

Troubleshooting: HP LaserJet III Malfunction „50 SERVICE“

If the HP LaserJet III printer shows „50 SERVICE“ after power up and the fuser is not defect ... then maybe the „AC Driver / Safety Circuit“ board of the „AC Power Module“ is defect. This PCB with part number „RG1-1438“ is made from cheap PCB base material which can render a conductive path between adjacent feedthrough holes if it is over heated.

First Check:

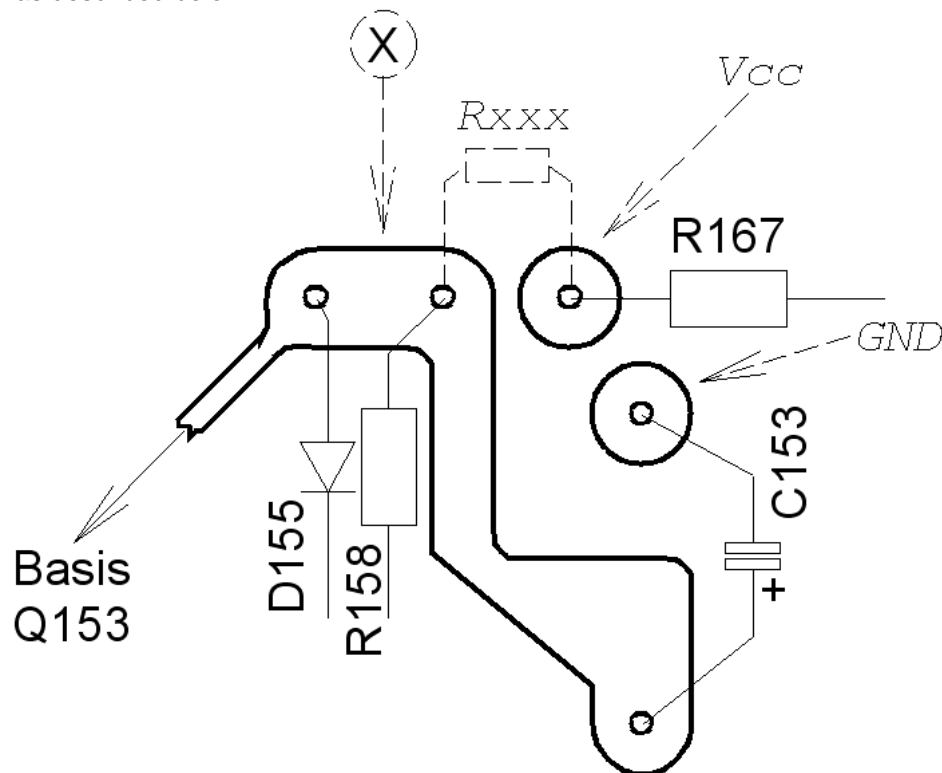
- 1.) Switch off the printer and disconnect the power cord.
- 2.) Check the fuser module (see below) or replace it by a functioning one.
- 3.) If this does not help then replace the „AC Power Module“ or repair it as described below:

Remove the „AC Driver / Safety Circuit“ PCB „RG1-1438“ from the printer:

- 1.) Switch off the printer and disconnect the power cord.
- 2.) Remove complete upper part of the housing (about 6 small screws). Some force is needed.
- 3.) Locate the „AC Power Module“ (right, back) including the power inlet, power switch and fan unit.
- 4.) Remove the black plastic air deflector / air filter holder (two black small screws) in front of the fan.
- 5.) Remove the fan unit (three small screws) and unplug the fan from the defective „RG1-1438“ PCB.
- 6.) Take away the upper, small metal sheet (about 4 small screws) which covers the „AC Power Module“.
- 7.) Remove the two remaining screws which hold the upper PCB named „RG1-1438“.
- 8.) Unplug the light blue cables (10 positions connector J151).
- 9.) Take out the PCB „RG1-1438“. Check and repair it as follows:

Checking the „RG1-1438“ board:

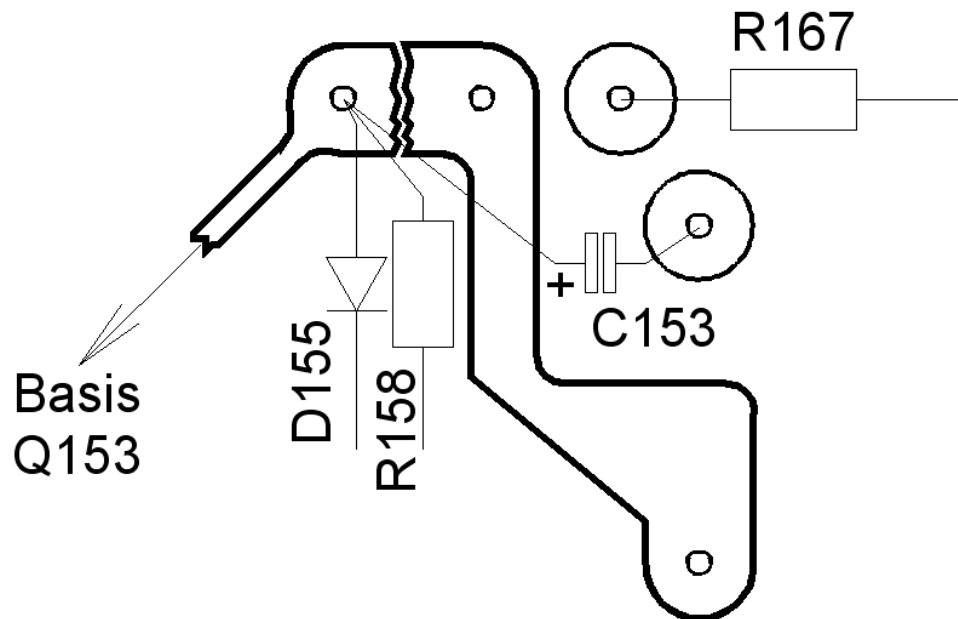
- 1.) Remove the following four circuits from the board (carefully soldering!):
Capacitor **C153** (22 μ F/25V) Resistor **R158** (560k) Diode **D155** Transistor **Q153** (2SC1815)
- 2.) After soldering let the PCB cool down to room temperature!
- 3.) Use an ohmmeter (2M range) and measure the resistance (leakage current) from the track which was connecting these four circuits (at base of Q153) to Vcc (pin 10 of connector J151 or R167).
- 4.) There should be absolutely high impedance as the track is not longer connected to any circuit. But if there is a resistance of less than 2M (down to 170k) measured, then there is a pseudo “resistor” *Rxxx* arisen within the PCB base material between the feedthrough holes of R158 and R167.
- 5.) Repair PCB as described below:



Drawing 1: Solder side of RG1-1438 before repair (with pseudo „resistor“ Rxxx)

Repair PCB „RG1-1438“:

- 1.) Cut the track at mark (X) in the middle between the feedthrough holes of D155 and R158.
- 2.) Do a control measurement (cold PCB) from the remaining track at base of Q153 to Vcc. There should be no measurable resistance (high impedance).
- 3.) Solder in the Diode **D155** and the Transistor **Q153** (2SC1815) at its original positions.
- 4.) Solder in the ,lower' leg of resistor **R158** (560k) at its original position. The 'upper' leg of R158 should be soldered directly on the 'upper' leg of D155 (circuit side of the PCB).
- 5.) Solder in the (-) leg of capacitor **C153** (22µF/25V) at its original position. The (+) leg of C153 should be soldered directly on the 'upper' leg of D155 (circuit side of the PCB).
- 6.) Reinstall the PCB „RG1-1438“ into the printer. For a first test the metal cover and the fan need not to be mounted.
- 7.) If (because of any other reason) the „50 SERVICE“ is displayed again the printer must be powered down for 7 minutes interval before the next test.



Drawing 2: Solder side of RG1-1438 after repair (circuit wiring on the circuit side of PCB)

Possible cause of the pseudo “resistor” Rxxx:

- Extensive heat generated by R167 or caused by low power fan of the first generation.
- Too small distance of the feedthrough holes of R158 and R167.
- Aging of the cheap PCB base material.
- The design of the safety circuit around R157, R158 and C153 which is relatively high impedance.

How the pseudo “resistor” Rxxx causes the “50 SERVICE” malfunction:

- The problem occurs in the first 2 or 3 seconds after power up of the printer.
- As the fuser is not active it draws no current → Q154 pulls R158 to ground
- This should discharge the C153
- But the pseudo „resistor“ Rxxx charges the C153 up to 3 volts!
- With this the safety circuit around Q153, Q151 and Q152 switches the relay for the fuser in off state.
- With this the fuser has no supply and it is not warmed up → „50 SERVICE“
- The safety circuit can only be cleared with power down of the printer.
- The „50 SERVICE“ error is not cleared until the printer has been powered down for seven minutes.

Comment: The pseudo „resistor“ Rxxx seems to change its resistance value with the temperature and the environment air humidity. And therefore it also changes when circuits are replaced because of the soldering heat. And this is the background why the “RG1-1438” seems to be repaired after replacing for example the C153.

Comment: The above described repair also helps if the „50 SERVICE“ error is only sometimes seen and disappears if the following power up sequence is used:

- Power down the printer for a period of 7 minutes after display of „50 SERVICE“
- Power up the printer and wait till second ,Click' occurs (about 3 ... 4 seconds after power up).
- Power down the printer, wait 1 or 2 seconds and power up the printer again → “50 SERVICE” gone

Fuser Malfunction Checks:

- 1.) Is the fuser assembly correctly seated into its connectors on the DC Controller PCB and the AC Power Module?
Visual inspection. Ensure the connectors are properly seated (no bent pins or pins outside their receptacles.)
- 2.) Is the circuit breaker on the AC Power Module tripped?
Reset breaker. Press the small light green button of the circuit breaker unit. This button is located directly below the black air filter (in front of the fan).
- 3.) Is the Thermistor defective?
Perform the following Thermistor Functional Check:
 - Remove the fuser assembly from the printer (4 fat Philips screws).
 - Remove the protective cover from the left side of the fuser assembly to access the Fuser PCB
 - Measure the Thermistor resistance at J332 pins 1 and 2 (where the two white wires are connected to).
 - At ambient room temperature the resistance should be approximately 1130 Kohms. If the printer has been operating for some time, the resistance value will be much lower.
 - If the Thermistor appears to be either open or shorted, replace the Thermistor (Exit Sensor PCB)
- 4.) Is the Fuser Bulb open?
The Fuser Bulb and the Thermoprotector are wired in series. To quickly check that neither assembly is open perform the following procedure:
 - Remove the fuser assembly from the printer (4 fat Philips screws).
 - Using an ohmmeter to check for continuity at the two pin connector at the right side of the fuser assembly.
 - If an open is detected, either the fusing bulb or the thermoprotector is defective.
 - To differentiate between fuser bulb and the defective thermoprotector proceed as follows:
 - ÷ Remove the screw securing the left side of the fuser bulb connector to the thermoprotector.
 - ÷ Verify the continuity of the bulb from the connector wire to the rear connector of the two pin connector.
 - ÷ If bulb is open, replace the completely fusing assembly.
 - ÷ If the bulb appears good yet the serial continuity measurement indicates an open, replace the thermoprotector.
- 5.) Is the AC Power Module defective?
Replace the complete AC Power Module. Or replace only the upper PCB "RG1-1438". Or try to repair the „RG1-1438“ as described above.
- 6.) If all this does not help ... then maybe the DC Controller PCB is defective ... replace.