

Microcentrifuge Repair

These ubiquitous little centrifuges show up all over eBay and lab surplus auctions and are known as MicroV or Labnet from Fisher Scientific and Galaxy by VWR. They were made around 2000 and feature PIC microcontrollers. You can get them for a few hundred dollars working and 10s of dollars broken. I picked up a working Fisher Scientific MicroV for \$75 and it promptly broke.

I've noticed more broken ones from states that have high humidity in the summer so I'm going to speculate that people put them in their fridges whenever a protocol called for spinning down at 4° Celsius. Not a good idea. Don't do that.

The case is put together as a clamshell with 4 plastic clips and two screws to secure it. You can see all 6 connection points on the bottom of the unit.

There's a plastic film over the bottom that hides the opening to align the motor with the base.

To take it apart begin by removing the screws. While gently pulling the two halves of the clamshell body apart, wedge the tip of a flat head screwdriver between the plastic connectors holding the top and bottom together and gently twist the screwdriver until they separate. Repeat this for all 4 plastic clips.

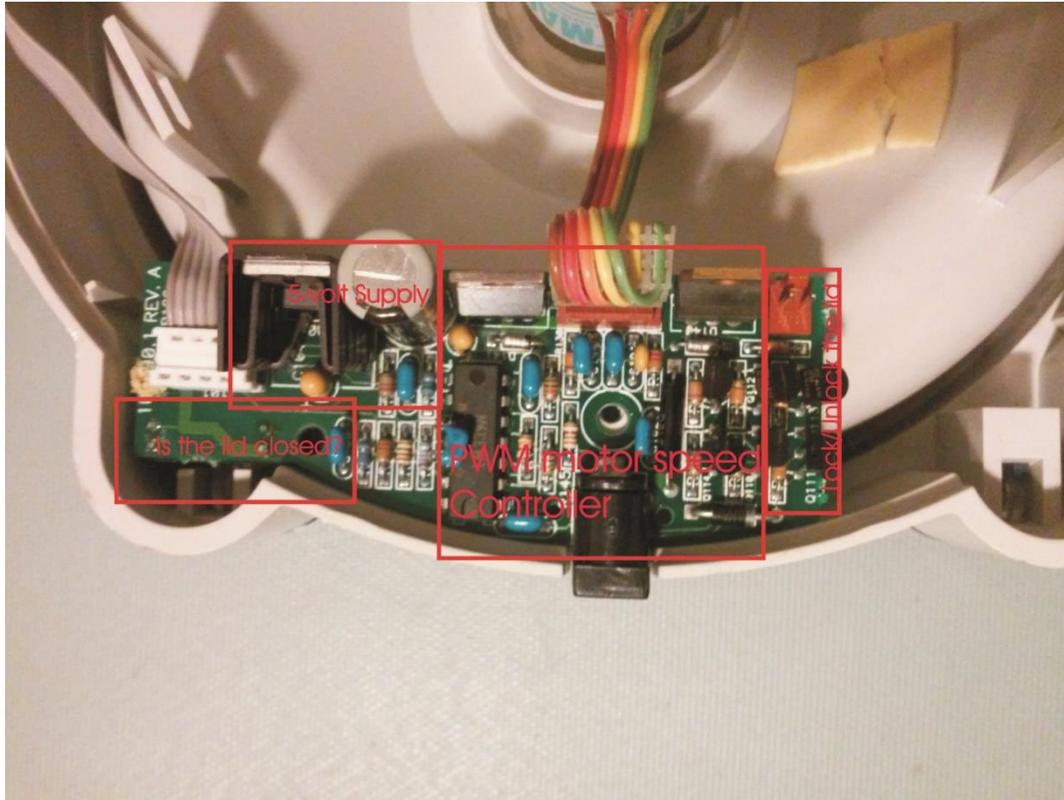


Once it's apart you'll see two circuit boards at opposite ends of the unit and a motor in the middle. The motor is well padded with soft plastic that you shouldn't touch with oily fingers. You'll see a tachometer attachment on the bottom of the motor and 5-wire connector that attaches to the circuit board at the back of the unit. It can be disconnected from this unit and the motor *carefully* set aside. The two circuit boards are held on with screws and padded with double sided foam tape.

The two circuit boards are attached by an 8-wire ribbon cable that cannot be disconnected. There is also a blue plastic flex ribbon from the controls on the front of the unit to the circuit board behind it. Be very careful not to bend or break this when sliding it out of the connector on the circuit board.



The real action and main circuit board that usually breaks is the power supply and PWM to the motor at the back of the unit. It's actually two power systems. The main supply is a 12 volt system that comes from a 3 amp wall wart that powers the motor through a quad comparator hooked up to output pulse widths and duty cycles controlled by a signal from the PIC on the controller board. The second power supply is a 5-volt supply to power up the digital electronics.



5 different functional areas are outlined on the board.

The lock-unlock and lid closed sensor are a bit feeble. The lid locks with a cam on the shaft of a hobby motor and the lid-closed sensor is just some black spray paint on a

tab on the lid to break the light beam between an LED and a photodiode.

On general principle, I usually start by replacing all the electrolytic and tantalum capacitors on a board since they're usually the first things to go. The next thing to replace is the transistors. Particularly the 5-volt rectifier and the TO 92 transistors used for processing signals to and from the comparator.

A key discrete component on this board is the long skinny black thing to the right of the screw-hole. It is a precision resistor that is used as the baseline against which to compare PWM voltages. Make sure this resistor (or whatever other stable reference voltage your system uses) is solid.

Once you've checked all the connections, start checking the base voltages and replace anything giving bad voltages.

If you're still not getting the thing to work, use an oscilloscope to trace the pulses from the control board to the comparator (or whatever your system uses for a series of op-amps) and to the MOSFET that sends power to the motor.

- To be continued -