Mitsubishi: Блок Управления

The purpose of this article is to help novice auto repairmen with the skills of repairing electronic equipment. I write in simple language, I will try to use specialized terms, if anything is wrong - I'm sorry.

I do not claim the truth in the last instance either - but everything written has done in person.

So...

If there is a suspicion that the ECU in the car is not serviceable or does not work properly.

To begin with, let's see what the ECU is – Electronic Control Unit or "Electronic Control Block".

This is an electronic device that works according to a given program, using certain input signals (sensors) to generate certain output signals of control of actuators (insula, solenoid valves, ignition coils, etc.).

If the ECU does not form any output command on the actuator, in the presence and compliance of the power supply voltage and the presence of input signals, then it is logical to assume that this is an internal malfunction of the ECU.

Signs of ECU malfunction :

1. No communication with the scanner is established or the parameters are not correct.
2. The lamp is not lit Check Engine after the ignition is turned on.
3.ECU fixes an error in the correctness of the element, its chain and the conditions of work in it specified.
4. There are no errors, but the engine is working incorrectly (extensive mixture, detonation, no advance ignition, etc.).

ECU malfunctions are divided into software and hardware.

In this article we will talk about the methods of inspection and repair of the ECU of the Mitsubishi cars of the early 90-ies of release.

Checking the block on the car, as a rule, does not cause difficulties, checks the presence of voltage supply, reliability of "minuses", the correctness of incoming signals and according to them outgoing managers.

Take, for example, the real situation - the 1991 Mitsubishi Galant car, the 2.0L 4G 3G 8 valve engine. The engine does not start, the "CHECK" lamp does not light on the instrument panel when ignition is turned on.

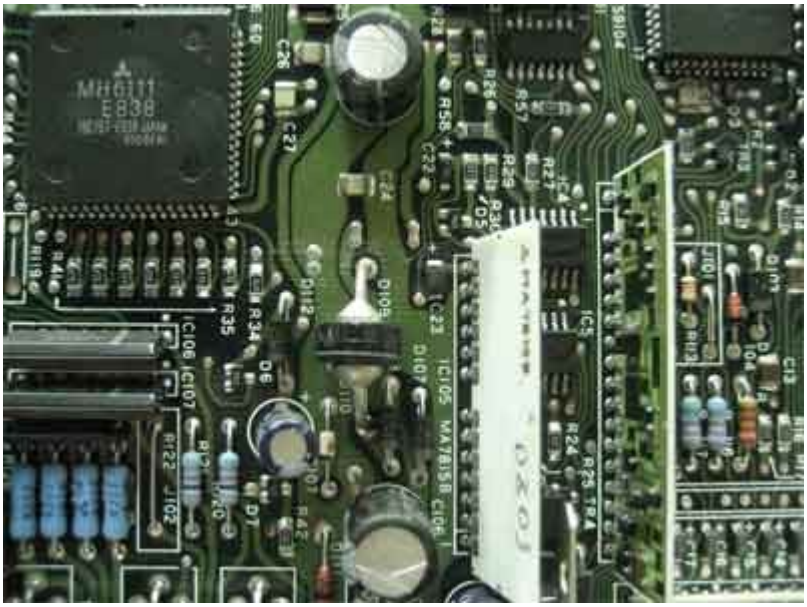
In most cases, I check and repair the block "on the table", so I will describe the sequence of all actions based on this.

1. Visual inspection.

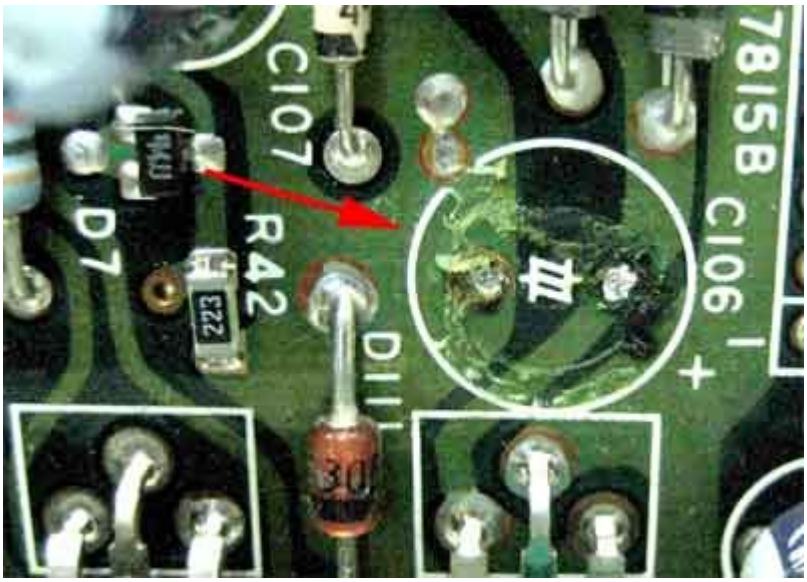
The opened unit is carefully inspected for the presence of mechanical damage, parts with traces of severe overheating, blackging of the board, burned conductive paths, bloating of chips, etc.

More than once discussed and many are aware of the reason for the most frequent failure of the unit due to the leaked capacitors in the food chains. Therefore, immediately pay attention to the capacitors, the presence of a leaked electrolyte under them and damage to the payment under them. Although if the capacitors are still factory, then it is better to replace them anyway.

Here is a living example - outwardly everything is beautiful ...



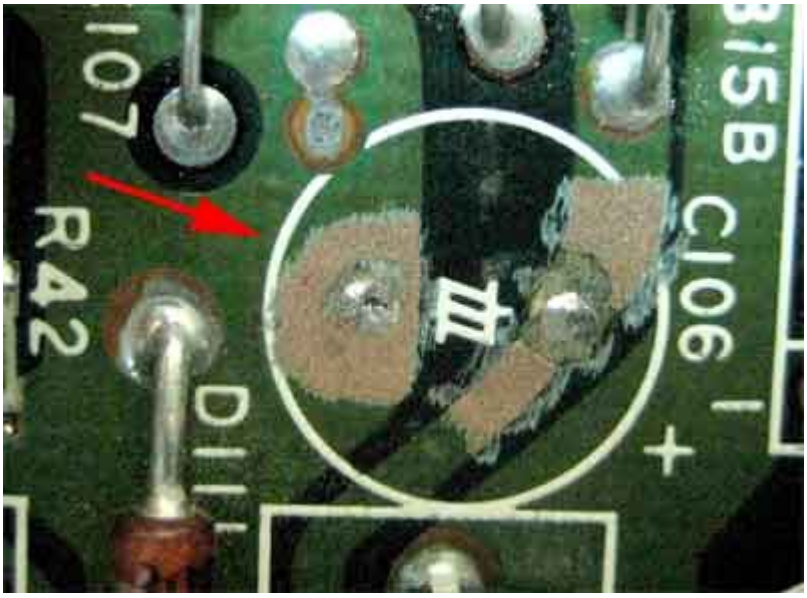
And if you lose capacitors we see this picture:



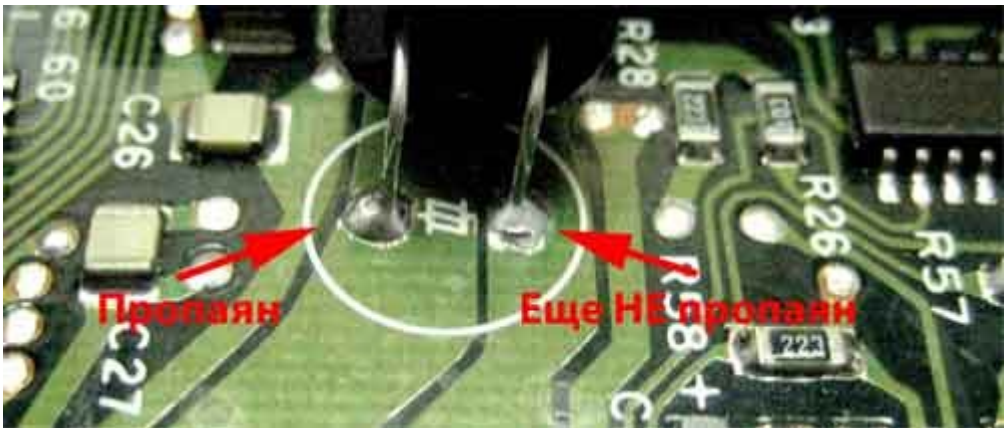
I use 47µF*50-63V and 100mqF*50-63B respectively. Attention - temperature range I recommend 105 degrees!

Replacement of capacitors also has its own characteristics, as a rule, under the capacitor there is already damage to varnish and paint on the board. In more severe cases, end-to-end metallization between the board layers rotates, the tracks rot.

Therefore, before you solder the new capacitor, the board in this place should be well washed with acetone or a solvent, clean the paths and places of soldering to copper, and bleed.



capacitor inserted and soldered reliably on both sides as shown in

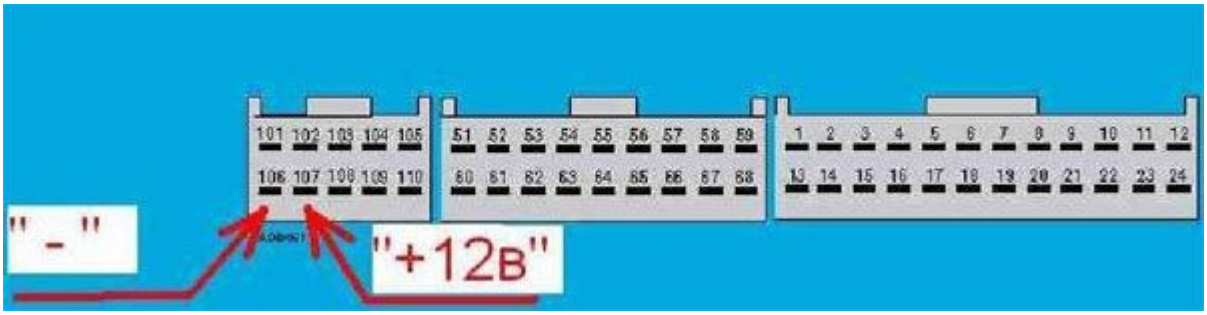


Particular attention should be paid to the capacitor 47 µF standing near the radiator and a green transistor (on the radiator). The transistor acts as a 1-in-house vitamin stabilizer of 5v. From its properness and proper work depends on the work of the digital part of the unit. Due to damage to the area of payment under this capacitor often leads to an increase in the supply voltage of +5v to 12v, which is “murderative” to power the digital part (5h +-5%) to put it mildly “killful”.

In this case, the damaged paths are restored, the board is well washed with acetone or solvent, the capacitors are replaced and only after that can be switched to the inclusion and verification of the block. In many cases, the check will show the performance of the block after the above measures.

2. Connecting and EPU checking.

To check the block, it is enough to serve the results as shown in the photo:

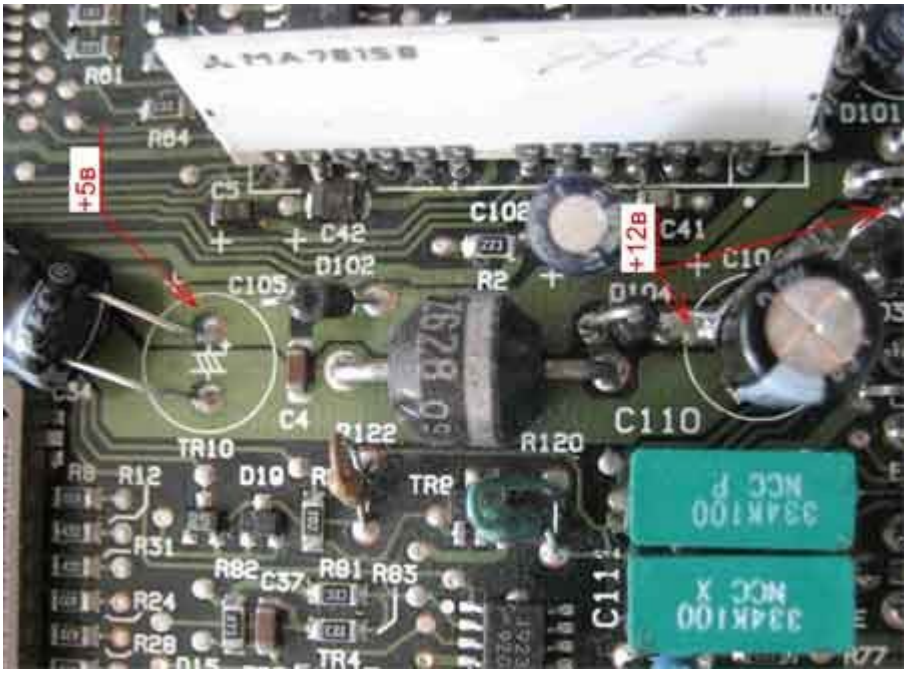


The power supply should be stabilized and issue a minimum of 0.5A at a voltage of 12Q.

The consumption of a serviceable unit with such a connection is 160-210 mA.

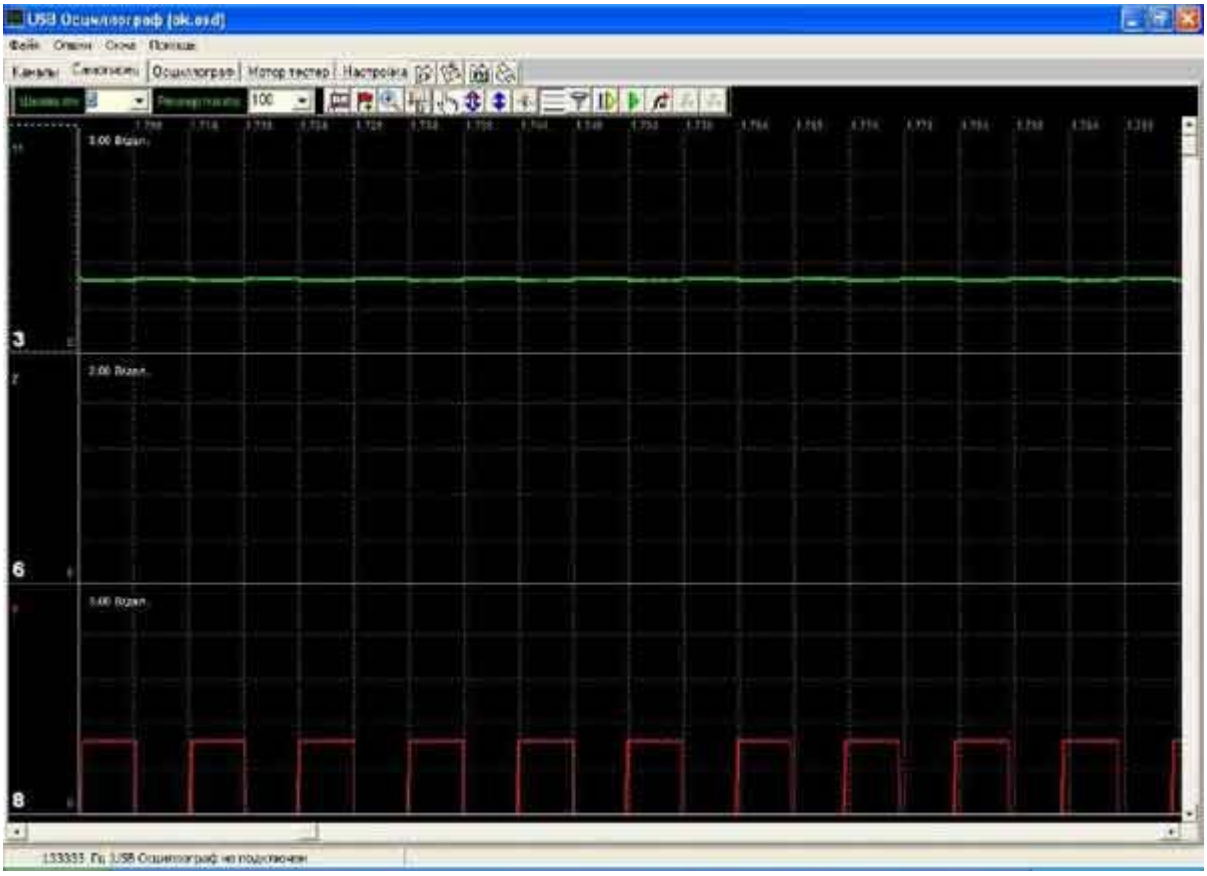
We measure the voltages at the specified points of payment. Different modifications of the blocks will differ in the arrangement of components, but the meaning of this is not lost, the capacitors in the power chains of 5v and 12v are present in any type of blocks.

The voltmeter should be used preferably digital, the deviation of the supply voltage +5B should not go beyond 4.9-5.1V.



About the work of the block, we will tell a lot about the ceramic assembly MA7815 (may be an analogue with a different marking). It performs the functions of a 5V stabilizer support voltage generator, a RESET command for the processor and a watchdog timer (Vatch)dog timer)

Oscillogram of the working block:

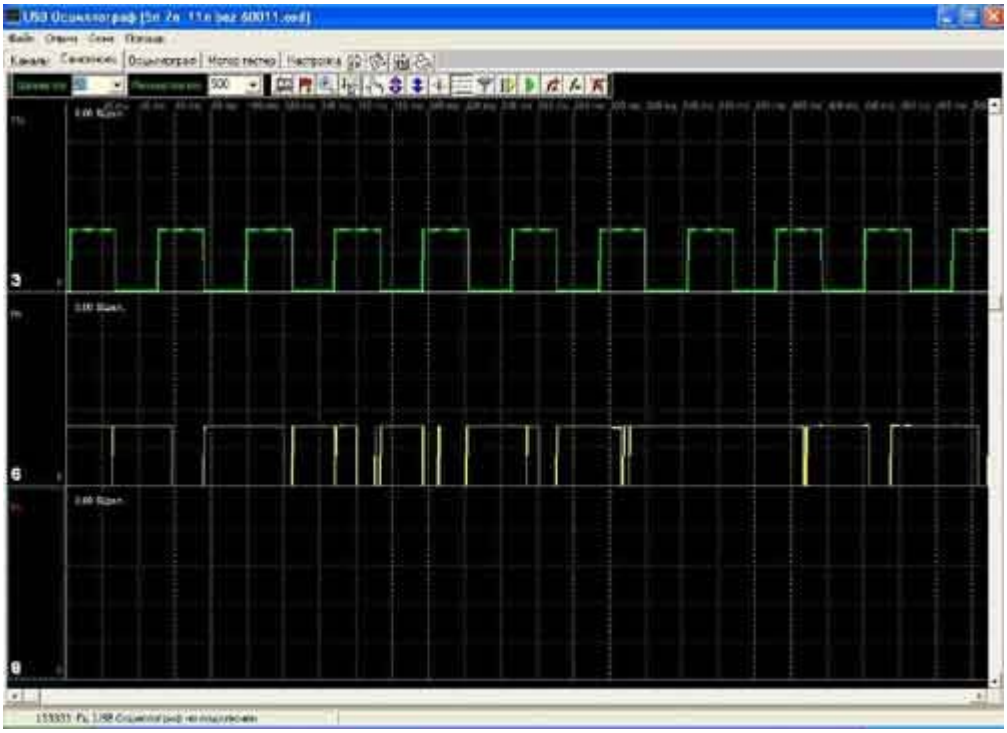


Channel 3 -11 pin Assembell Reset, about 5v.

Channel 6 – 7 pin

Channel 8 – 5 pin pulses of resetting the timer from the processor (confirmation that the processor is working and executes the program).

When the processor is faulty, in the block option without external memory, and / or malfunctioning port expander M60011 and/or ROM microscheme(Eprom)27C128 or 27C256, in the version with external memory, then on the assembly will be observed such a picture ...



There are no pulses to confirm the operation of the processor, and the watchdog timer is cyclically restarted by the processor, as evidenced by pulses on the 11th leg of ceramics (Reset).

Finally, if on ceramic assembly we see order, we simulate the start of the engine:

We become the prone of the oscilloscope on the 54 ppin (the outlet of the switch control) of the connector, on the pin 51.52.60,61(nos), connect low-power 12-in bulbs (the second output of the light bulbs to lunch together and connect to +12v power unit).

Pin 21 units are briefly connected to the negative of the power supply, as if “chicken” several times in a row – on the oscilloscope we will see a positive pulse, and on the light bulbs a short-term flash.

Further inspections are already being carried out by car.

3. The repair itself.

The most common problem and its elimination is described above.

If individual output channels fail, while maintaining the operability of the remaining functions, the approach to the problem is already individual in each case, to describe everything for a long time and I do not see the need, since these types of repairs already require certain qualifications and experience from the repairman.

If the processor (and/or port expander does not work in the block), then for many repairs such a block becomes an insoluble task due to the lack of spare parts.

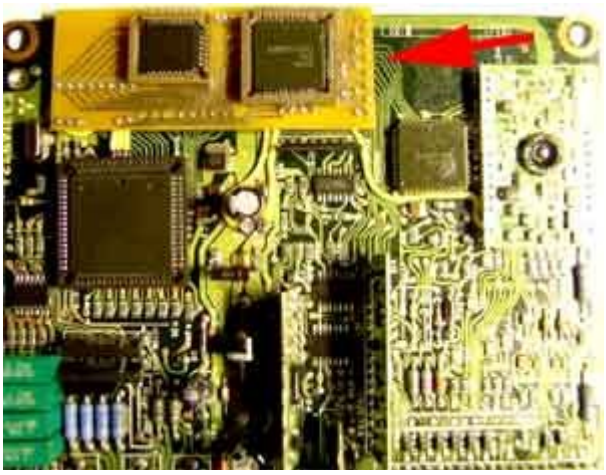
The problem is also aggravated by the variety of engine control programs (efle), in the version of the block without an external ROM, then the replaceable processor should have the same “mask” as the native one.

In the block with external ROM, this is not critical , the processor can be replaced by any MH6111 with any mask.

My colleague from Latvia Gunars solved this problem in another way.

An additional board was drawn up on which the port expander (M60011) and the ROM with the engine work programme was developed.

This handkerchief is soldered to the unit, the processor is replaced by any MH6111 (what was found on sale)



The block with an external ROM is repaired even easier - faulty components are simply replaced. The weak point of these blocks of the chip (port expander) M60011, with problems with power supply, it fails in the first place.

And the service life of ultraviolet-era-erated ROMs has long been exhausted in our time, given the year of the block and the fact that the guaranteed resource for keeping information from chip manufacturers is 10 years.

I express my gratitude for the assistance in preparing this material and working out the repair technology of Gunars (gunars@talsi.org) and Melnikov Denis (finishing the layout and ordering of the manufacture of printed circuit boards to the plant).

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"nick" at our Forum - aleksej_27

Union Of Automotive Diagnostics