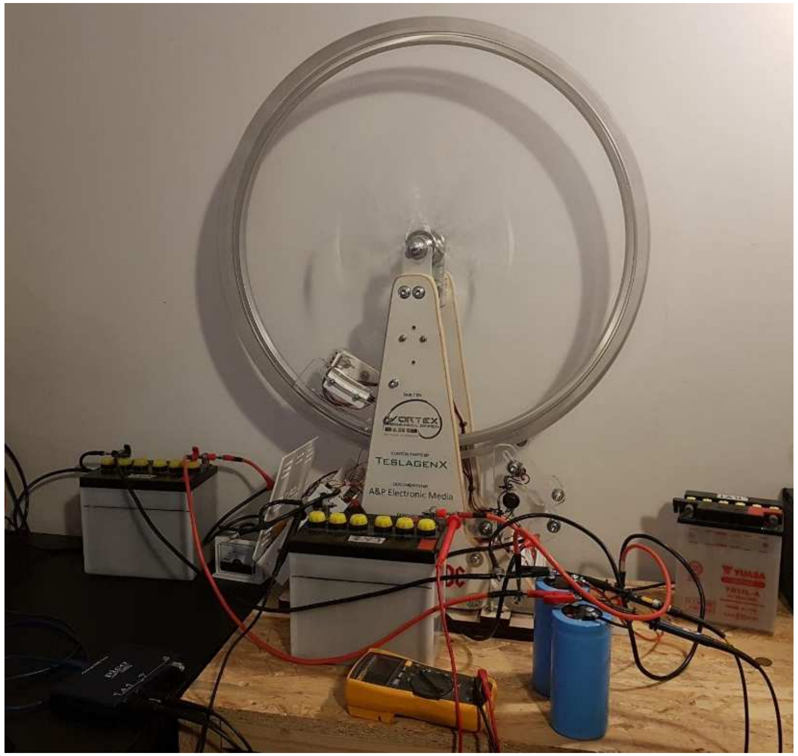
Back Pop Circuit tests

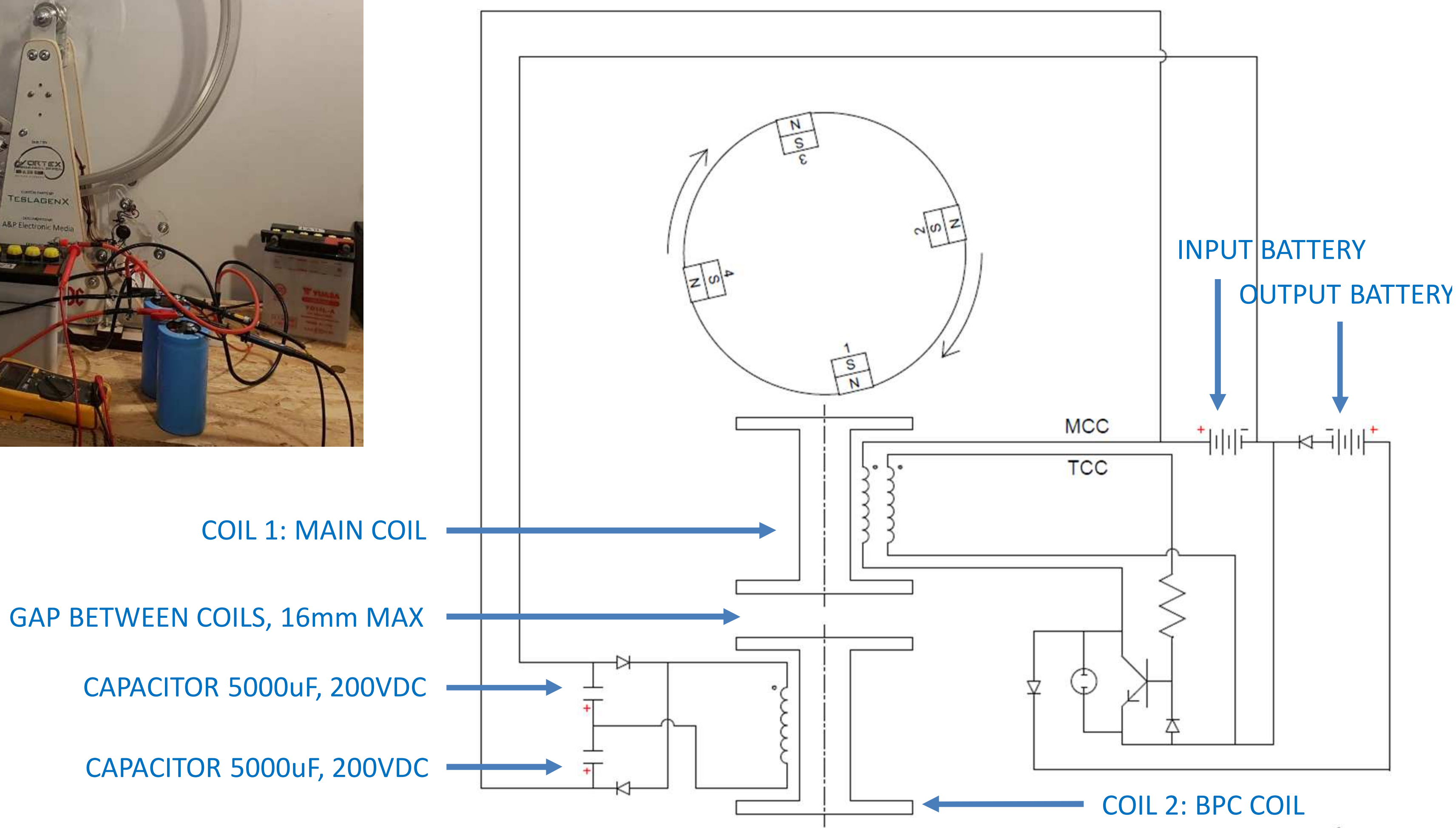
V2.0

2022-05-01



CIRCUIT FOR TESTS 1.1, 1.2, 1.3, 1.4

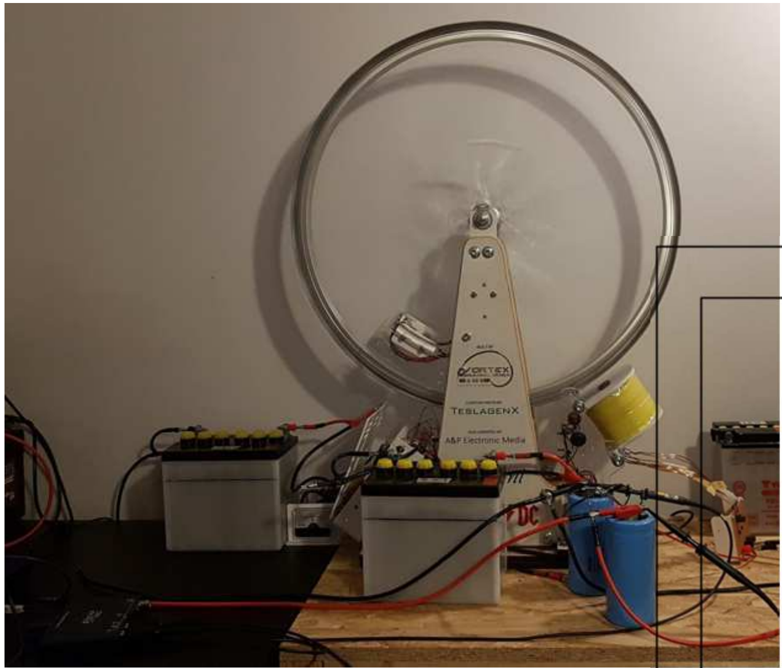
COIL 2: BPC COIL (SPARE MAIN COIL)



Back Pop Circuit tests

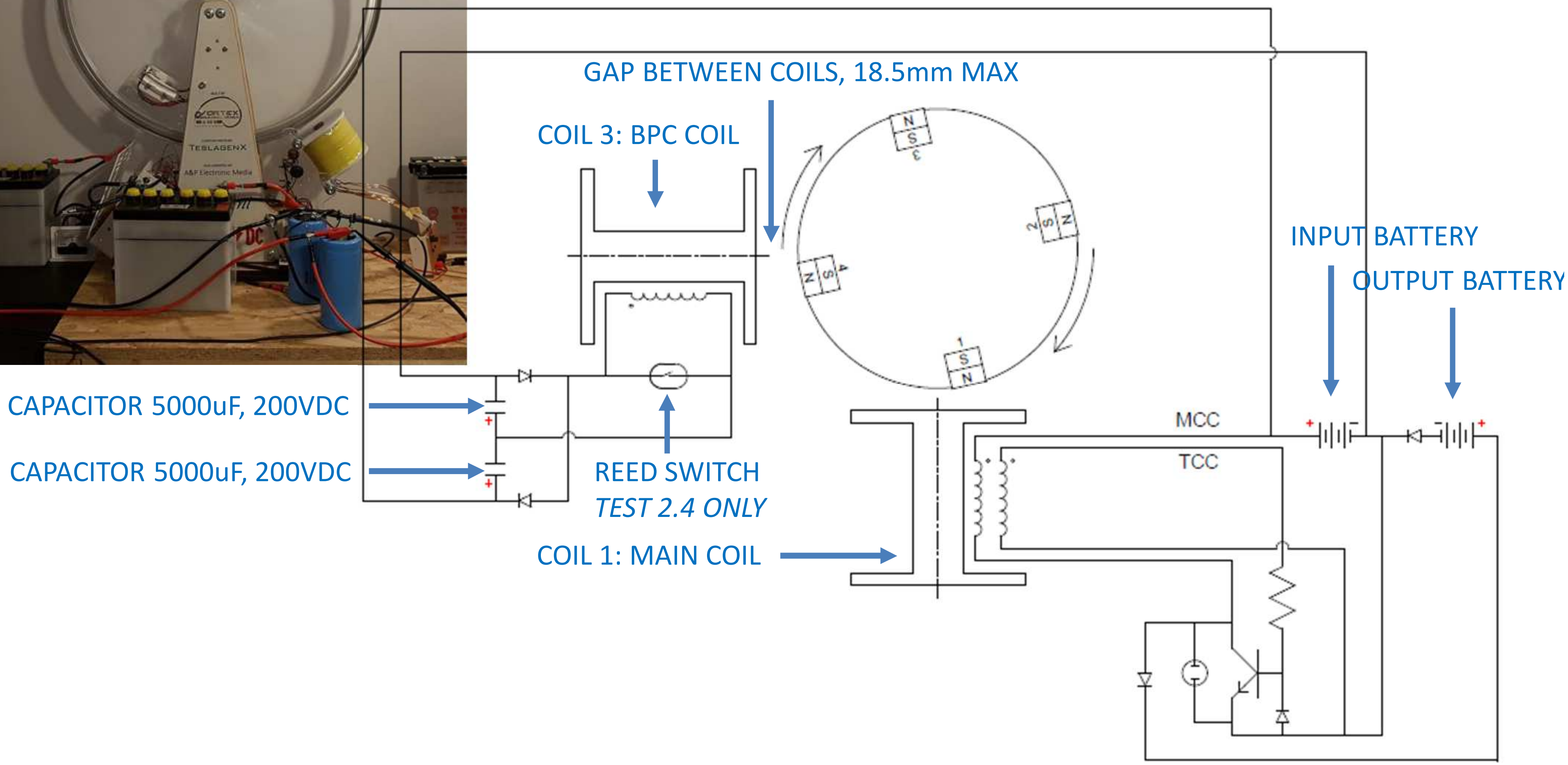
V2.0

2022-04



CIRCUIT FOR TESTS 2.1, 2.2, 2.3, 2.4 (REED SWITCH)

COIL 3: BPC COIL (GENERATOR COIL)



Content

Revision history

V2.0
-Added generator circuit image @ schematic
-Updated introduction
-Added revision history
-Added short conclusions after tests
-Added tests 2.1, 2.2, 2.3, 2.4
-Updated conclusions
-Added Appendixes

V1.0
-Original release
-Tests 1.1, 1.2, 1.3, 1.4 only

Introduction

The following tests are ‘quick and dirty’ tests to get a ballpark feeling for some parameters when using a Back Pop Circuit (BPC) to feed some energy back to the input

Main things I wanted to test are:
When the terminals of the capacitors are not connected to the input battery, how does the max voltage in the capacitors change when I:
-Increase the RPM (by changing my rotor)
-Decrease the gap between Coil 1 and Coil 2 / the rotor and Coil 3
-At which gap size (different for Coil 2 and Coil 3) does the BPC start to effect the charging process negatively

The test where performed roughly in the following way:
-with terminals of the capacitors not connected to the input battery I would wait till the RPMs were more or less stable and write down some parameters
-connect the terminals of the capacitors to the input battery and write down those same parameters

2022-04-19

Test 1.1: Baseline; Max gap 16mm, Rotor 1

Rotor 1, 24 / 22mm, 10mm gap
Gap between coils **16mm (max)**

Capacitors not connected -/ connected to input battery
RPM 202 / 203
Amp 1.2 / 1.2 A
Output battery voltage 14.50 / 14.51 V

Max voltage in capacitors when not connected to input battery: **18.53V**

Conclusion: At first glance the BPC (Back Pop Circuit) did not seem to have a negative effect on the charging with a 16mm gap between coils.

2022-04-20

Test 1.2: Increase RPM; Rotor 3 (instead of Rotor 1)

Rotor 3, 21 / 22mm, 6mm gap
Gap between coils **16mm (max)**

Capacitors not connected -/ connected to input battery
RPM 265 / 265
Amp 1.40 / 1.39 A
Output battery voltage 14.72 / 14.72 V

Max voltage in capacitors when not connected to input battery: **19.4V**

Conclusion: At first glance the BPC (Back Pop Circuit) did not seem to have a negative effect on the charging with a 16mm gap between coils. Increased RPM yields higher voltage in caps (when not connected to input battery). When connected to the battery the input amperage seems to drop slightly.

2022-04-23

Test 1.3: Decrease gap; 12mm (instead of 16mm)

Rotor 3, 21 / 22mm, 6mm gap
Gap between coils **12mm**

Capacitors not connected -/ connected to input battery
RPM 265 / 265
Amp 1.39 / 1.38 A
Output battery voltage 14.72 / 14.72 V

Max voltage in capacitors when not connected to input battery: **22V**

Conclusion: At first glance the BPC (Back Pop Circuit) did not seem to have a negative effect on the charging with a 12mm gap between coils. Decreasing the gap yields higher voltage in caps (when not connected to input battery). When connected to the battery the input amperage seems to drop slightly.

2022-04-23

Test 1.4: Decrease gap; 8mm (instead of 12mm)

Rotor 3, 21 / 22mm, 6mm gap
Gap between coils **8mm**

Capacitors not connected -/ connected to input battery
RPM 268 / 268
Amp 1.42 / 1.39 A
Output battery voltage 14.90 / 14.86 V

Max voltage in capacitors when not connected to input battery: **27.7V**

Conclusion: At first glance the BPC (Back Pop Circuit) seems to have a negative effect on the charging with a 8mm gap between coils. Decreasing the gap yields higher voltage in caps (when not connected to input battery). When connected to the battery the input amperage seems to drop and the voltage in the output battery too.
(I would expect that the RPMs would drop too but I didn't notice it, maybe because I did the test too quick/didn't wait long enough for the RPMs to start dropping).

2022-04-25

Test 2.1: Baseline; 18.5 Max gap

Rotor 3, 21 / 22mm, 6mm gap
Gap between generator coil & rotor magnets **18.5mm (max)**

Capacitors not connected -/ connected to input battery
RPM 264 / *
Amp 1.38 / *
Output battery voltage 14.64 / *
Input battery voltage 12.17 / *

Max voltage in capacitors when not connected to input battery: **7.7V**
**Since combined voltage in capacitors did not go above Input battery voltage, no valid measurements are available when connected to battery. However I connected the output wires of the capacitors briefly to the input battery, expecting to see the voltage in the capacitors jump to 12V.17V but they did not.*

Conclusion: At first glance the BPC (Back Pop Circuit) with a 18.5mm gap to the magnets could not generator sufficient voltage in the capacitors -> = total voltage in the capacitors was lower than the input battery voltage.

2022-04-25

Test 2.2: Decrease gap; 10mm (instead of 18.5mm)

Rotor 3, 21 / 22mm, 6mm gap
Gap between generator coil & rotor magnets **10mm**

Capacitors not connected -/ connected to input battery
RPM 263 / 263
Amp 1.3 / 1.3
Output battery voltage 14.84 / 14.84
Input battery voltage 12.17 / 12.17

Max voltage in capacitors when not connected to input battery: **16.48V**

Conclusion: At first glance the BPC (back Pop Circuit) did not seem to have a negative effect on the charging with a 10mm gap to the magnets. Decreasing the gap yields higher voltage in caps (when not connected to input battery).

2022-04-26

Test 2.3: Decrease gap; 6mm (instead of 10mm)

Rotor 3, 21 / 22mm, 6mm gap
Gap between generator coil & rotor magnets **6mm**

Capacitors not connected -/ connected to input battery
RPM 257 / 244
Amp 1.3 / 1.21
Output battery voltage 14.84 / 14.83
Input battery voltage 12.17 / 12.18

Max voltage in capacitors when not connected to input battery: **22.6V**

Conclusion: At first glance the BPC (Back Pop Circuit) seems to have a negative effect on the charging with a 6mm gap to magnets. Decreasing the gap yields higher voltage in caps (when not connected to input battery). When connected to the battery the input amperage seems to drop and the RPMS too.

2022-04-30

Test 2.4: Reed switch, 10mm gap; coil shortening

Rotor 3, 21 / 22mm, 6mm gap
Gap between generator coil & rotor magnets **10mm**

Capacitors not connected -/ connected to input battery /connected to input battery w. reed switch active
RPM 260 / 260 / 240 and falling
Amp 1.21 / 1.21 / 1.18
Output battery voltage 14.93 / 14.93 / 14.87
Input battery voltage 12.17 / 12.12 / 12.12

Max voltage in capacitors when not connected to input battery and reed active: **??V**
I forgot to have the capacitors not connected to the input batter, to look at the voltage with the reed switch active.

Conclusion: At first glance the BPC (Back Pop Circuit) seems to have a negative effect on the charging with a 10mm gap to magnets & the reed switch active. Activating the reed switch yields higher voltage in caps (when not connected to input battery). When connected to the battery the input amperage drops and the RPMS too.

Overal Conclusions

Influence of RPM
When increasing the RPMs (changing from rotor 1 to rotor 3) the total voltage over capacitors increased (when not connected to the input batteries

Influence of gap between Coil 1 & Coil 2 *(spare main coil)*
When decreasing the gap, the voltage over the capacitors increased (when the terminals of the capacitors were connected to the input battery)
The gap could be decreased to 12mm, seemingly with no negative effect on the charging process.
The amperage dropped slightly (when the terminals of the capacitors were connected to the input battery)
When decreasing the gap to 8mm the charging process of the output battery started to be effected in a negative way.

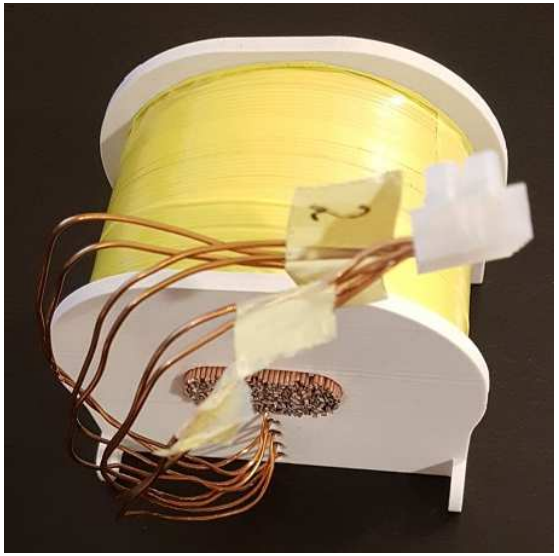
Influence of gap & reed switch between the magnets(rotor) & Coil 3 *(generator coil)*
When decreasing the gap, the voltage over the capacitors increased (when the terminals of the capacitors were connected to the input battery)
The gap could be decreased to 10mm, seemingly with no negative effect on the charging process.
The amperage dropped slightly (when the terminals of the capacitors were connected to the input battery)
When activating the reed switch @ 8mm the voltage in the caps increased even further, the amperage dropped further, but the charging process of the output battery was effected negatively.
When decreasing the gap to 6mm (reed switch inactive) the charging process of the output battery started to be effected in a negative way.

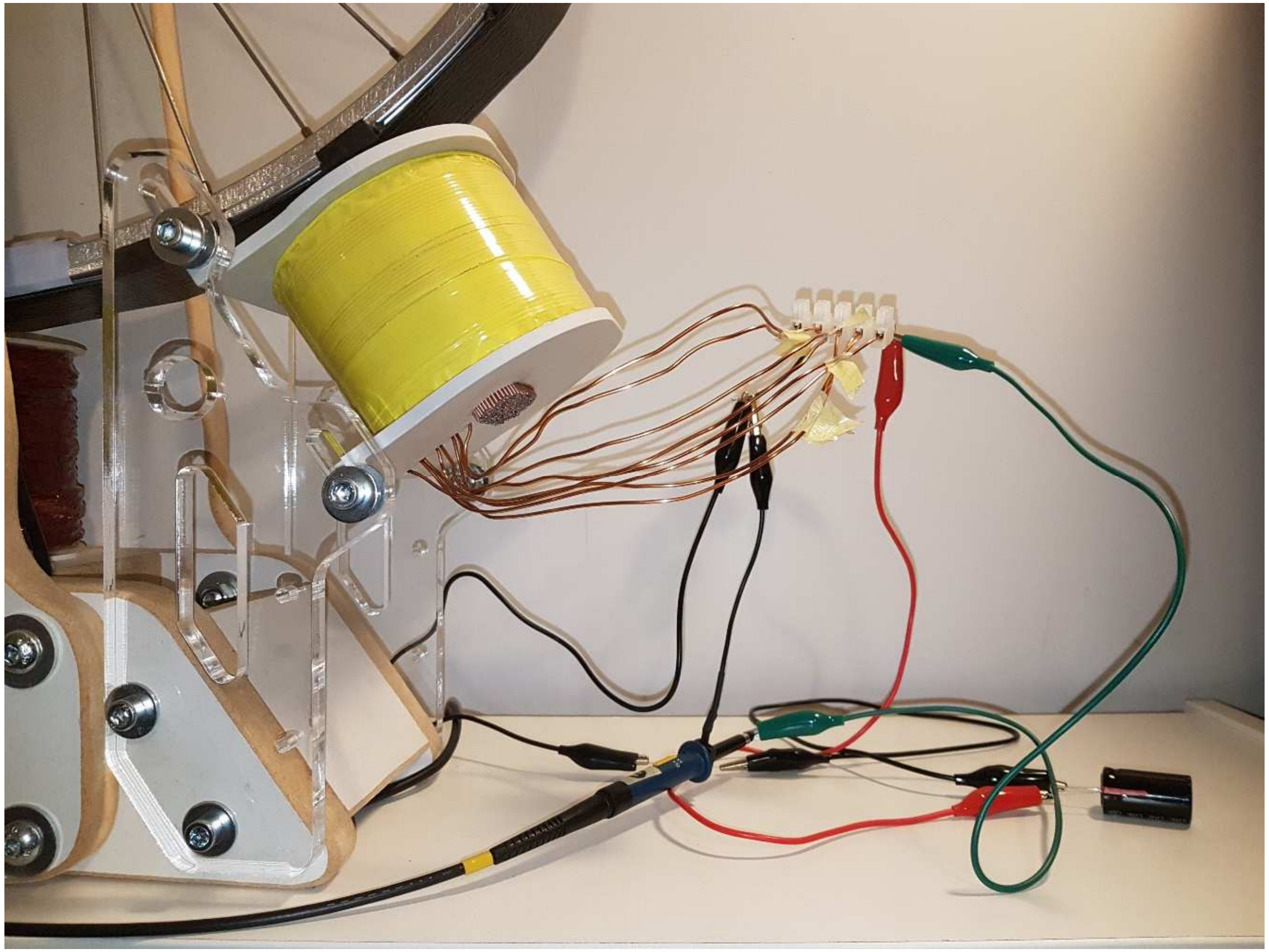
As mentioned in the introduction, these tests were performed very quickly, to get an initial idea for the influence of the Back Pop Circuit and its parameters. Although it seemed that the increased RPMs and a gap reduction to 12mm would influence the output of the Back Pop Circuit in a positive way without influencing the voltage in the output battery, only full charge cycles would show if a real overall performance increase is gained with this Back Pop Circuit.

Appendix – Coil 2 spec

(generator coil)

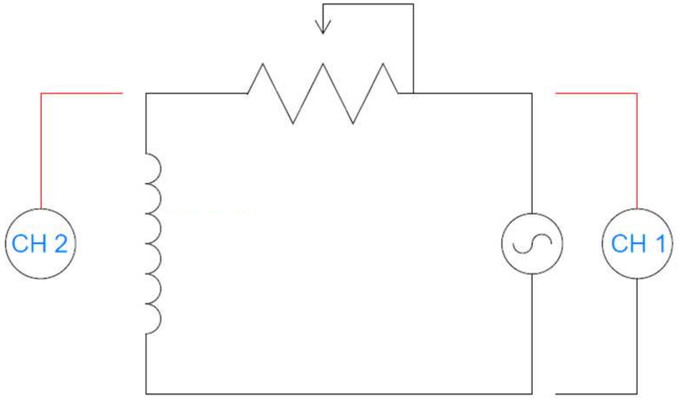
-Coil wire AWG 16
-4x Coil 291 windings, in series
-Total 1164 windings
-Total inductance +/-1.35H
-Core = welding rods, DIN 8554:G1 (=R45)

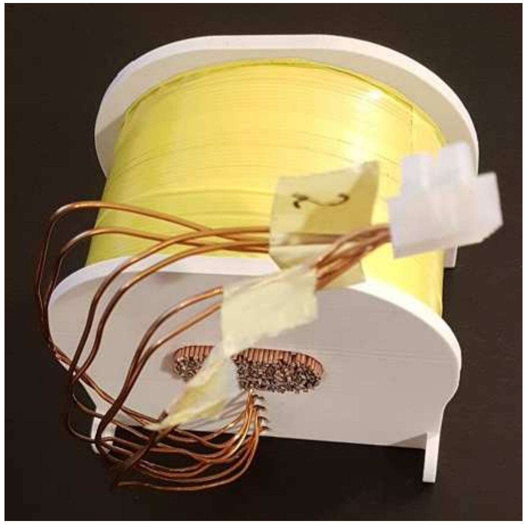




Appendix – Coil 2 spec

(generator coil)





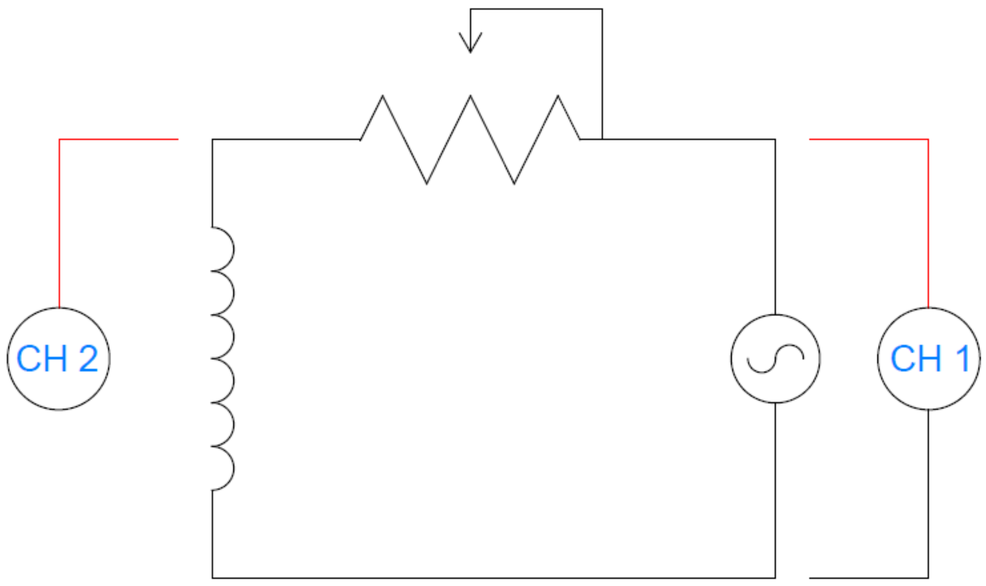
Resistance of Coil (As Built)				
Inner diameter wire	Ø	1.32	mm	
Surface area wire		1.59	mm2	
Nr of windings	n	1164	-	*As Built*
Length of wire	L	308362	mm	
		308	m	
Resistance/length		0.01317	Ω/m	
Resitance Coil calculated	R	4.1	Ω	

https://en.wikipedia.org/wiki/Henry_(unit)

Resistance of Coil (As Built)					**Signal generator to calculate inductance of Coil**		
Coil 1	R	1	Ω	*Gemeten via kroonsteentje*	Freq. Hz	Coil Res. Ω	Induct. H
Coil 2	R	1.2	Ω	*Gemeten via kroonsteentje*	500	648.1	1.30
Coil 3	R	1.4	Ω	*Gemeten via kroonsteentje*	200	273.9	1.37
Coil 4	R	1.6	Ω	*Gemeten via kroonsteentje*	100	136.2	1.36
					50	71.6	1.43
Total	R	3.9	Ω	*Gemeten via kroonsteentje*	10	13	1.30

Appendix – Coil 3 spec

(spare main coil)



OLD TGX Coil	8 power windings		1 winding (nr1)		Trigger winding	
Freq. Hz	Coil Res. Ω	Induct. H	Coil Res. Ω	**Induct. H**	Coil Res. Ω	Induct. H
2000	55	0.03	55	**0.028**	55	0.03
1000	31.1	0.03	31.1	**0.031**	31.1	0.03
500	17.3	0.03	17.3	**0.035**	17.3	0.03
200	9.3	0.05	9.3	**0.047**	9.3	0.05
100	6.7	0.07	6.7	**0.067**	6.7	0.07
Ressitance 8pw	1.4	Ω				
Ressitance 1pw	2.5	Ω				
Ressitance Tw	3.9	Ω				