# THE LITTE GUIDE TO BUILD
## "THE CARDBOARD CIRCUIT"

STEP 01 — 1M POT — S 01
– DIODE – – 82 K – – LED +
STEP 02 — S 02
– DIODE – – 82 K – – LED +
STEP 03 — S 03
– DIODE – – 82 K – – LED +
STEP 04 — S 04
– DIODE – – 82 K – – LED +
STEP 05 — S 05
– DIODE – – 82 K – – LED +
STEP 06 — S 06
– DIODE – – 82 K – – LED +
STEP 07 — S 07
– DIODE – – 82 K – – LED +
STEP 08 — S 08
– DIODE – – 82 K – – LED +

CONTROL VOLTAGE OUT

STEP 06 >
STEP 02 >
STEP 01 >
STEP 03 >
STEP 07 >
STEP 08 >
STEP 04 >
ST 05

IC = 4017

150 OHM
+ 6 V
+ 9 V

IC = 555
R = 1M POT
R = 100 K
< jumper to pin 3
1K
ON/OFF LED    R = 0.7K

8 BIT SEQUENCER ONE /// VERSION 2.0
GHOSTIH-LABORS 2014

# ISSUE 04 /// 8 BIT SEQUENCER
# FOR THE ATARI PUNK CONSOLE

**And the nights flew by .... like witches on their brooms ....**

You know these situations .... you end up in a castle, in your dreams, awaking in your room again. The candle burned down, during the night. But what should we do on a beautiful day like this?! I would like to recommend the ultimative space mod, for the Atari Punk Console. It's here! An 8-Step Sequencer in form of a paper circuit and I think you've realized, that I use to put two or more circuits on page 04. The reason for this is sharing. If you would have problems with the building process. You'll have a spare directly at your second hand. But I did this, because you can build this with your friends, side by side. You could assemble two of it, if you want. And I'm sorry, that I didn't write this before, but I would like to keep it short and simple, but this wasn't possible, at all. There are too much things to say. Today, we'll build the "8 Step Sequencer" for the "Atari Punk Console". We'll talk about switches, new functions and some more possible mods.

**This is the list of parts, which are needed, today!**

```
 1  x   4017 IC
 1  x   555 Timer IC ( for the clock )
 1  x   1 M potentiometer ( 1 Mega Ohm Pot )
 8  x   80 K Resistor ( 86 K or 100 K – 100 K Version not tested! )
10  x   switches or more ( + 1 x momentary switch )
 8  x   100 K potentiometer A
 1  x   150 OHM Resistor
 1  x   100 K Resistor
 1  x   4,7 K Resistor
 1  x   1 K Resistor
 8  x   1N4148 Diode
10  x   LED's
 1  x   1 uf capacitor + –
```

Welcome back! Grab your tools and follow me, please! It will take some time, to finish this build. No Printer? >>> page 13

**Grab Your basic tools:**

```
1 x   Soldering Iron
1 x   Solder ( Stannol 1 mm Flowtin TSC would be the best choice )
1 x   Wire Cutter (scissors if you don't have one)
1 x   pliers
1 x   printer
1 x   one piece of cardboard from the back of your college-block
1 x   compasses ( or another spiky tool, to poke the holes )
1 x   open window /// a well ventilated room
1 x   wire ( much wire ) solid core ///
```

If you want to build this little circuit, please have a look at issue one, of this small magazine. I did a whole description, how you can build your own cardboard circuits. It is cheap, good for practise and a good alternative, to test things out, when you have nothing, to etch a circuit.
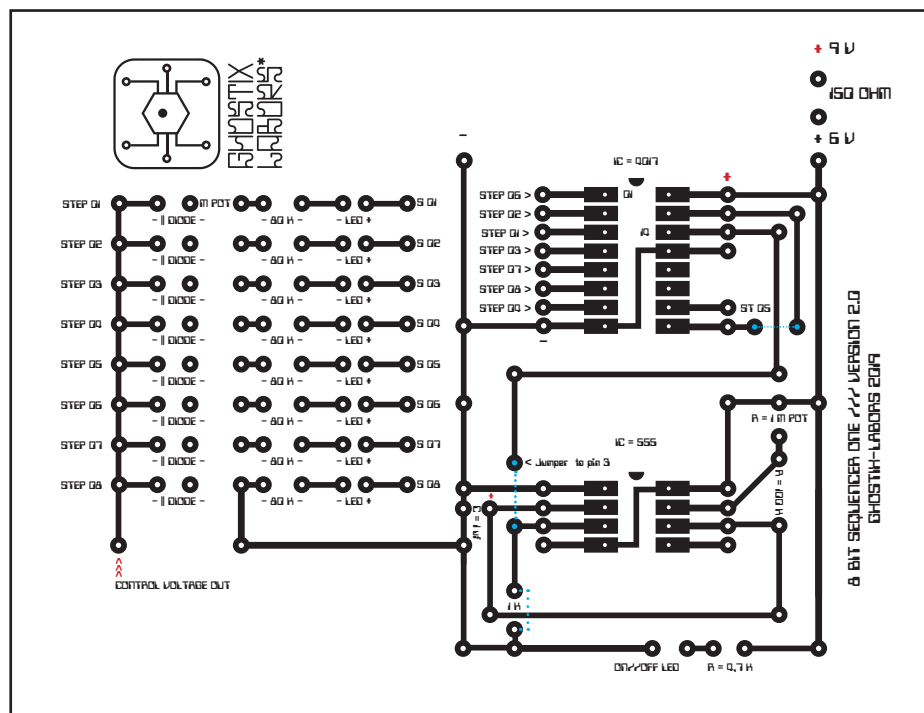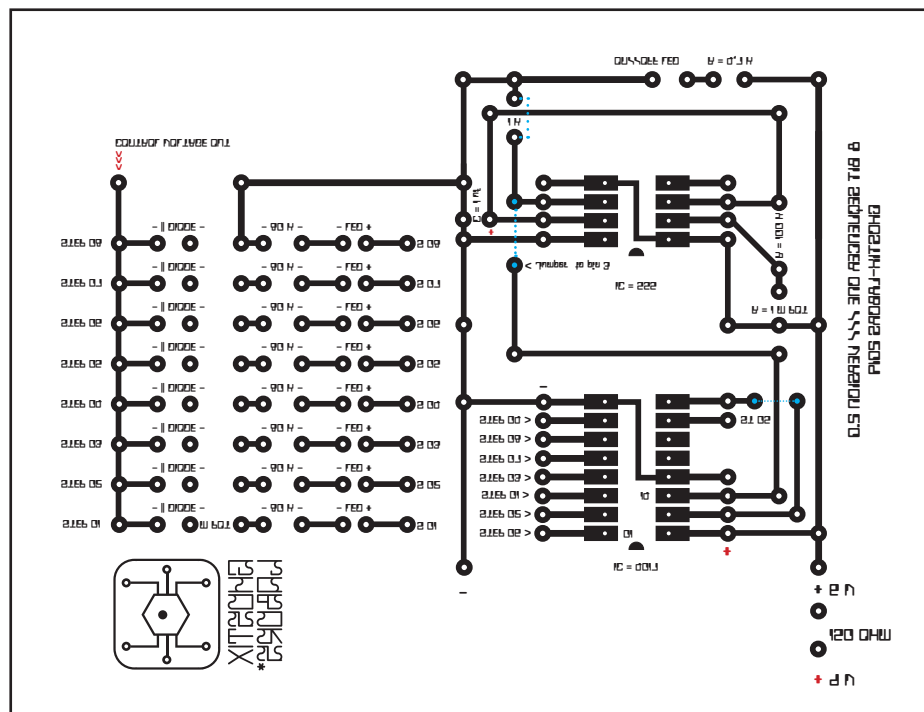
This circuit was tested by me and the prototype works until this day. So I think everything should go well with it.



Now, we need our printer, again. But you can also draw the circuit on a sheet of paper. ("Page 13")
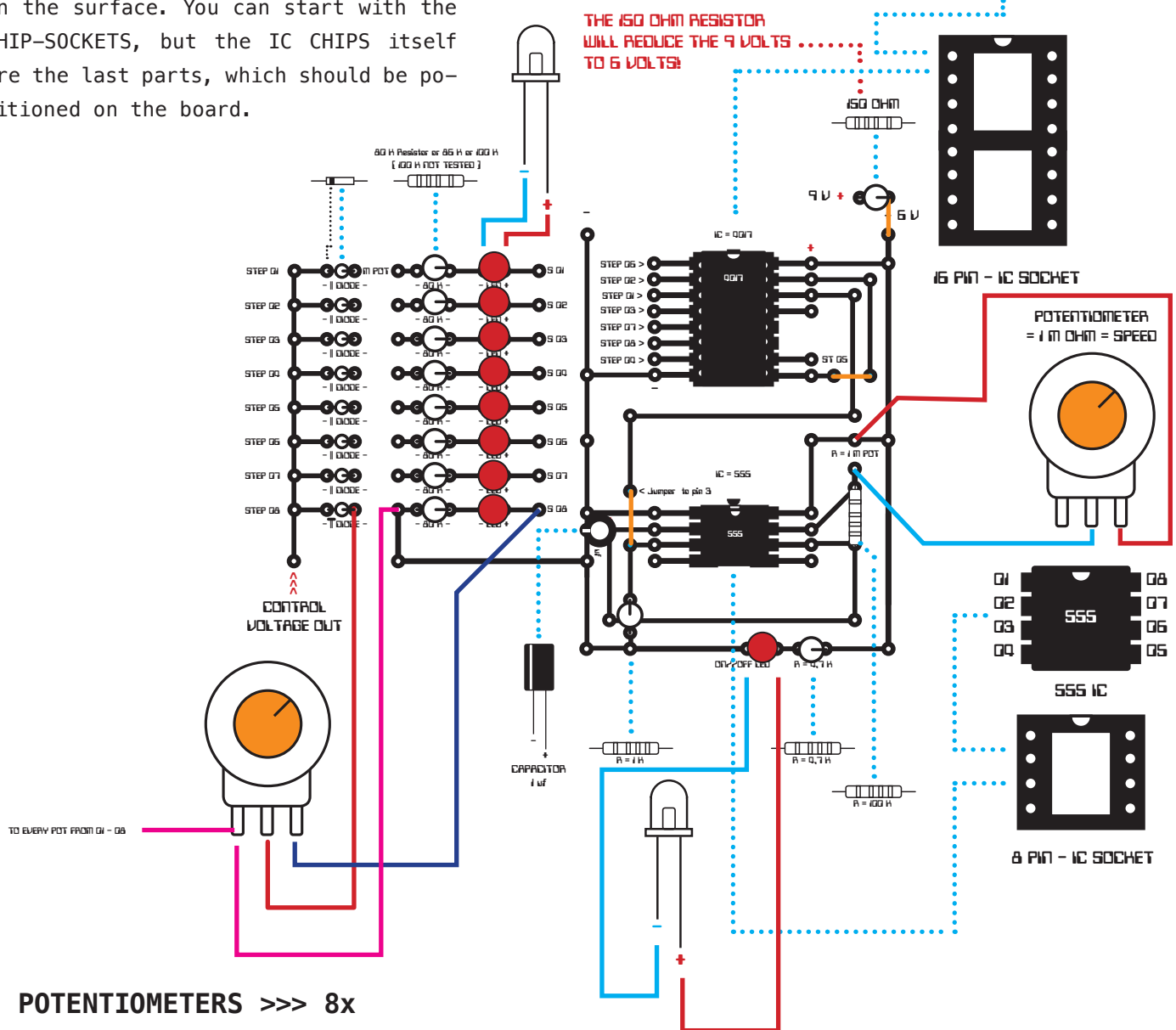
**The Start >>>**

On the next page, you'll find your circuit. But make sure that your printer settings are correct, before you print this file. Don't stretch the file to 100 % of the A4 format. This is a common option, but these pages are already prepared, and should have the right measurements. There is a small, black cube on the left side, of the following page. This is your control mark and if this cube is 1 cm x 1 cm tall, the diameters of your circuit boards are correct. Your Printer Settings will allow you to print the circuit board only. Feel free to set the preferences to the relevant range. So, if you want only the circuit board, just print out page 4.

This Black Box has to be 1 cm x 1 cm then you should have the right measurements - to go forward with this print! >>>>>>>

<< FOLD

---

**Board (top, mirrored):**

8 BIT SEQUENCER ONE /// VERSION 2.0
GHOSTIX-LABORS 2019

GHOSTIX LABORS*

CONTROL VOLTAGE OUT

STEP 01 — DIODE — — 80 R — — LED + — S 01
STEP 02 — DIODE — — 80 R — — LED + — S 02
STEP 03 — DIODE — — 80 R — — LED + — S 03
STEP 04 — DIODE — — 80 R — — LED + — S 04
STEP 05 — DIODE — — 80 R — — LED + — S 05
STEP 06 — DIODE — — 80 R — — LED + — S 06
STEP 07 — DIODE — — 80 R — — LED + — S 07
STEP 08 — DIODE — — 80 R — — LED + — S 08

IC = 222
R = 1M POT
A = 1 M POT
A = 100 R
A = 0,7 K

OUT//OFF LED
< Jumper to pin 3

120 OHM
+ 9 V
+ 9 V

---

**Board (bottom):**

GHOSTIX LABORS*

STEP 01 — DIODE — — 80 R — — LED + — S 01    1M POT
STEP 02 — DIODE — — 80 R — — LED + — S 02
STEP 03 — DIODE — — 80 R — — LED + — S 03
STEP 04 — DIODE — — 80 R — — LED + — S 04
STEP 05 — DIODE — — 80 R — — LED + — S 05
STEP 06 — DIODE — — 80 R — — LED + — S 06
STEP 07 — DIODE — — 80 R — — LED + — S 07
STEP 08 — DIODE — — 80 R — — LED + — S 08

CONTROL VOLTAGE OUT

IC = 4017
IC = 555

STEP 06 >
STEP 02 >
STEP 01 >
STEP 03 >
STEP 07 >
STEP 04 >
STEP 00 >
ST 05

A = 1 M POT
A = 100 R
A = 0,7 K
< Jumper to pin 3

ON//OFF LED

8 BIT SEQUENCER ONE /// VERSION 2.0
GHOSTIX-LABORS 2019

+ 9 V
150 OHM
+ 9 V

## THE SEQUENCER BOARD >>>

Here we have the full amount of well
sorted parts, which have to be placed
on the surface. You can start with the
CHIP—SOCKETS, but the IC CHIPS itself
are the last parts, which should be po—
sitioned on the board.



OUTPUT Q5   01    16   V +
OUTPUT Q4   02    15   RESET
OUTPUT Q0   03    14   CLOCK
OUTPUT Q2   04    13   ENABLE
OUTPUT Q6   05    12   CARRY OUT
OUTPUT Q7   06    11   OUTPUT Q9
OUTPUT Q3   07    10   OUTPUT Q4
- GND   08    09   OUTPUT Q8

4017

THE 150 OHM RESISTOR
WILL REDUCE THE 9 VOLTS .......
TO 6 VOLTS!

150 OHM

16 PIN — IC SOCKET

POTENTIOMETER
= 1 M OHM = SPEED

80 K Resistor or 85 K or 100 K
[ 100 K NOT TESTED ]

STEP 01
STEP 02
STEP 03
STEP 04
STEP 05
STEP 06
STEP 07
STEP 08

CONTROL
VOLTAGE OUT

IC = 4017

CAPACITOR
1 uf

ON-OFF LED

SSS IC

8 PIN — IC SOCKET

### POTENTIOMETERS >>> 8x

Here we have the main example, how the
full row of potentiometers, has to be con—
nected to the mainboard. There is a more
detailed illustration on the next page.
Please follow this example step by step.
>>> Page 07

= SOLID WIRE CONNECTION NORMAL WIRE [ JUMPER WIRE ]
>>> MAKE SURE THAT THIS WIRE IS INSULATED !!!

TO EVERY POT FROM 01 - 08

## CONNECTING THE
## POTENTIOMETERS >>> TO OUR BELOVED CIRCUIT BOARD

Here we are again. I reduced the Atari Punk Console to it's basic configuration, because all the wiring, from the last issue, could result in a possible confusion. We'll concentrate on our few connections, we have to make. We need longer wires, this time, just make sure, that it'll fit in a case of your choice. The LED's shouldn't be assembled directly to the board, because you have to see the sequence on your front panel. This time, we have to see every cable as an important part of the sequencer. If they are not connected in the correct way, your final product, won't work. You'll find your way through this process, by connecting one colour, after another and there shouldn't be any problems with it.
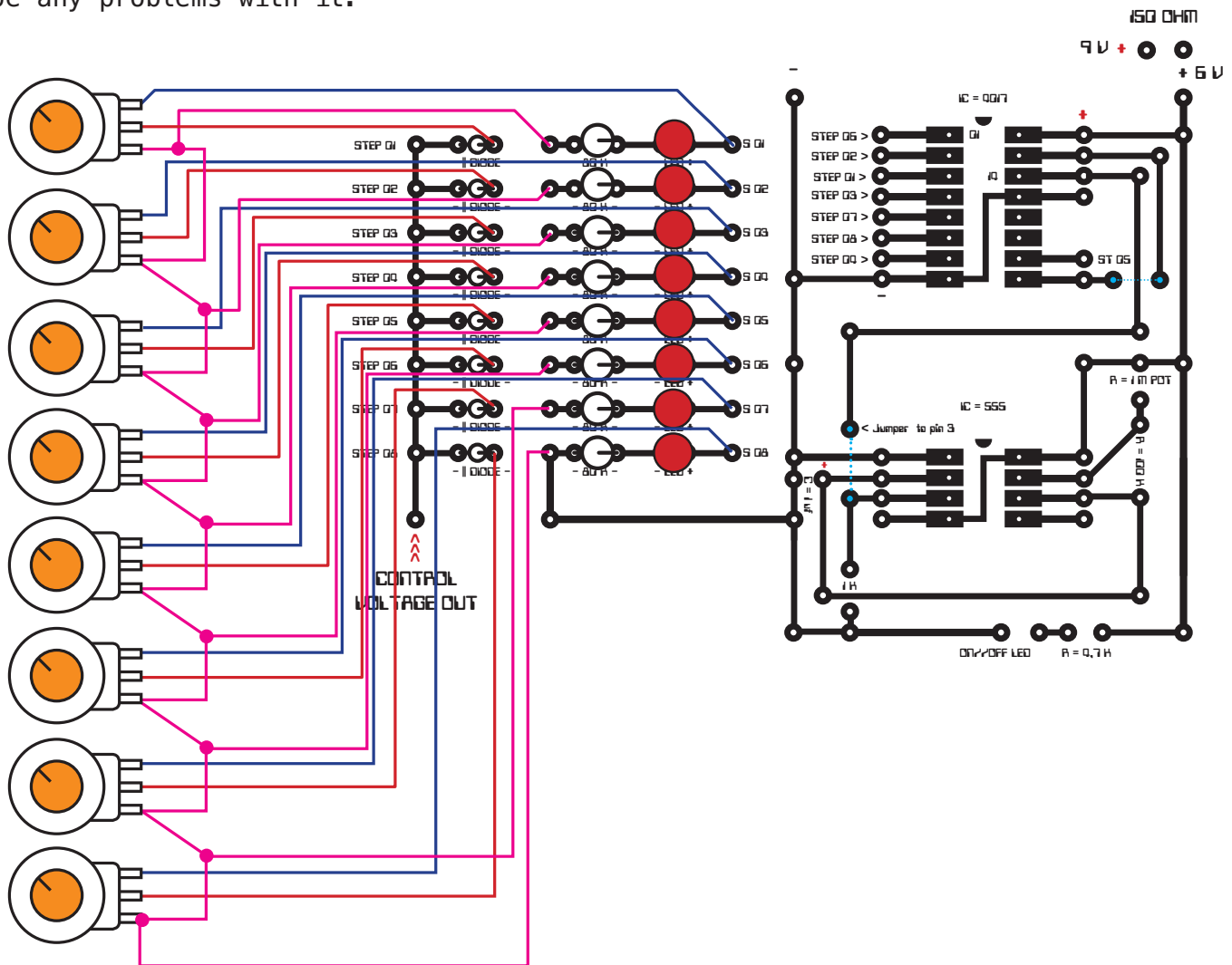
## CONNECTING THE
## OUTPUTS OF OUR 4017 IC >>> TO THE LED SECTION

In our last step, we'll connect our jumper cables, to the circuit board. As always, work your way through every step. S 01 has to be connected to S 01 — simple — from step 01 till step 08. You don't have to implement the switches, like I've shown in this litte graphic. A simple cable will do the job. But with our switches, we are able to disconnect every single step from the according sequence. This will lead us to a more flexible way, to alter our melodies. Make sure, that your switches will face in one direction. This is important, because nothing is more frustrating, than the illu—sion, that your device is broken, but there is possibly only one switch, facing in the wrong direction. In this way, you'll always know, that the connected function is on. Otherwise, you would have a bunch of switches, and you don't know if the switch says on or off. I'll never forget my second bend. It was a cigar box and I didn't know if the switch is on or off. Because these switches, came from old lamps. ( Push button style ) Finally, the unit seemed to be dead, and I think it was exactly, because of this problem, which lead to this frustration. Eventually, I salvaged all the parts from it and used them in future projects. But I didn't repeat this error ever again. And you read this and possibly, you'll never make the same mistake!?
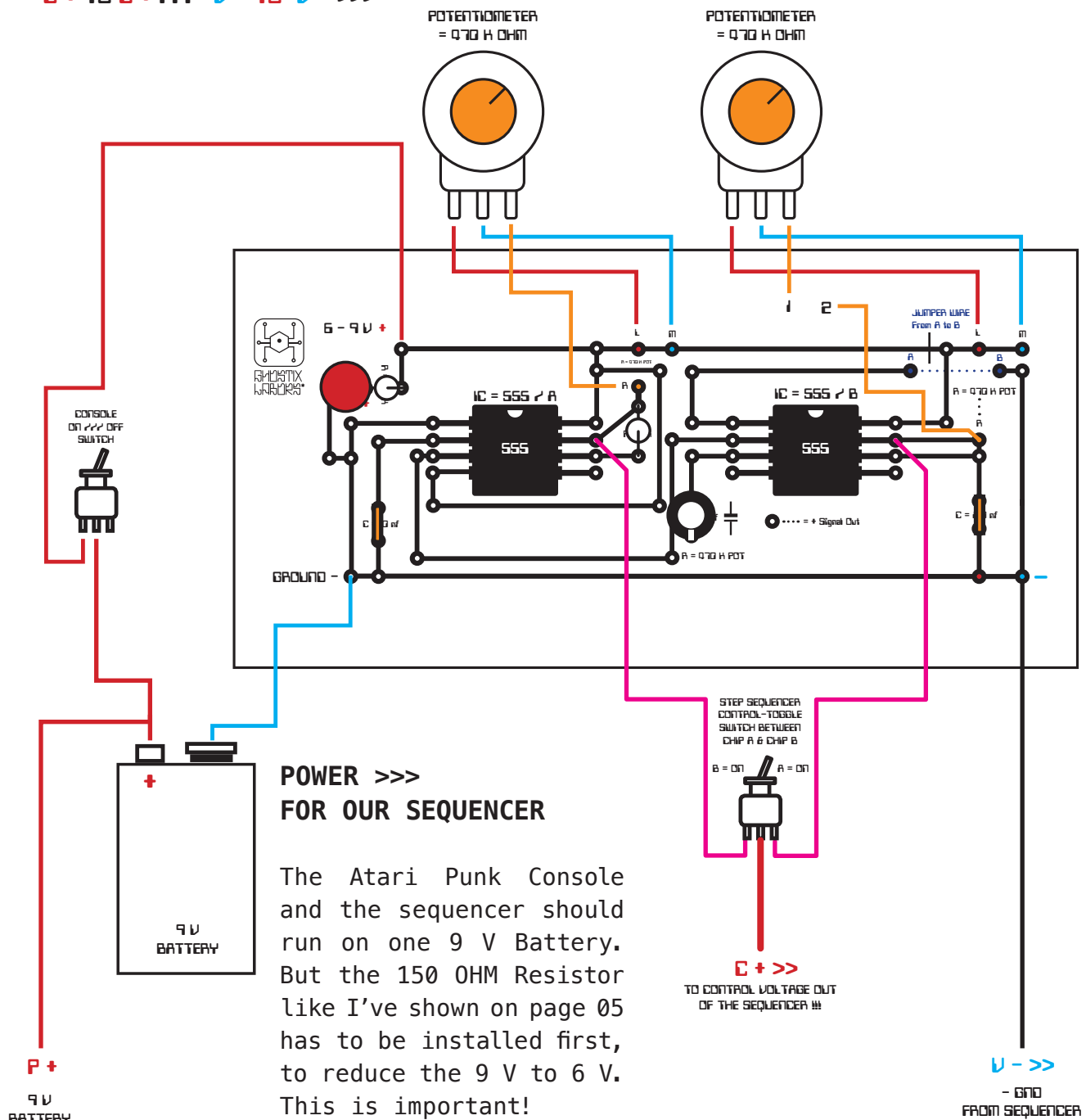
### RESET FUNCTION >>>

The "RESET" function will inter—rupt the running sequence. The Sequencer jumps back to step 01 and will stay there as long as the button is pushed.
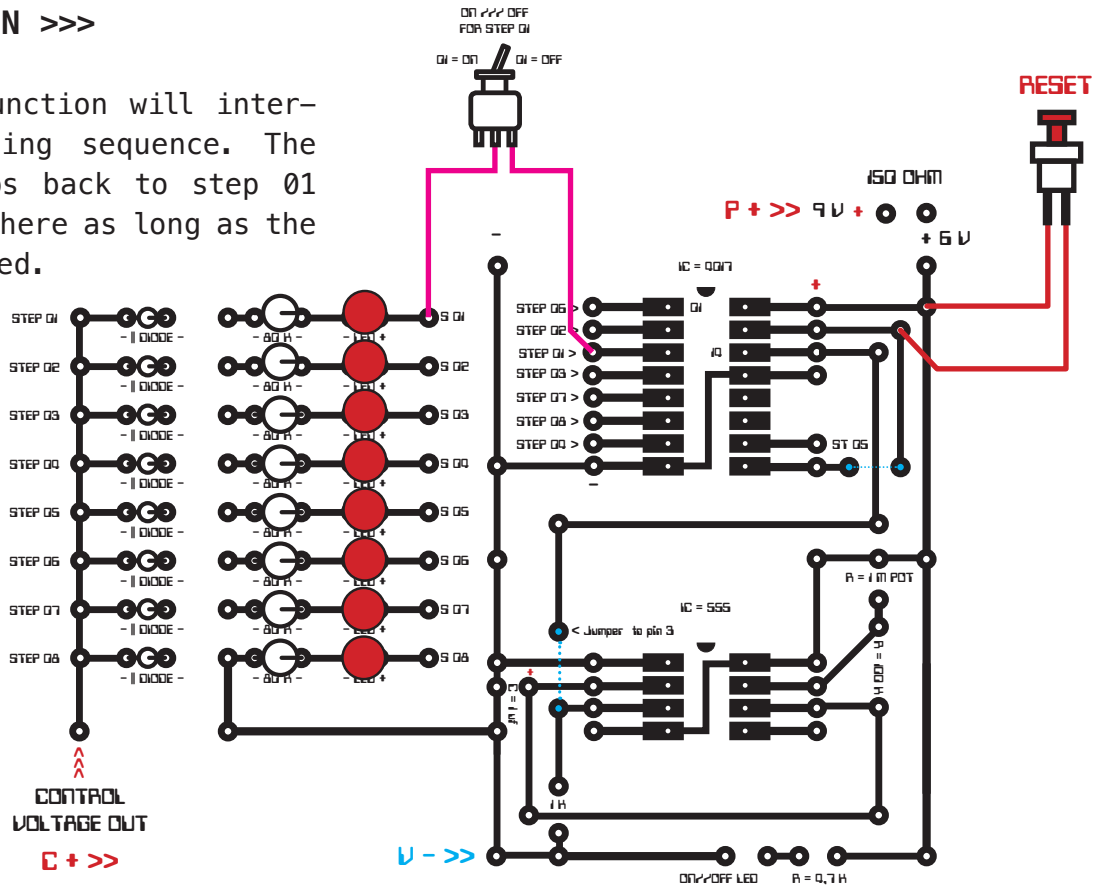
**CONNECTING THE**
**8 STEP SEQUENCER >>> TO OUR MUTANT ATARI PUNK CONSOLE**

Here we are again. You can see the Atari Punk Console to it's basic con-figuration, because all the wire connections from the last magazine, would result in a chaotic graphic. We'll concentrate on our few connections, we have to make. **P+** has to be connected to **P+** on the previous page and so on! **C+ TO C+ ↗↗↗ V- TO V- >>>**
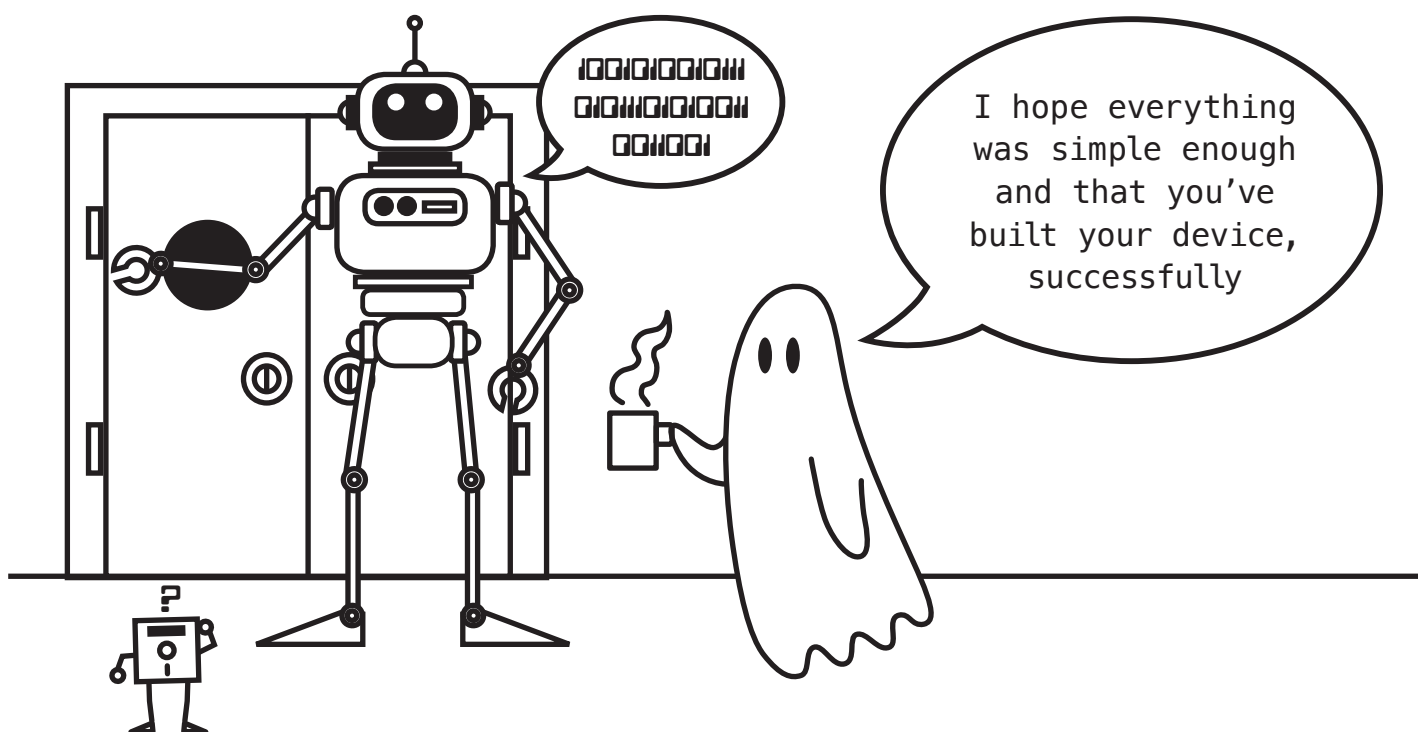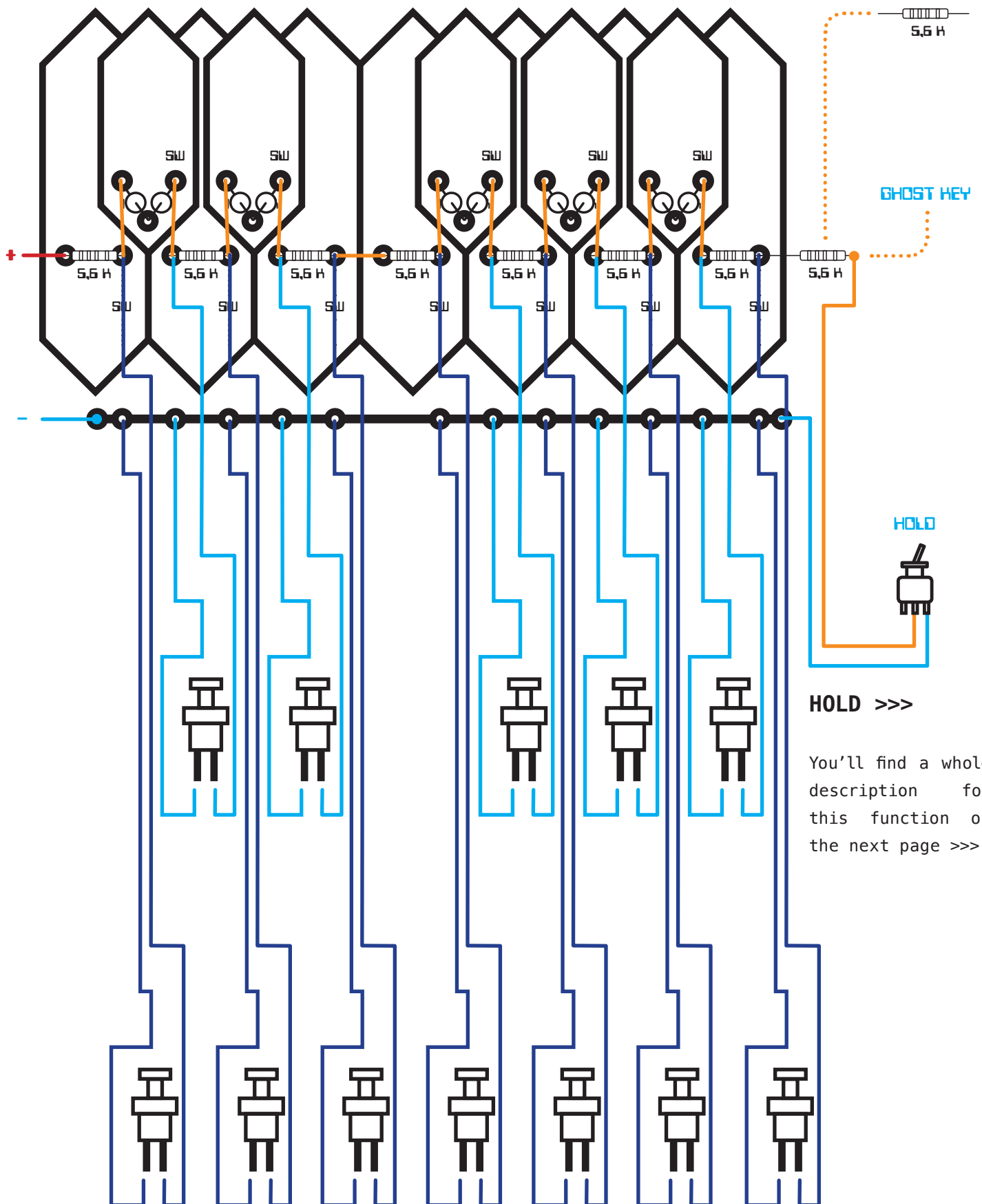


POTENTIOMETER = 970 K OHM

POTENTIOMETER = 970 K OHM

CONSOLE ON ↗↗↗ OFF SWITCH

6 – 9V +

IC = 555 ↗ A

IC = 555 ↗ B

555

555

JUMPER WIRE From A to B

A = 970 K POT

A = 970 K POT

A = 970 K POT

C = nf

C = nf

·····= + Signal Out

GROUND –

+
9V
BATTERY

STEP SEQUENCER CONTROL-TOGGLE SWITCH BETWEEN CHIP A & CHIP B

B = ON    A = ON

**POWER >>>**
**FOR OUR SEQUENCER**

The Atari Punk Console and the sequencer should run on one 9 V Battery. But the 150 OHM Resistor like I've shown on page 05 has to be installed first, to reduce the 9 V to 6 V. This is important!

**C+ >>**
TO CONTROL VOLTAGE OUT OF THE SEQUENCER !!!

**P+**
9V
BATTERY

**V– >>**
– GND
FROM SEQUENCER

**THE FINISHED MACHINE >>>**

So, if your device is sorted correctly and prepared for it's first Test, just go for it. But I have to say, that your connections have to be save and insulated. The external parts, should be placed in the correct order ( Taped to your desk ). Just to prevent the machine from short circuits. If everything is working as it was intended, then I would like to say – Congratulations! You have build your own Mutant Atari Punk Console with a lot of "MODS"!

Your 8 Led's from the step sequencer should light up, one after another. From step 01 until step 08, then the unit will go to reset and the sequence starts again, from the beginning. The notes of the 8 steps are controlled by their Potentiometers. Maybe, you'll hear a blip from one of the steps. This circuit has a wide range. Find out, how deep and how high you can get, with your notes.

The important thing is, that you'll have to press one of your keys down, to hear the sequence. We'll fix this problem with a little mod. And if you'll wonder, why I didn't say anything about this, in the first place. There is another good reason for this. I could write a long text about one specific function. But it is better, that you can see the problem and how it could be solved. That is the difference, between theory and practical improvements. I'll tell you, what you can do ....

See the next page >>>

5,6 K

SW SW SW SW SW

+

5,6 K    5,6 K    5,6 K    5,6 K    5,6 K    5,6 K    5,6 K    5,6 K

SW SW SW SW SW

GHOST KEY

−

HOLD

**HOLD >>>**

You'll find a whole
description for
this function on
the next page >>>

## GHOST KEY >>> AND THE HOLD FUNCTION

Why do we have to install another fake key, on our keyboard circuit. Because the Atari Punk Console is a Mono Synthesizer. This means the unit can only play one note at a time. If you would hold one key you would hear a tone, if you would play another key afterwards, while holding the first key down, the first note will stop playing and the next higher note is played. And there we have the problem. We could install our "hold" switch on the lowest note, by bridging the deepest key. But then the key couldn't be played, because this note would be always on. Instead of doing this, we will install another Resistor, as a ghost key, in our row. This resistor acts as the lowest note. If we use our hold function now. The lowest note ( Ghost Key ) will be played and you can use the lowest note on your keyboard, because it will always be one note above the ghost key.

## TRANSPOSING THE SEQUENCE >>>

You can transpose your sequence, with all of your 12 keys. Fantastic!!!

The next step is your case and some other modifications. But these improvements won't rip the whole project apart. Your enclosure has to be big enough. I would recommend a case, which has the size of one A 4 page or even bigger and 7 or 10 cm deep. Just have a look at all the functions, which we've implemented over the last few issues. I'm stuck, with one problem here. If I would give you a prepared Layout or a front panel. It would be frustrating to all the people out there, who wouldn't find a proper enclosure, in the right size. Not everyone out there has a full shed, filled up, with the necessary tools, to do this in a proper way. I'll think about this and maybe, I'll do it anyway. But I want to admit, that this will also be a lot of work. If you would get the finished result, like a product from an electronic store, this was not the intention to start this magazine. This build depends on you and your imagination. And I would like to see all the finished results, so feel free, to send us some pictures, from your machines. Trust your own ideas and use the things, which you have, in a creative way. There is so much plastic and metal trash out there – small parts will fit together, very often. So try to combine them and make your own build a little more interesting and individual!

## NEXT ISSUE >>>

We'll talk about possible inputs for more flexibility. And about a long list of other stuff, we can do, with this tiny and underrated Music Machine. Look at the result, and what we can do with this. I have to admit, that we needed a few more parts, but I hope you see the simplicity of our unit in the beginning and how much functions we have now ....
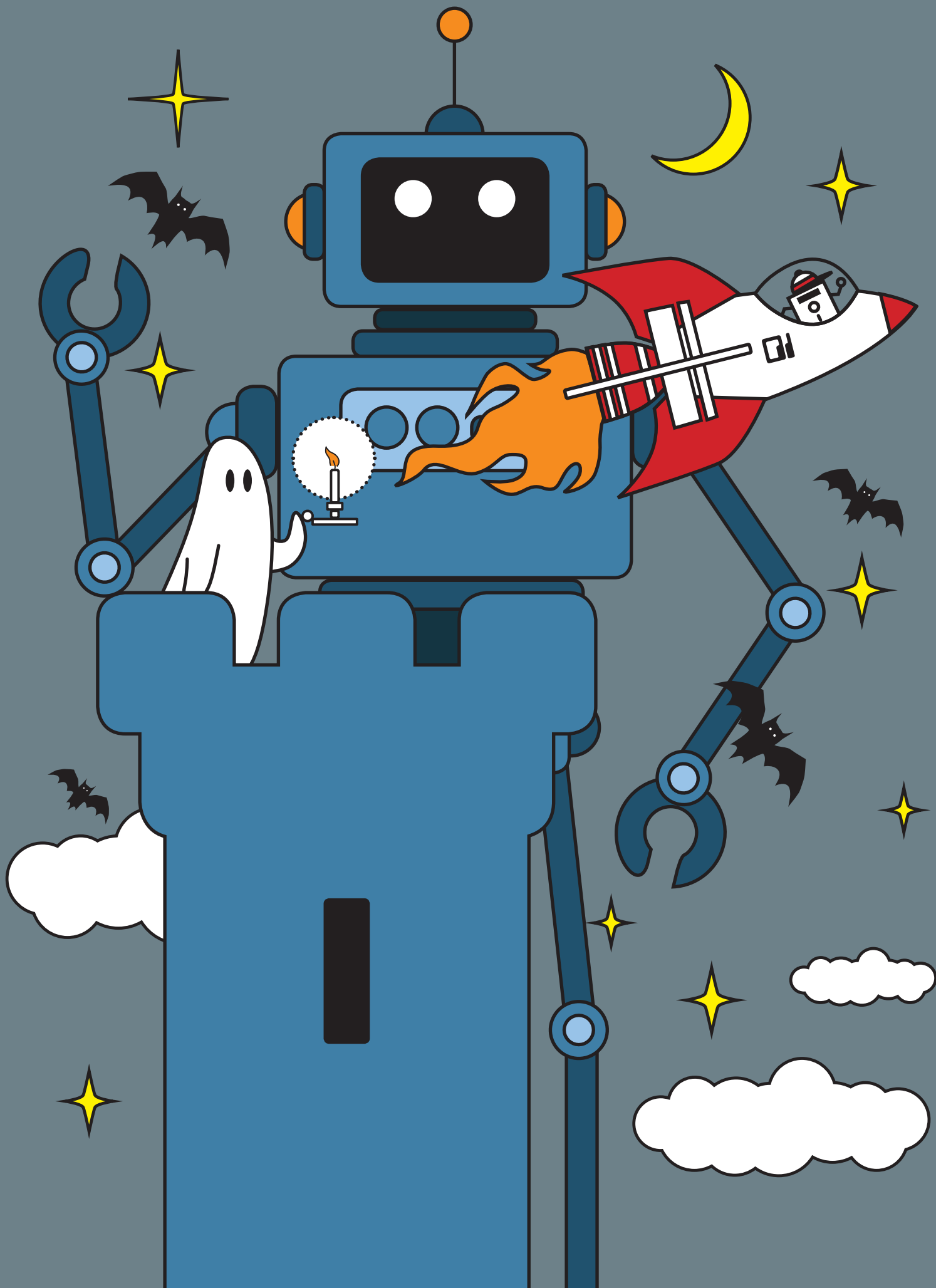
## /// THE CIRCUIT >>> DRAWN BY HAND

It's no problem, if you don't have a printer. You can draw the circuit on a piece of paper and start from this point. The only problem with this variation is, that your measurements of the IC —Socket has to be correct. Just take a ruler and take the measurements. Draw the part for the IC—Socket and see, if it would fit in. Continue with the connections. The measurements of these are not so important, as long as they don't touch each other or get to close. The rest of the process, is similar, to the printed version. If your first side is drawn, just fold the piece of paper and you can copy the other side through the paper, by holding it to your window.

# !!! WARNINGS !!!

If you don't know, what you're doing, just ask your parents, they'll help you out. Otherwise, ask a friend or your science teacher, what to do, at first.

I'm not responsible for any harm, due to the use of the Cardboard Circuits. And I'm not responsible for any machine you'll fry. Make sure, you do the right thing and read my warnings. If you are not familiar with Circuit Bending or soldering , just find out more about it. There are pretty much online resources and diy—guides, in form of Video—Tutorials and books!

Voltages from Battery Powered devices up to 12 Volts are OK. If you aren't sure about an electrical device, please, ask your parents, first! Don't open expensive machines, which aren't yours and think twice about it. Because there is a difference between cheap toy keyboards and things you can't replace. If you touch a power transformer, which is plugged directly into the wall, it will kill you.