Specialist på elektronikreparation
www.ribit.se

Soldering manual
RiboCop(tm) v3.0

(updated 2025-04-12)

About this document

This soldering instruction will instruct you, step by step, how to solder RiboCop64 v3.0 using the kit.

NOTE: The kit is **not** for beginners as almost all components are surface mounted. You can solder these using a normal soldering station, but hot air is recommended. SMD-pinchers, flux, soldering braid and other tools are strongly recommended.

All components in SOT-package are **SENSITIVE TO ESD**, so you really need to handle them with utmost care. If any of these components become ESD-damaged then their behaviour will be unpredicted. This means the final product might act like it's working, when it's not. Since the soldering skills required are very high for this project, and your soldering skills cannot be anticipated, this kit is sold without any warranty at all. **Use at own risk**.

There are two manufacturing errors on the PCB. Both will need to be corrected manually while soldering. Instructions on how to patch these two errors will be provided in this document.

We strive to keep this document updated and inform about the common caveats, but there is no guarantee that all information here within is correct. Mistakes happen.

TL;DR:

THIS KIT IS NOT INTENDED FOR BEGINNERS

PRODUCT WARRANTY DOES NOT APPLY

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Kit contents:

Amount	Symbol	Description	Marking	Package
1	C1	1uF	-	1206
1	R1	56Ω	560	1206
1	R2	2kΩ	202	1206
1	R3	10kΩ	103	1206
1	RN1	1kΩ network	102	1206
1	RN2	10kΩ network	103	1206
1	U2	Comparator	ZAYF	SOT23-5
1	**Q1(*)**	**MOSFET**	**D99**	**SOT23-3**
1	**Q2(*)**	**BJT**	**1F**	**SOT23-3**
1	**Q3(*) (**)**	**MOSFET**	**LP2L**	**SOT23-3**
1	D1	4.7V Zener	-	MiniMELF
1	D2	Schottky diode	46	SMD
1	D3	Green LED	-	1206
1	D4	Red LED	-	1206
1	D5	Yellow LED	-	1206
1	J1	DIN-connector	-	THT
5	J2	Solder pins	-	THT
1		Circuit board		

(*) Q1, Q2 and Q3 use the same package. Take great care to solder the correct component to the correct designator. Use the marking code as guide.

(**) Q3 has its footprint mirrored. The component needs to be soldered upside-down!

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Tools required:

- Hot air station
- Soldering station
- Solder, 0.3 – 0.5mm

Optional tools that will simplify the work:

- Flux
- Soldering braid
- PCB-clamps
- Hooks
- Microscope
- Variable power supply (for functional testing)
- Multimeter with continuity tester and diode tester (for testing)

When the device is assembled, the device needs to be tested to make sure there are no errors. For this purpose, a multimeter and a variable power supply is required. Otherwise you will not be able to test and see how the board reacts to an over-voltage situation, which kind of defeats the purpose of this device.

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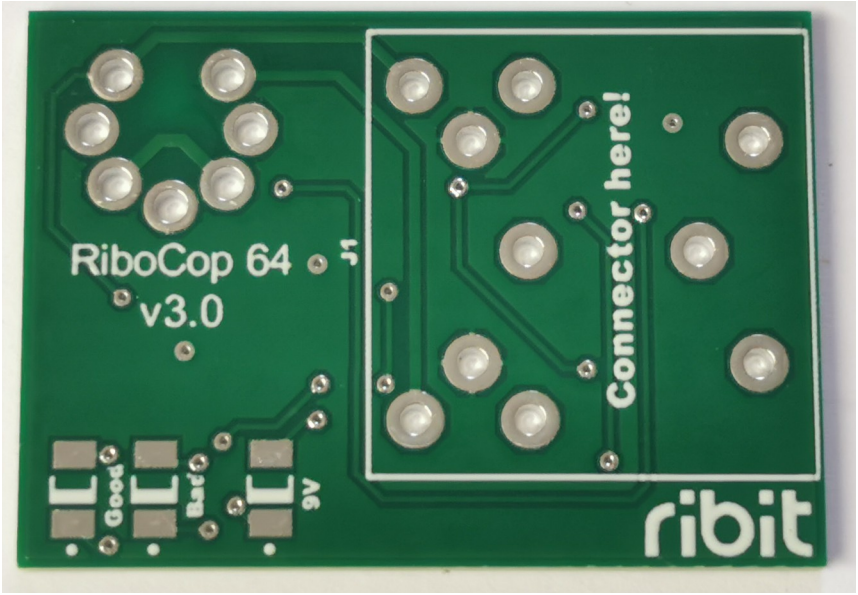
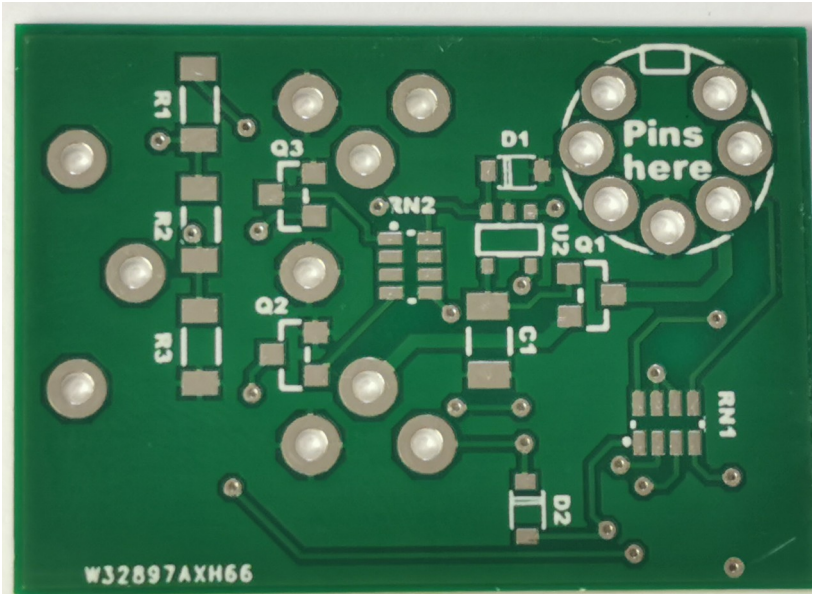
PCB-assembly

Put the PCB on the desk and make yourself familiar with it. Top vs. bottom side shown below.





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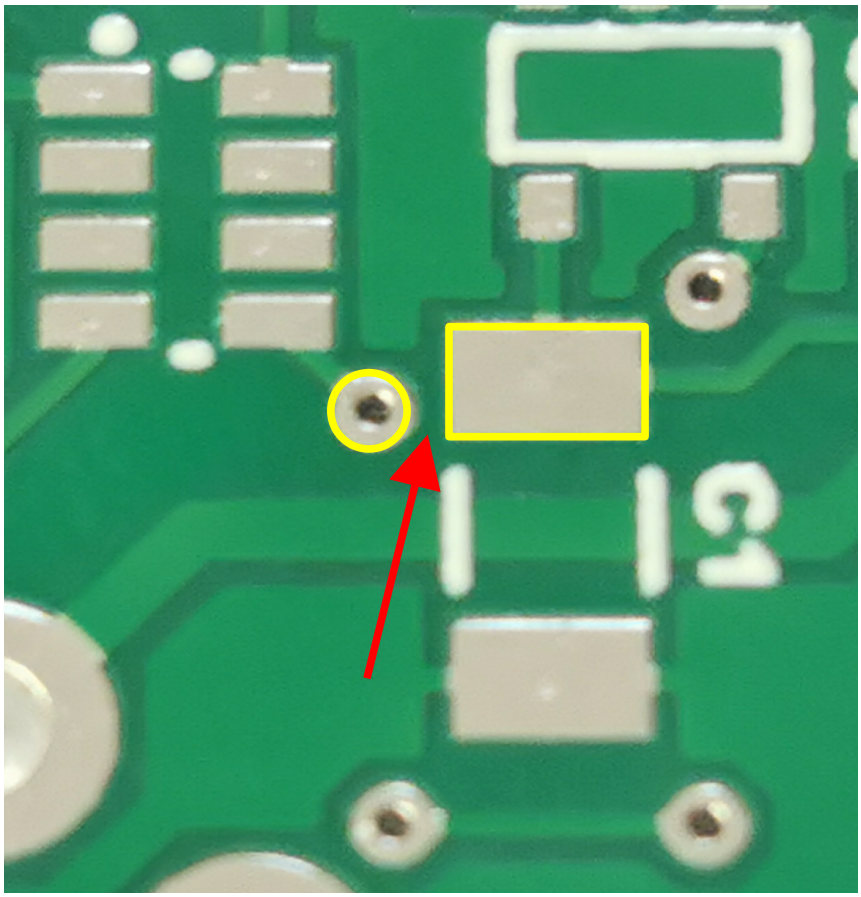
The errors

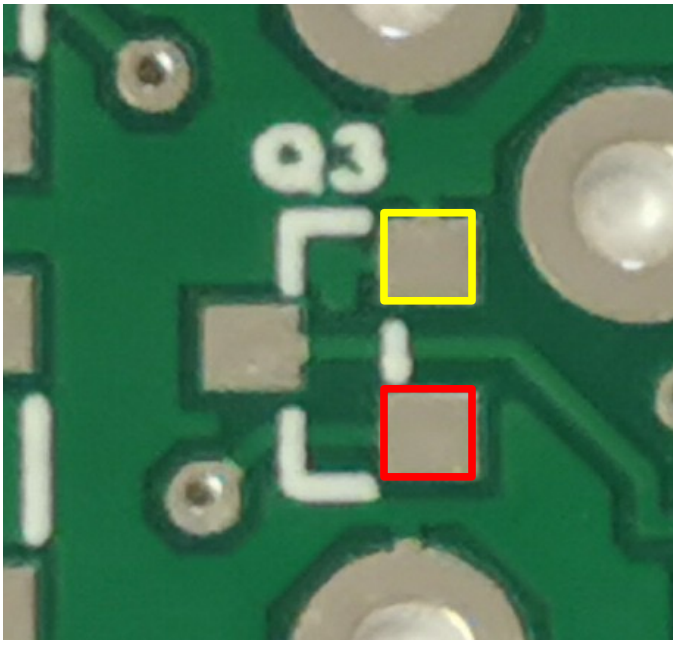
The board has two manufacturing errors. The first one is a missing path between C1 and RN2:



The red arrow is pointing at where the missing path should be. The yellow rectangle and the yellow circle should be connected. It does not matter if this is done before of after C1 has been soldered, but it's probably easier to do it before C1 is populated.

How to connect the areas is up to you. You can use a very thin wire or you can put a large blob of solder to create a bridge.

The second manufacturing error is at Q3, where two pads have been swapped:



The yellow and red box are in each others' place.

To fix this Q3 must be mounted upside-down. Flip the component, hold it still and gently push the three legs straight down with a screwdriver (or any similar tool). Then solder the component and the fix is done.

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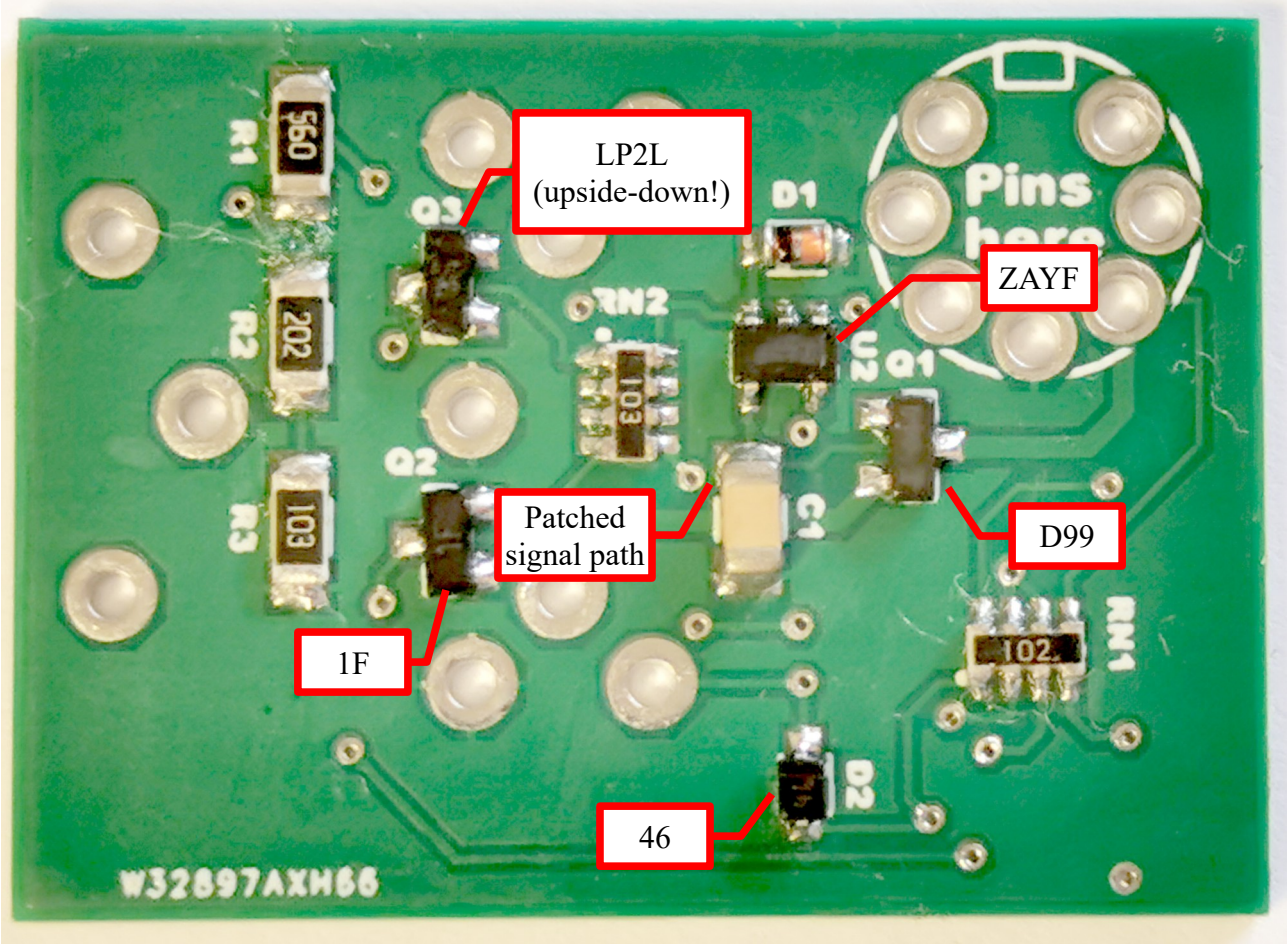
Bottom view of the finished board

When all components are soldered, the board should look like this:



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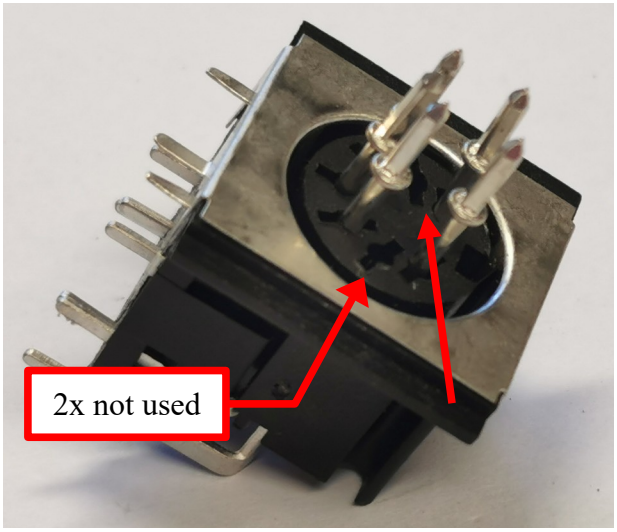
DIN7-pins

The solder pins can be a bit tricky to keep straight. The easiest way is to put the five pins in the DIN7-connector (which will act sort of like a pin holder) and then putting the board over them. Do note that two pins are not used.



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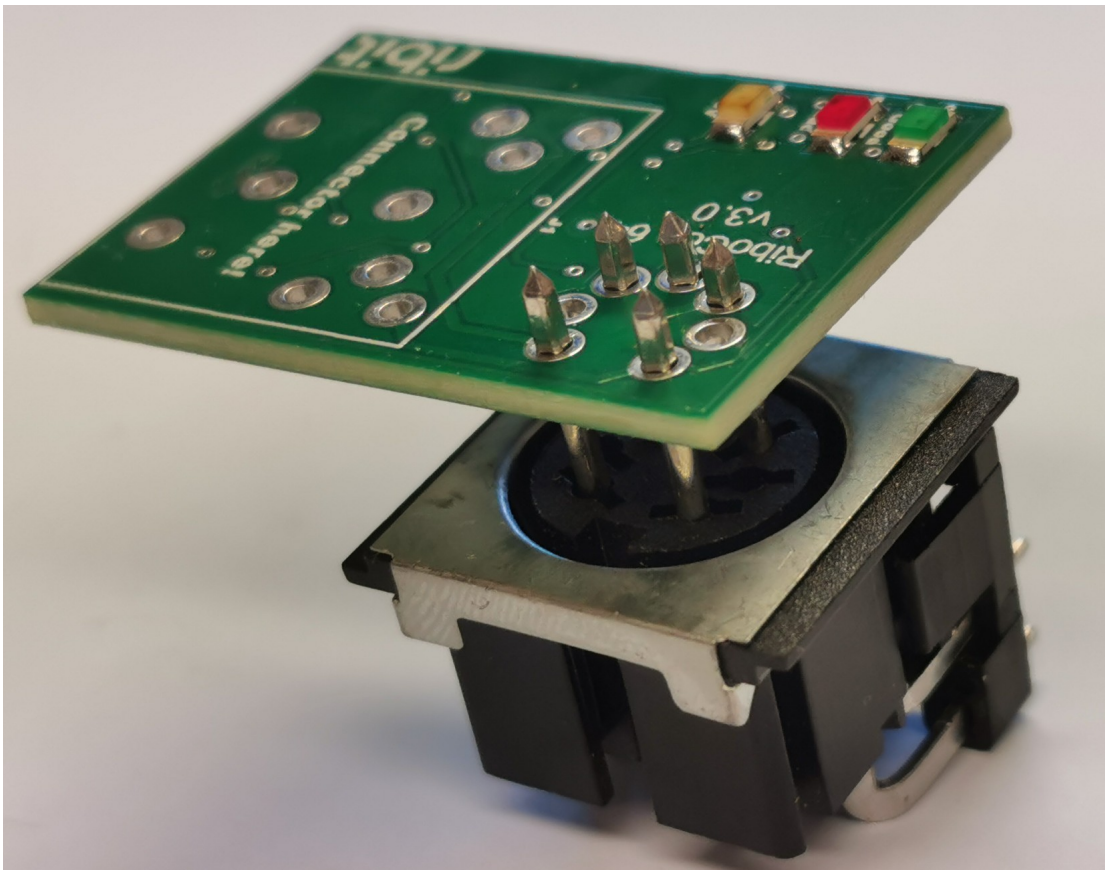
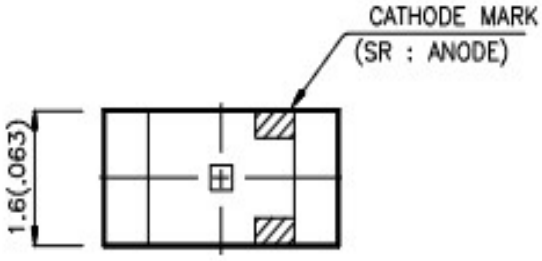
The pins will stick out of the holes and it's best to keep the "stick out"-distance as short as possible by lifting the board so the pins are just slightly higher (0.5 – 1mm) than the board. This will give you the best distance from RiboCop64 into the C64 power jack.



When the pins are soldered you can solder the three LED (with colored lens) in place. The marking in the corner of the colored lens should point to the long side of the circuit board (the one near the top in the image above).



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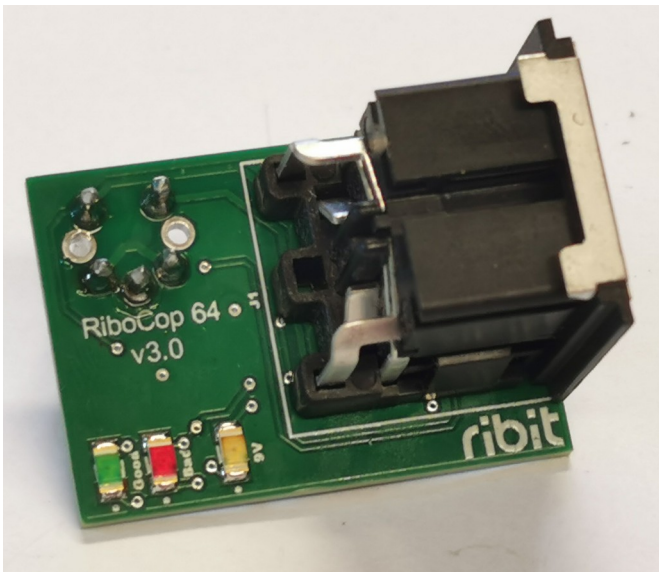
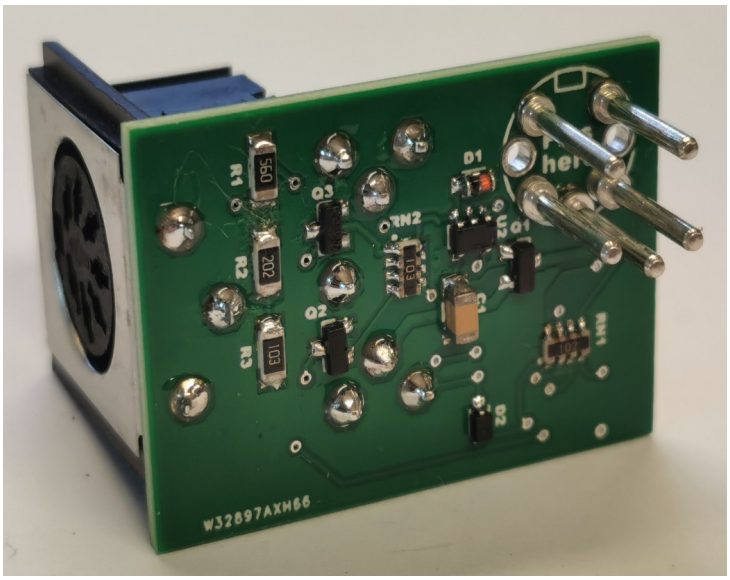
When the LEDs are soldered, the only thing left to solder is the big DIN7-connector. Be sure to put it on the front side, where it says “Connector here!”. If you put on the bottom side, Bad Things™ is going to happen and you will not be a happy camper.

After everything is soldered in place, it should look like this:





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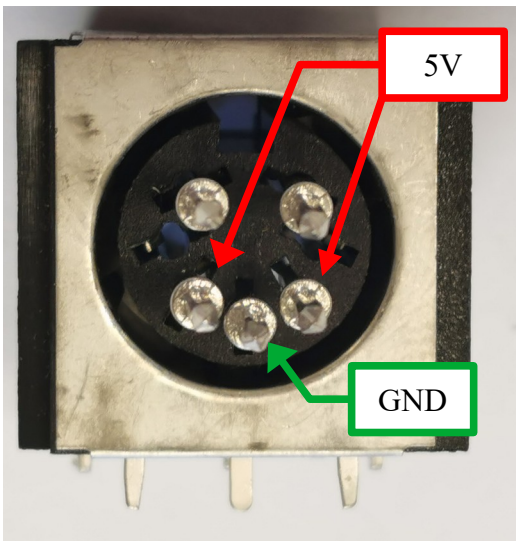
Testing

1. Connect a variable power supply to one of the two incoming 5V-pins in the DIN-connector. Make sure the voltage is around 5V, and power on. If you have done everything correctly, green LED (and nothing else) will light up.



If the green LED is not lit, disconnect the power and use a multimeter in diode mode to verify that the LED is working.

If the red LED is lit, make sure the power supply is sourcing between 5.0-6.0V.

When only the green LED is lit, measure the output and verify that the voltage is equal to the input voltage (give or take 100-200mV)

2. Increase the voltage to at least 6.0V. This will trigger RiboCop(tm), and it will cut the output. When triggered, only the red LED should be lit.

While the red LED is lit; measure the output voltage. There's not supposed to be anything here, except if RiboCop is not having a load resistor; then you will measure the voltage from the big output capacitor. If you want you can use a 100 ohm resistor to short the output, then the capacitor won't delay its charge during a trig.

If the input voltage is above 6.0V and the green LED is still lit, then something is very wrong and you have to find out what and where. Double check all components and verify the correct component is in the correct place. Verify that the two diodes are facing the correct direction.

If any of these do not match, turn off the power supply and verify all the solder points to exclude shorts. Pay extra attention to Q1, since its three pins are really near each other; there's a great risk that some solder are shorting them.

How to change the cut-off point

As default, RiboCop64 will cut the supply as soon as it reaches 6V. Some people consider this voltage level too high, even if the MOS-semiconductors inside the C64 have an absolute maximum rating of 7V. It is better to be safe than sorry, so it is of course possible to alter the trigger voltage and make it lower than 6V.

The resistor pair R2 / R3 are the ones that set the trigger point. To alter the trigger, you need to replace R2 with another value. This other value is not included in the kit, so you will have to procure it on your own.

Have a look at the table below to see which value of R2 you can use.

R2 value [Ω]	Trigger voltage [V]
1.3k	5.5
1.5k	5.6
1.6k	5.7
1.8k	5.8
2.0k	6.0
2.2k	6.1

If you change the value of R2 you absolutely must verify the trigger level manually before connecting the device to a C64, because something else might have been changed when you replaced the resistor. Always double check, and verify the double checks as well.