

M1T380

M1T380 is the most advanced and one of the last multimeters made in Metra Blansko in years 1987 – 1991.

It is a precious programmable multimeter for measuring DC voltages and currents, AC measuring using True RMS methodic and resistance measuring including 4-wires method. It also provides many programmable mathematic and statistic calculations. Device is able to be connected in IMS-2 system. (IMS-2 is Western Europe equivalent of GPIB, except the LPT connector it is the same).

The device is known as a very accurate providing very comfortable and intuitive user interface. It is controlled by 8bit 8080A system.

However, multimeter is also known for his extremme unreliability about typical freezing, restarting without obvious reason or giving ERROR report on display. In the better case. In worse, multimeter shut down with no warning and then you have to find the failure at your own. There are few typical reasons for it.

Metra Blansko made this multimeter in 1987, however, electrotechnic industry in Czechoslovakia was very backward since political plot in 1968. Technology used is typical for 70th compared to the Western world.

Great pain of the multimeter are parts used in.

There are typical tantalum capacitors which explode without warning, in better case, they just make short circuit.

There are typical flat cable connector which increase their resistance with age or lose contact. Solution is recutting them.

There are TTL chips which are unreliable, after 30 years they just don't work or behaves strange.

There are chips in ceramic package. National company Tesla made these chips, but after years they do not seal and they let moisture into package.

Lets look at the multimeter

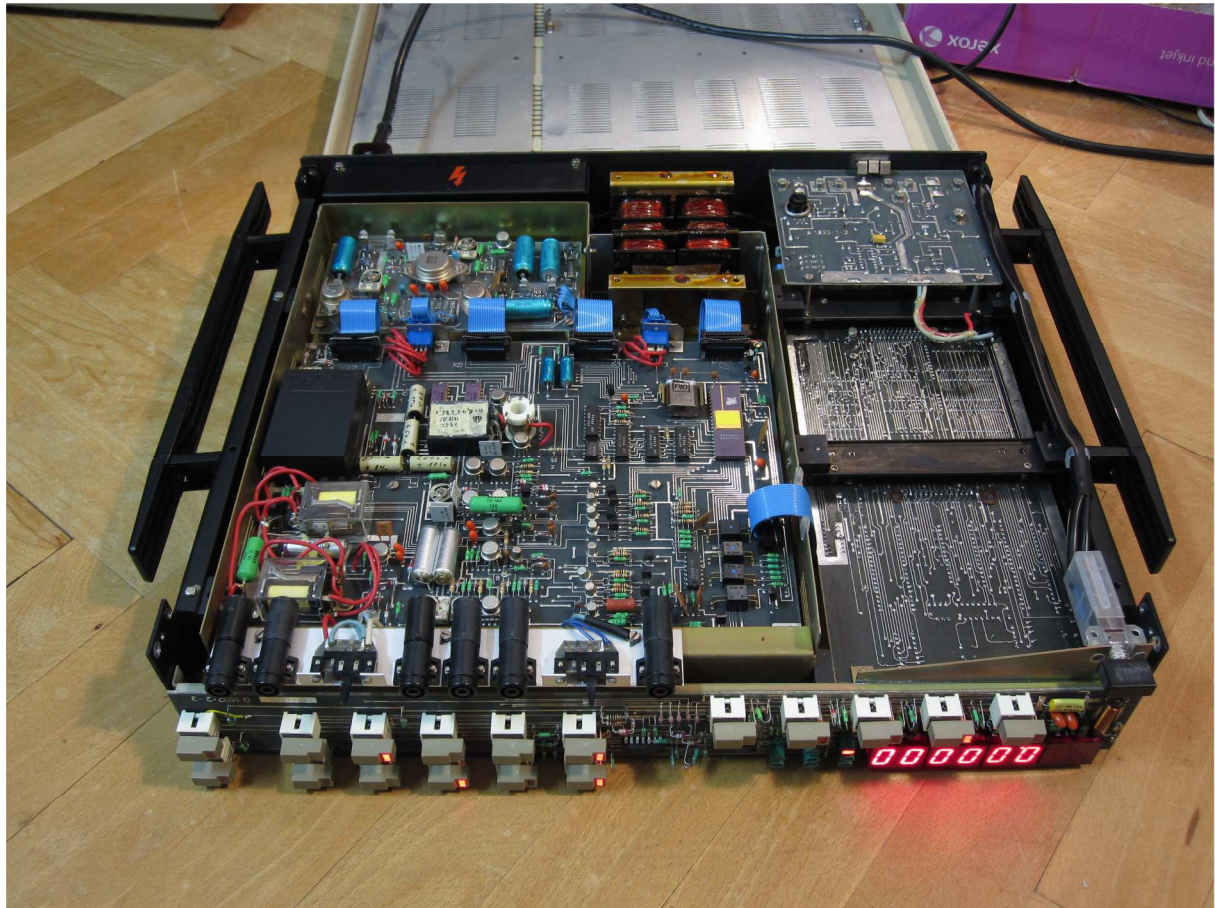




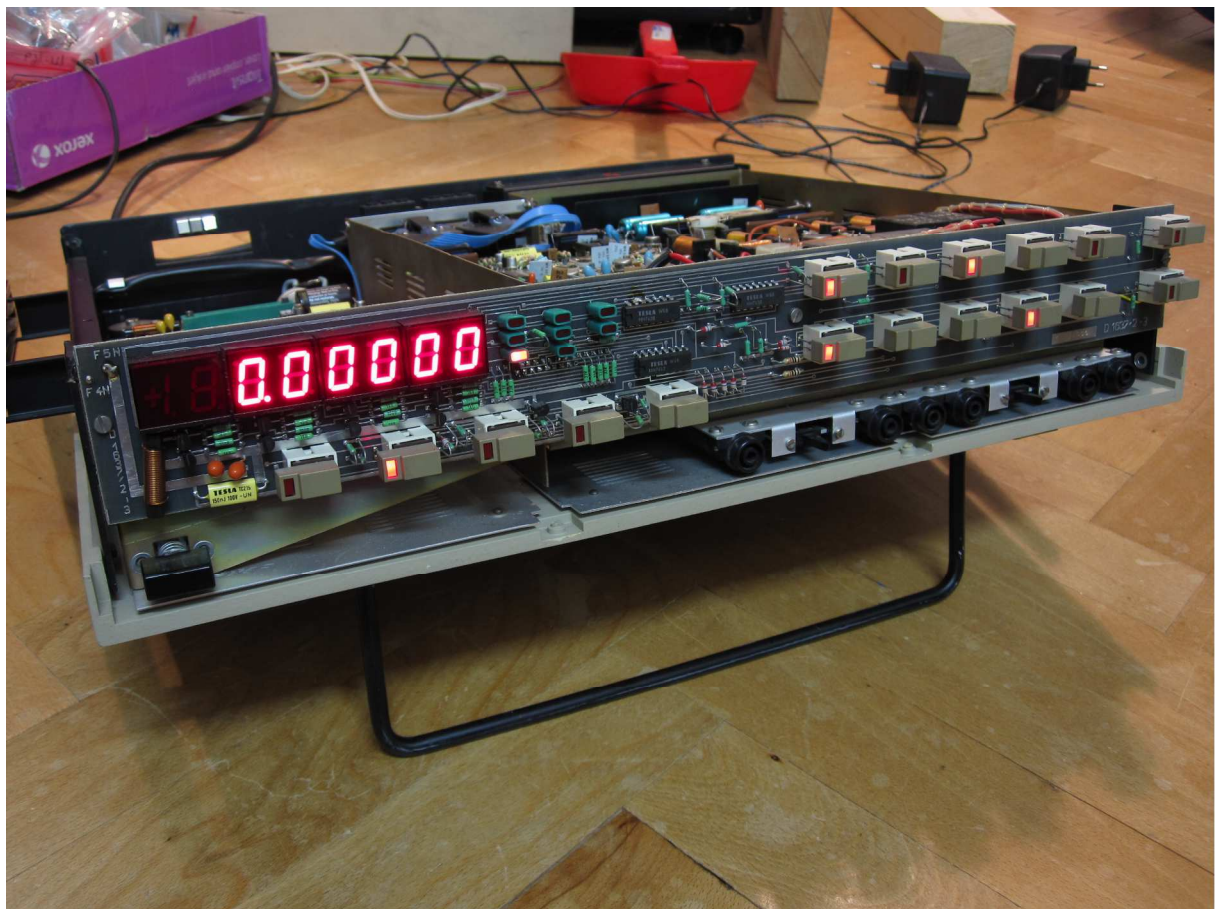
MIT380 with top cover off.



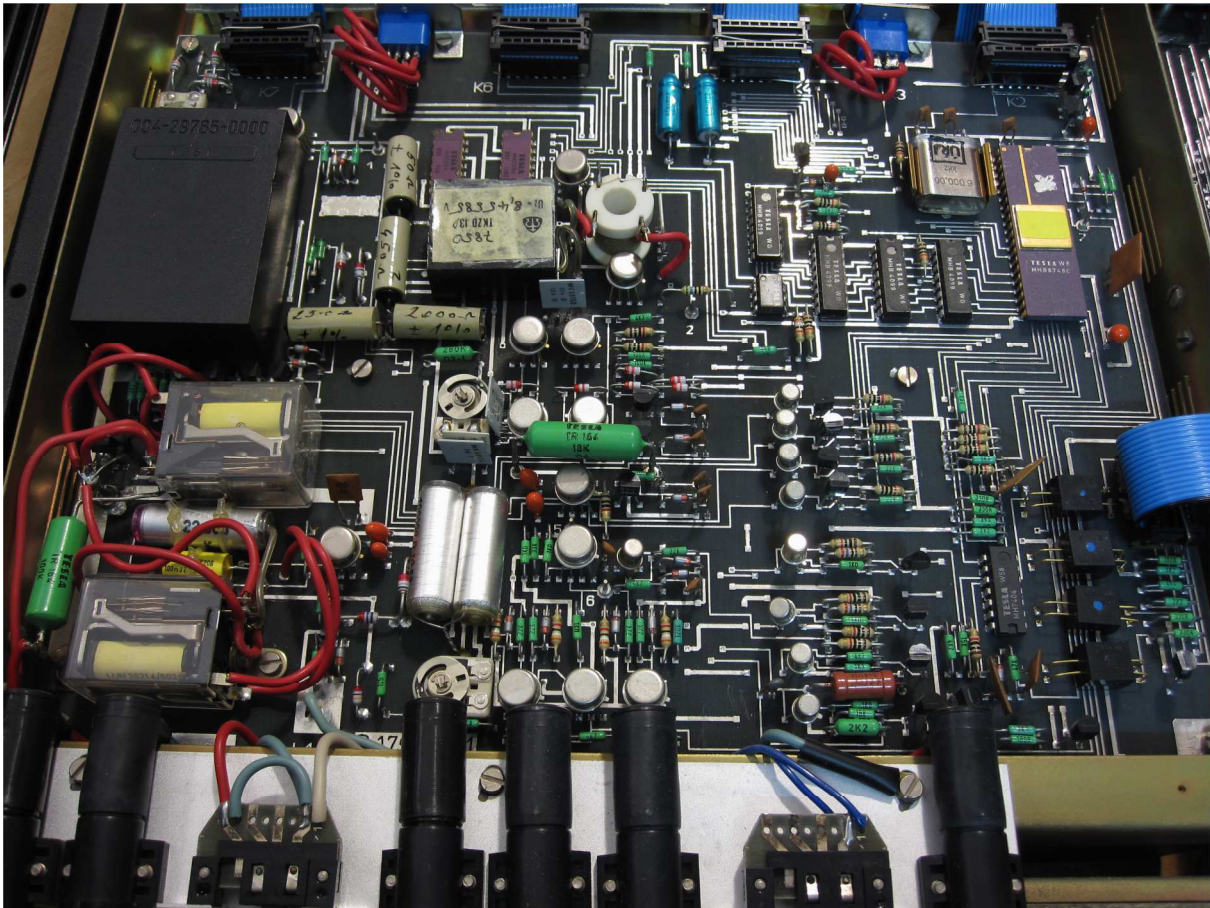
8080A computer on the left.
TRMS converter, input voltage dividers+shunts on the right. Power supplies are back.



Overview of the MIT380 from the bottom.



Display, keyboard and their multiplex controllers.



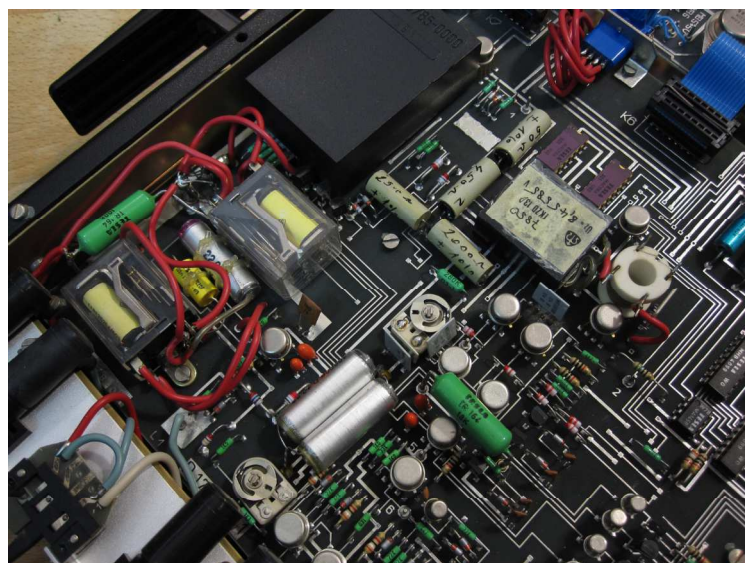
This is the A/D converter board. It uses 8748 microcontroller.

On the down-left there are protect relays.

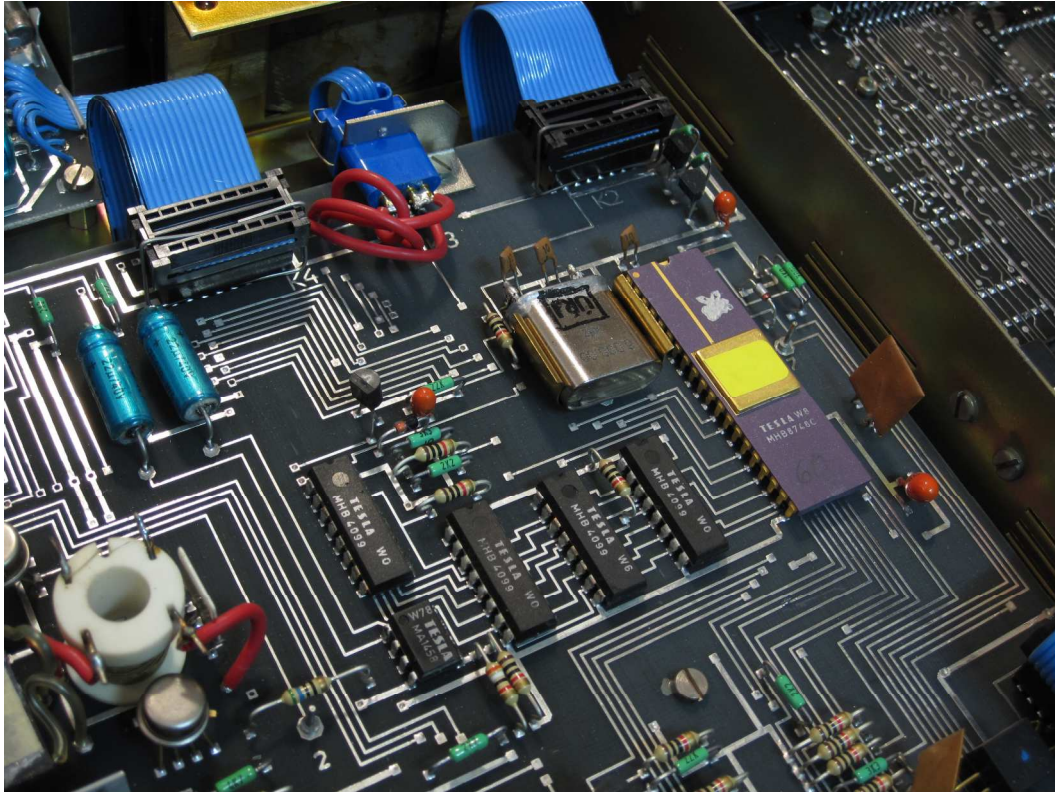
On the up-left there is a precious input amplifier, however, schematic is not available and I don't want to break its package.

On the right there is the microcontroller with optocoupler interface which send and receive data from 8080A computer. Optocouplers make active measure circuits floating and isolated of the rest of the device.

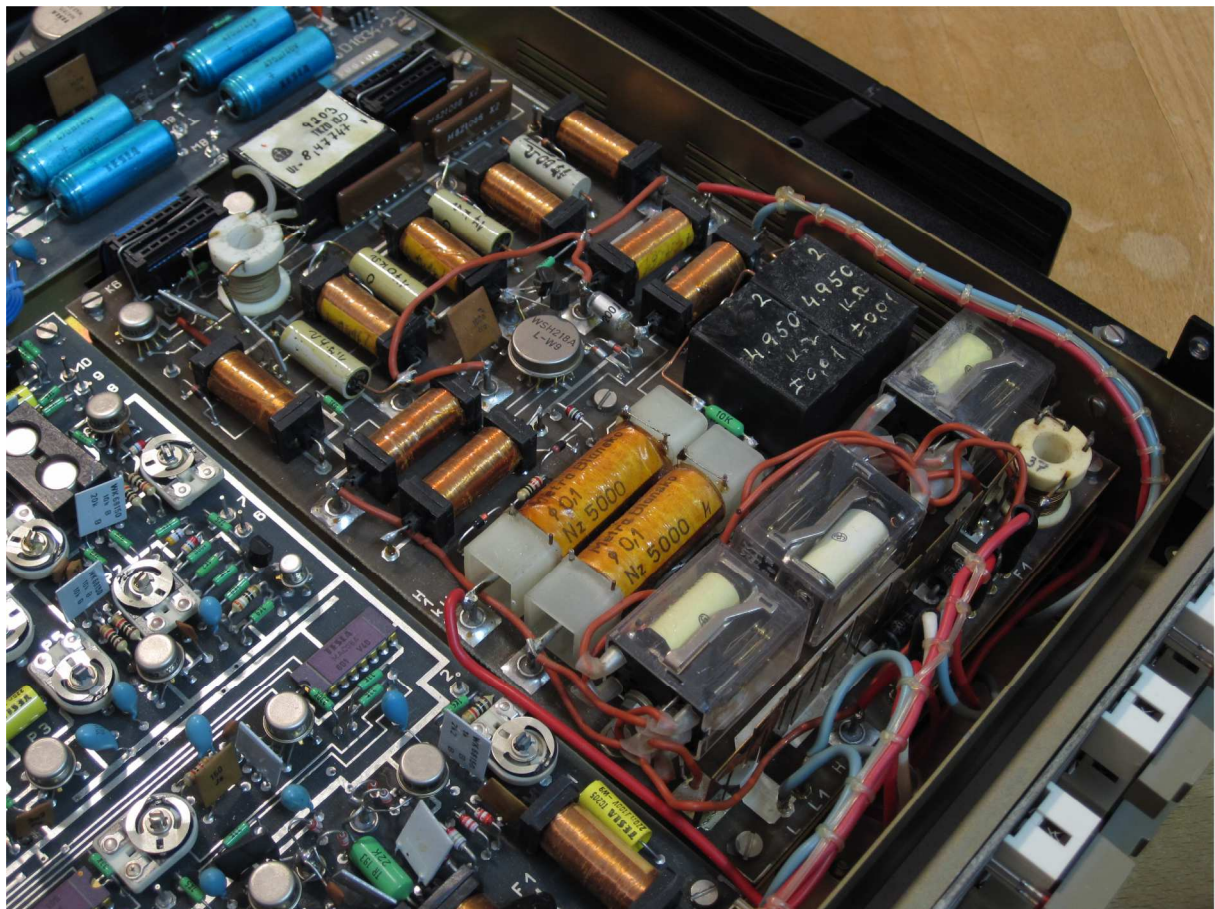
(There is a controversy about this microcontroller, because Tesla made some processors and many other chips copying and reverse engineering Intel originals without license. They had to additionally buy it. Nowadays it is impossible to discover which chips were copied and which were made in license.)



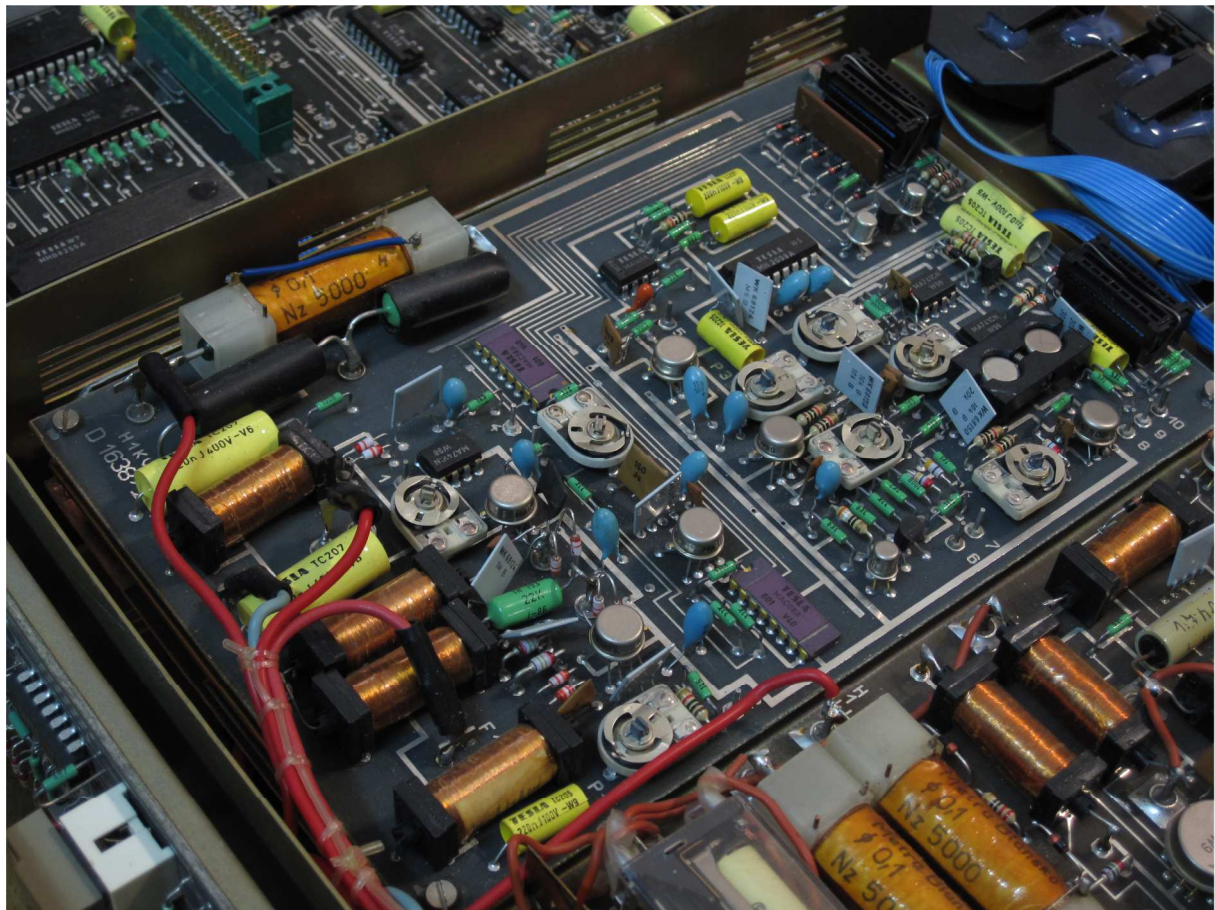
Close up of input circuits.



Czechoslovakian variant of 8748 called MHB8748C, made in Tesla Piešťany. Nowadays there are ON Semiconductor offices and technical support. No production ☹



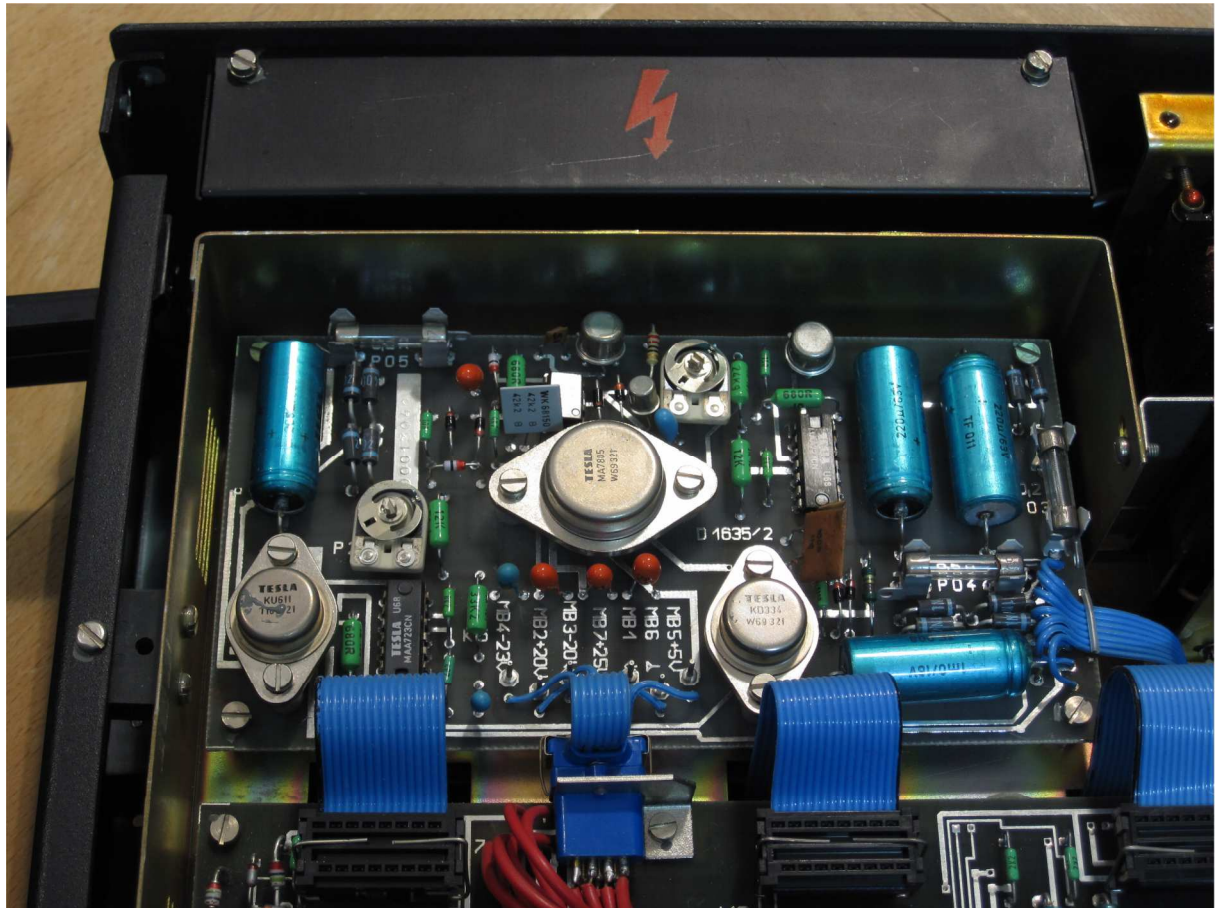
These are input circuits consisting of switches, input dividers and current shunts.



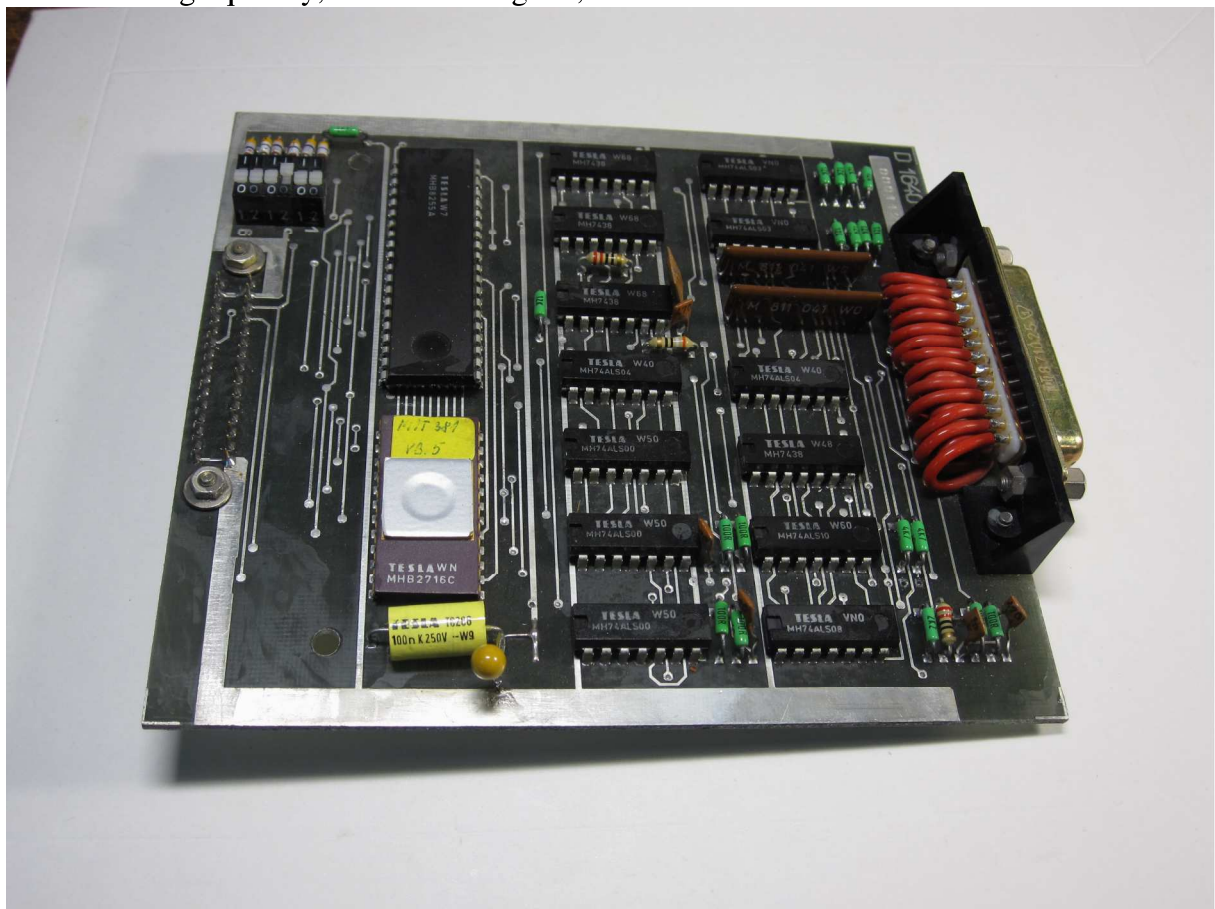
True RMS / DC converter. I am not sure how exactly it works, but manufacturer statement in manual is about operational rectifier and non-linear exponential characteristic of base-collector junction.



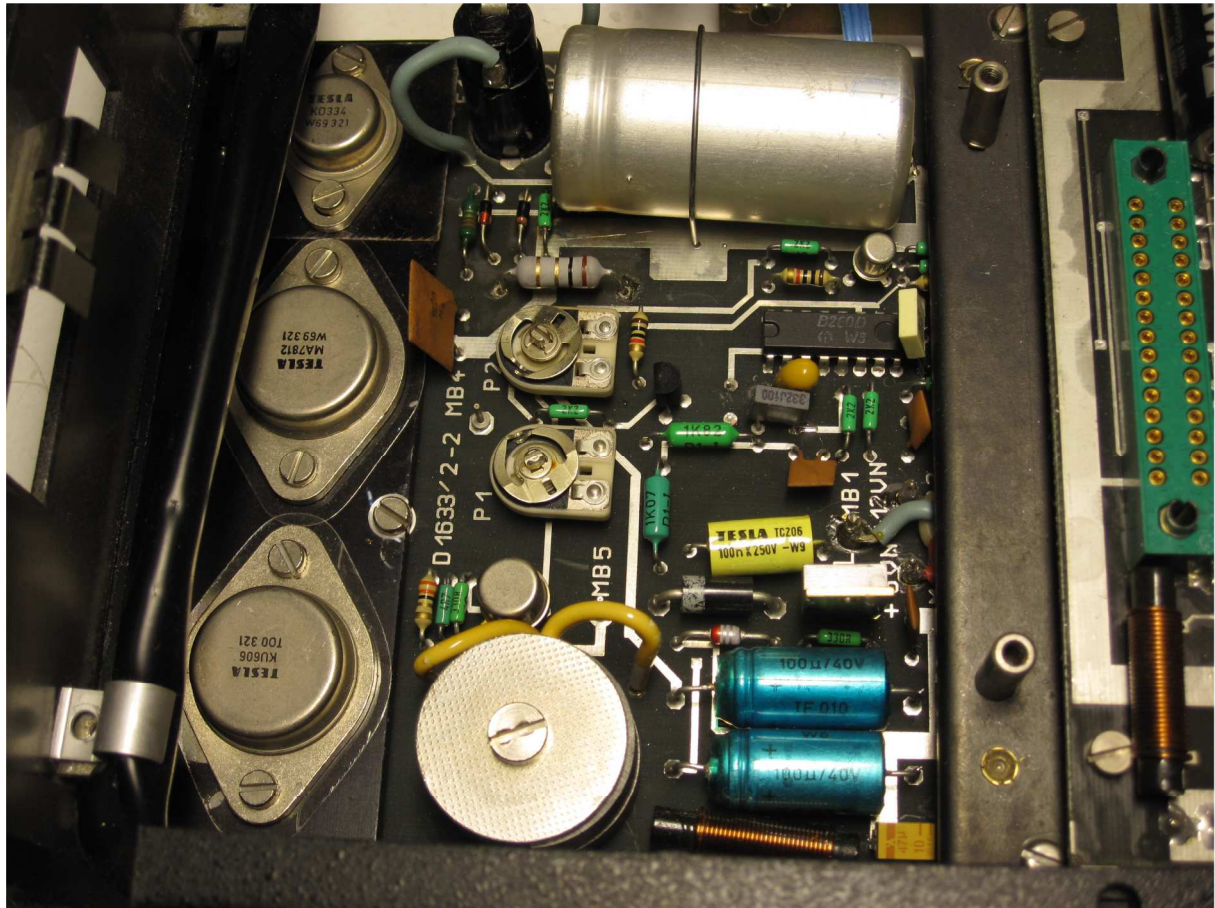
Floating power supply $\pm 15V$



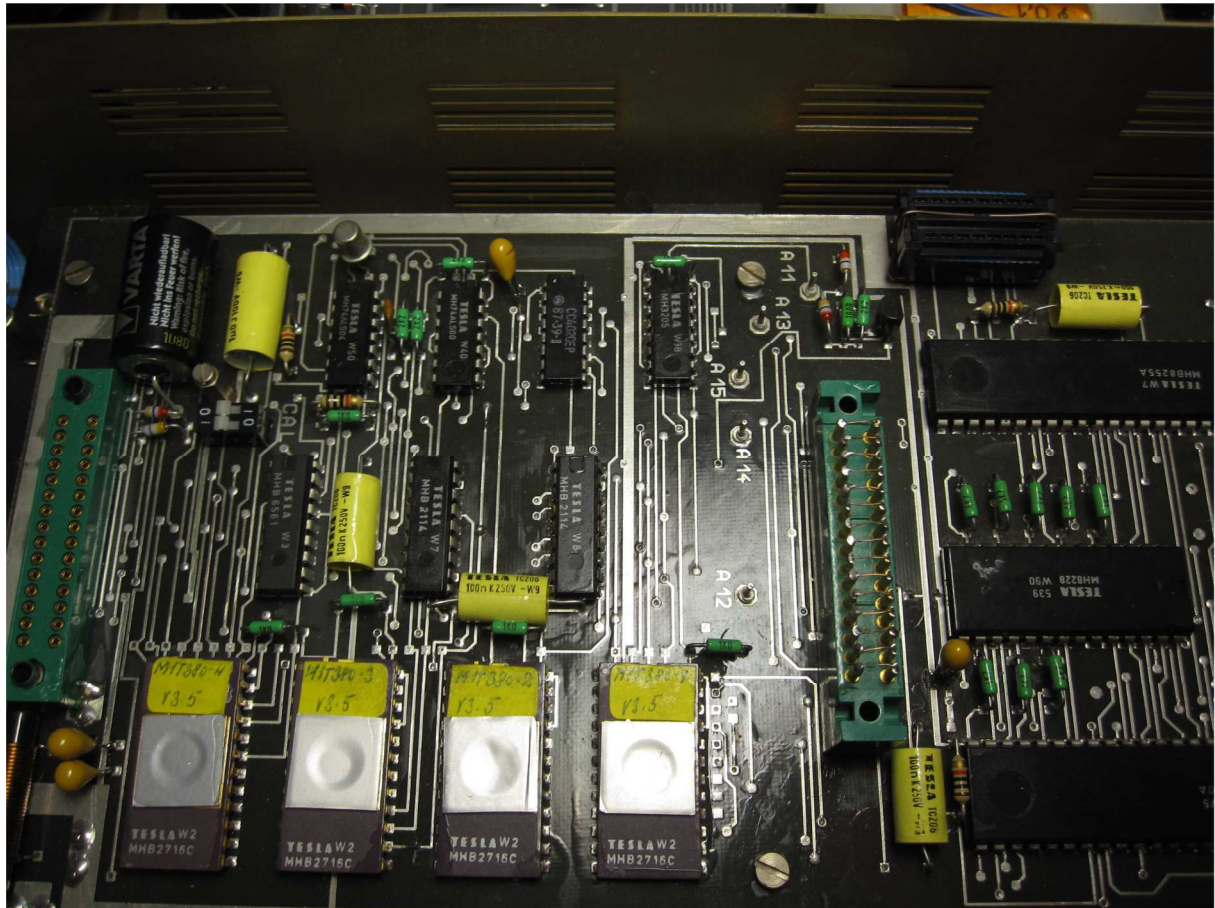
Floating power supply for additional voltages. Notice the 7805, this Tesla copy is known for its high quality, better than original, holds much more current and overload.



IMS-2 interface equals GPIB interface in Western World. It is supposed to have the same parameters except the connector, Eastern countries used LPT connector from Western world.



Non floating power supply +5V, +12V for digital board. +5V is switched and I had an issue about this board. Notice the 1R0 resistor above the trimmers and some MKT capacitors. This M1T380 sometimes suddenly restarted and was producing a lot of noise. I believed in capacitors failure, but it was not the problem. Then I noticed something suspicious about the ferrite core of the inductor. I disassembled it and then the ferrite core pour out to my hand smashed into uncountable pieces. Well, I installed a new ferrite core and finally M1T380 do not freeze, do not restart and it is quiet now. Unluckily I didn't take a photo of cracked ferrite.



8bit control computer. A very problematic board.

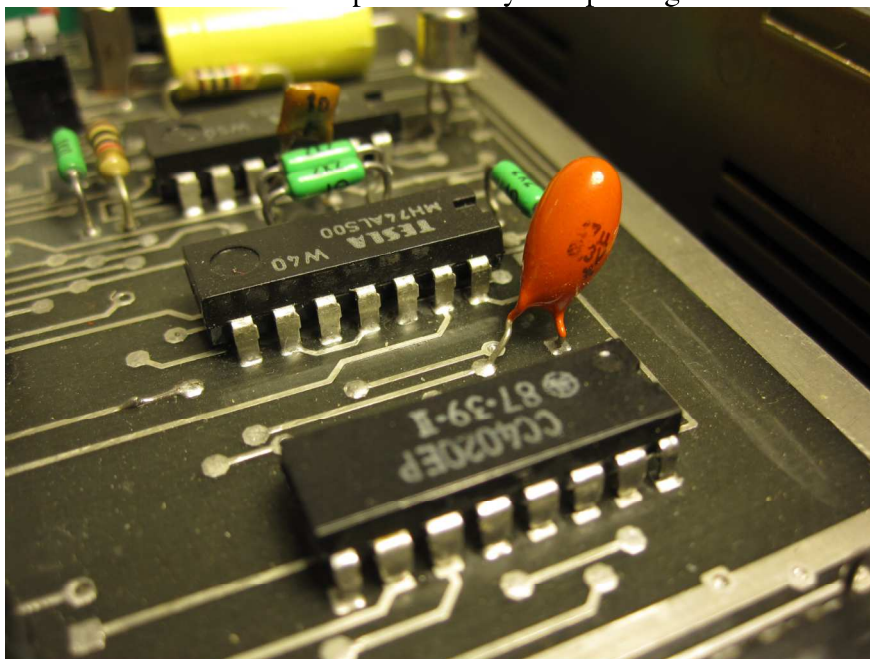
Printed board is made of material of very poor quality from slovakian Gumon factory in 80th.

It is usual that copper trace unstick from laminate and it is not possible to use classic solder tip for desoldering parts. Well, it is not possible to disassemble the board at all. The only way to replace parts is to cut off their pins and solder new parts on the remaining pins.

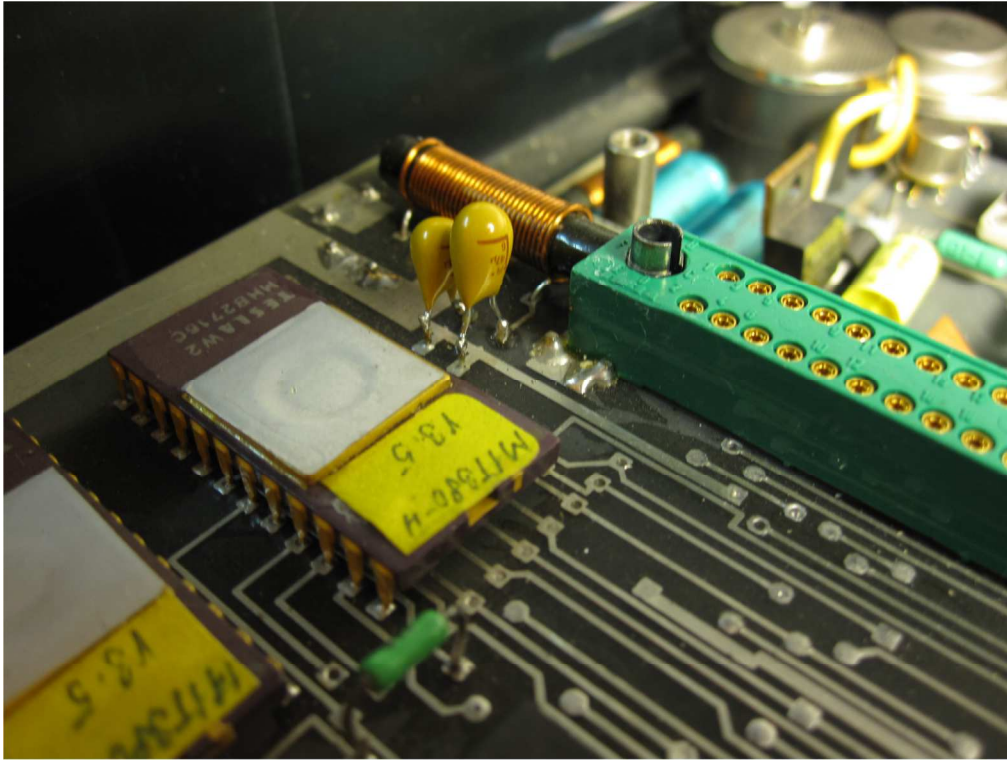
What is more, chips made in Tesla love suddenly not to work and that is a problem.

I had an issue about this board too. Multimeter sometimes shut down and I was discovering the problem. I found cracked tantalum capacitor near by the inductor (down-left).

Lets see the possible way of replacing:



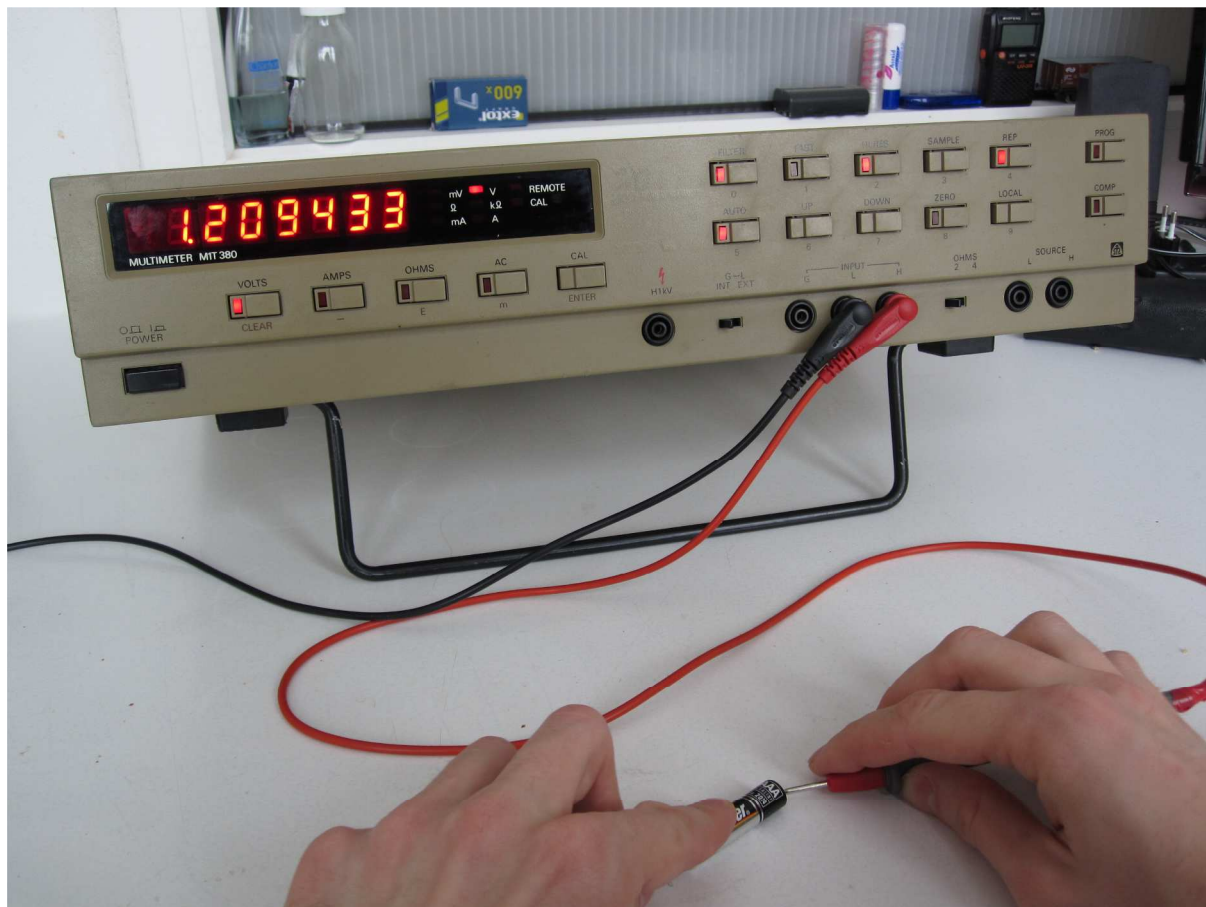
Patiently cut off this controversial tantalum capacitor and leave only pins.



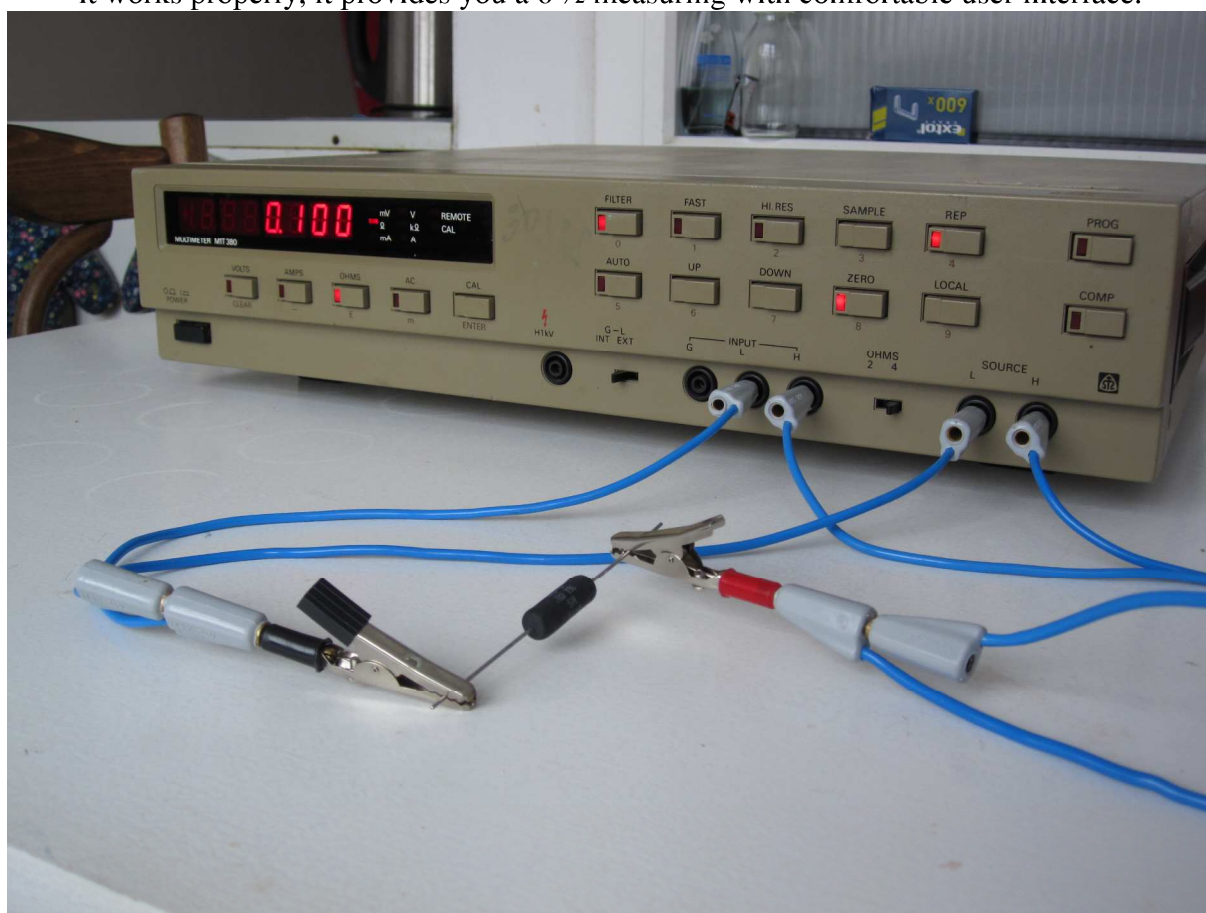
Solder new parts on remaining pins.



Just for be sure, I replaced all of them. The one on the upper left went gone with smoke effect.



Despite of poor quality of used material is MIT380 a very good measure device. In moments it works properly, it provides you a 6 ½ measuring with comfortable user interface.



Measuring Vishay Dale 0,1ohm resistor using 4wires method.