#80 : Lars Dreier : AC PCB dead

Added by John B. on Sep 20

Assigned to
Shinguk K. Yan Y.

When done, notify

Notes
#80 : Lars Dreier
https://decentespresso.com/admin/carts?userid=1752&cartid=4735

Symptoms
1. Machine doesn't get heated even when it's not connected to the tablet.
2. When the machine turns on,"Click"(The electricity checking) sound goes 4 times, stops for a while, And gives one more time.
3. Bluetooth connected with machine(Double tap the Hex code and "connected" shown) - firmware / soft ware up to date.
4. Metal temperature at 0°Cand although it's connected by bluetooth, "START" doesn't go to "STOP".

Cause
- I assume that it's AC board issue. Especially the heater side.
- But it's quite odd that the sensors are not working properly...we need to see this in real.

Comments

🎉 John Buckman turned on comment notifications for Yan Yan

John Buckman
New machine already sent to client:
https://decentespresso.com/admin/carts?cartid=6307&userid=1752

🎉 Yan needs to arrange customer pickup:
https://decentespresso.com/admin/read_emails_support?artistid=1752

John Buckman
🎉 Yan progress to report on the pickup from Lars?
Yan Yan
Hi John, I have created a waybill for Lars, the tracking number would be: 1Z9W073W8691738159.

Now I am waiting for Lars to call UPS to schedule a pickup.

Yan Yan
Hi John, we have received the broken machine today (4th Oct 2018). Serial No. 80. (Machine replace to him is No.248) Attached commercial invoice and shipping label here.

[Attached images]
Machine arrive Decent factory at 4 OCT 18 about 12pm

1. I take out the machine from the carton packing and find that the leg base is bend
Then I change the leg base in order for me to put the water tank in...

2. Open the top cover of the machine ... note the female receptacle connector to the steam heater is going to lose ... the connector does not have the positive lock..
3. Then I fix the female receptacle and plug into the steam heater and there are no other obvious visual problem ... Connect the debug cable and try to turn on the machine with 120V AC

4. confirm with the Symptoms #2
   2. When the machine turns on,"Click"(The electricity checking) sound goes 4 times, stops for a while, And gives one more time.

5. Debug cable shows the following :
Machine stop and debug screen stopped

6. Take out the AC board and test with the AC board tester ...
All of the AC board output normally and the 12V relay output is normal and able to control ... But the AC frequency output reading is 0.

7. Try to trouble shoot the AC board at component level ... find the capacitor C2 (10uF/35V) is abnormal compare with the other working AC board.
De-solder the capacitor out and measure with a multi-meter
8. Replace C2 with a new 10uF/35V capacitor and frequency (100Hz) is normal again

9. Install the AC board back to the machine. Turn on the power and pump sound can be heard again and debug screen keep on showing the update status ...
10. Test with hot water pour, steam output and espresso pressure... Seems to be working...
Conclusion:
DC board (or firmware program) will not work if no frequency output from the AC board ... But I cannot explain the root cause of the C2 capacitor damage/failure ...

Please let me know if you have any further instruction for this machine ...
I am concerned that there is a flaw in my design for that circuit, and I'd like you to double check if you if there is a more serious problem here.

I assume D7 and R8 were fine?

We have some differential probes for using the oscilloscope with AC voltages, it you would like to look at a circuit in use. Actually, inside this circuit (past R6 and R7), there should be no high voltages, but if you use the differential probes you don't have to worry about any possible issues (including grounding issues).

The 220k resistors are in series with the 22K (R8) resistor. This forms a 20:1 voltage divider.

D7 is just there in case R8 fails open. It should never be active. Even if it is active, it should limit the voltage across C2 to around 6V, which us much less than 35V. If R8 fails, the circuit stops working, but the voltages are still safe.

The output of the diode bridge around R8 is a 100Hz rectified sine wave. When it is decreasing, it forces Q2 pin 2 0.6V below Q2's base. Q2 turns on and discharges the capacitor through the LED in U1. Once sufficiently discharged, Q2 turns off and C2 recharges for the next half cycle.
I can't think of anything I'm doing wrong in this circuit. I think all components are being kept at safe voltages and currents. Do you agree, Parry?

Parry, to help you think about this, I have shared a simulation of the above circuit online for you, at: https://www.circuitlab.com/circuit/c78jk2/zero-crossing-detector/
Parry Law, Senior Technician

Ray Thanks for your explanation and it is detail and helpful ...

I assume D7 and R8 were fine?
Yes ... I compare the measure value (in circuit measurement ) with other PCBA..

And I can see similar zero crossing detection circuit on the web :
https://www.avrfreaks.net/forum/zero-crossing-detector-using-4n35-optocoupler

So I believe it should be no problem and most of the other espresso machine are still working ....
But I think it is difficult to find out the root cause of the failure as there maybe many other unknown factor affecting ...

Ray Heasman, Lead internals

Yeah, variants on this circuit have been around for a long time. I don't trust a circuit just because other people have used it though. I did fully simulate it and try a few variants of it before using it in prototypes.

I just thought it would be a good idea to get someone else to have a look at it as well.

Thanks for your help.

Parry Law

No problem👍
Parry Law, Senior Technician

As we have already give the replacement machine to the user, please let me know if you need to refurbish the returned machine (#80) and re-sell as V1.0 ... As I may need to update and change steam and water heater crimp terminal with the positive lock ... also we may need to change the parts inside group head ...

John Buckman

Can you try leaving the brass parts in a solution of Cafiza, to see if that cleans them up? You should be able to find that product in the shelves near Miriam. I prefer to clean the brass parts rather than replacing them.

About selling this as a new version 1.0 machine, I will post something in a few minutes that addresses the policy we will have with these returned machines.
Parry Law, Senior Technician

John I have get the "Cafiza" cleaning tablet to dissolve in the water tank.

Then I take out the parts from the Group Head and leave it in the solution.
The following part is not take out
I think I will leave the parts inside the solution overnight and let you know the result tomorrow.

As the leg base is already bend when we open the packing and we don't have the good leg base ... So I have to use a minor defect leg base ...

🤔 John please let me know if you accept to use this leg base in this machine.
John Buckman

Yes 🤕 Parry I am okay with using that QC failed leg base for this machine but we will check with a client first before sending this to them, to make sure they are ok with the cosmetic defect (it's hidden under the drip tray).

Once the brass pieces that you have soaked in Cafiza are done, please run a clean cycle using the tablet app, and using the water that had the Cafiza tablet in it.

You should probably use a blank porta filter so as to cause the cleaning product to circulate inside the brass parts.