



Organizzazione di Volontariato

Hi!

Thank you for choosing an Apulia Retrocomputing - Odv Laboratory product!

We collected the documentation we think is necessary and sufficient to assembly and enjoy the performances of a Galaksija computer. We wrote down the instructions that can help you building it.

We found it useful to complete such documentation with a concise brochure (print it, if you like it) that briefly summarizes the history of the idea and the project that led us to the creation of a working Galaksija.

On the Web, we collected even more documentation that proved useful in solving the problems we encountered in carrying out the project, useful for assembling the Galaksija.

We did not consider it useful to provide further information than those you will see reported here as in our opinion they could be dispersive.

Apart from two transistors and two electrolytic capacitors, the components need no explanation regarding the installation. The silk screen printing is very easy to understand. All the prototypes we made work perfectly.

Finally, in the future we expect to be able to distribute the EPROMs already programmed, for the benefit of those who do not have a suitable programmer.

For any need, feel free to contact the following email

laboratorio@apuliaretrocomputing.it

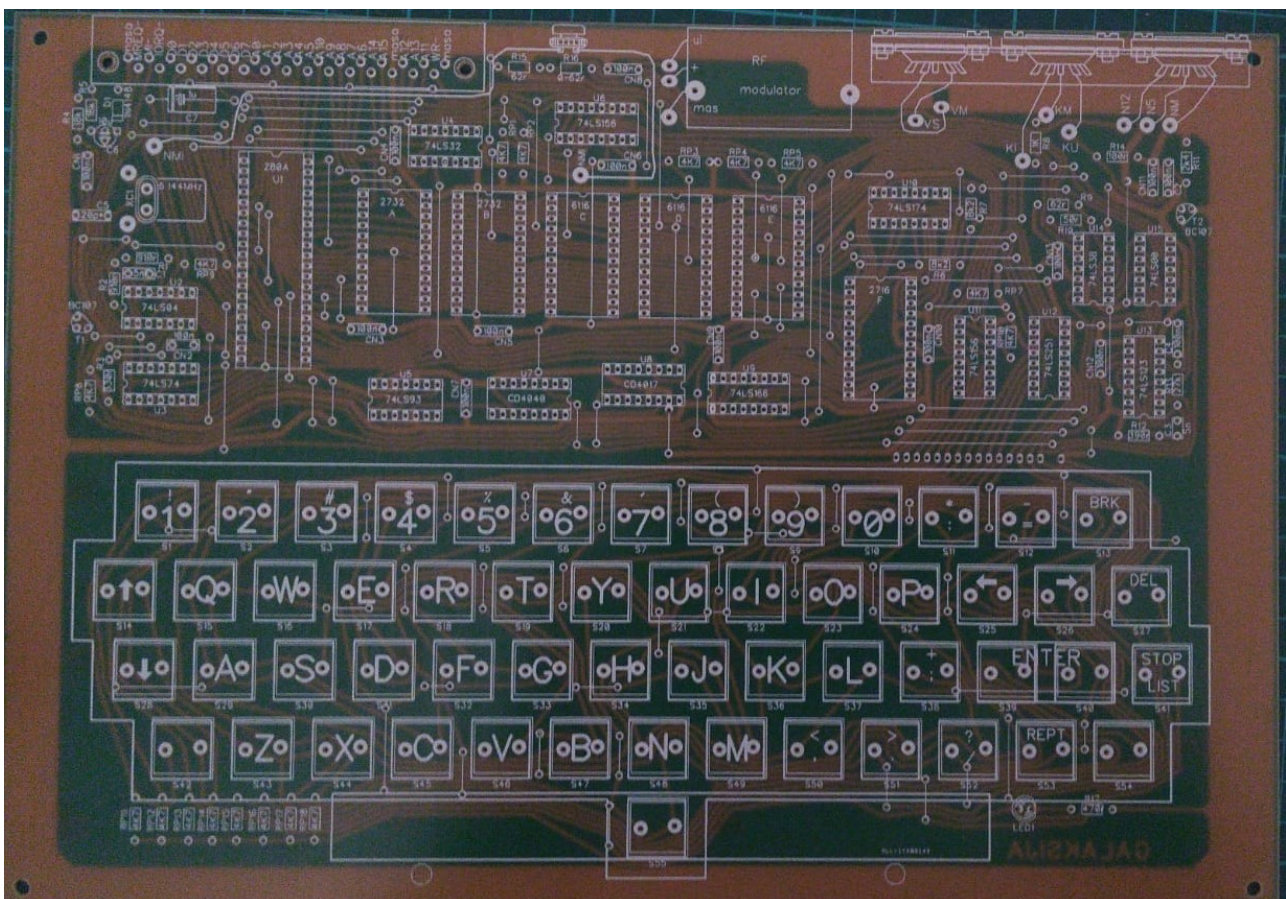
Apulia Retrocomputing - Odv
LABORATORY



INSTRUCTIONS FOR THE REALIZATION OF THE GALAKSIJA COMPUTER

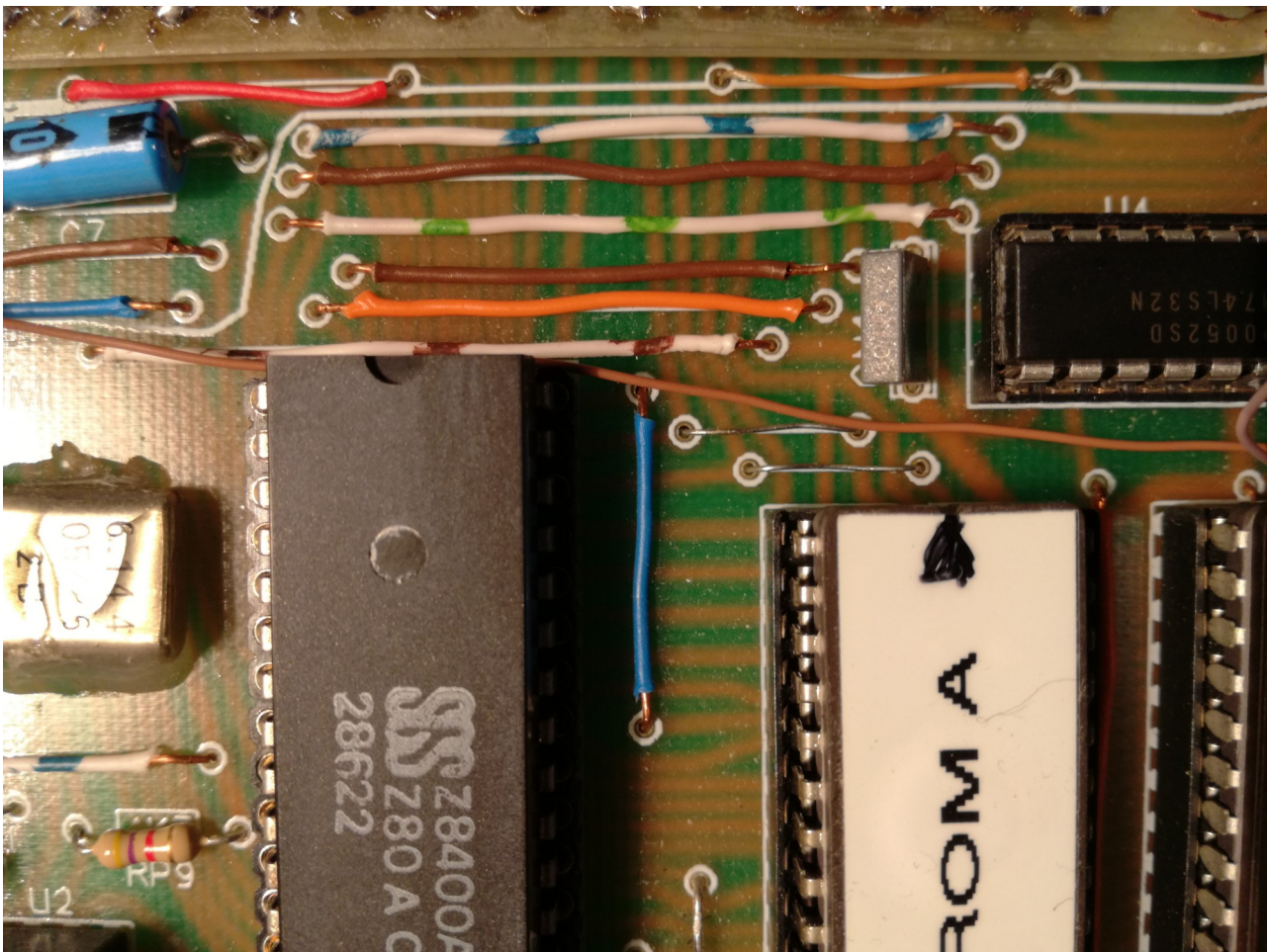
PCB VERIFICATION

Once in possession of the PCB, the first thing to do is to check if there are any short circuits, interruptions or possible visible defects. The boards have undergone a factory check, but detecting a problem at this stage is more convenient than having to diagnose it later.



JUMPERS

Begin the assembly starting from the jumpers on the upper side of the board. Use single wire conductors such as telephone wires. If you use too thin wires, they will break internally. If you use too thick wires, they may not fit into the holes and you may have problems assembling the chips. Since the wires will pass under the integrated circuits and will be hidden, using the correct section will make the job easier. The wires should not be pulled too tight and should not be bent too much. It is necessary to do this with extreme care and a final continuity test is strongly recommended. An error at this stage will then make the diagnostic task very difficult.



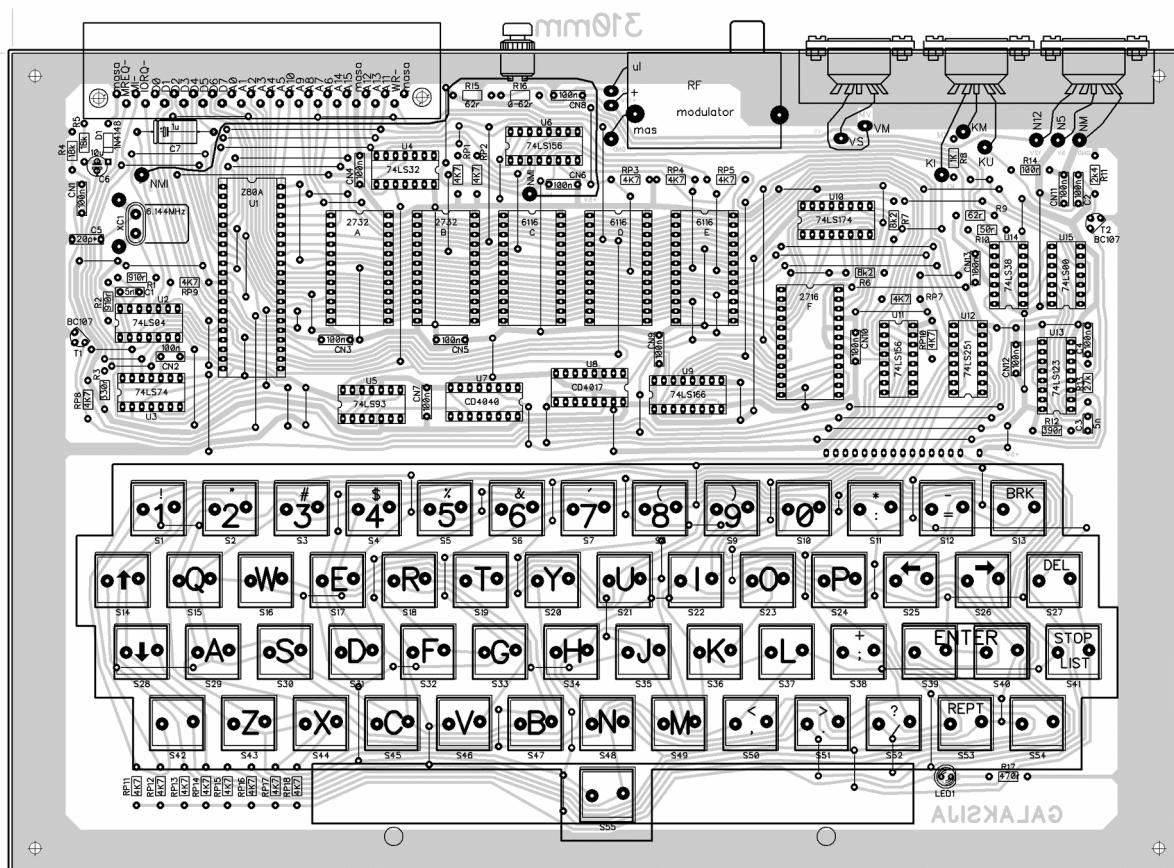


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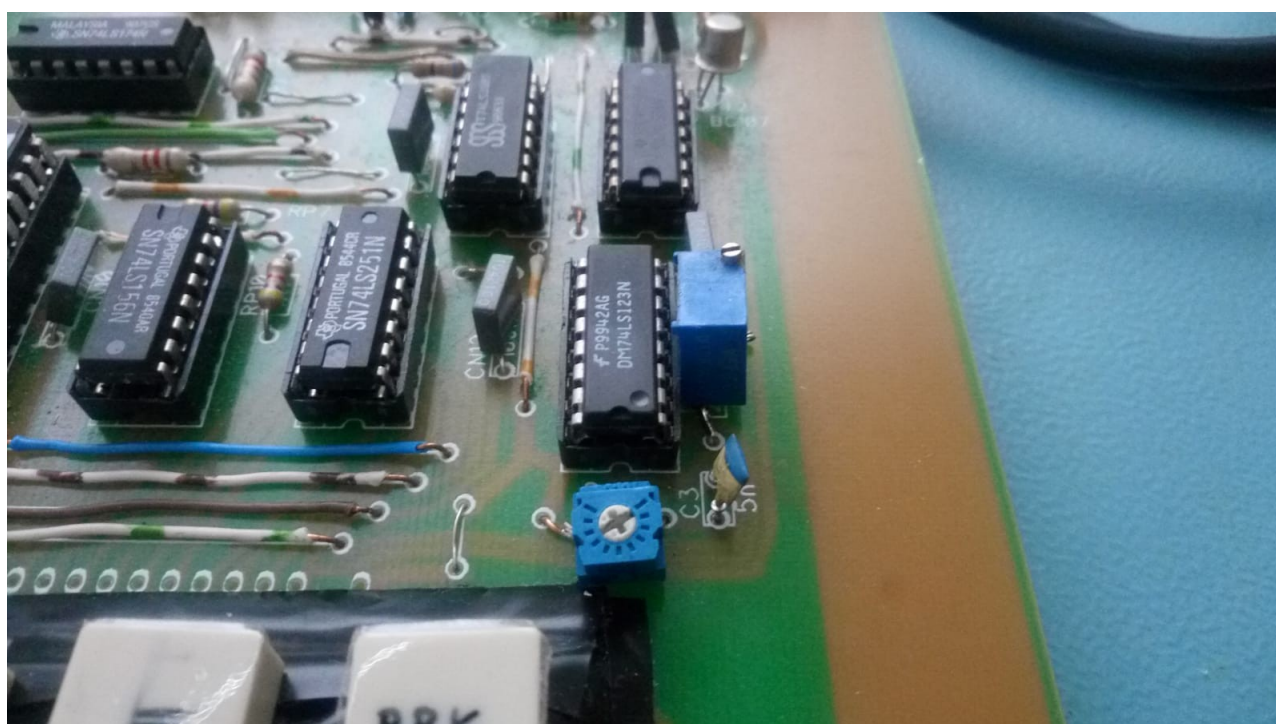
COMPONENTS

You can proceed with the rest of the components, taking care to glue or fix the quartz in a stable manner (see previous photo). We suggest the use of sockets with round pins, more expensive but with a much better result. It is also advisable to check the tolerances of the components before welding them. In this way it is possible to eliminate possible defective components and reading errors, such as 24ohm instead of 24kohm.

The chips to be chosen must be of the LS series for the TTL ones, while for the CMOS ones no critical issues were found. It is advisable to heat the pads just a little, to avoid running into the usual problem of lamination or the loss of the pads itself. In order to make the job easier, the PCB drawing with the original screen printing is provided in the attachments, showing the values of the components.



The 5nF capacitor C3 must be replaced with a 6.8 nF one. It is not a design error, but it is necessary because of the different tolerances of modern components. Also attached is the list of components with indications on the position of the pins of the BC107 and the LED. Finally, to provide a further visual reference, a photo of a Galaksija made by us is attached.



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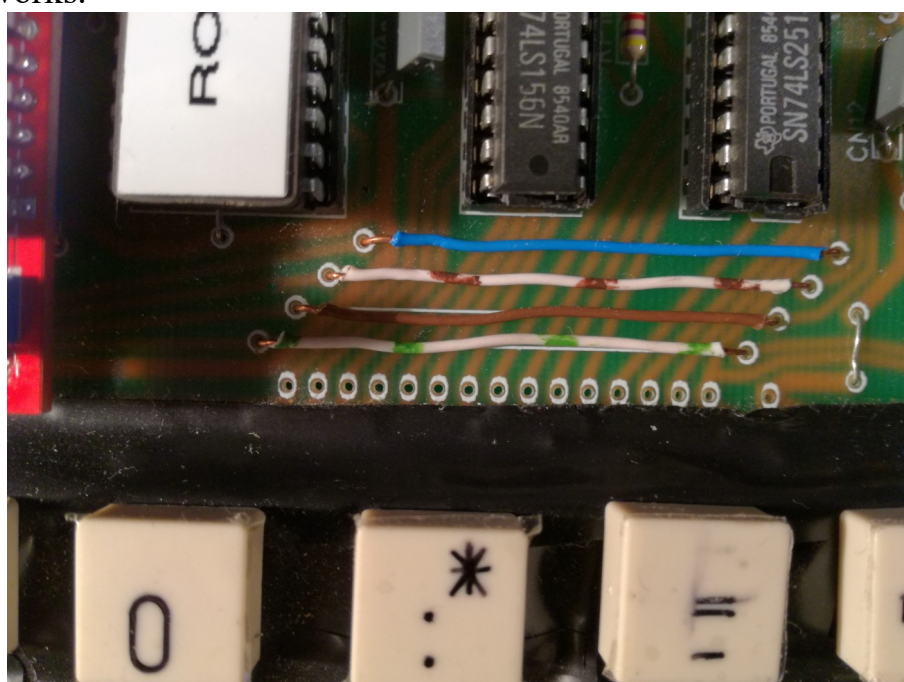
VIDEO PATCH

The assembly of the video patch is necessary in the case of a more recent CPU. It is not necessary for older CPUs, but it is still recommended to eliminate doubts in case of malfunctions. The modulator is not strictly necessary: for the test phase it is suggested to mount only the power supply and the video output, so as not to have to disassemble everything in case of problems.



KEYBOARD

It is possible to create a keyboard directly on the PCB (see previous photo) or to create an external keyboard to be connected to the connector already prepared on the PCB. You can also temporarily solder some microswitches, in order to verify that everything works.





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PROGRAMMING THE EPROMs

Using a programmer suitable for EPROMs 2716 and 2732, it is necessary to program the EPROMs using the image files provided, already tested by us. Load the “Galaksija_G.rom” file on the 2716 EPROM “F”. On the 2732 EPROMs “A” and “B”, load the “minusA.rom” and “minusB.rom” files respectively. For those who do not have an EPROM programmer, we can supply the already programmed EPROMs.



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FIRST POWER UP

Before turning on the Galaksija, check that the CPU, the RAMs and the ROMs are in the correct position and in the right direction (if you make a mistake, they will burn instantly). Check that none of the pins have been bent internally between the socket and the chip and only when you are sure you can start the test phase.

At this point turn on the Galaksija; if nothing is displayed, calibrate the video patch trimmer either with an oscilloscope or by trial and error, making small variations until the image appears on the video.

If you have an oscilloscope, on pin 9 of the 74LS38 (U14) you will see the signal oscillating until it becomes well defined. The optimal setting is when it reaches the maximum amplitude as in the photos below. Further fine adjustment may be required on subsequent power-ups. Try several times until you are sure no further adjustment is needed. If you have an early production Z80, you do not need the video patch.

SIGNAL OUTPUT FROM PIN 9 OF THE 74LS38



correct setting



too high



too low

CORRECT SIGNAL ON PIN 15 OF THE 74LS166



correct signal



superimposed signal



missing signal



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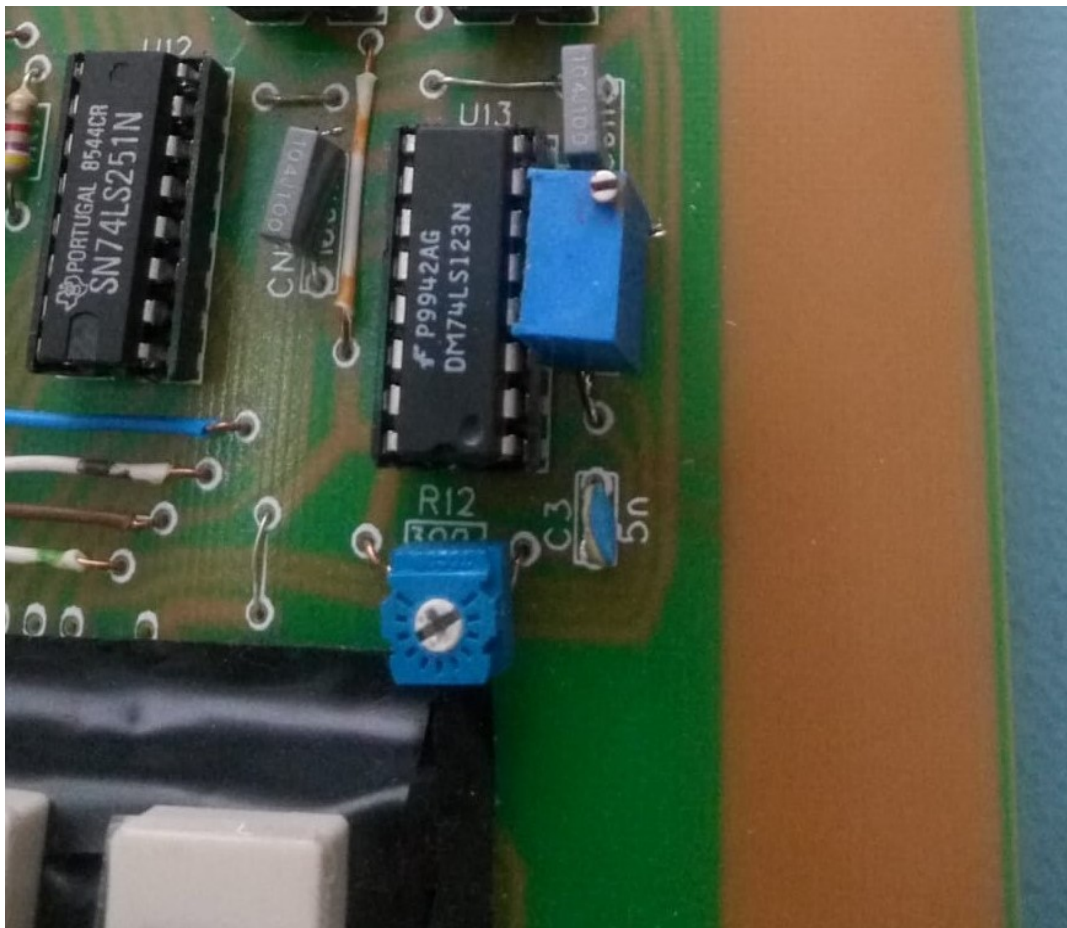
When the 74LS166 produces signals that overlap each other and interfere with the normal operation of the video generator, the trimmer value on the patch is too high.

When the 74LS166 does not produce any signal, it is a stall condition: the video generator does not work anymore, therefore there is a too low value of the trimmer on the patch.

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VIDEO IMAGE CENTERING

To center the video image, it is possible to replace the resistors R12 and R13 with two trimmers, as it is possible that on modern CRT/LCD TVs/monitors the image is not centered. Regulating these trimmers, you can change the horizontal and vertical frequencies. Attention: if you go out of certain ranges, you will have synchronization problems.





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FINAL RESULT

