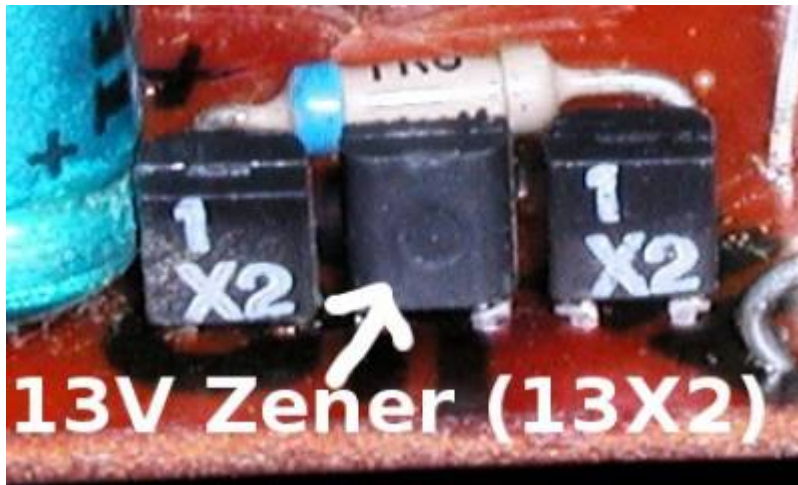
2. pcb-bottom-view



3. inline-transistor T2



4. pcb-zener-diodes



BIG THANKS GOES OUT TO...

THANKS TO ALL THE USERS ON THE EEVBLOG FORUM WHO HELPED ME WITH THAT! THANKS TO ANY MAKER WHO FREELY SHARES KNOWLEDGE, VIDEOS, TUTORIALS AND OTHER FREE LEARNING MATERIAL ON THE INTERNET! Keep information free for everyone!

THANKS and C U! — [Axel Werner](#) 2011-11-06 22:45

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