Hello!

This guide is for building 8S module from Transient Modules.

It is good to have basic soldering skills and to be able to identify electronic components before starting this kit. In case you're an experienced DIYer, please read all the steps thoroughly before starting as some of them may be not so obvious.

The 8S kit consists of two boards and all the parts comes in two bags separated. See the parts list below to identify each one of them easily before start building.

Part	Qty
Resistors:	
Resistor 100K	6
Resistor 10K	5
Resistor 1K	2
Capacitors:	
100nF	8
22pF	2
10uF electrolytic	2
Diodes:	
1N4007	2
Potentiometers:	
100KB	8
100K SMD Trim pot	1
Sockets:	
ICs	3
Jacks	6

Part	Qty
Regulators:	
7805	1
7905	1
Ics:	
Atmega328P	1
DG408DJ	1
TL072	1
CD4051 (SMD)	1
Spacers:	
10mm spacer	1
11mm spacer	1
Screws:	
M2 hexagonal screw	1
M2 phillips screw	1
M3 silver screw	2
M3 black screw	2

Part	Qty
Headers:	
8 pin header female	2
8 pin header male	2
4x2 pin header female	1
4x2 pin header male	1
3 pin angled header	2
Power connector	1
Transistors:	
2N3904	5
Others:	
LEDs	8
Knurled nuts	6
Ferrite bead	2
Crystal 16MHz	1
Jumper	2
Panel	1
Bottom PCB	1
Top PCB	1
Ribbon Cable	1

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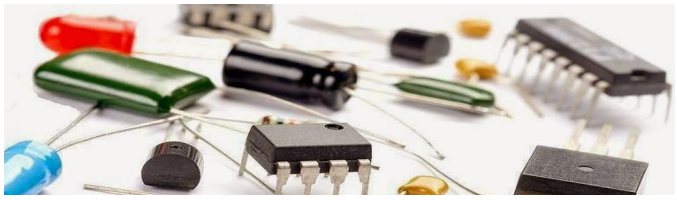
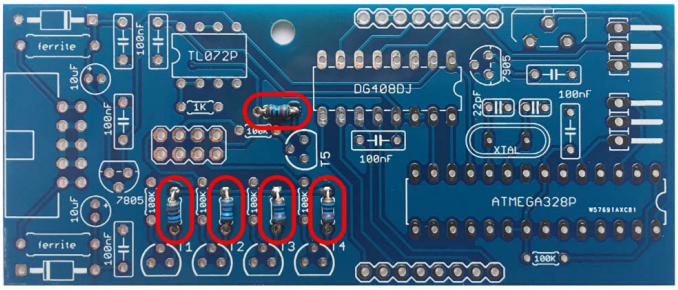
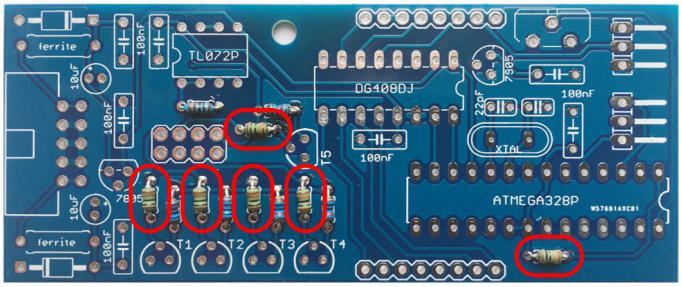
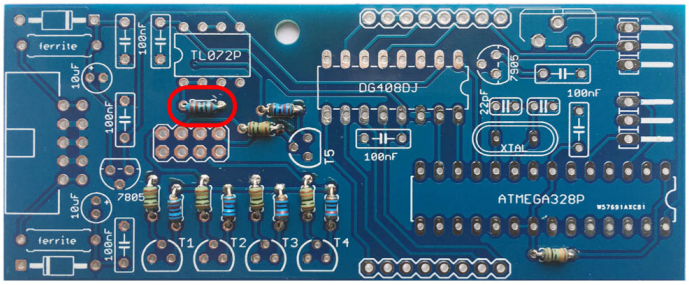
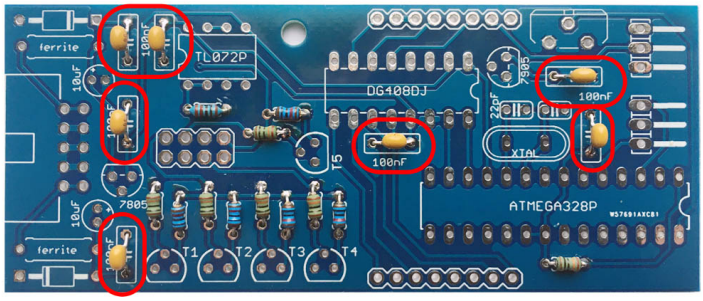
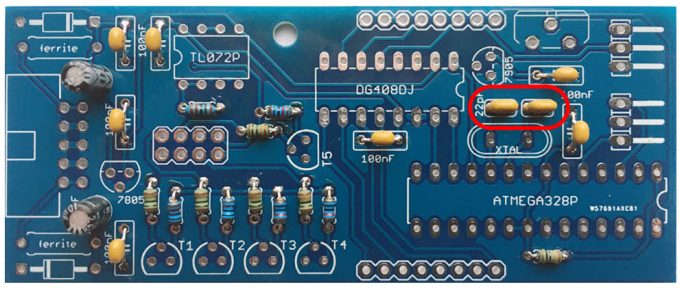
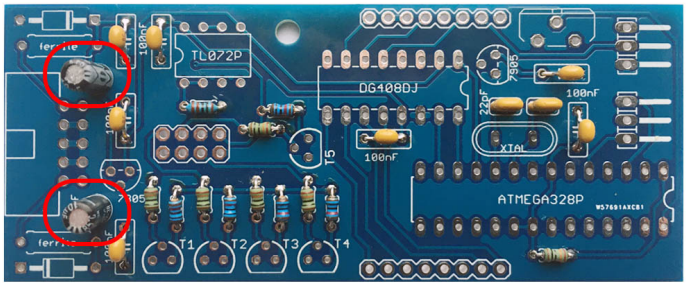
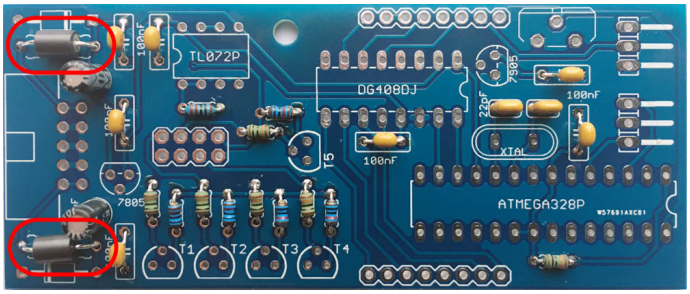
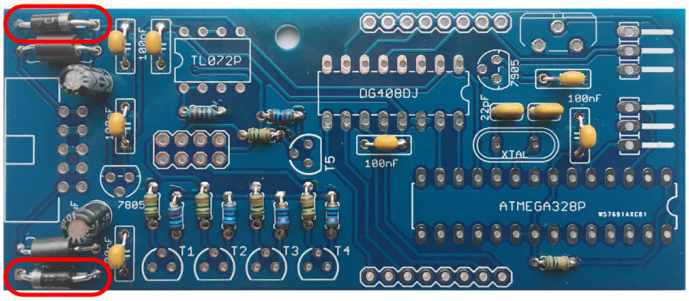
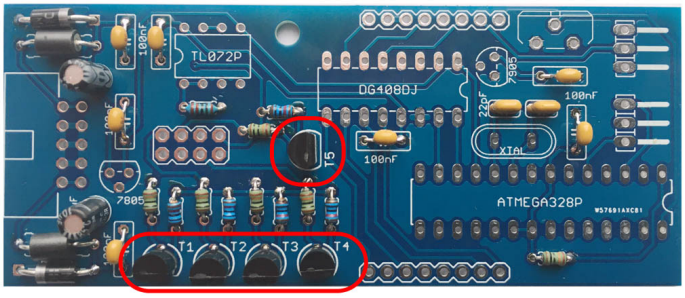
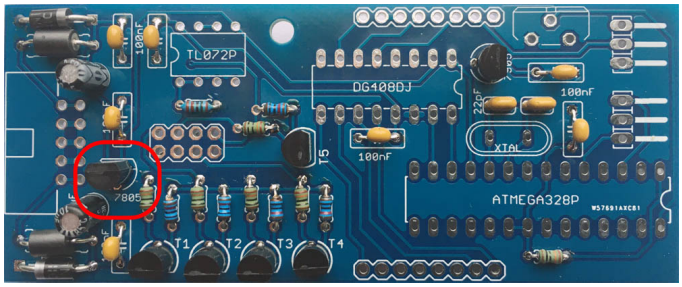
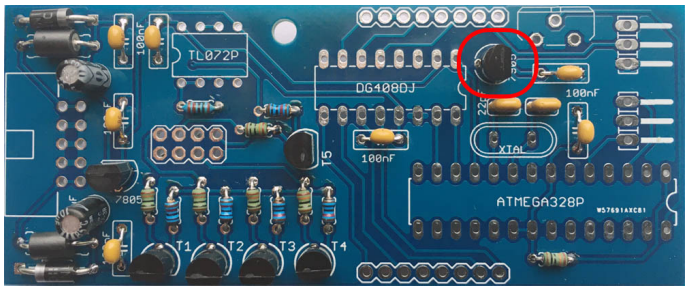
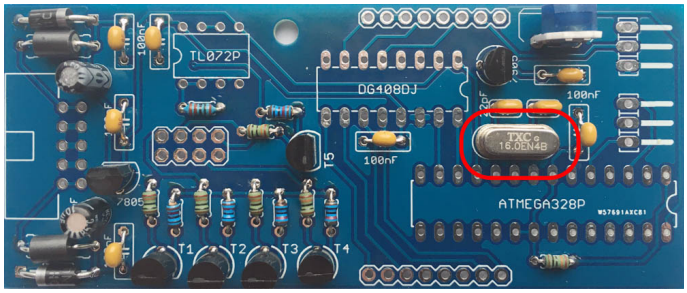
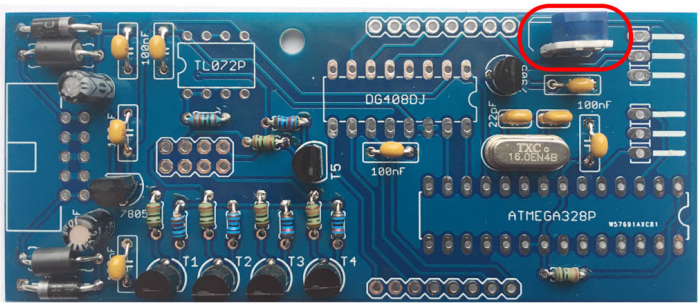
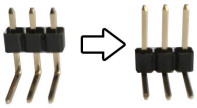
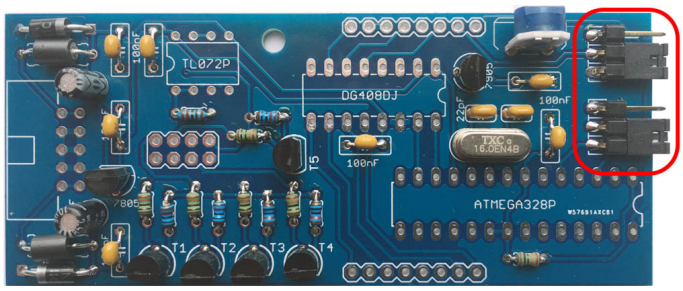
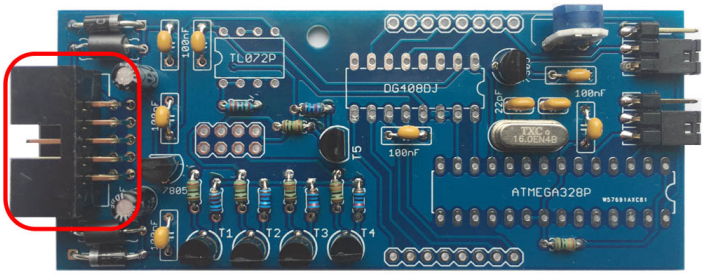
1. Let's begin with the back PCB. Start by emptying the bag of parts into a **bowl** or **container**. This makes it much easier to pick them and you're a lot less likely to lose anything.	
2. Solder the 5x **10K** resistors. Colour code: brown, black, black, red, brown.	
3. Solder the 6x **100K** resistors. Colour code: brown, black, black, orange, brown.	
4. Solder the **1K** resistor. Colour code: brown, black, black, brown, brown.	
5. Solder the 7x **100nF** capacitors (labelled 104).	

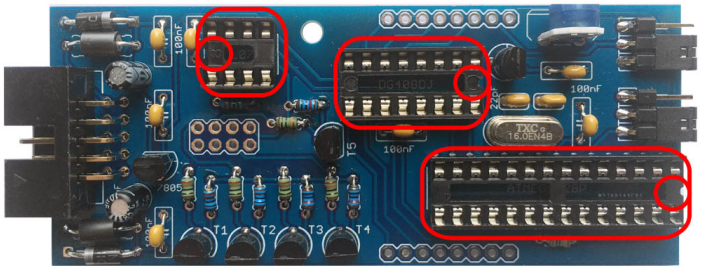
6. Solder the 2x **22pF** capacitors (labelled 220).	
7. Solder the two 10uF electrolytic capacitors (labelled 10uF). ***NOTE!*** ***Orientation is vital.*** *The long leg should be positioned in the pad marked with the + symbol.*	
8. Solder the two **ferrite beads**.	
9. Solder the two **1N4007** diodes. ***NOTE!*** *Orientation is* ***vital****. The gray ring on the diode must match the silkscreen.*	
10. Solder the 5x **2N3904** transistors. Labelled T1, T2, T3, T4, T5.	

11. Solder the **7805** regulator. ***NOTE!*** *Check **three** times before soldering, 7805 is very similar to 7905 and swapping these two by mistake will fry the module.*	
12. Solder the **7905** regulator.	
13. Solder the **16MHz** crystal.	
14. Solder the **trimmer**.	
15. Next solder the 2x **3 pin angled header**. Push the black plastic part all the way down as shown below to make sure they sit completely in the PCB and position them as in the image. 	

16. Solder the **power header.**

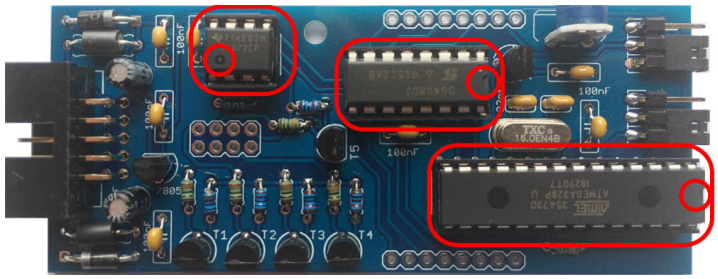


17. Solder the three **IC Sockets**. Make sure the **notches** in the sockets match the silkscreen**.**



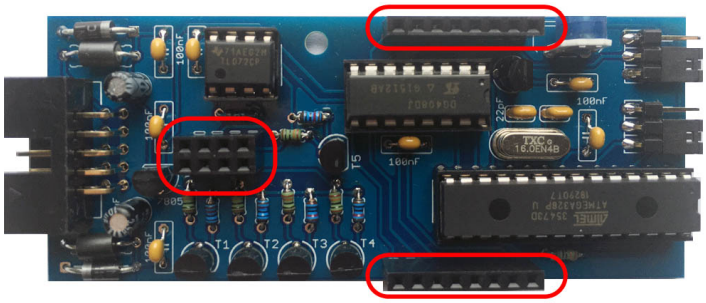
18. Next take the **TL072, DG408, ATMEGA328P** and position with the notch on the top face at the same end as the notch in the socket.

NOTE! *The pins on the ICs need to be bent inwards slightly, they will come slightly splayed out.*



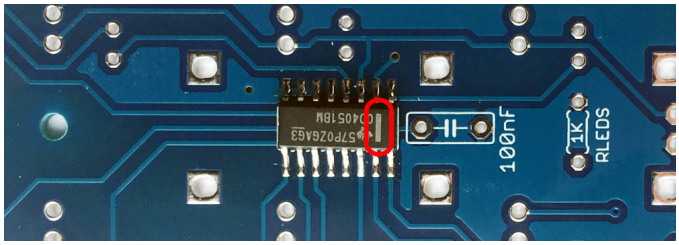
19. Place the two **8 pin female header** and the **2x4 pin female header** and solder both ensuring they are 90º to the PCB.

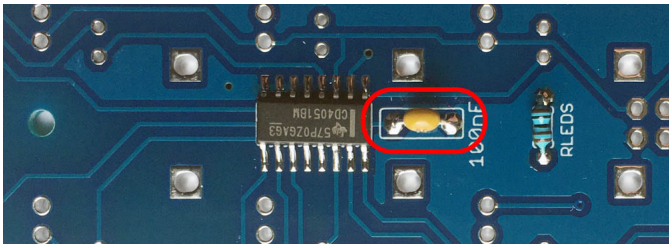
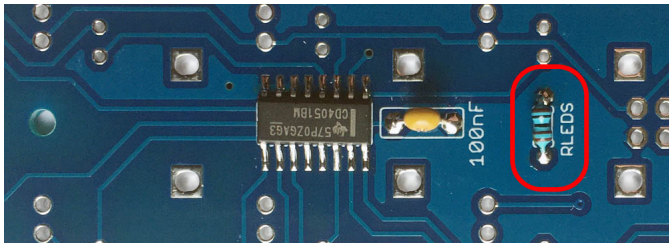
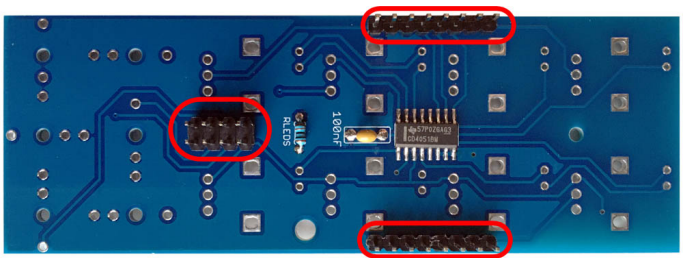
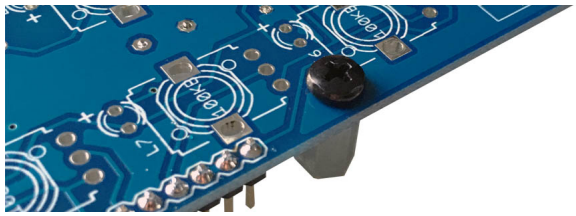
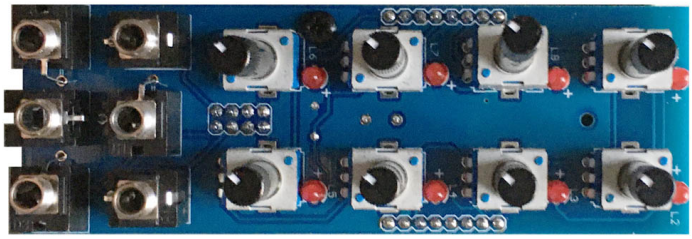
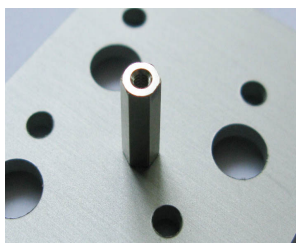
:) Back PCB is now finished! :)

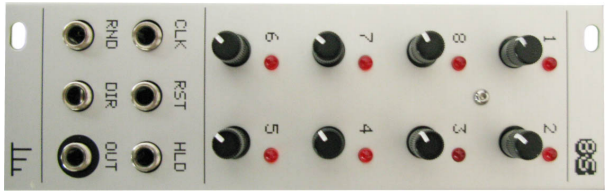
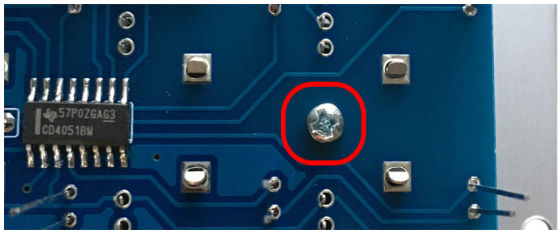
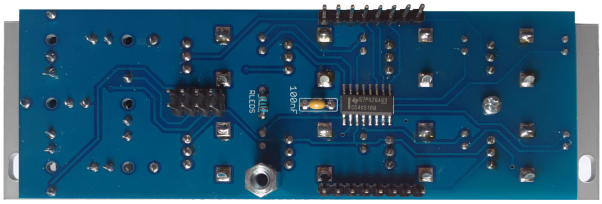
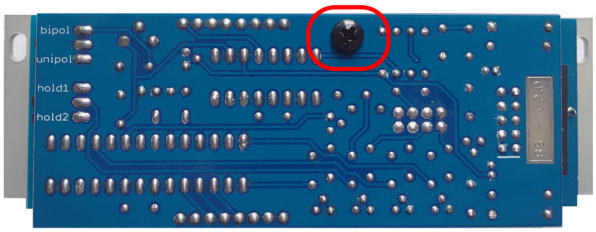


20. Front PCB! First, solder the CD4051. Position it with the line on the top face at the same end as the notch in the silkscreen.

Video of a good SMD soldering procedure, in case it's your first time: http://bit.ly/2pPBRyx



21. Solder the remaining **100nF** capacitor.	
22. Solder the remaining **1K** resistor, labelled “RLEDS”. <u>Colour code:</u> brown, black, black, brown, brown.	
23. Solder the two **8 pin male header** and the **2x4 pin male header** ensuring they're all 90º to the PCB. ***NOTE!*** *This part is placed at the bottom of the PCB and soldered from the top, as shown.*	
24. Screw the **11mm spacer** (the one which is slighlty bigger) as shown, using a **M3 black screw**.	
25. Place the 8x **100KB** pots. Make sure they're **fully inserted**. Also place the 6x **jack sockets** and the 8x **LEDs**. ***NOTE!*** *The long leg of the LEDs must be positioned in the pad marked as '+'.* **!! DON'T SOLDER ANYTHING YET !!**	
26. Screw the **10mm spacer** to the panel using the **M2 hexagonal screw**.	 

27. Place the **front panel** moving a little the parts if necessary.	
28. The spacer in the panel must match the hole in the PCB. Join both using the **M2 phillips screw**.	
29. Place the 6 **jack nuts** and make sure that the OUTPUT nut in the bottom is centered with the silkscreen in the panel.	
30. Make sure all the **leds** are positioned through their respective holes on the panel (you can center the potentiometers a bit as well). Now you can solder all the **jack sockets**, **leds** and **potentiometers**.	
31. Join the front PCB and the back PCB using the pin headers and ensuring the hole on the board match the spacer. Screw both boards with the remaining **M3 black screw**.	
32. Connect the ribbon cable. The red stripe on the cable must line up with the line indication on the back of the module. And... :) Module finished! :) Please read below for testing and calibration.	

TESTING AND CALIBRATION:

The 8S should automatically jump to step 1 when powering it up. If it does not, power off the case because there's something wrong. Write us and we'll figure it out!

If it jumps to the step 1 at power up, patch a clock singal into the CLK input. It must run in cycle. First, check that all the leds light up and that there's voltage present at the output for each step.

Second, check that all the inputs work properly by connecting a positive offset voltage into each one of them individually, while it receives a clock signal. Here's the 8S demo video in case you want to make sure of the behaviour of each input: https://www.youtube.com/watch?v=3G85gdKKbb4

About the ADJ trimmer:

Some digital modules need few milliseconds to generate signals. This trimmer makes the 8S read its inputs after those signals have been generated. Using the 8S with analog modules, set it completely clockwise. With digital modules try few spots turning it counter-clockwise until the 8S 'catch' the external signals properly. Don't be meticulous, precision it's not critical here. The trimmer is read on each power cycle, so you'll need to turn off and on your case every time you change its position.

About the HOLD1 / HOLD2 jumper:

This new version of the 8S has 2 possible behaviours for the HOLD input. If the jumper is set at HOLD1, as long as the 8S detects a **high** state at the HLD input, it will hold on that step. If the jumper is set at HOLD2, when there is a **high** state detected at the HLD input, the 8S will hold the voltage of that specific step at the output. If a clock signal is received, the step will change to the next position but the voltage will remain the one from the previous step, until HLD receives **low** again.

Something is not working as it should? *

Did you like the build manual? *

You had problems during the build process or have an idea that could improve it? *

Are you missing any part? *

Were you soldering slighlty drunk and did a mess? *

* Based in real e-mails.

Then, write us to: contact@transientmodules.com

If everything went fine: congratulations and enjoy the module!