

Stiffler Scientific



Thermal Magnetic Battery

Initial work done and presented by

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Advanced Technology Group 1999

All new text by Stiffler Scientific will appear in this color.

Is Maxwell's Pressure Demon^{4} and a violation of the Second Law of Thermodynamics at work in TMB?

The following material was recovered from ATGroup archives. New research into TMB is about to begin at Stiffler Scientific with the goal of determining the actual underlying principles governing TMB operation. When ATGroup discontinued research the cell had reached a significant point in its evolution, in that it was capable of powering LED's for a considerable length of time, without depletion of the magnets being used. This ability placed TMB in the pseudo-science category in that it appeared to violate the basic tenants of thermodynamics.

The (at the time) strange requirements of a working TMB, the specific plastic insulating layer that developed a static potential, the organic plate (pure carbon in one case) and the overall nonsensical configuration of a working cell caused serious rebuttal and denial from the peer community.

It is our hope to determine how the TMB works, within or without of generally accepted scientific understanding. The time is now right for a revisit and comprehensive examination of TMB. With the world's energy demands growing by the hour, new theories may need to be development and accepted.

History

Experiments conducted on charge and discharge time periods of various (in lab constructed) capacitors exposed to varied magnetic field patterns, produced anomalous data that could not be explained.

These tests were all conducted using a maximum voltage of 1.0 volt potential. The capacitors were charged and discharged from the 1.0 volt supply through a 4.7Meg ohm composition carbon resistor. All charge and discharge cycles were digitally monitored and plotted.

Data indicated that with different angles and polarities of the permanent magnet magnetic fields, that the charge and discharge rates would vary for the same capacitor under duplicated and controlled conditions. Data was consistent under the same conditions when performed in a Faraday Cage.

Further investigation indicated that observed variations could be modified greatly when different metals were used for the two capacitor plates used in the TMB cells.

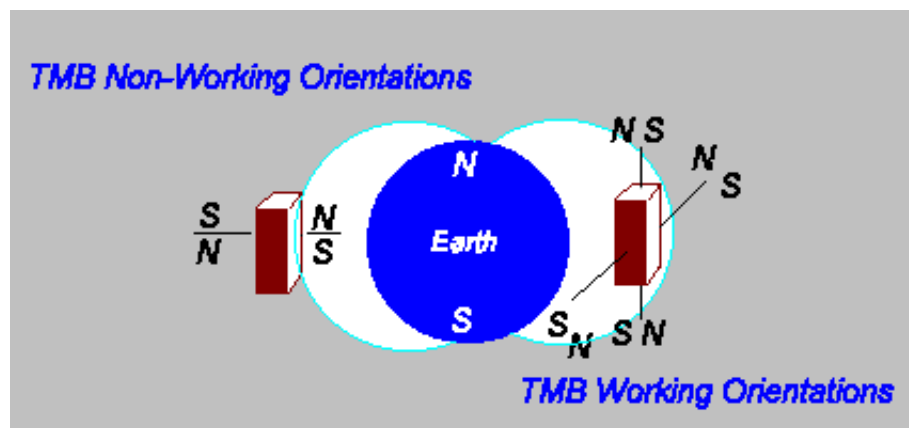
A control set of experiments was conducted without the magnetic fields being applied to the capacitors followed by duplicate experiments with the magnetic fields applied. The results of the control set allowed the factoring out of thermal noise internal to the structure and any other components used in the tests. These results indicated variations in $t = RC$ from non-field tests to those with fields applied. The most marked difference was a particular combination that indicated a (5t) difference or some 300% in charge/discharge times.

Starting with a number of different hypotheses we set out to determine if this was a new or known and documented effect. Therein was born the experiments resulting in TMB.

TMB Beginning

Throughout the TMB discussion various devices and components will be shown and talked about. Component description will be given when so indicated.

The following orientation picture is included for reference only. Examination by independent researchers has indicated that our initial observations were "Incorrect" and orientation does not affect TMB cell output. This issue will be revisited at a later time.



The first TMB cell using Sn & Cu plates and two permanent magnets.



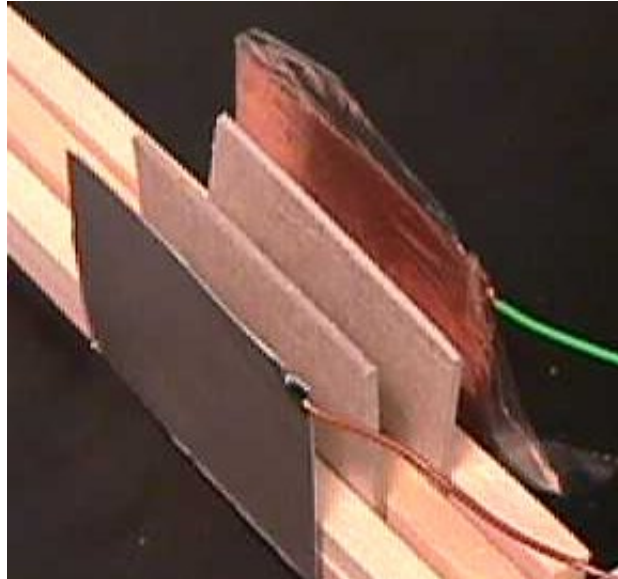
Components:

- 1 - Cu cell plate, 44mm X 50mm
- 1 - Sn cell plate, 44mm X 50mm
- 2 - Cardboard separator plates
 - L = 44mm
 - W = 50mm

T = 2mm

- 1 - Plastic film separator, 44mm X 50mm
"Clear Polyethylene"
Standard Kitchen Product, 'Glad or Cling Wrap'

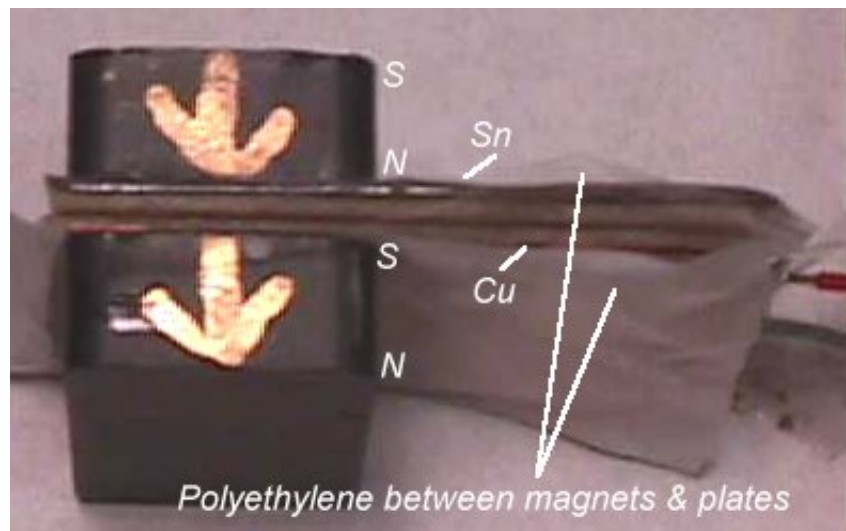
Construction of first TMB cell.



The plastic separator (polypropylene) performs a very important function, it removes any galvanic effect that may occur from moisture in the cardboard separators and reacting with the Sn and Cu plates. This galvanic effect is undesirable and masks or degrades the TMB effect.

A constructed TMB cell is secured with a plastic lab clamp. A measurement of the resulting cell capacity (plate to plate) was approximately 31.7pf, including connecting leads.

A two magnet, Sn and Cu plate TMB.



Components:

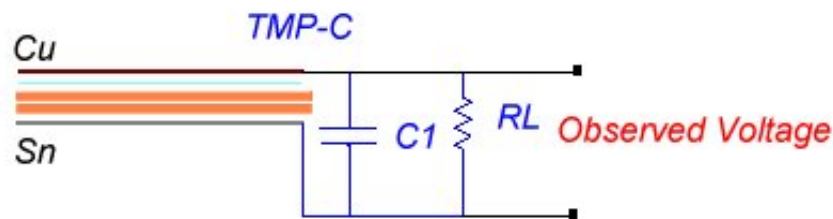
- 2 - Ceramic magnets
L = 48mm
W = 22mm
T = 10mm

Important Note:

During all experiments where a human touched a TMB cell, a charge was transferred between the human to the cell. This even happens when standard grounding procedures are used such as static wrist strap, anti-static mattes and sprays. These grounding methods reduce the transferred charge, although do not eliminate it. This charge can be as high as 200-300mV. During cell measurement this must be taken into account during initial measurements. Under the best of conditions we were able to reduce the initial charge to around 6-8mV above the cell production voltage. This charge will decrease over a period of seconds and the TMB output will stabilize at its resting voltage.

The preceding pictured TMB shows the cell plates in the center of the two magnets, this design is changed greatly in following models..

The following diagram is from an early TMB where the plates were between the magnets. The Blue line shows the placement of the plastic layer while the Brown lines show the placement of the cardboard separators.



The following two diagrams show a TMB where the plates are mounted external to a single magnet. The first images shows a fiber separator being used, followed by the second picture with a balsa wood separator.

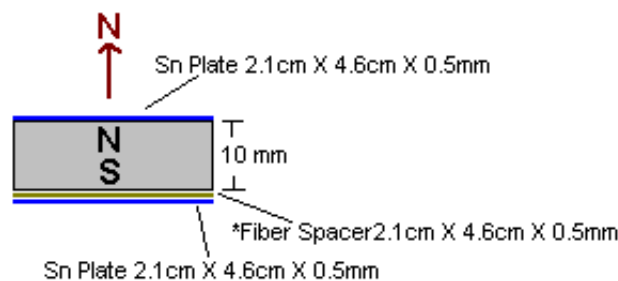
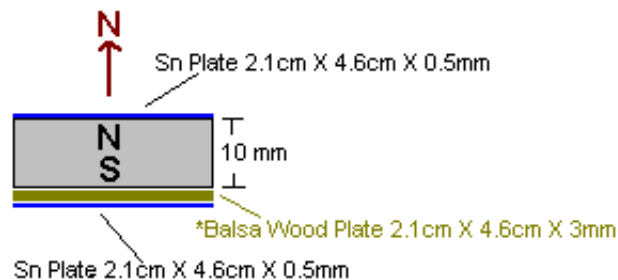


Fig: 1.0

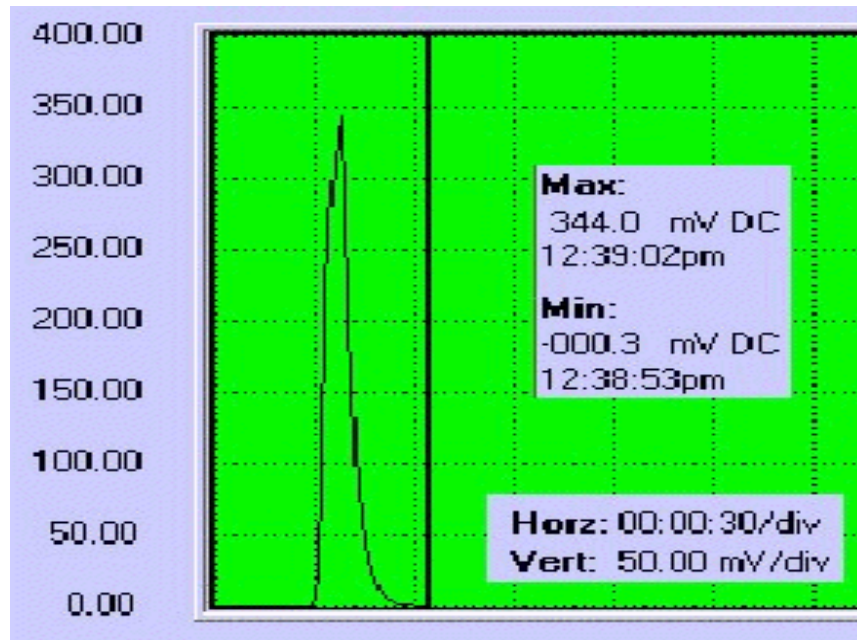


A TMB constructed (explained above) using the indicated load circuit and voltage monitoring started at the cell construction point. The following plot shows the initial charge transfer during cell construction and the rapid discharge of C1 after the cell is placed aside to stabilize. The cell starts at -0.3 mV and peaks at 344.0 mV. As can be seen in the chart, the voltage declined over a period of 10 minutes.

Components:

R1 -> 4.7Meg Ohm Carbon 1/2W, load resistor

C1 -> 1uf 250V Mylar (Nichicon)



The cell dropped to 0.1mV and maintained this reading. Because of the +/- one digit on the measuring device this voltage is considered measuring offset only and is not significant. It is therefore considered as 0 volts across C1. Monitoring was continued for some 2 hours, noting only a difference assumed to be measuring resolution where the reading fluctuated between 0.0 mV and 0.1 mV.

One might ask what happens if two cells are connected in series?. The increase in voltage for series connected TMB's follows the following equation.

$$V_{sc} = V_c + ((C_n - 1) * V_c) / 2$$

V_{sc} = Resulting voltage of series connected TMB cells.

V_c = Voltage of a single TMB cell.

C_n = Total number of cells connected in series.

Example SC-1:

$$C_n = 3$$

$$V_c = 34\text{mV} \text{ *This is an example and is not directly representative of a particular TMB configuration}$$

$$V_{sc} = V_c + ((C_n - 1) * V_c) / 2 = 0.034 + ((3 - 1) * 0.034) / 2 = 0.068 \text{ or } 68\text{mV}$$

The resulting series voltage of three TMB's is not the $(3 * V_c)$ as would be expected.

In addition the source resistance of series connected TMB's does in fact follow conventional thinking in that;

$$R_s = R_{c1} + R_{c2} + R_{cn} \dots$$

$$R_s = \text{Total series resistance of cells } R_{c1} \dots R_{cn}$$

The preceding example of series connected TMB's allowed for the following assumptions :

- 1) The TMB cells are isolated from each other so that there is no magnetic interaction of the TMP magnets.
- 2) Each TMB cell is held at a constant ambient reference temperature.
- 3) Each TMB must be of identical construction, plate area, magnets and plate separation.

The next question asked was, what happens when two or more TMB's are connected in parallel?

First, if both TMB cell output voltages are not equal, the resulting voltage will assume the lower of the two cells. The output current therefore does not result in a doubling as found in two conventional batteries connected in parallel with equal output voltages. Rather it results in a current doubling of the capacity of the lower voltage cell.

Calculate the capacity of each cell separately to arrive at each cells potential current and then multiply that current by two for the cell with the lowest output.

The following table shows the four different configurations for a two plate, two-magnet cell. The table shows the various magnetic polarities on each plate.

Double Magnet Configurations.

Cu-Copper Plate	Magnet Polarity	Sn-Tin Plate	Magnet Polarity
Cu	N	Sn	S
Cu	S	Sn	N
Cu	N	Sn	N
Cu	S	Sn	S

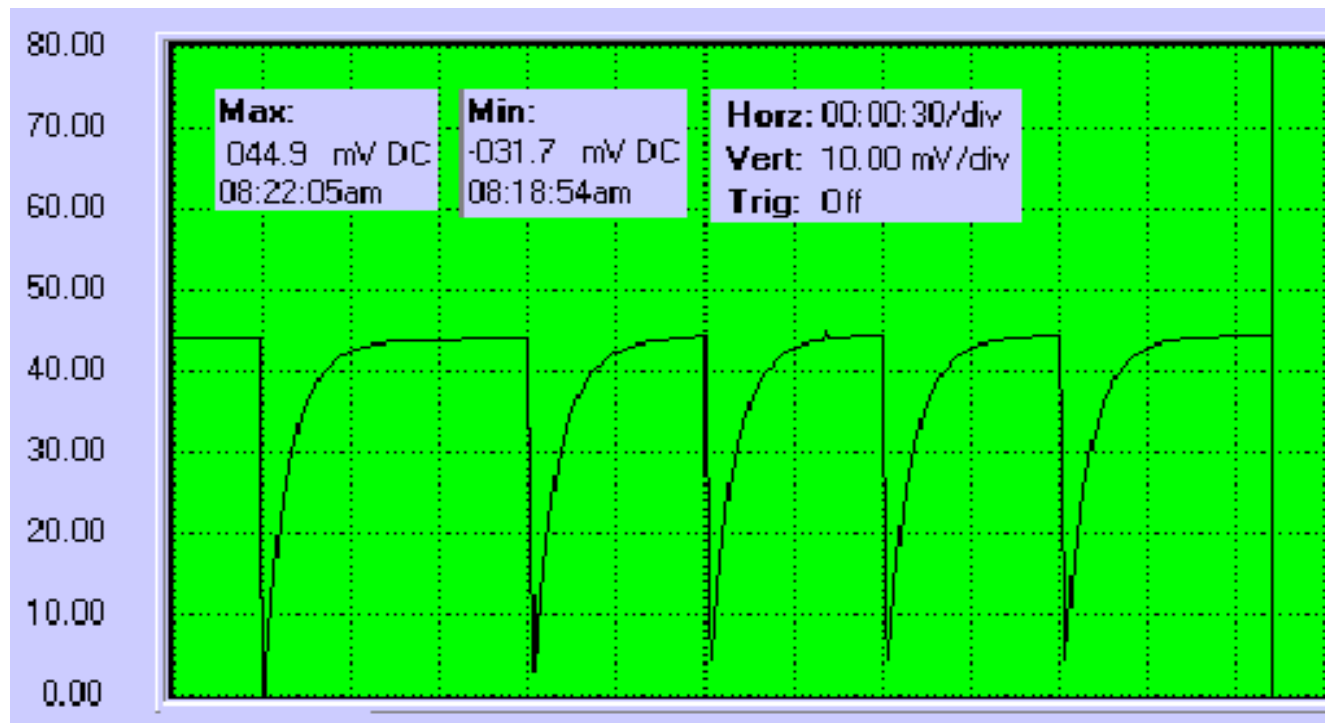
TMB Structure N->Sn.

The following TMB uses a single magnet placed transversely with the N pole against the Sn plate. A single 2mm insulating plate is used between the Cu and Sn plates. The magnet is insulated from the Sn plate with a standard plastic film sheet as described. The constructed cell is pressed together with a lab clamp.



The constructed cell was connected in our standard measuring configuration (load resistor and capacitor) and left to stabilize for 12 hours. The initial cell charge immediately after construction was 245.8 mV. After the 12-hour settling period it stabilized at 43 mV +/- 0.3 mV.

To examine the properties of this configuration the TMB cell was cycled through a typical discharge/charge protocol. The graphic results of this test are shown in the following link.



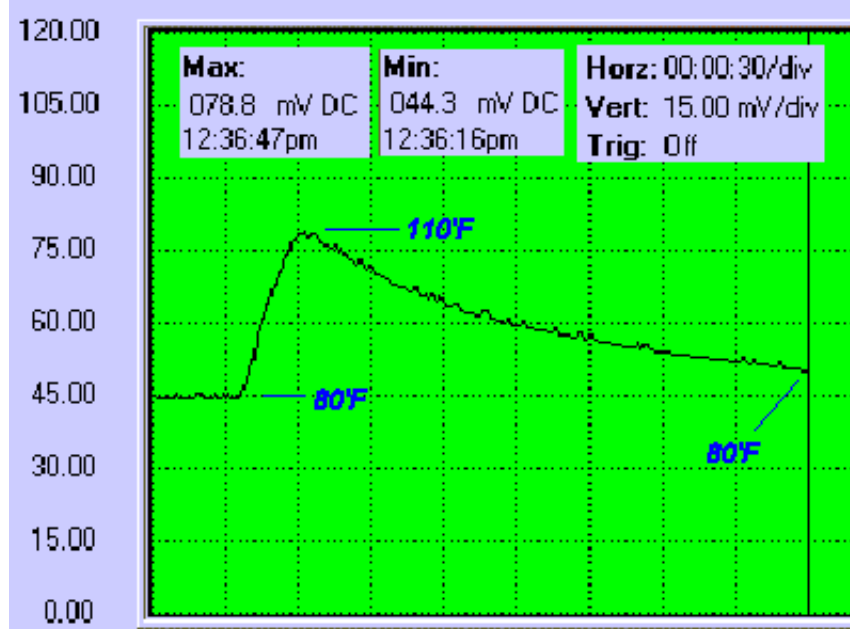
When looking at the discharge/charge graph of the N->Sn configuration one can make a rough calculation of the charge resistance by using the 5t rule of thumb. Therefore if the 1uf capacitor will charge back to its initial state before discharge in approximately 60sec., then $60/5 = 12 = 1t$. Using the simplistic $t=RC$ we solve roughly for R, $R = 12 / 1 \times 10^{-6} = 12,000,000$ ohms.

The affect temperature on the N->Sn cell is of great interest and indicates some valuable relationships between the cell output and the temperature of the cell. The following graph was generated for a temperature range covering a thirty-degree difference. The test started at 80°F and stopped at 110°F. A "K" type thermocouple was mounted between the Cu plate and the insulating plate spacer to measure the cell temperature.

The starting voltage of the cell was 45 mV @ 80°F and increased some 33.8mV with a 30°F temperature increase, coming back to a rest voltage of ~51.1 mV at @ 80°F. The heating and cooling curves are different in that the heat was applied at a rapid rate and the cooling was allowed to progress slowly.

Of additional interest is that the cell voltage remained higher once cooled to the initial starting 80°F. This was questioned during many of the tests and it was found that the ceramic magnets were remaining at a higher temperature, for a longer time than the Cu plate on which the measuring thermocouple was mounted. It appeared that the cardboard and or balsa wood separators provided the thermal insulation to shield the Cu plate

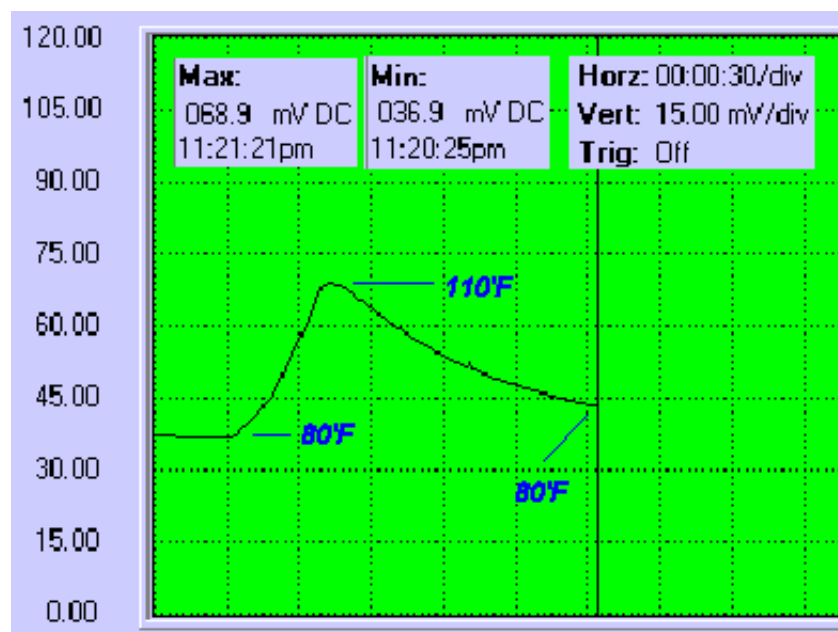
Voltage vs. Temperature, Graph #1



TMB Structure S->Sn.

The following temperature graph is from a TMB using a single magnet placed transversely with the S pole against the Sn plate. A single 2mm insulating plate is used between the Cu and Sn plates. The magnet is insulated from the Sn plate with plastic film. The constructed cell is held together with a lab clamp

Voltage vs. Temperature, Graph #2



Comparing the N->Sn cell and the S->Sn cell results from the preceding temperature observations.

Voltage vs. Temperature Table #1

Cell Structure	Start 80F	End 110F	Change
	26.67C	43.33C	
	299.8K	316.5K	

N->Sn	44.3mV	78.8mV	34.5mV
S->Sn	36.9mV	68.9mV	32.0mV

In the paper by John Marshall Dudley^{4} on experimental work exploring Maxwell's Pressure Demon, he shows that due to tunneling there should be a dramatic increase in power, doubling for each 14 degree Celsius increase in temperature.

Looking at the preceding 'Voltage vs. Temperature Table #1' we can see that in the 'N->Sn' cell the voltage increased (78.8mV - 44.3mV) or 35.5 milli-volts (56.22%) for a temperature change of (26.67C - 43.33C) or 16.66 degrees, (61.55%).

The current for this example would be; $e/sec = (eV * Vc) / R$

e/sec = electrons per second

eV = electric charge on an Electron

Vc = voltage of the cell

R = load resistance (1 Meg ohm meter input)

$$e/sec = (1.6E^{19} * 7.88E-2) / 1E6 = 1.262E12$$

Starting current at 26.67C was;

$$e/sec = (1.6E^{19} * 4.43E-2) / 1E6 = 7.088E11$$

therefore; $7.088E11 / 1.262E12 = 5.617E-1$ or 56.166% increase.

$56.166\% / 16.66'C = 3.371\%$ increase per degree C.

Checking for S->Sn configuration;

$$e/sec = (1.6E^{19} * 6.89E-2) / 1E6 = 1.102E12$$

Starting current at 26.67C was;

$$e/sec = (1.6E^{19} * 3.69E-2) / 1E6 = 5.904E11$$

therefore; $5.904E11 / 1.102E12 = 5.357E-1$ or 53.575% increase.

$53.575\% / 16.66'C = 3.216\%$ increase per degree C.

The above confirms that there is no appreciable difference between the 'N->Sn' and a 'S->Sn' cell structure.

The average of the two different (shown to actually be similar in output) cell configurations is calculated for comparison with what would be expected for a match to Maxwell's Pressure Demon^{4}.

$$(3.371\% + 3.216\%) / 2 = 3.294\%$$

John Marshall Dudley's^{4} paper indicates one should see an increase in power of approximately $100 / 14 = 7.143\%$ per degree C increase in temperature, where TMB appears to follow 3.294% per degree C.

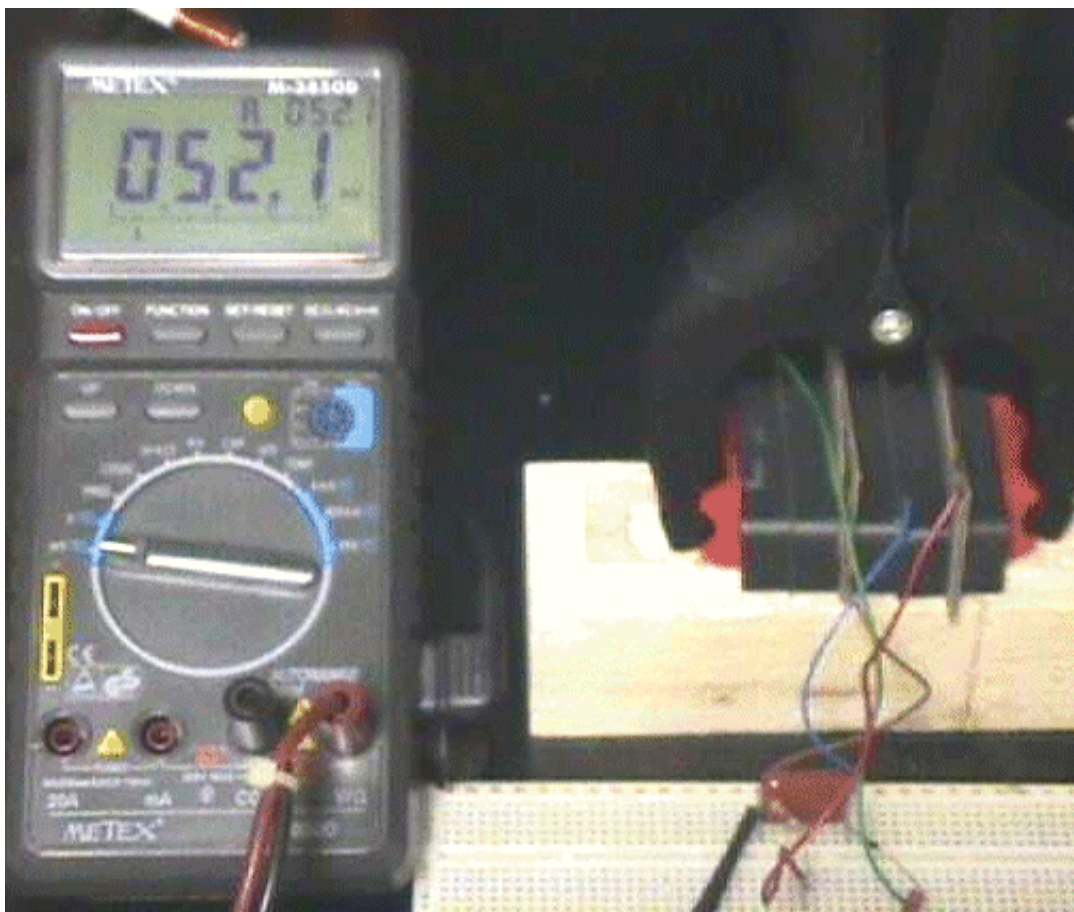
The difference seen in TMB can result from the spacers used in its construction, as they were all considerably thicker. Additionally the pressure applied to a cell may have been lower than what was stated in John Marshall Dudley's^{4} paper. Also in consideration is the fact that the separation layers in the TMB were solid whereas John Marshall Dudley's^{4} used a 0.01" thick fiber glass screen.

The first question that comes to mind from the above look at TMB is, 'What part do the magnets play in the overall operation (if any) of TMB'?

Over repeated testing of both the N->Sn and S->Sn cell structures, it was concluded that there was no significant difference in the magnetic polarity of the bias magnet. Charge and discharge rates of the 1uf capacitor were statistically similar. Additionally the influence of temperature on the cell output voltage was also statistically similar.

It appears that there is a linear voltage change with temperature. Testing was only performed in the range of 75°F to 200°F and linearity was apparent. This linearity of course could change when the test window is changed. No projections were made at this point in the experiments.

The following image is from a series arrangement of TMB's.



Sept. 3, 1999

It has been confirmed that the reaction taking place in a TMB cell resulting in energy output is not dependant upon the usage of Sn and Cu as the cell plate material, at (this time) we are discounting any affect from the polypropylene insulation barriers. We now have a TMB cell producing a sustained 95mV using two Sn plates.

Current status of TMB research;

- 1) May be caused by an Organic or Piezoelectric reaction.
- 2) Requires pressure (compression) of the entire cell (>2 lbs/sq in.).
- 3) Magnetic polarity determines cell voltage and polarity.

If compression is not used on the cell, a marginal varying voltage of from 1-5 mV will result which may not or may not vary slightly and varies significantly with cell temperature. With compression the voltage will increase and hold constant output voltages and varies as explained with temperature.

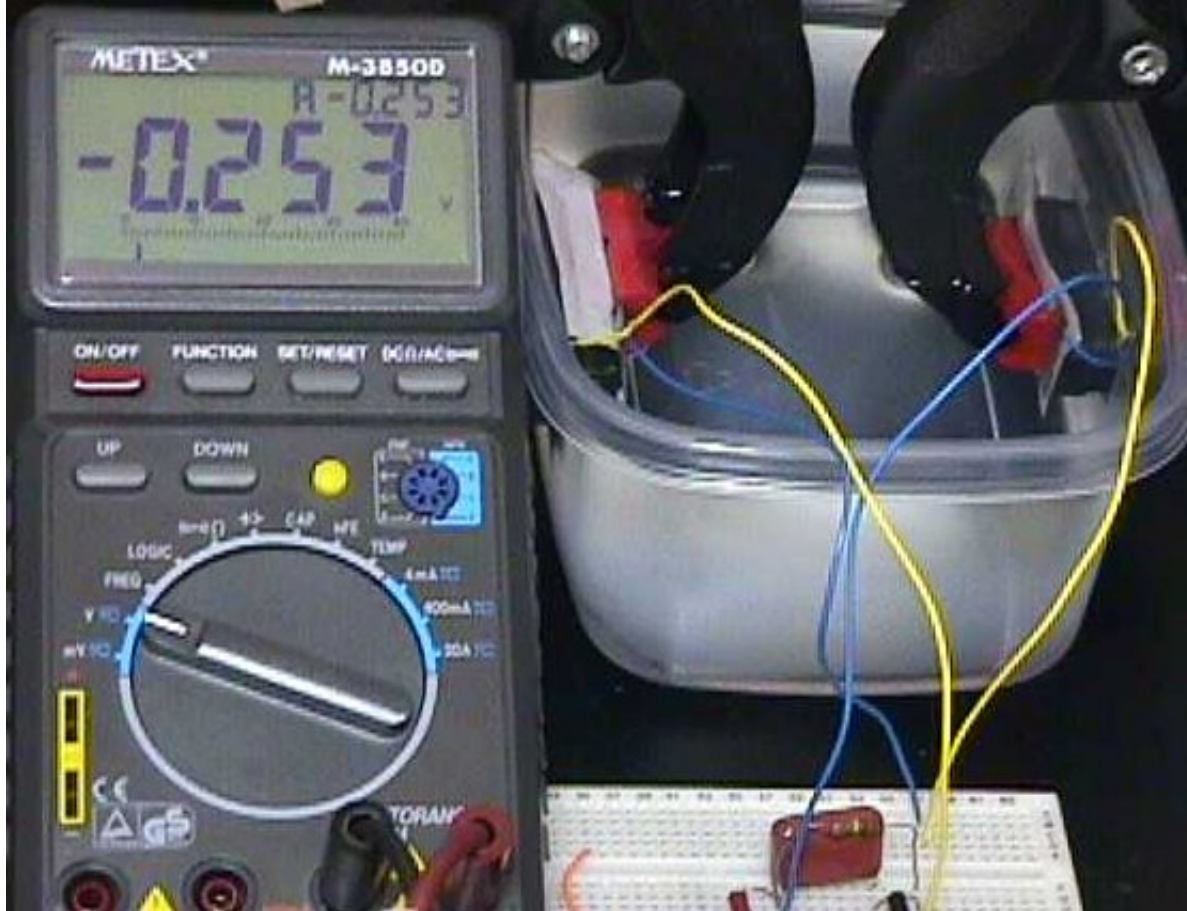
We are still using polypropylene insulators to insure no galvanic effects are introduced, although we have tested numerous plastic insulators and found no detectable contributing effect. It should be noted that a possible ion current passing through the polypropylene has not been ruled out.

Sept. 7, 1999

More Questions



X2 Cells In Distilled Water Bath Connected In Series With 100K Load



We distributed a number of evaluation cells to researchers before we made our discovery announcement. These researchers in turn have been looking at TMB and attempting to answer the question (How Does It Really Work ?) and as a result many different types of experiments were performed. The preceding picture shows duplication in our lab of one of these researchers experiments and the interesting results.

A short history on how this came about, an initial assumption that the potential across the TMB could be galvanic (because of the usage of Sn and Cu, although insulated) we early on removed this as a possibility by insuring this could not take place. Another researcher felt the ion infusion was coming from ions of H_2O that were present in the cardboard or balsa wood separators used in a TMB's construction. The particular experimenter micro waved the cardboard separators to drive the H_2O out as much as possible without damaging the cardboard. He then repeated the experiments and found the TMB no longer produced a potential, thus his assumption that the ions were indeed coming from the H_2O in the cardboard.

We did in fact perform a similar, yet reverse experiment early on, in that we saturated the cardboard with tap water under the assumption that the output would show an increase because of a greater abundance of ions. This experiment was negative, no statistically significant increase in the cells output was found. This turned out to be very puzzling when our researcher report the drying of the cardboard, until we realized that possibly the actual cardboard could have been affected from charge alteration as a result of the microwave energy used in the drying.

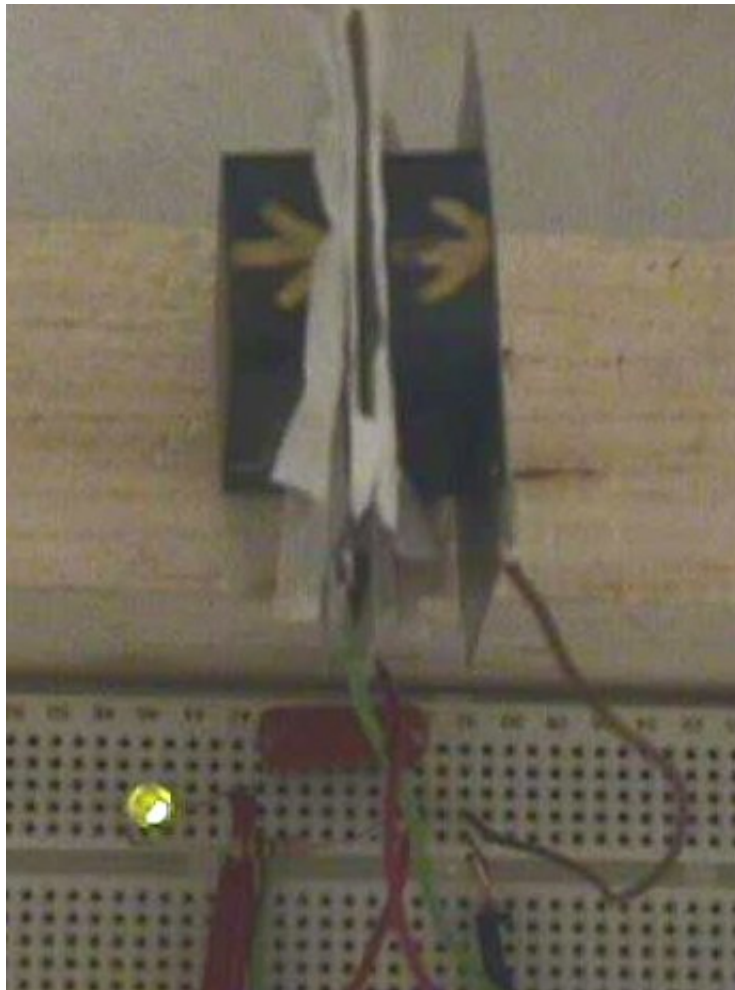
In an attempt to keep as many in the research loop as possible we passed some of this new and pertinent information on to our other evaluators. As a result the above water bath experiments were developed.

The first experiment consisted of a single cell TMB (with a paper separator on S

magnet face) being totally immerse in distilled water. The cell did not produce a voltage. The researcher then added a second magnet on the exterior of the plastic container in opposite magnetic polarity (attractive) to the N pole of the submerged magnet. The cell immediately began to produce output of 100X that of a normal air mounted TMB. The picture above shows the cell driving a 100K ohm load with a potential of 177 mV, yielding a sustained current of 1.77uA. Now this same cell would only produce 102 mV into a 10Meg ohm load when mounted in the air (with or without) the second bias magnet.

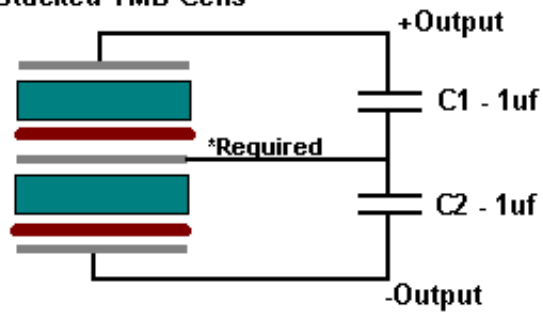
This experiment has now opened a whole new list of questions and provided some very interesting results with significant possibilities.

Never before seen pictures of a TMB powering a Green LED.



Circuit for a Series TMB Stack

Stacked TMB Cells

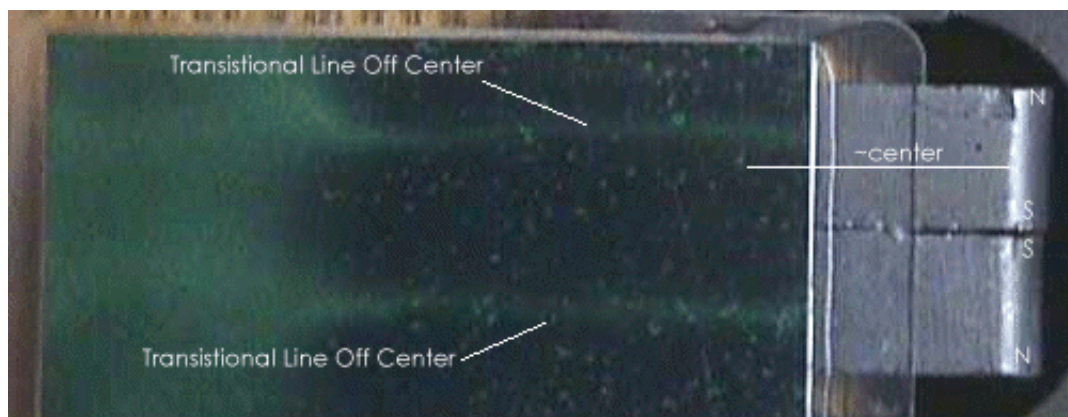
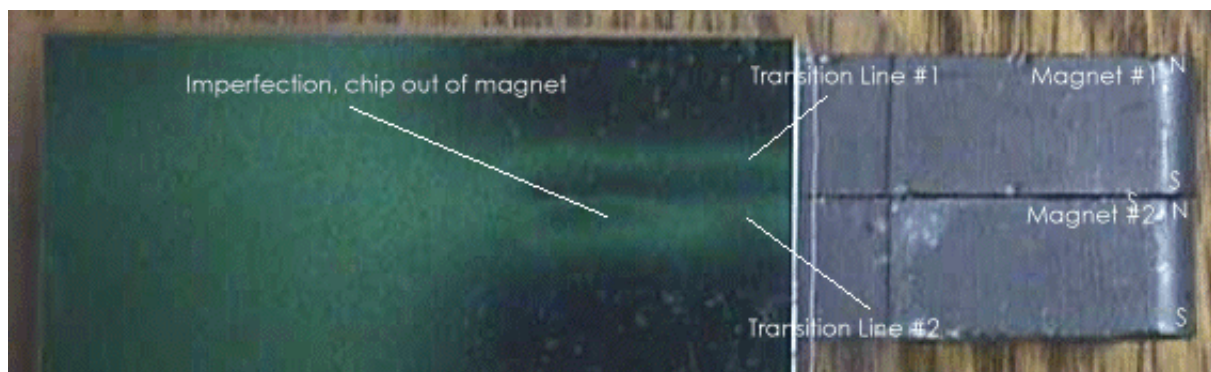
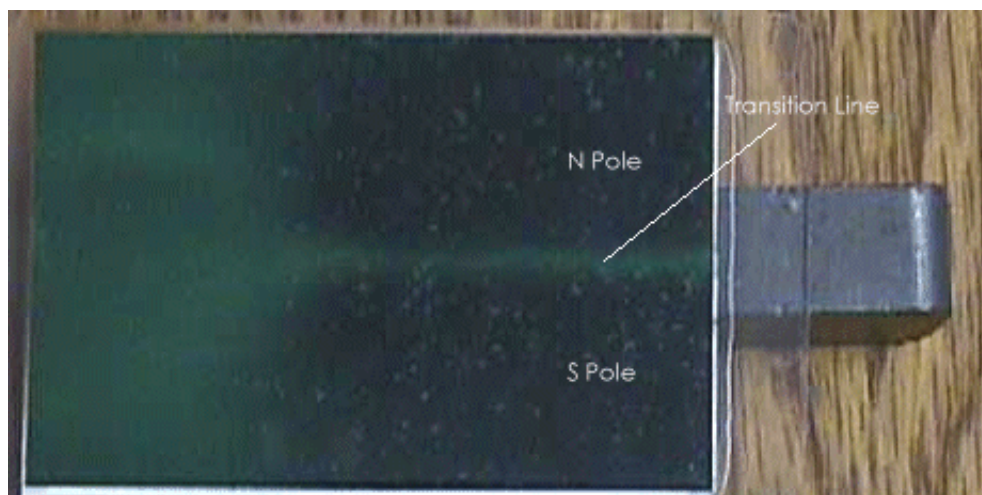


- Sn Plates
- Magnet
- Balsa Wood

*Required

The stack output is 0V if this connection is not provided. ~Cell output is 150mV, for a total of ~300mV across C1,C2.

TMB and the Null Zone (Transition Zone) in Magnets



The preceding three images show what we call the 'Transition Line' or 'Null Zone'

present in all permanent magnets. This 'TL' is the transition point where magnetic polarity changes identity and is a very interesting area when explored in depth

The following three graphics depict three dipole configurations within a sample material. The first, TMB-5, shows a random, non-magnetized arrangement of dipoles. Followed by TMB-6, which shows a dipole or magnetized alignment, although the dipoles are not in physical alignment. The third image TMB-7 shows what is considered by many texts to be a depiction of a magnetized material. It shows the dipoles in magnetic alignment as well as physical alignment.

Fig: TMB-5



Fig: TMB-6

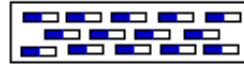


Fig: TMB-7



The following four images show the 'TL' in a somewhat different way. There should be little problem in understand what the images are attempting to explain; therefore a detailed description will not be made.

Fig: TMB-8

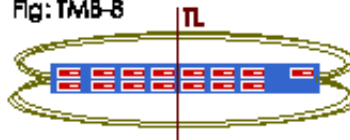


Fig: TMB-9

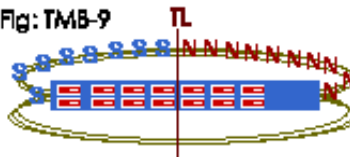


Fig: TMB-10

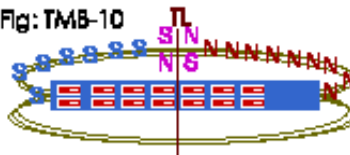
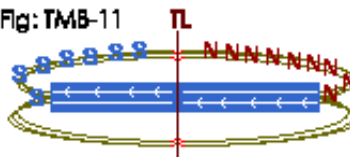


Fig: TMB-11



Again the following images should be clear and additionally show how we probed the 'TL' area with various coils that were fed to a chopping amplifier and then to an oscilloscope.

Fig: TMB-12

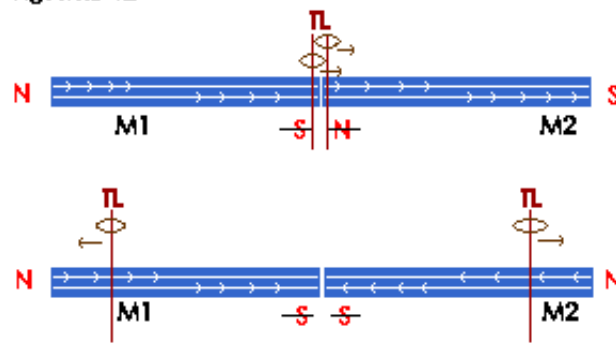


Fig: TMB-13

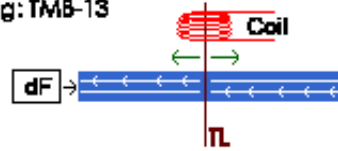


Fig: TMB-14

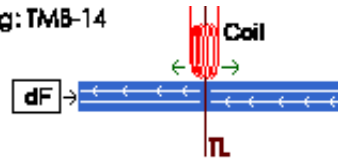


Fig: TMB-14

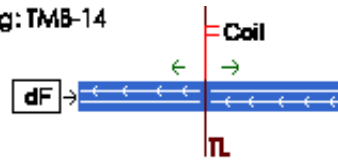


Fig: TMB-16

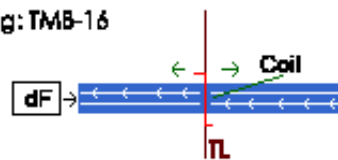
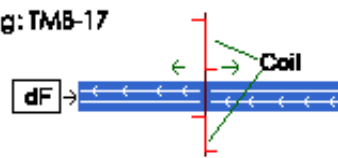


Fig: TMB-17



Summation.

At the time the TMB research was stopped, a cell had been developed with an output sufficient to drive LED's for extended periods of time, without depletion of the magnets themselves.

It was determined that some of the early cells did have a output contribution from ion flow within the components, although this was later engineered out of all following cells.

The plastic insulation barrier is critical to cell operation and the type of plastic used is specific. Early plastic did allow for ion flow while later plastic selection removed this condition.

The underlying mechanism explaining the TMB operation could not be determined, although the following was determined;

- 1) The correct plastic insulation was critical in forming of an electrostatic potential.
- 2) An organic plate (separator) was required, non-organics would not work,
- 3) Undetermined was the method of current flow across the electrostatic barrier.
- 4) The 'TL' of the magnets were altered in specific ways in properly constructed cells.
- 5) The electrostatic potential determined the output voltage of the cell.
- 6) The magnetic field in some way interacted with the static field and supplied the cell output.

TMB research was discontinued for reasons that were not made public.

(1) Seebeck Effect. In short the literature defines the Seebeck Effect as 'A temperature gradient in an electrical conductor causing charge carriers to diffuse to the colder end of the conductor'.

The Seebeck coefficient is defined as the open circuit voltage observed for a unit temperature difference. Some literature refers to the Seebeck coefficient as *thermoelectric power*.

$$\alpha := \frac{dV}{dT}$$

The coefficient is; the sign convention for this coefficient is positive if the cold end is positive and negative if the cold end is negative. Metals are considered conductors, although in some cases a positive Seebeck coefficient is observed.

For metals, the typical range is around 10×10^{-6} .

(2) Nernst-Ettinghausen Effect. It can be observed that an electric field E_y exists in a direction mutually perpendicular to a longitudinal heat flow Q_x and a transverse magnetic field B_z . The resulting sign is such that the field appears in the y direction when the heat flow is in the x direction and the magnetic field in the z direction.

$$E_y = +A_{EN} B_z Q_{ix}$$

(3) Cold Blue Arc. When a load is connected or disconnected to a TMB cell an arc can be seen of approximately 1/16" in length. This arc is light blue in color and not something typically seen in normal electronic circuits. The arc is wide compared to its length and is quite broad in size when initially appearing.

(4) Maxwell's Pressure Demon and the Second Law of Thermodynamics by; John Marshall Dudley, http://www.execonn.com/maxwell/maxwells_demon.html