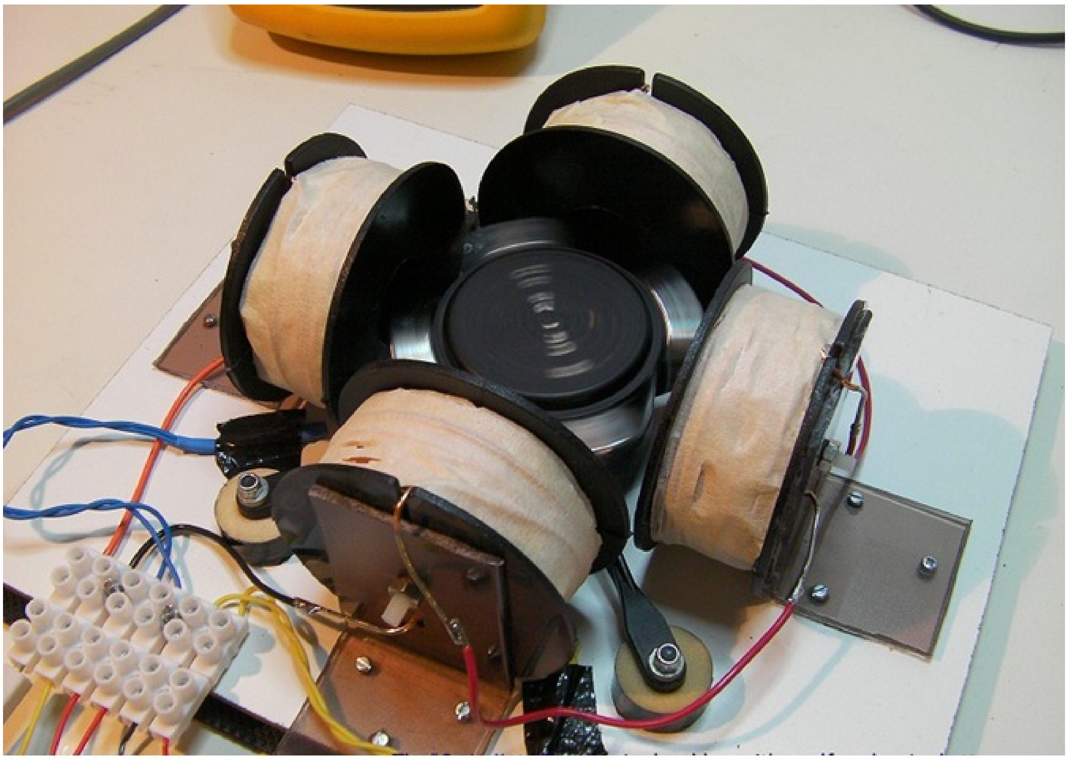
The "Brandon motor"

The "Brandon motor" has been designed by an Australian fascinated by free energy researches. His new innovative design motor is based on very high efficiency pulse motor. The "Brandon motor" is able to run in closed loop for months and self-charge its own battery, its efficiency is very close to 100% and may be more...



The "Brandon motor" uses four AIR CORE coils and four NdFeB magnets mounted on rotor.

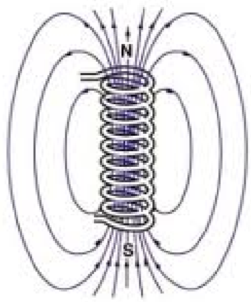
The rotor can be build from a computer fan or anything that may come in handy.

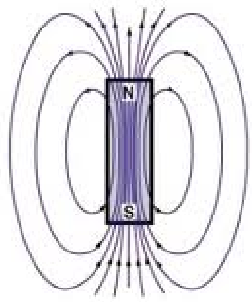
Let me explain the principles of the Brandon Motor:

AIR CORE is a type of magnet in which the magnetic field is produced by the flow of electric current. The magnetic field disappears when the current is turned off.

Electromagnets are widely used as components for lots of electrical devices, such as motors, generators, relays, loudspeakers, hard disks, etc.

An electric current flowing through a wire creates a magnetic field around the wire . To concentrate the magnetic field, in an electromagnet the wire is wound into a coil with lots of turns lying side by side. The magnetic field created this way passes through the center of the coil, creating a very strong magnetic field there.





The direction of the magnetic field of a coil can be determined using the right-hand rule. If the fingers of the right hand are curled around the coil in the direction of current flow (conventional current, flow of positive charge) through the windings, the thumb points in the direction of the field inside the coil. The side of the magnet that the field lines emerge from is defined to be the *north pole*.

The main advantage of an electromagnet over a permanent magnet is that the magnetic field can be rapidly manipulated over a wide range by controlling the amount of electric current passing the coil.

NdFeB magnets or neodymium magnets:

This type of magnet is widely used.

It is a permanent magnet made from an alloy of neodymium, iron, and boron.

This materials are used to form the $Nd_2Fe_{14}B$ tetragonal crystalline structure.

Developed in 1982 by General Motors and Sumitomo Special Metals, neodymium magnets are the strongest type of permanent magnets ever made.

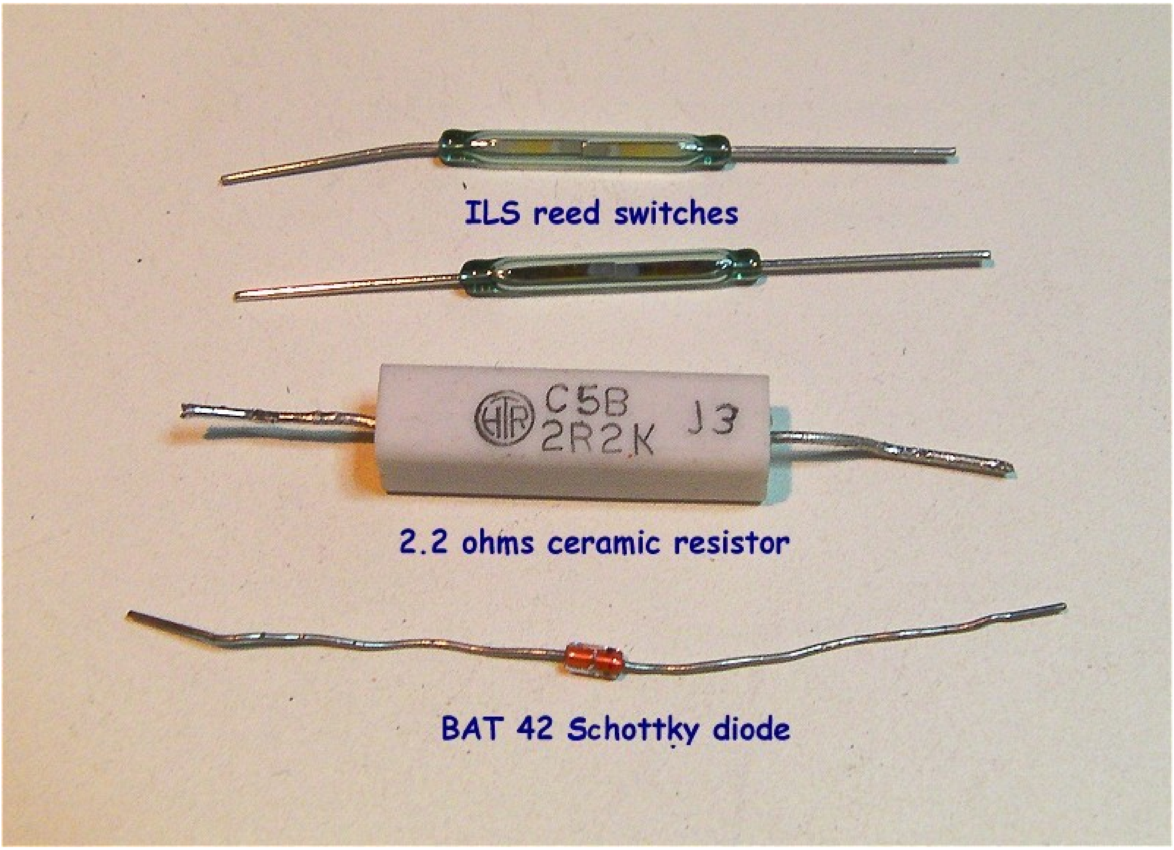
Neodymium magnets have replaced alnico and ferrite magnets in many of the myriad applications of the modern products that require strong permanent magnets, such as motors incordless tools, hard disk drives, and magnetic fasteners.

Due to their greater strength allows us the use smaller, lighter magnets for any given application.

Part List

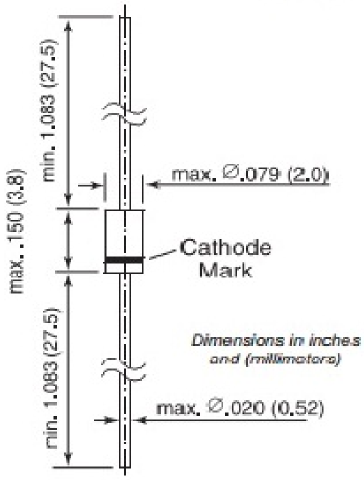
Below are the additional components required to build the "Brandon motor":

- BAT 42 schottky diode
- 2.2 ohms ceramic resistor
- ILS reed switches



BAT 42 schottky diode: is used for general purpose applications. These diodes feature very low turn- on voltage and fast switching. These devices are protected by a PN junction guard ring against excessive voltage, such as electrostatic discharges.

Such a diode is required to reduce voltage drop during the charge of the battery.



ABSOLUTE RATINGS (limiting values)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		30	V
I_F	Forward Continuous Current	$T_a = 25°C$	200	mA
I_{FRM}	Repetitive Peak Fordware Current	$t_p \leq 1s$ $\delta \leq 0.5$	500	mA
I_{FSM}	Surge non Repetitive Forward Current*	$t_p = 10ms$	4	A
P_{tot}	Power Dissipation*	$T_l = 65$ °C	200	mW
T_{stg} T_j	Storage and Junction Temperature Range		- 65 to +150 - 65 to +125	°C °C
T_L	Maximum Temperature for Soldering during 10s at 4mm from Case		230	°C

THERMAL RESISTANCE

Symbol	Test Conditions	Value	Unit
$R_{th(j-a)}$	Junction-ambient*	300	°C/W

ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS

Symbol	Test Conditions			Min.	Typ.	Max.	Unit
V_{BR}	Tj = 25°C	I_R = 100µA		30			V
V_F*	T_j = 25°C	I_F = 200mA	All Types			1	V
	T_j = 25°C	I_F = 10mA	BAT 42			0.4	
	T_j = 25°C	I_F = 50mA				0.65	
	T_j = 25°C	I_F = 2mA	BAT 43	0.26		0.33	
	T_j = 25°C	I_F = 15mA				0.45	
I_R*	T_j = 25°C		V_R = 25V			0.5	µA
	T_j = 100°ÉC					100	

DYNAMIC CHARACTERISTICS

Symbol	Test Conditions	Min.	Typ.	Max.	Unit
C	T_j = 25°C V_R = 1V f = 1MHz		7		pF
trr	Tj = 25°C I_F = 10mA I_R = 10mA i_{rr} = 1mA R_L = 100Ω			5	ns
h	T_j = 25°C R_L = 15KΩ C_L = 300pF f = 45MHz V_i = 2V	80			%

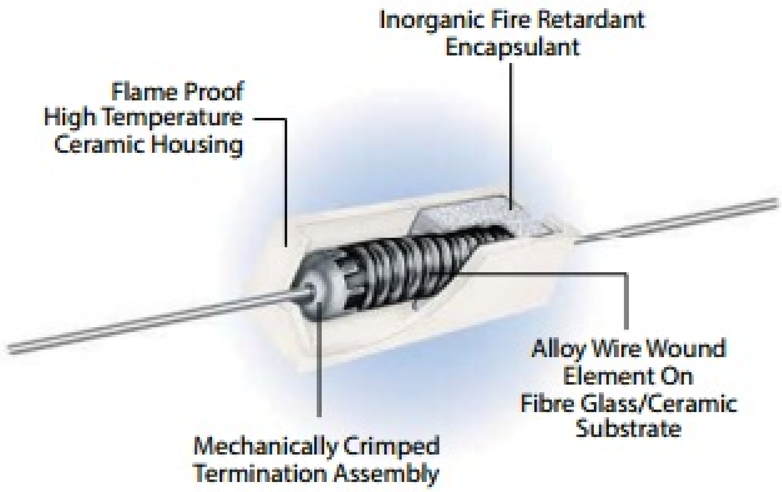
<u>**2.2 ohms ceramic resistor**</u> are almost universally used in the far east for all radio, TV and industrial equipment applications.

Due to the excellent stability on high temperature, no damage can be caused to neighbouring components;

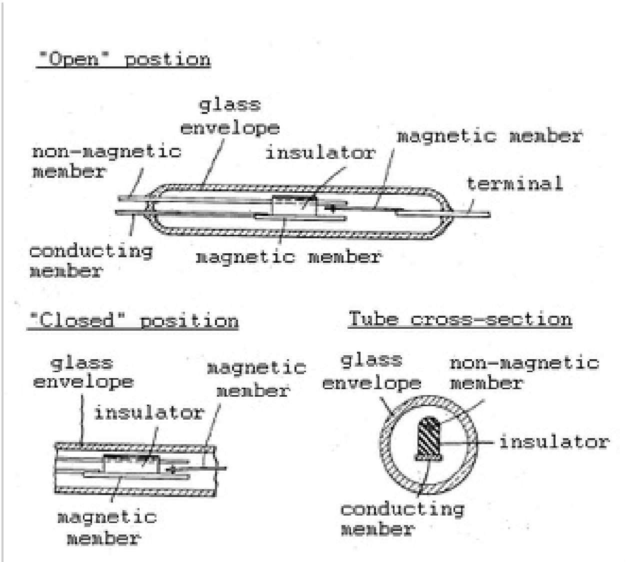
They are resistant to humidity and shock and have a pretty low price. Due to a very high degree of insulation and low surface temperature, these resistor can be mounted with their bodies relatively closer to the PCB.

- Instant overload capability; low noise figure
- Non-Flammable Construction
- Low-Inductance type is available

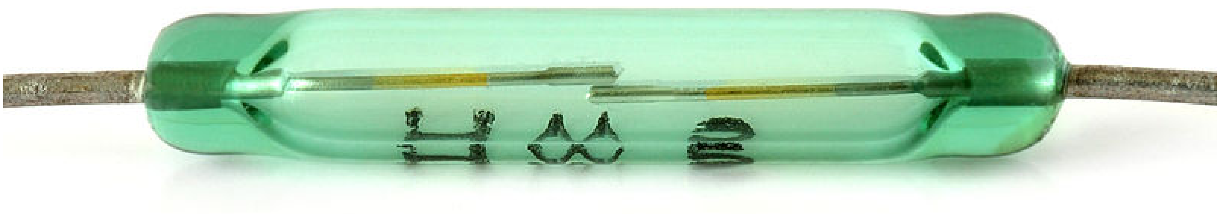
- Low and High Resistance value available
- Temperature Coefficient: ±300ppm/°C
- Resistance Tolerance: ±5%



ILS reed switches is an electrical switch operated by an applied magnetic field. It was invented at Bell Telephone

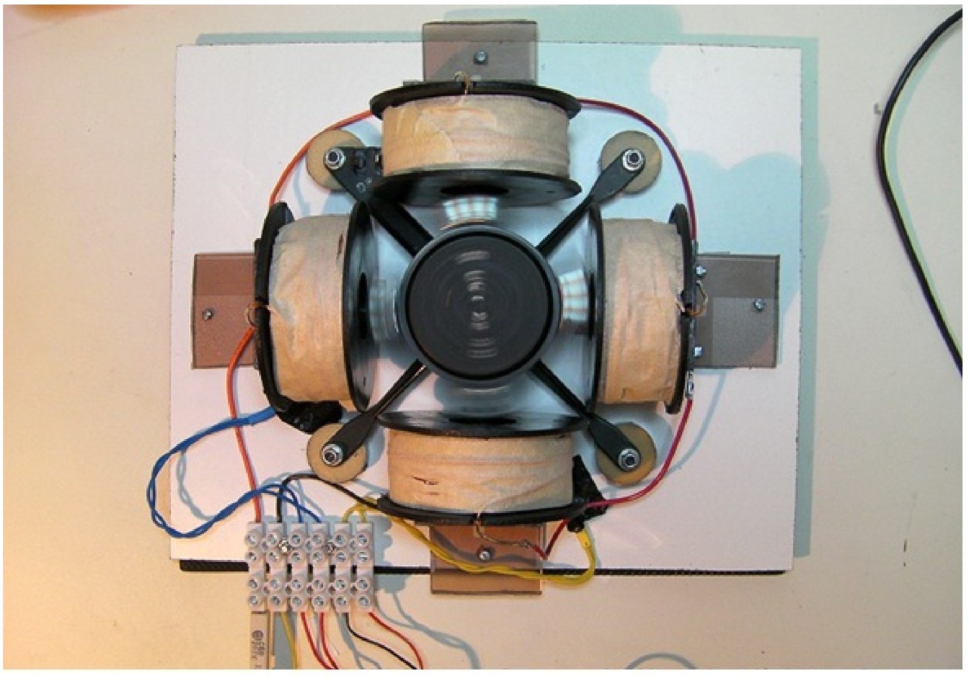


Laboratories in 1936 by W. B. Ellwood. It consists of a pair of contacts on ferrous metal reeds in a hermetically sealed glass envelope. The contacts are opened in state, closing when a magnetic field is applied, or they could be closed in the origin state and opened when a magnetic field is applied. The switch can be actioned by a coil, making a reed relay, or by bringing a magnet close to it. Once the magnet is pulled away from the switch, the reed switch will go back to its original position.



The reed switch contains a pair (or more) of magnetizable, flexible metal reeds. The end portions are separated by a small gap. The reeds are hermetically sealed in opposite ends by a tubular glass envelope. One important quality of the switch is its sensitivity.

You will find, below, the full construction details and diagram of the "Brandon motor".



Magnets specifications:

4 NdFeB magnets (Bremag 27) of 27 MGoe (208 kJ/m3) polarisation N outward.

Magnet size: diameter 22 mm, 10 mm thick

Coils specifications:

Four AIR CORE coils: Monacor LSIP 180

Inductance : 1.8 mH, Rdc: 0.55 ohm

Outer diameter: 70 mm, Inner diameter: 23 mm, thickness: 30 mm

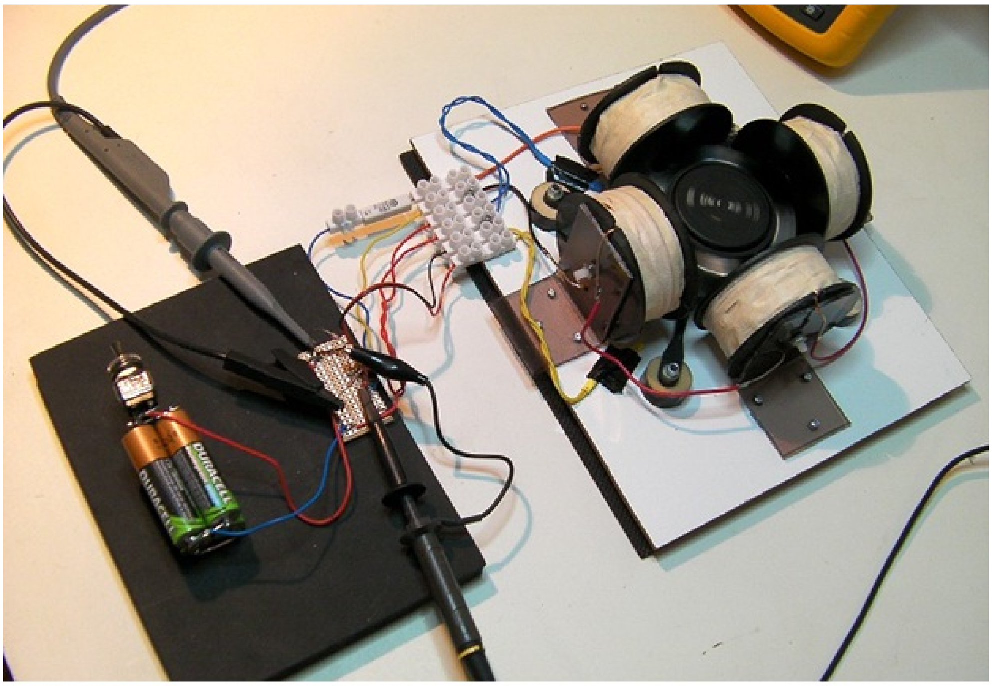
Rotor specifications:

Rotor made from an old computer fan, diameter = 52 mm

less than 2mm gap beetwen the rotor and the air core coils

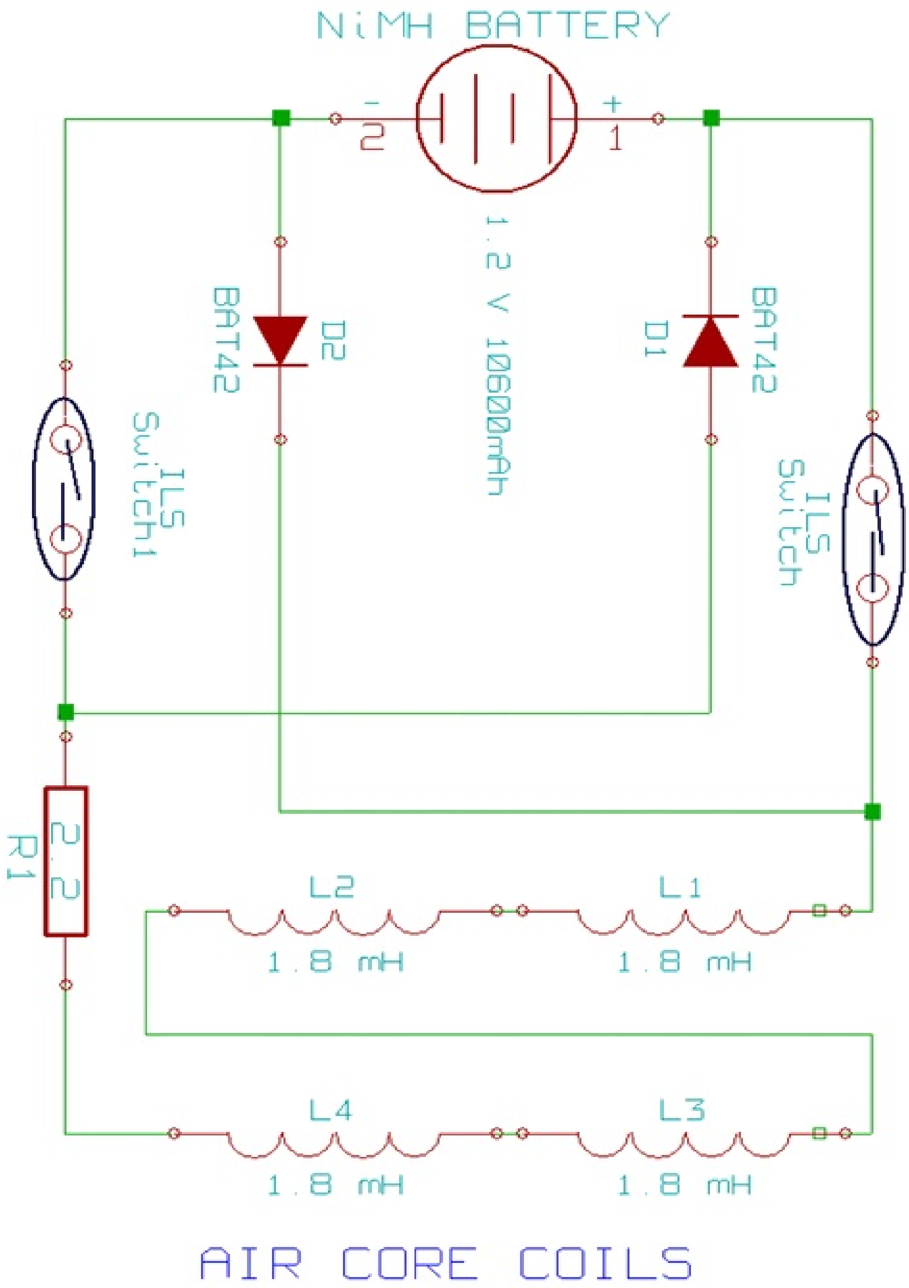
Battery: NiMh battery from 1.2 to 6V can be used

The blades of the computer fan have been removed and the Neodymium magnets have been fixed with cyanoacrylate glue on the rotor.

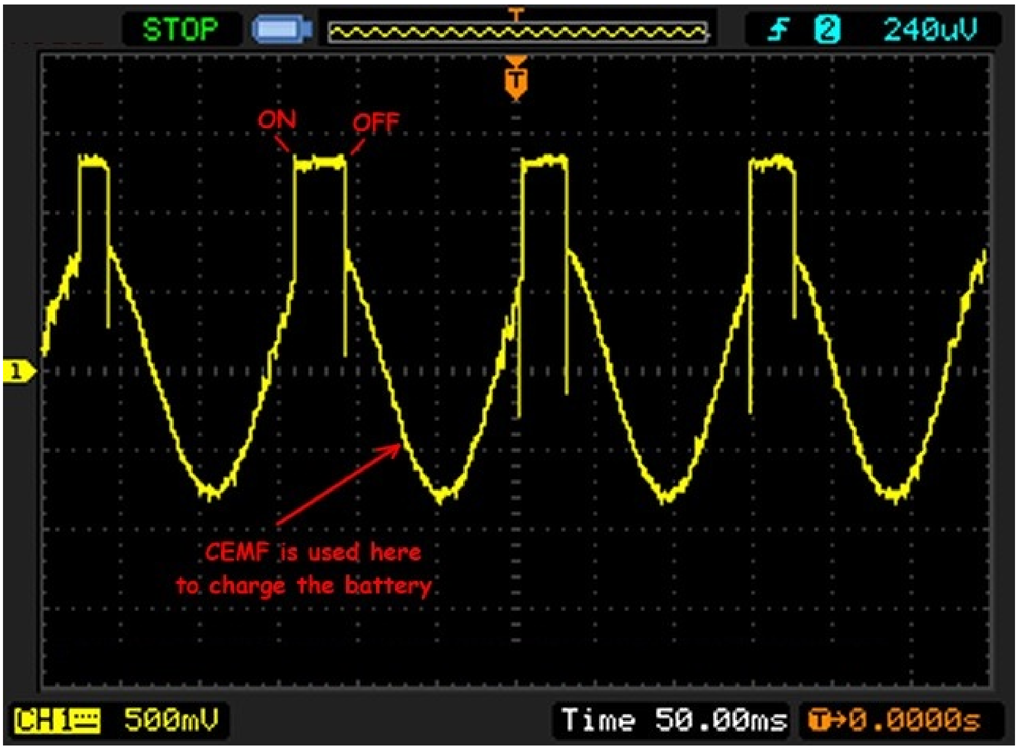


In the closed loop test, I have used 4 NiMh cells (4x 1.2v connected in parallel),
Each cell capacity is 2650 mAh, this gives a total of 10600 mAh,
With this battery, the "Brandon motor" is able to self run for a very long time...

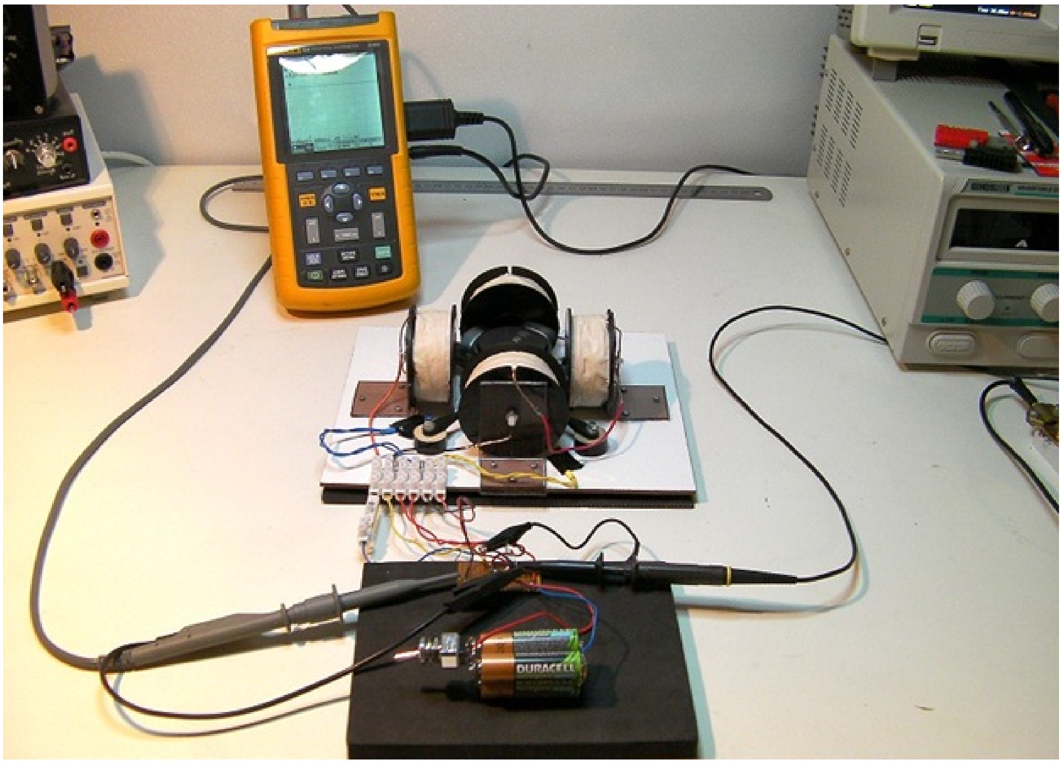
This is the schematic diagram of Brandon Motor:



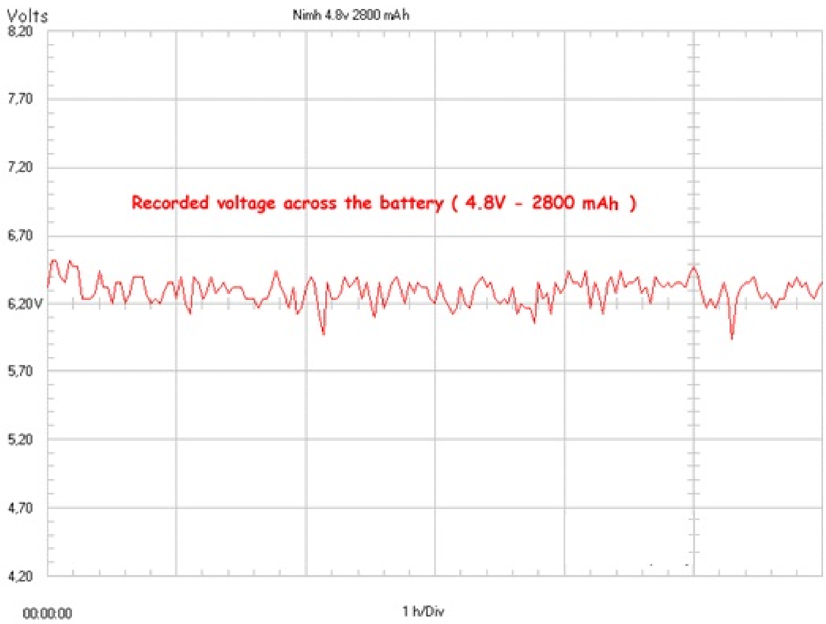
The ceramic resistor 2.2 ohms is used to reduce the current flow in the coils



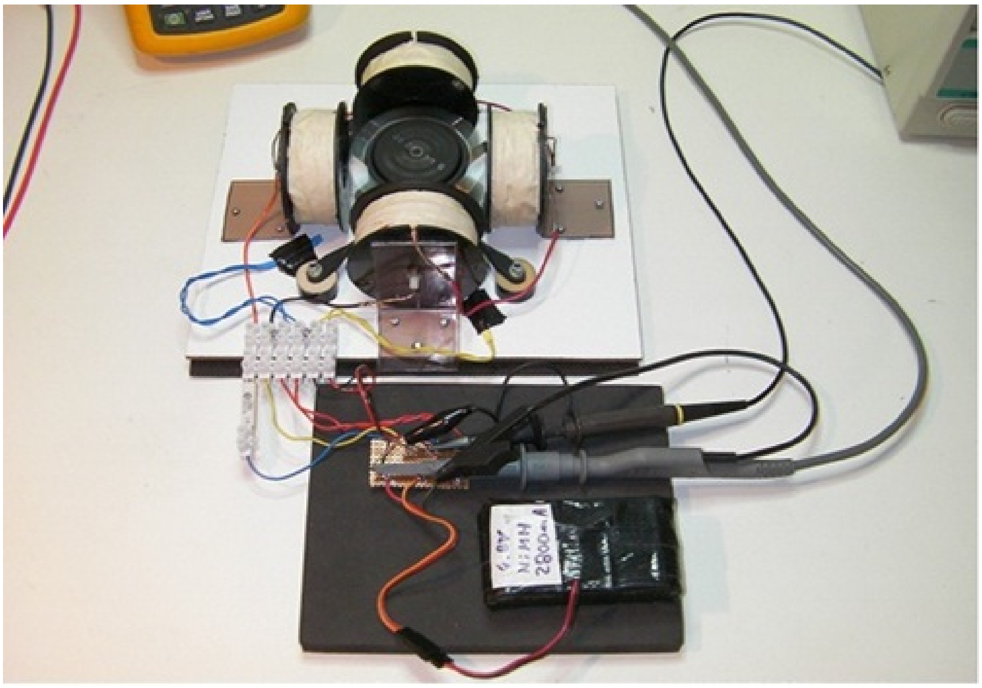
Above, the voltage across the coils: Timing is very important here, the 1st ILS switch is used to set the start of the pulse, the 2nd ILS switch is used to set the end of the pulse. Shorter the pulse is, better the efficiency... The CEMF induced in the air coils by the strong Neodymium magnets is used here to charge the battery, so the motor is able to self-charge its own battery through the fast switching and low voltage drop.



This are the voltage recorded across the battery in closed loop mode.



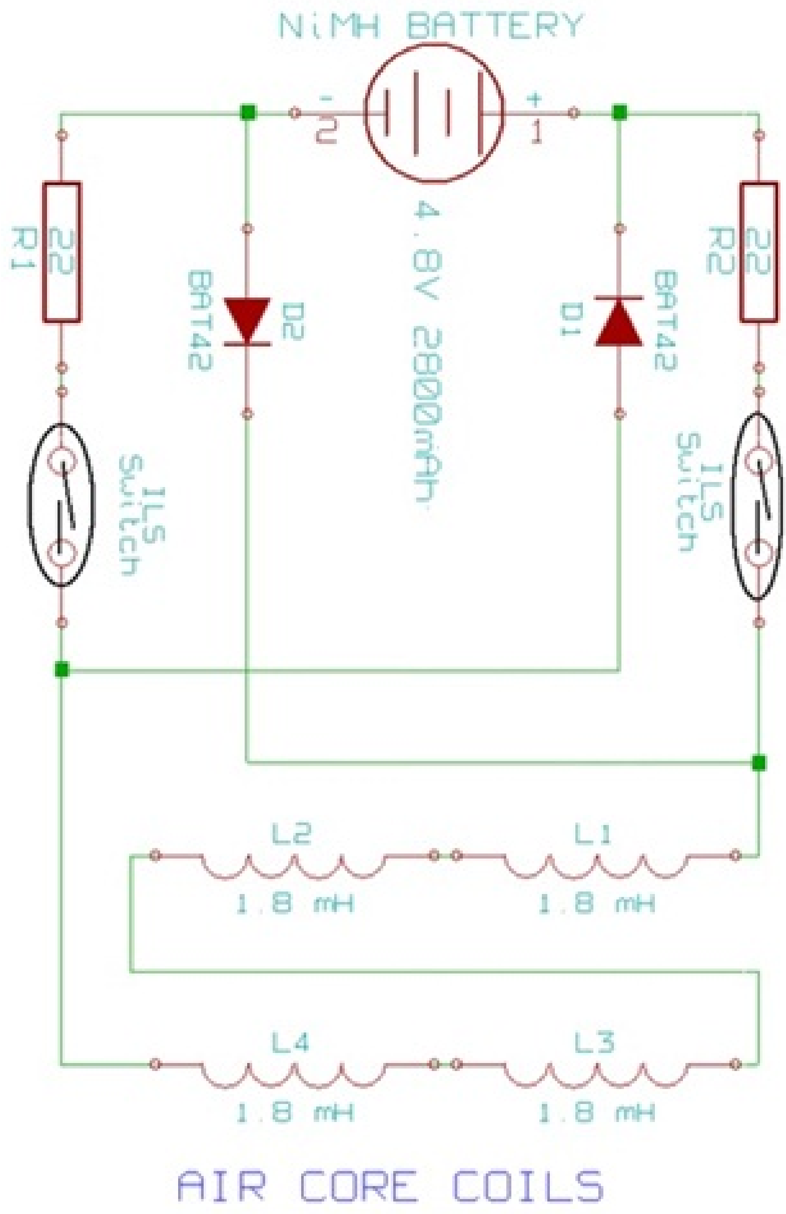
To reduce the duration of the battery voltage measurement, I have used a 4.8V NiMh battery (2800 mAh) (photo below),

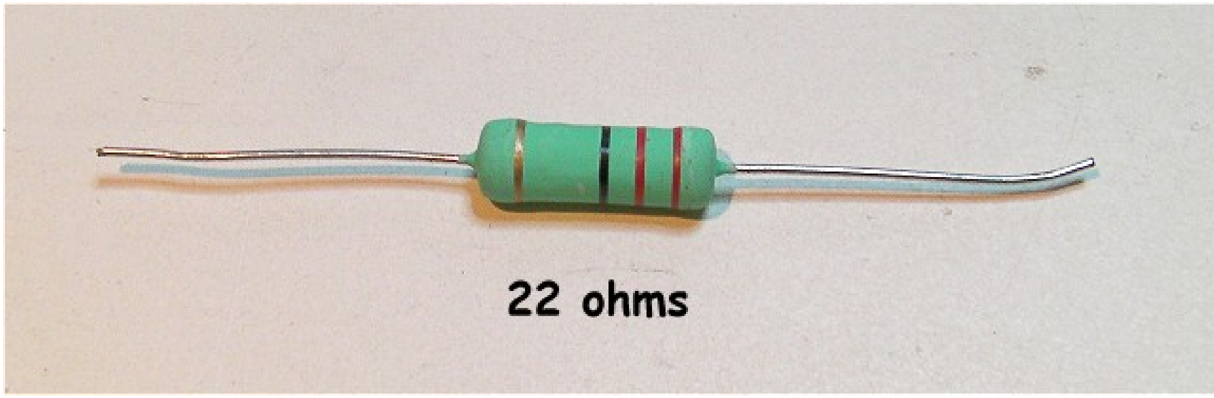


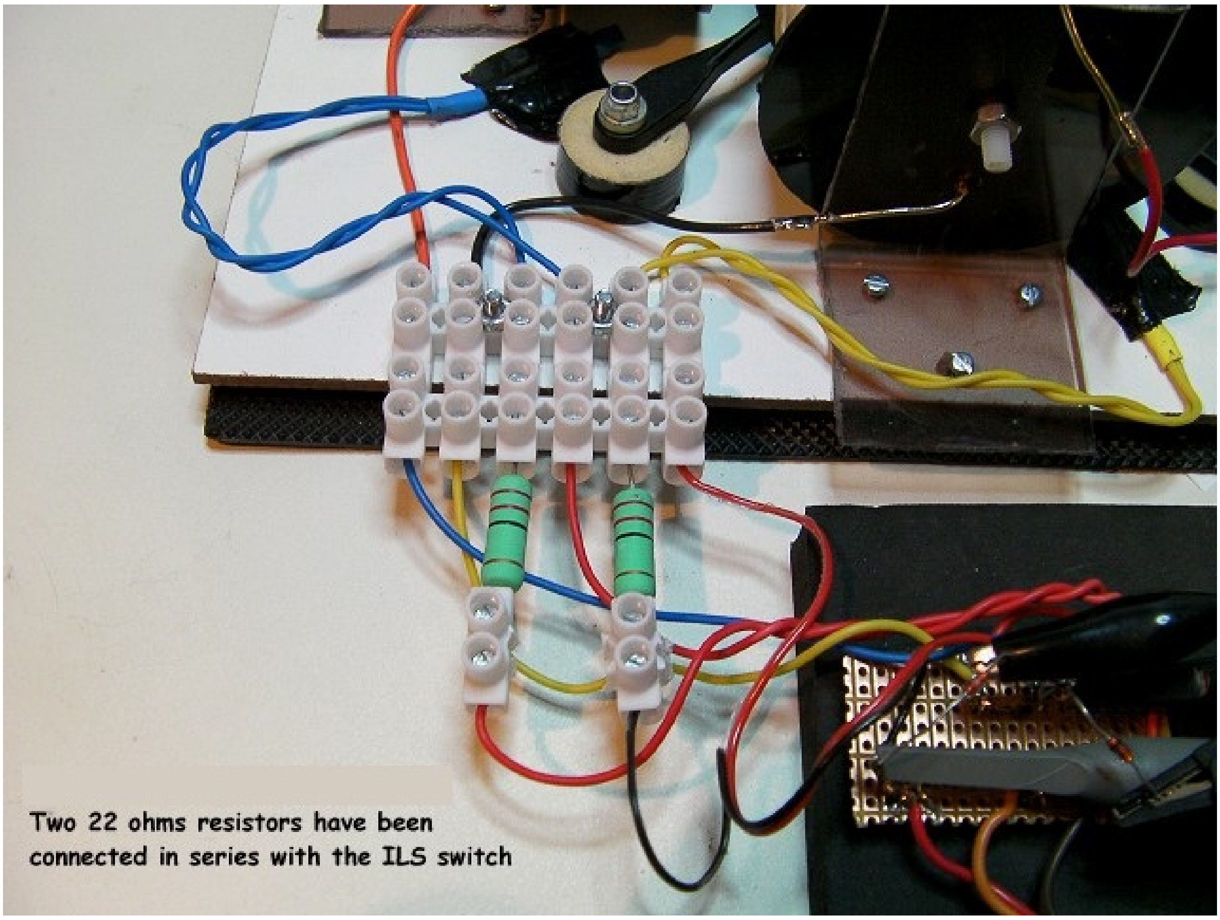
<u>Parts list for the "Brandon motor" construction</u>

1	An old computer fan with its blades removed
4	Neodymium magnets (22 mm diameter and 10 mm thick)
4	Air coils, Monacor LSIP 180 - Inductance : 1.8 mH, Rdc: 0.55 ohm
2	Schottky diodes BAT 42
2	ILS reed switches
1	Ceramic resistor 2.2 ohms
1	High capacity NiMH battery (from 1.2v to 6 V)

I have reduced significantly the pulse current by adding two 22 ohms resistors in series with the ILS reed switches and removed the previous 2.2 ohms in serie with the coil. So, the coils are connected directly to the battery through the Schottky diodes and thus the charging effect is better while the current spent for the pulse is significantly reduced.... See the new diagram below :

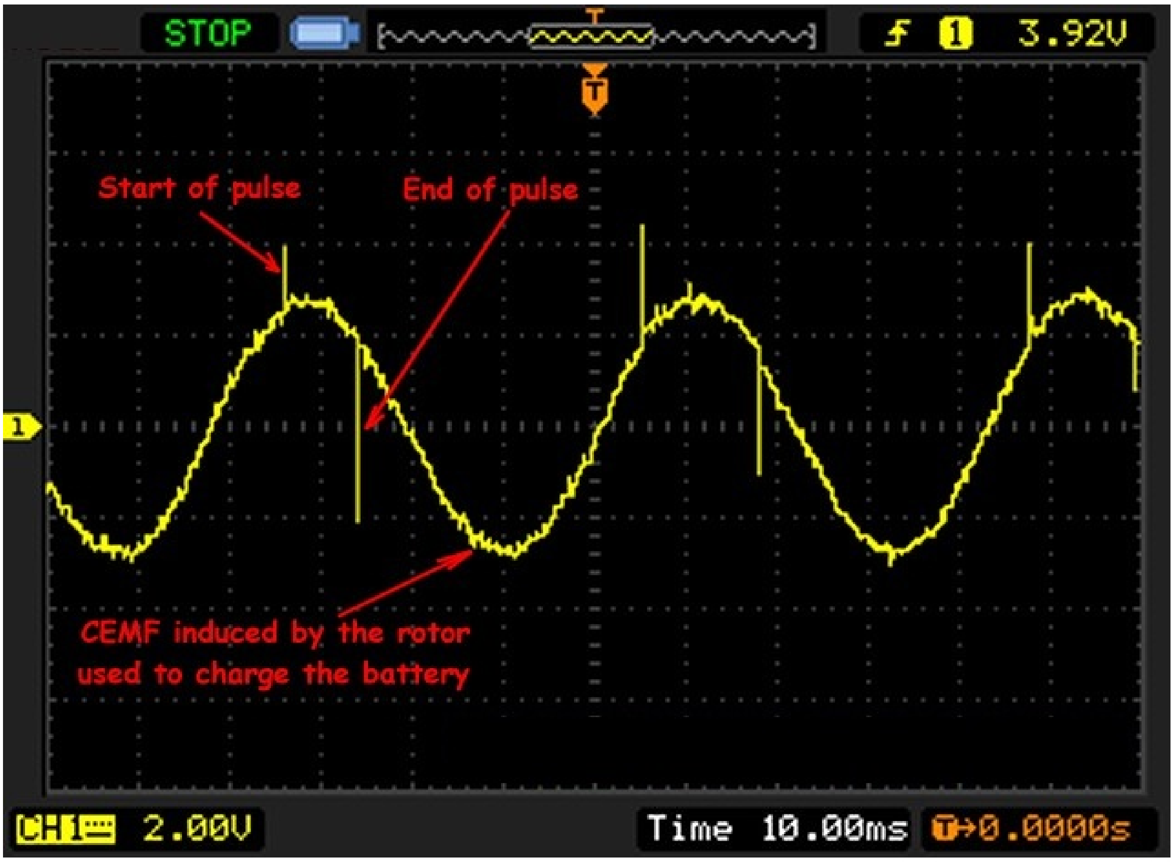



22 ohms


Two 22 ohms resistors have been
connected in series with the ILS switch

TEST RESULTS

Woow... The result is indeniable, the "Brandon motor" still turns at full speed and continue to produce a strong CEMF to contribute to the charge of the battery while shape of the pulse begins insignificant compared of the level of the CEMF. Only the start and the end of pulse spikes can be observed... See the scope picture below :



In this case the "Brandon motor" is able to run itself for a lot of days...

Multimeter Datalog

ID du multimètre : FLUKE 189 V2.02

Rév. 3.0

Heure de début	30/01/2010 19:01:38
Heure de fin	05/02/2010 06:51:31
Temps écoulé	131:49:53
Intervalle	0:05:00
Nombre de relevés	1589
Evénements d'entrée	8 (% des valeurs : 4% V DC)
Intervalles	1582
Mise à l'échelle	(sans)

Max	Moyenne	Min
5,595 V DC	4,976 V DC	3,3003 V DC

Date enregistrée : 05/02/2010 10:18:29

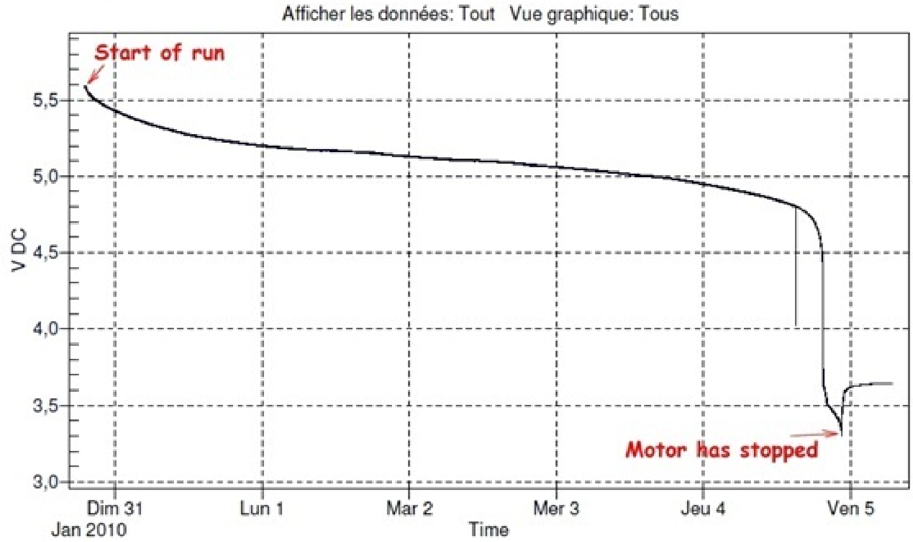
Données transférées :

Objet du Test

Motor" v1.2 - Long run test in closed loop

Battery : NiMh 4.8 V 2800 mAh
Test started at full charge

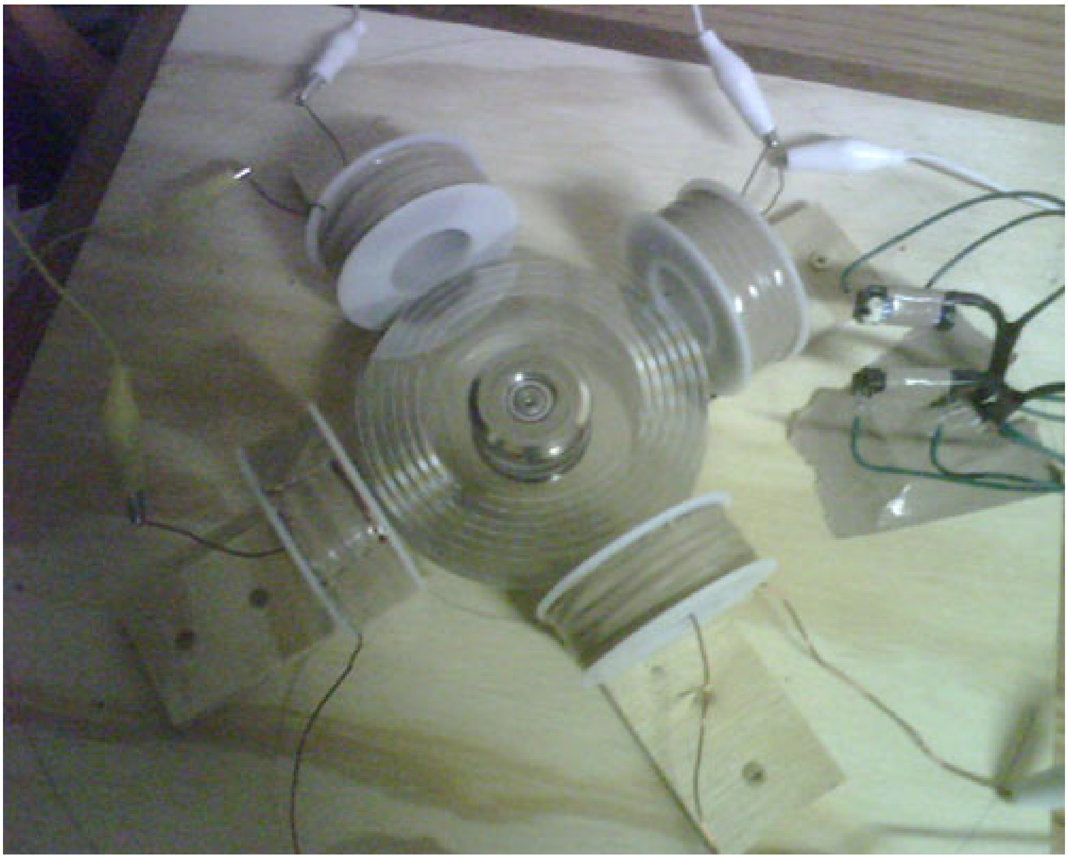
Nom du graphique : "Ossie Motor" v1.2 - Long Run Test in closed loop on a NiMh 4.8 V 2800 mAh battery

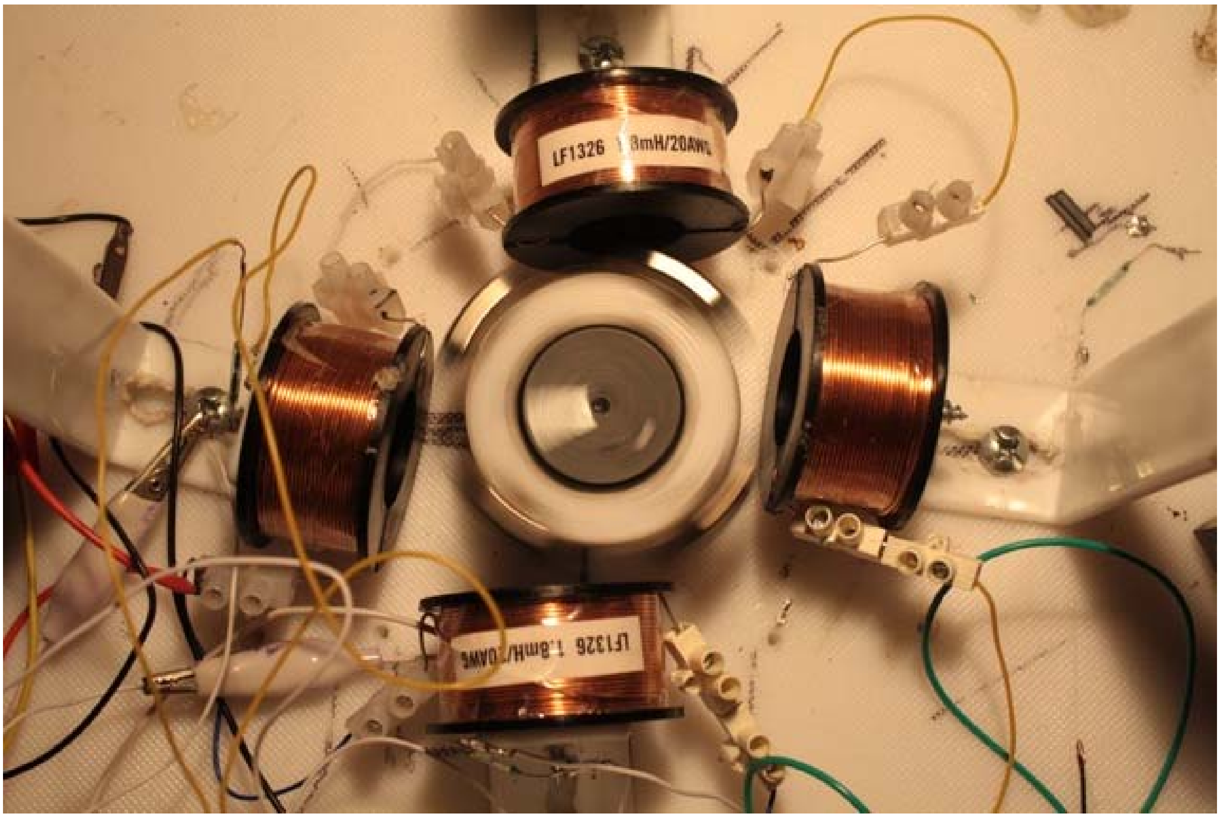


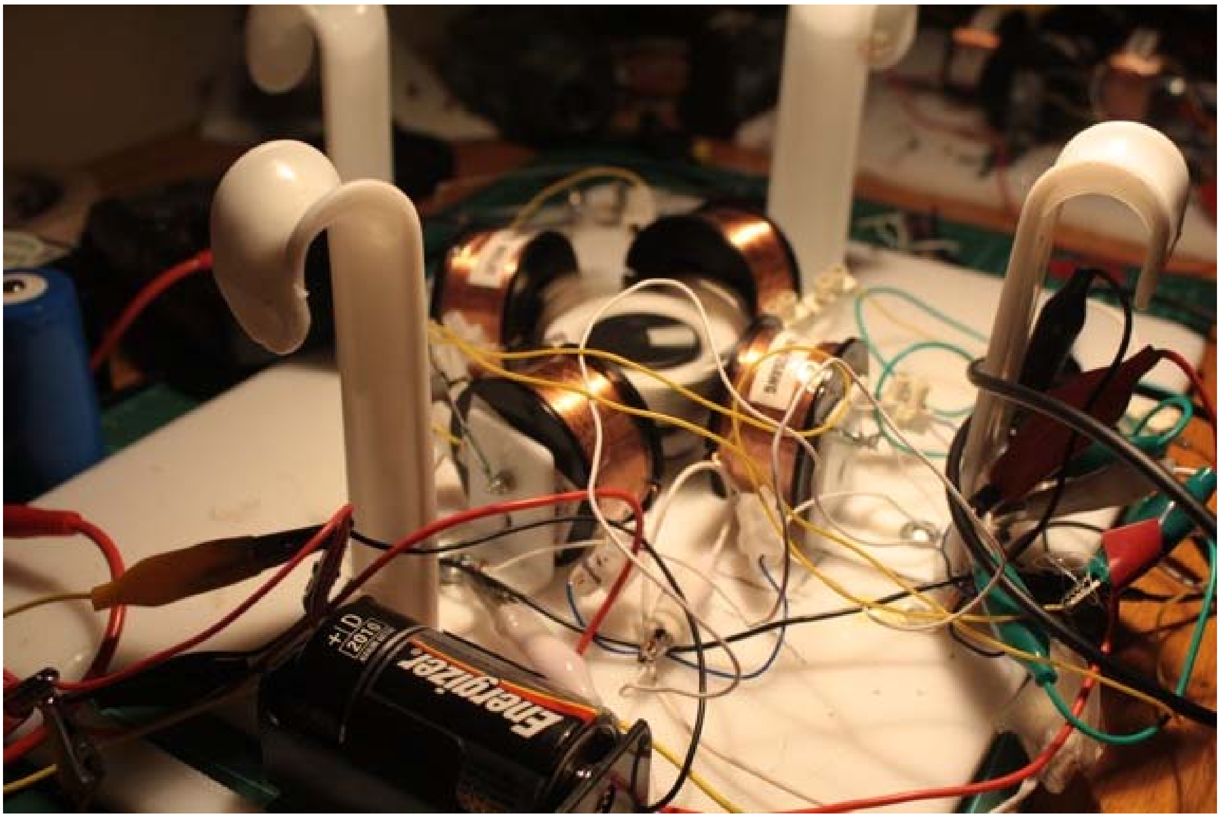
After the long week test run in closed loop,
the NiMh battery has been recharged and 3028 mA have been reloaded.

So, it is interesting to notice that during this long test run, the "Brandon motor" has needed less than 20 mA per hour to run at full speed... If we take in account the self discharge, non negligible, of the NiMh battery and the mechanical losses, we can say that this motor is very efficient...

Another replication of Brandon motor :




LF1326


Energizer