

M1T 290 – Metra Blansko

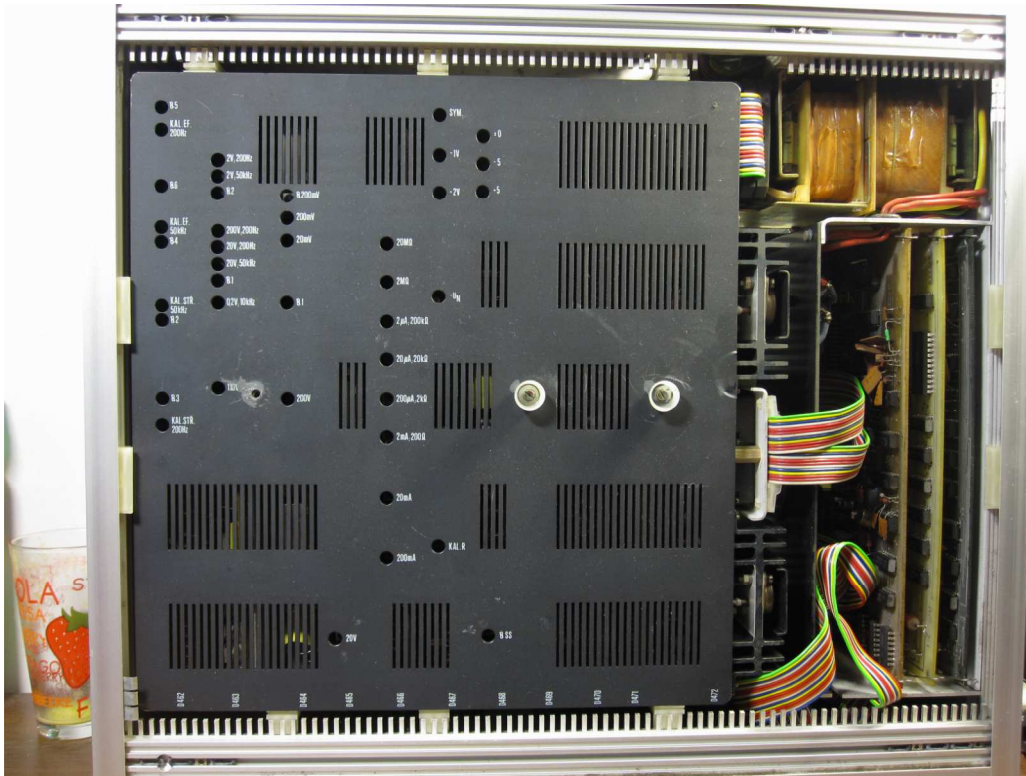


M1T290 multimeter is evolved of older voltmeter MT100. They have very similar topology. This machine is real proof of czechoslovakian backwardness in elektrotechnic industry because it was made since 1984 to 1987 and technology used in is typical for early and mid 70th. However, this years let engineers from Metra improve and troubleshoot all points of its construction using classic TTL logic and precious measurment methods. Despite its huge mass and great dimensions, it is a very precious and what is more, a quite reliable multimeter. It is much more reliable than more advanced M1T380 which crash without an obvious reason very often.

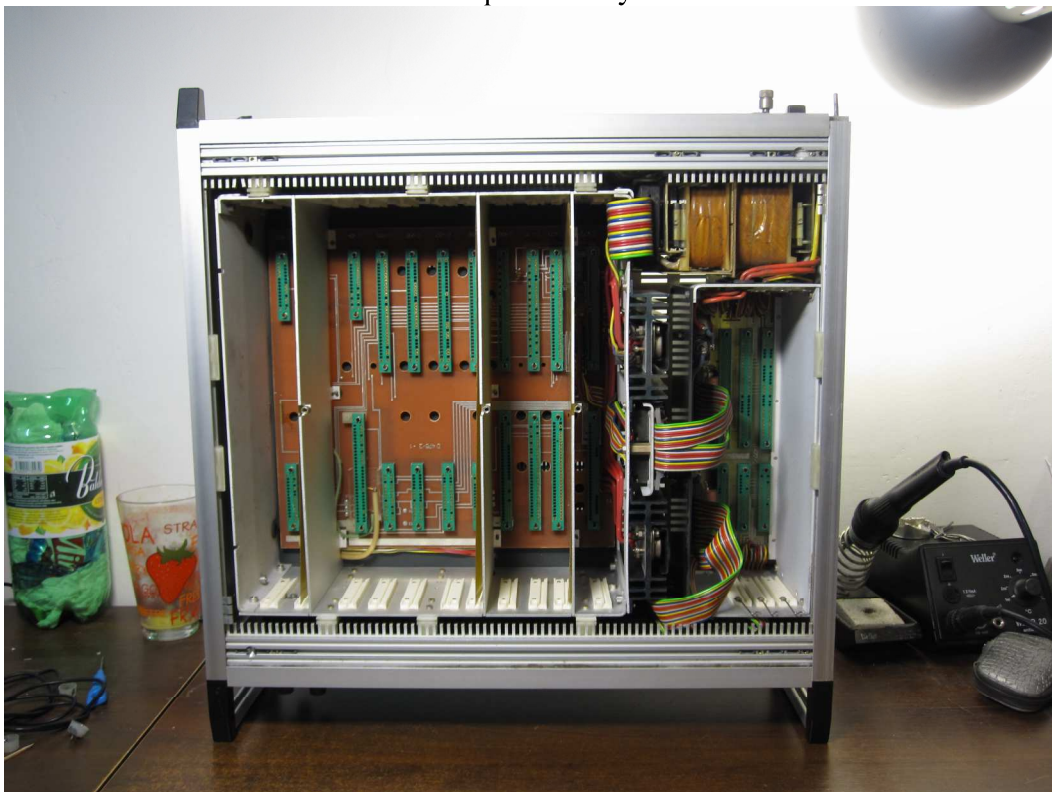
Multimeter provides AC and DC voltage measurments in range of 20mV – 2kV, current measurment of 2uA – 2A and also a 4wire resistance measurment method. It is possible to include this device in IMS2 measure system with special modul. (IMS2 is Eastern Europe GPIB equivalent)



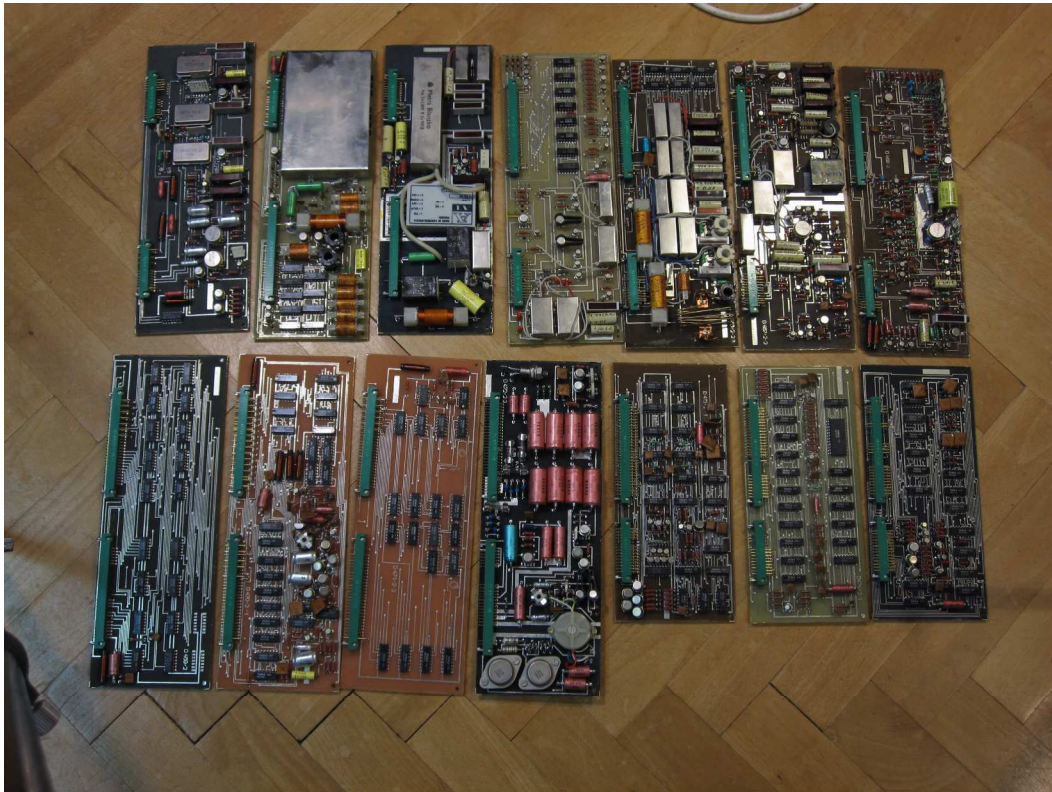
Lets look what is inside.



Typical floating section with Guard shield on the left and digital section on the right.
Data communication are provided by ferrite transformers.



After dissassembling all of boards. A great opportunity to clean it of dust ☺

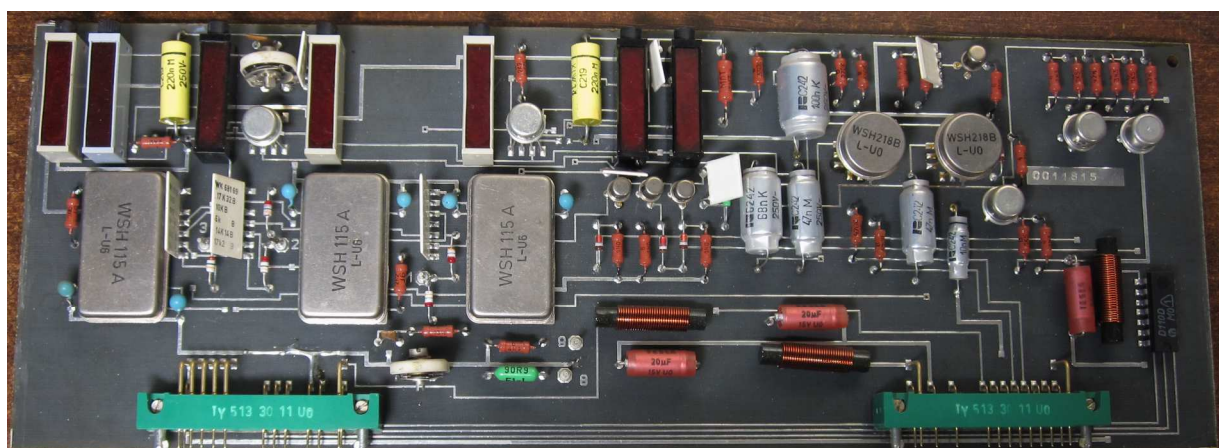


All of the boards located inside.



Backsides of the boards. Some of them are made of very poor material and laqued with unsolderable laquer. Repair of boards made of this material is very painfull proces. The main use was for digital board which supposed not to be repaired, in my opinion.

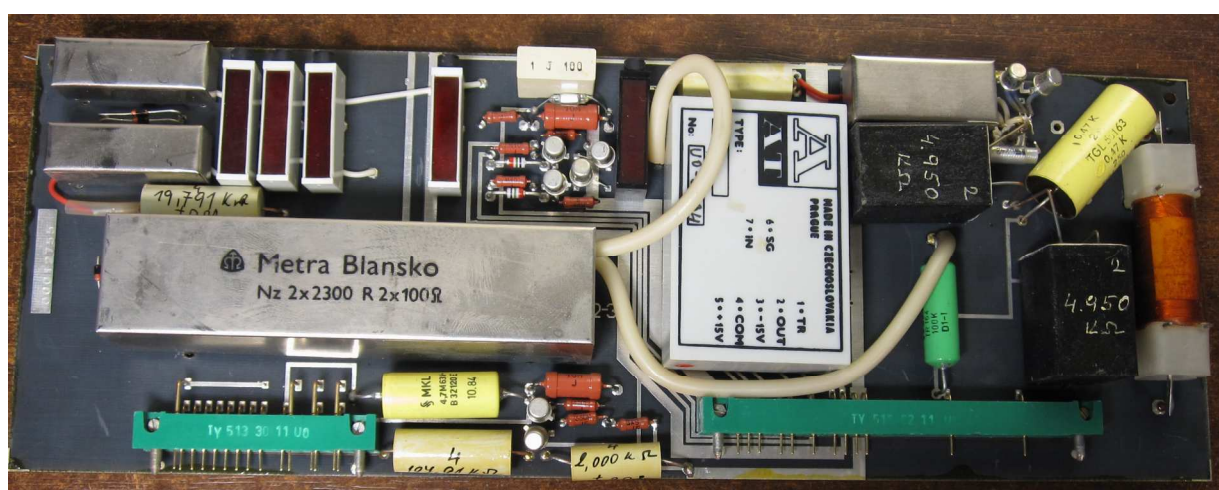
Floating section



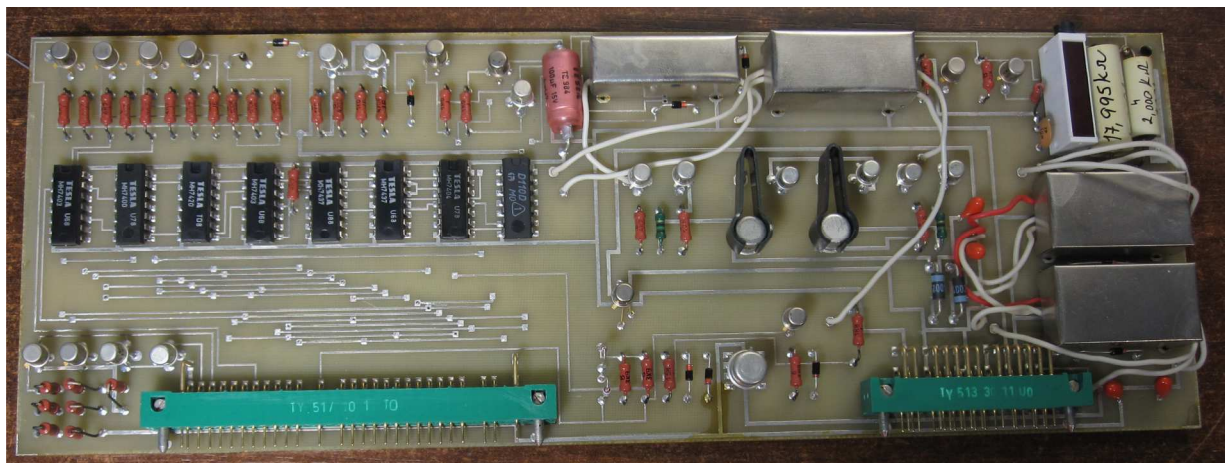
D462 – Average AC value converter and effective value converter.
This is not a True RMS voltmeter.



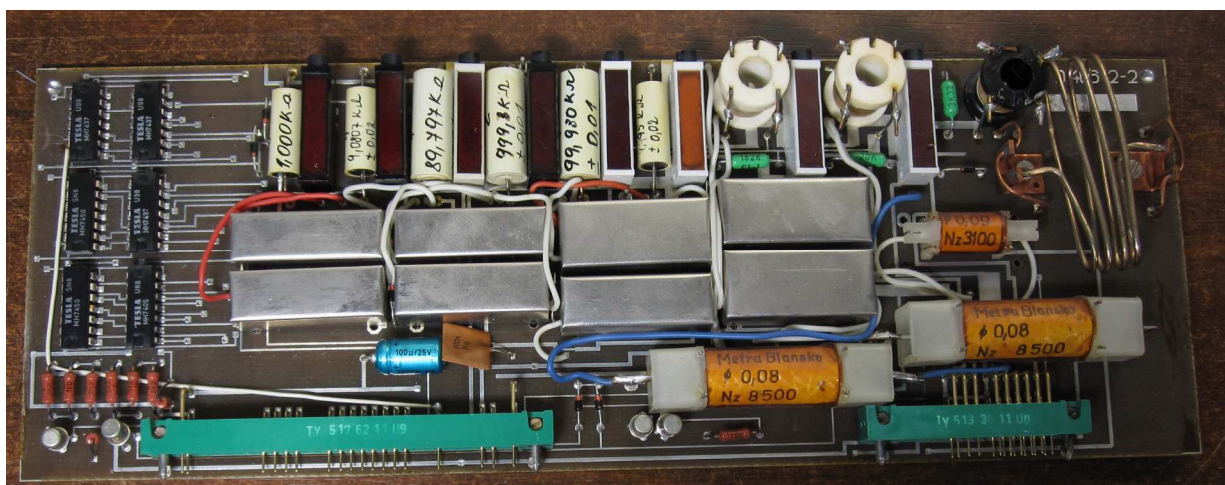
D463 – Input AC amplifier, relay control circuits and current shunts.



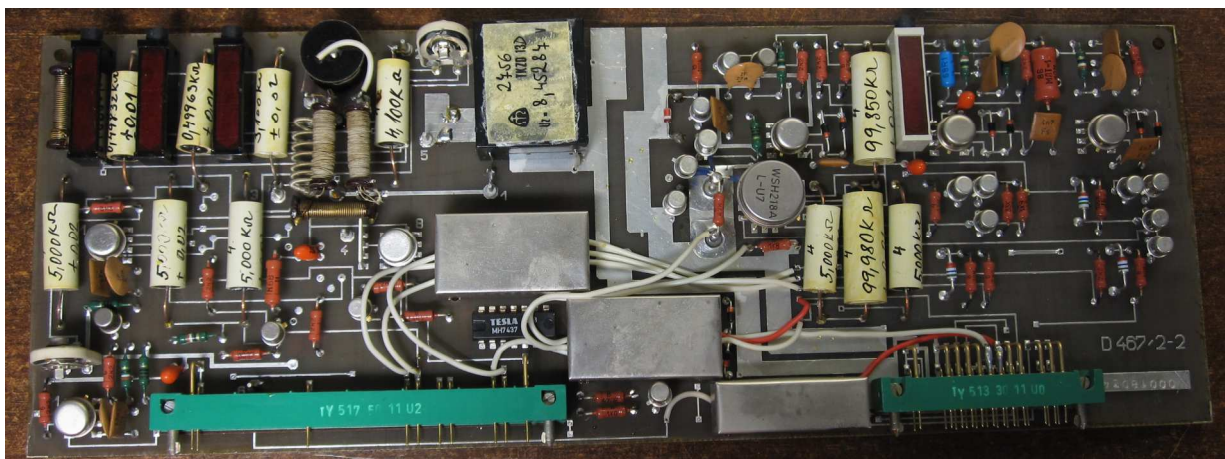
D464 – Input DC amplifier, resistance divider for 20mV and 200mV.



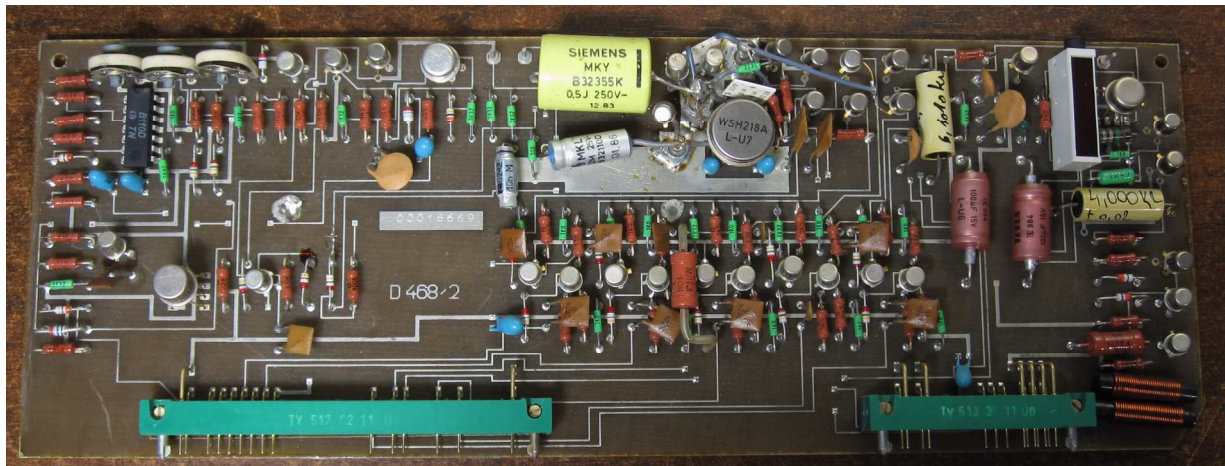
D465 – power amplifier of input amplifier, inverter, resistance divider for 20V and 2kV and relay control circuits.



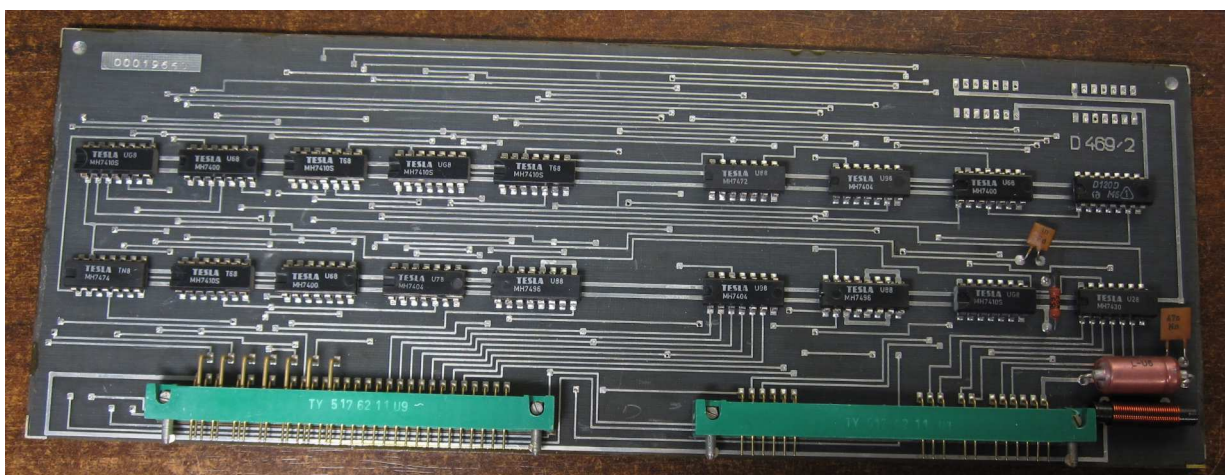
D466 – Set of accurate resistors for resistance and current measuring, current shunts for 200mA and 2A, relay control circuits.



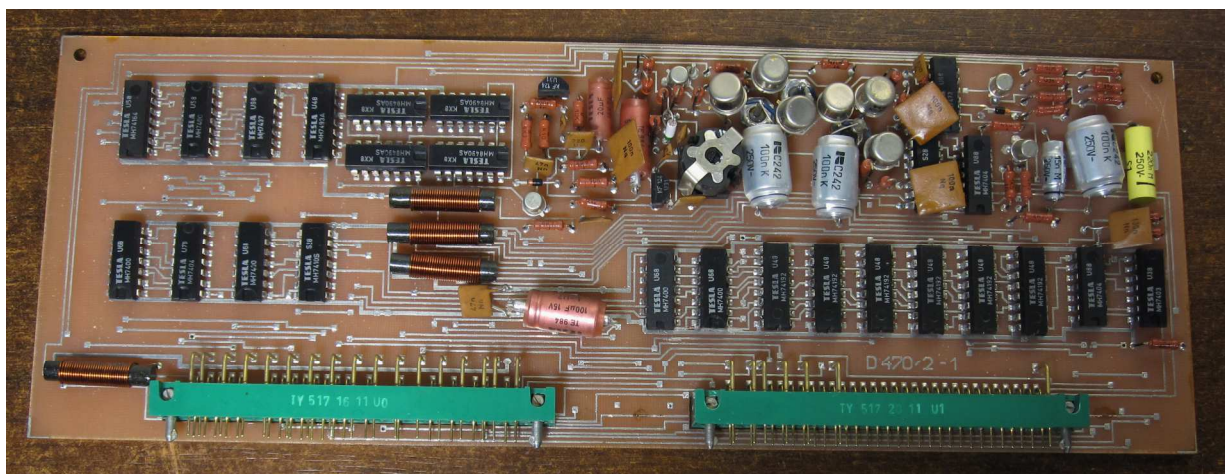
D467 – Calibration voltage reference and integration voltage reference, current power supply for resistance measurement and some relay control circuit



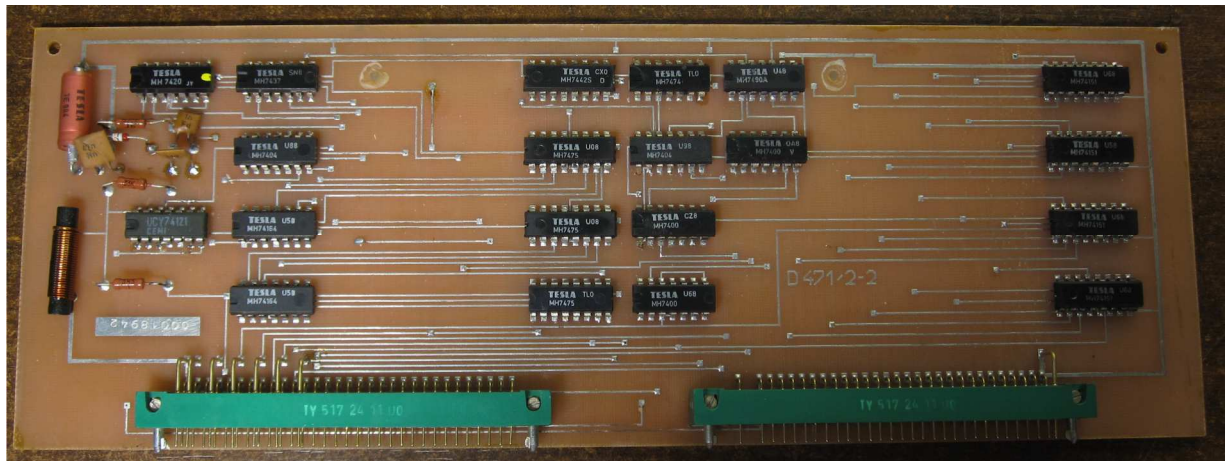
D468 – Impedance separator, the integrator, comparator and FET control circuits



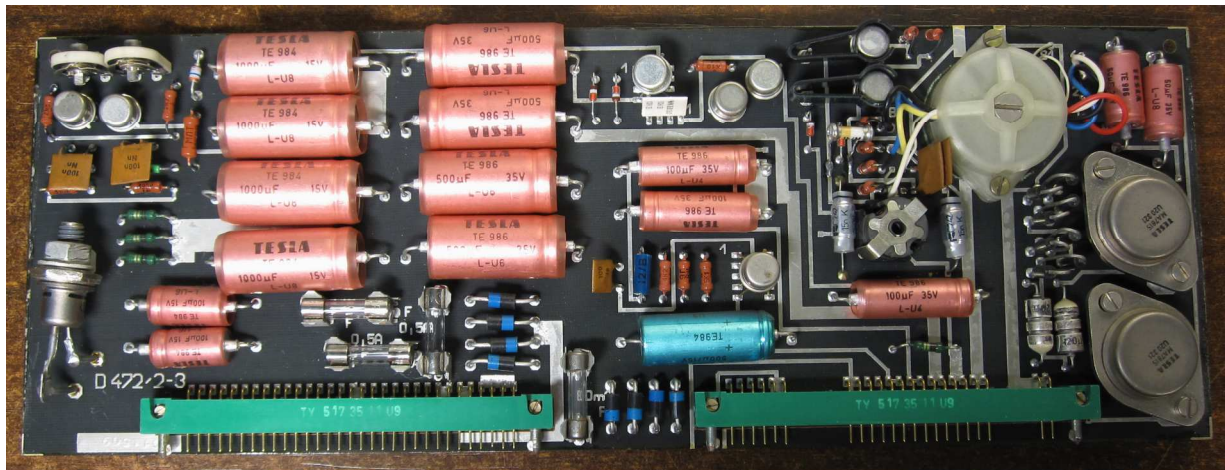
D469 – time pulse supply, comparative level memory, overflow detector, integrator switches control



D470 – reversible counter, control oscillator bounded to frequency (50Hz), control circuits and up and down range impulse supply

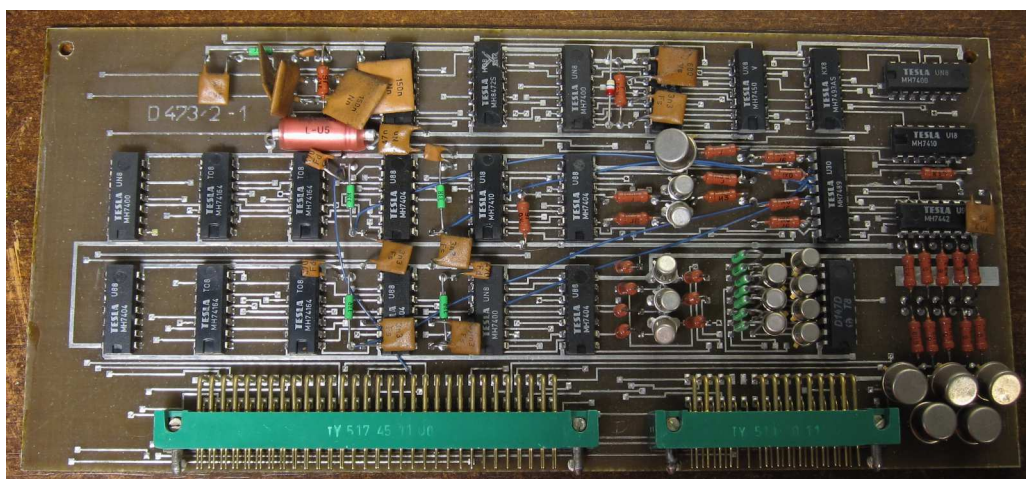


D471 – Data multiplexer and demultiplexer providing communication of floating and-non floating part of multimeter. Here is also the memory of maximum and minimum for range switching.

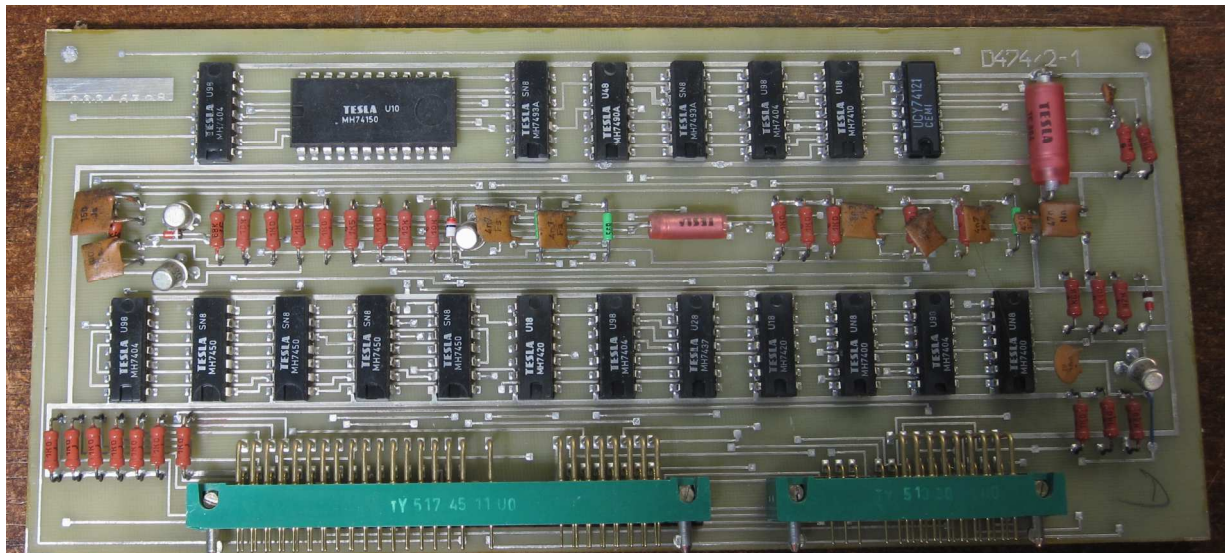


D472 – Floating power supply providing +/- 15V, -20V and +5V for logic circuits

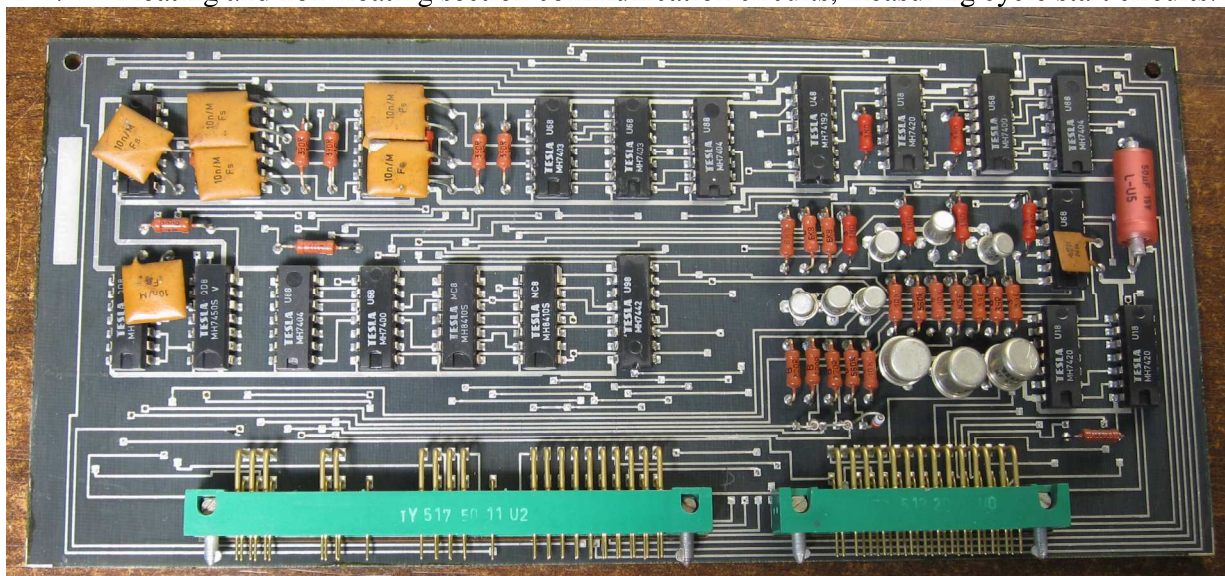
Non-floating section



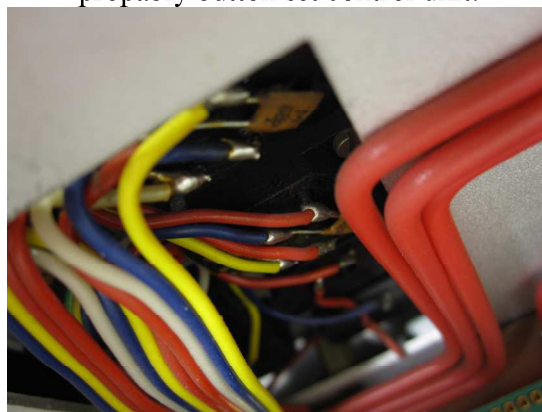
D473 – Data memory, LED display multiplexer and floating point control unit



D474 – Floating and non-floating section communication circuits, measuring cycle start circuits.



D475 – I am not sure about this board, because I am missing this part of the manual, but this is probably button set control unit.



It is difficult to recognize it, but these are ferrite transformers providing galvanic separation of floating and non-floating section. However, these transformers are very noisy and the machine during its duty is really annoying. It is hard to believe that Metra didn't use optocouplers despite they were already available in these years. Perhaps political reasons.



I had an issue about display, sometimes it was blinking or didn't show the value. I disassembled it and discovered that it is absolutely OK. The only problem was connector on the board. All in all, I already know how it looks like inside the display unit ☺



Front panel and top cover off.



Just testing resistance measurement.



Many of these multimeters were made and there are still few calibration laboratory providing calibration of these machines. However, this process cost more than all this machine itself. The price of MIT290 was 75 000 Kč in 1985. This price equals value of smaller car that year or 3000€ nowadays without calculated inflation and real money value.

You can buy it for 50€ nowadays in auction or bazaar.