

# **COUNTER ELECTROMOTIVE FORCE ENABLES OVERUNITY RESULTS IN ELECTRIC SYSTEMS**

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## **ABSTRACT**

Conventional models of electric energy determine that it is depleted as it transfers its energy to various loads connected to a supply. Therefore efficiency is constrained to unity or less. A non-classical magnetic field model refutes classical assumption by predicting that electric energy, dissipated at a load, can indeed exceed the energy delivered by the supply. While the model is not the subject of this application a broad overview is appended. Over unity results are achieved by generating counter electromotive force within inductive components in a switching circuit. These components enable this returning energy, manifest as a negative transient voltage across a resistor. At critical levels, it also results in a partial recharge of the battery. Results confound constraints required by conventional models of electric energy transfer and may prove the proposals of that field model.

## **INTRODUCTION**

The fundamental laws of physics, as they relate to the transfer of electric energy, have been effectively used. Applications of these have pioneered our most advanced technologies and these are, indeed considerable. Because of the remarkable success in this field, it is widely understood that everything that can be known about electric energy transfer and application, is known. Therefore there has been no need to revisit those principles established by the

Laws of Induction. And, consequently also there has been no need to question the Second Law of Thermodynamics. As a result, there are no engineering publications available for citation. It is hoped that this lack will obviate the need for references in this submission.

Essentially this paper raises questions that relate to the laws of physics. But the evaluation of the experiment described hereunder, requires the expertise of electrical engineers for evaluation of the measurement protocols. However, as engineers use the concept of current flow it is considered appropriate to give a brief description of this flow in terms of the model that is more fully described in the appendix to this document.

This field model concludes that electric current flow comprises the movement of magnetic fields that use circuit components to alter their spin or justification. The fields are imbalanced as their justification, or charge, reflects the ionised condition of the source amalgam. It is proposed that it is the quantum of these imbalanced fields that is measured as potential difference. And re-justification at the terminals of the supply, diminishes this difference without varying that quantum. As it is also proposed that all magnetic fields comprise particles then, properly, the electromagnetic interaction may not be constrained to the principles governing the Second Law of Thermodynamics. Therefore the model predicted that unity could indeed, be breached on electric circuit apparatus

As science is progressed through experimental evidence it is expected that theory will give way to fact. The test described hereunder shows gains that far exceed the constraints determined by classical theory. These results are repeatable and depend on the generation of counter electromotive force.

The circuit designed and used in the test is well known and commonly referred to as a shunt circuit. Here the second path of current is generated from the transient voltage induced across the resistor itself, which is designed to be

highly inductive. A MOSFET is used as a switching device as this has an intrinsic or parasitic diode. This allows a path for the reverse flow of current resulting from this induced transient voltage. Depending on the applied frequency and duty cycle it is possible to greatly enhance the level of counter electromotive force. This in turn, results in enhanced efficiency as the amount of energy dissipated at the load then exceeds the energy supplied by the source.

Various tests have been conducted that apply these principles of the shunt circuit that are not described in this exercise. They include the use of a variety of resistors in series with single and double wound inductors as well as a variety of power supplies including battery and utility supply sources. And all these experiments have resulted in gains where energy dissipated is greater than energy delivered. The level of gain is largely dependent on the frequency applied to the switch, to the duty cycles and to the level of inductance in the circuitry. All the tests are repeatable.

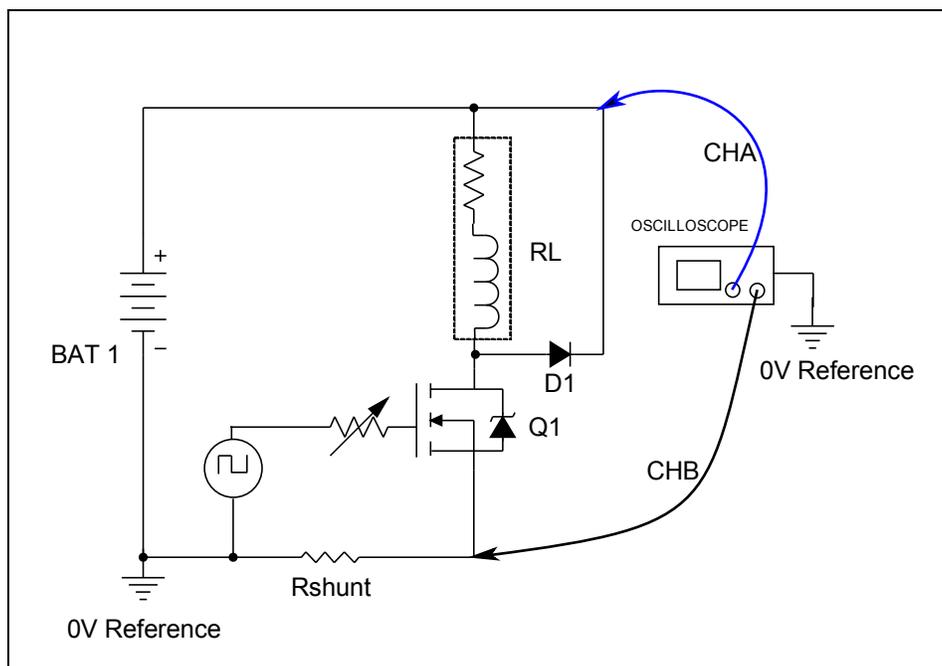
It is not surprising that an increasing number of inventors claim to have results in excess of unity. The use of the principles of the shunt circuit is increasing and energy measurements are ever more critically determined. This is precisely because the need for energy efficiency is becoming paramount. Inevitably the gains that are enabled by this application will conflict with predicted results. But all such claimants remain on the fringe of experimental science precisely because their results exceed classical presumption and are widely considered to be anomalous.

Therefore the object of this application is to engage in a systematic evaluation of the experiment that is detailed herein. It is hoped that publication will enable a wide dissemination of this so that results can be replicated. The results and conclusions can then be analysed by a broad range of experts in the art who are better qualified to comment than the authors.

To this end the paper details the experiment that was chosen precisely because it results in a level of over unity that far exceeds margins of error in measurement analysis. It is presented with a detailed description of the components to the circuit apparatus to enable replication. This is followed by an overview of the measurements and a discussion of this and similar work. The brief conclusion points to the potential in developing this technology that may encourage more research, investigation and development. Appended is a synopsis of current flow as proposed by a non-classical magnetic field model that may account for breach of unity.

## EXPERIMENT

The following test was published in Quantum Magazine October edition, 2002.



**Figure 1 Circuit schematic diagram**

A 24 volt battery, (BAT 1) is applied in series with a 10 Ohm wire wound

resistive load (RL). A flyback diode, (D1) is placed in parallel with (RL) thus connecting it back to the positive terminal of the battery. At the junction of the diode and the inductor is an N Channel power MOSFET, (Q1), connected, in turn, to a 555 switching circuit with variable duty cycles and frequency adjustment. A 0.25 Ohm shunt resistor is placed in series with the negative terminal of the battery.

CIRCUIT COMPONENT	DESCRIPTION
BAT1	Battery 24V, 2x12V 20 Amp hour in series
RL	10 Ohm ceramic hollow core wire wound
Rshunt	1R 2W 5% Carbon resistors x 4 placed in parallel
D1	Rectifier diode, 1N4007
Q1	N-Channel MOSFET, IRFPG50

**Table 1. Circuit component values**

### SPECIAL PARAMETERS

The load resistor was made by Specific Heat CC (SA). It comprises a 10 ohm hollow core wire wound ceramic structure with a length of 150 mm. and a diameter of 32 mm. 48 turns of resistance wire are spaced at 1 mm. It was chosen for its inductance (8.64 micro Henries).

The MOSFET was chosen to have a parasitic diode that enables conventional reverse current flow during the off period of the duty cycle.

The oscillator is adjusted to output a frequency of 2.4KHz at a 3.7% duty cycle on time. Adjusting the variable resistor in series with the gate of the MOSFET reduces the gate current and results in random oscillation that

overrides the predetermined frequency and duty cycle.

## MEASUREMENT OF ENERGY DELIVERED BY THE BATTERY

The positioning of the probes A and B is detailed in the circuit diagram. As mentioned, the voltage waveforms that result from such a high oscillating frequency vary greatly from one cycle to another. The transient voltage spikes that are deliberately generated, then compound this variation. In order to evaluate a reasonable average of the energy delivered a time base of 1us/div was chosen.

Current flow to and from the battery was determined from the voltage waveform across the 0.25ohm shunt resistor divided by its resistance. Batteries are not, typically, able to deliver a negative current flow. Therefore, it was determined that current delivered by the battery would be the product of instantaneous voltage measured across the shunt divided by the resistance of the shunt measured above zero. Correspondingly, any current delivered back to the battery would be determined from the instantaneous voltage across the shunt divided by the shunt's resistance, measured below zero. The actual flow of current from the battery would be the difference between these two values.

The oscilloscope's coupling was set to DC to determine instantaneous direct current voltage measurements. Multiple waveforms were stored and downloaded to a spreadsheet for analysis. The equation applied to obtain the sample values was

$$\frac{\sum_{n=1}^x VI}{x}$$

where  $x$  = Number of samples taken,  $V$  = Battery voltage,  $I$  = Current,  $I = \frac{V_{shunt}}{R_{shunt}}$

The instantaneous product of each sample ( $V \times I$ ) was determined and the sum of all the samples was then computed. In order to establish the average power delivered during each cycle the sum of all the samples was then divided by that sample range number. Results indicated that the average power delivered by the battery was 1.13 watts.

## **MEASUREMENT OF ENERGY DISSIPATED AT THE LOAD RESISTOR**

The load resistor was wound to deliberately yield a high level of inductance. This, in turn, generates high voltage spikes during the off period of each switching cycle. Also, the reactance and impedance vary with each oscillating waveform. This makes it difficult to determine the accurate instantaneous impedance of the load resistor at any given moment.

These conditions caused protracted discussion on the accuracy of measurement related to current phase lag within the inductive component of the load. To obviate any further discussion it was decided to confine the measurement of power dissipated to caloric values.

Measurement of the rate of temperature rise was enabled through the use of a platinum-based temperature probe fixed to the hollow wall of the resistor. The probe was chosen because it is not affected by the applied high frequency. The probe in turn, was linked to a digital device that displayed instantaneous readings of temperature change in degrees Celsius.

Tests were conducted in a draft free environment. Ambient room temperature was recorded on the digital display linked to a second identical type platinum based probe positioned inside a similar resistor. The test was allowed to run for a period of about an hour until the temperature of the load resistor stabilized. The difference between ambient room temperature and the rate of temperature rise on the load resistor was assumed to represent the actual rate of

temperature rise under test conditions.

The temperature rose to 52 degrees Celsius above ambient after a little over an hour. At this point it stabilized and then remained roughly consistent within the fluctuations of ambient room temperature.

### **CALORIC CONTROL TEST**

The same load resistor was allowed to cool and then placed across a variable power supply source as a means to measure comparative temperature rise against an applied DC power in the same draft-free environment. The applied DC voltage was adjusted until the same temperature above ambient was obtained.

### **RESULTS**

The temperature rise above ambient stabilized at 52 degrees Celsius when the applied dc voltage from the variable power supply was set at 13.32

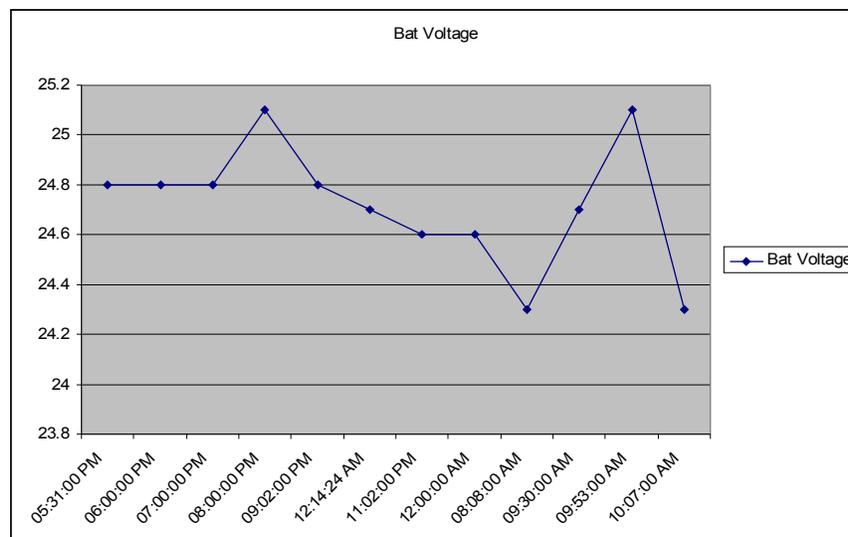
volts. This represents  $\frac{V^2}{R}$ ,  $13.32 \times 13.32/10 = 17.74$  watts. Results indicated that an average of 17.74 watts was dissipated at the start of the test period.

The following schedule of results as indicated in Table 2 was taken from an experiment that was conducted over a 16.5 hour test period to determine the rate at which 2 x 12 volt batteries in series discharged their energy.

### **MEASUREMENT OF BATTERY DISCHARGE RATE OVER 16.5 HOURS**

Time	Minutes	Load Temp	Ambient Temp	Above Ambient	Battery Volts	Joules	Control Watts
17:31		69.5	21.4	48.1	24.8		16.41
18:00	29	69.5	18.4	51.1	24.8	30333.37	17.43
19:00	89	69.7	17.7	52	24.8	94731.64	17.74
20:00	149	69.5	17.6	51.9	25.1	158290.68	17.71
21:02	211	68.5	17.4	51.1	24.8	220701.39	17.43
22:01	270	68.9	17.5	51.4	24.7	284072.11	17.54
23:02	332	68.10	17.3	50.8	24.6	345226.01	17.33
24:00	390	67.6	17.3	50.3	24.6	401545.08	17.16
8:08	878	65.10	16.6	48.5	24.3	871641.65	16.55
9:30	960	64.8	16.1	48.7	24.7	956977.91	16.61
9:53	983	71.1	16.8	54.3	25.1	1092584.58	18.52
10:07	997	76.5	16.6	59.9	24.3	1222429.15	20.44

**Table 2. Measurement of battery discharge over time**



**Figure 2. Battery voltage over period of measurement**

During this time, measurements were taken of both the temperature rise above ambient of the load resistor and the voltage drop across the batteries.

The average rate of temperature rise was 51.37 degrees Celsius above ambient. The average wattage as it related to temperature rise (Caloric Control Test) was 17.53 watts.

This, in turn resulted in a total of 1.22 Mega joules dissipated over the entire test period. The wattage measured to have been delivered by the battery was 1.13 watts x 997 minutes x 60 seconds being 67 596 joules. The voltage measured across the battery fluctuated during the test period. But there was no evidence of any significant battery voltage reduction that could be reasonably ascertained. Note that the battery voltage remained above 24 volts.

This extended test period had the added advantage of testing the experimental results over a more significant duration of time to determine that neither the energy dissipated at the load resistor nor the energy delivered by the battery was a purely transitory phenomenon. The evaluation of the performance of the batteries, in terms of their rated capacities, was omitted as the performance of these lead acid batteries typically varies from their watt-hour ratings. Such evaluations are widely considered to be subject to too many vagaries to represent dependable results.

### **Table Column Heading description**

**Time** - Computer clock – not calibrated

**Minutes** - Test period in minutes

**Temperature on load** - Measured on the digital display device linked to  
The temperature probed coupled to the load resistor on the circuit.

**Temperature** - Difference between the test and ambient temperature

**Battery Volts** – Instantaneous battery voltage read from the digital display of the Fluke oscilloscope with the probes placed directly across the battery.

**Joules** - Watts per control Watts x time

**Control watts** - The caloric control test determined that 17,74 watts represents

a temperature rise of 52 degrees Celsius over ambient. Therefore,  $17.74/52 = 0.34$  watts as a factor, per degree Celsius over ambient. Power, (watts) was therefore determined as the difference between test and ambient temperature multiplied by this factor, to give a broad indication of power (watts) dissipated at the load resistor.

## **RESULTS**

Energy dissipated at the load = 1.22 Mega joules

Energy delivered by the battery = 67.6 Kilo joules

## **OVERVIEW OF RESULTS**

The need to involve independent entities and authorities was proposed as a supplementary method to review the experimental results. It was determined that this process was required because of the anomalous and contentious nature of the claims that are associated with this proposed technology. The companies listed below approved the inclusion of their name in publication of these results and, together with the authors of this article recommend a wider forum for systematic and statistical consideration of the experiment and its results.

The Cape Hope Metrology Laboratory confirmed that the test equipment had been calibrated at Tallumant's Metrology Laboratory

Spescom as distributors of Fluke instruments who attended demonstrations

ABB Electric Systems Technology Institute in North Carolina who conducted independent tests. Here tests were confined to the evaluation of instantaneous power delivered simultaneously by the battery supply source and dissipated in the load. Measurements were enabled through the use of four channel oscilloscopes.

Johnathan Green of BP (SA) who applied tests to measure the effect of the energy gains on battery duration

SASOL representatives who are offering a bursary award to encourage further research

J De Bruto of Power Engineers

### **Error margins**

It would be reasonable to assume a maximum of 10% error on all temperature measurements as the caloric test conditions were crude. Error margin ratings applied to the Fluke 199 C oscilloscope, as this relates to the voltage measurements across the shunt and the load are 10% and 1.5% respectively at the highest frequencies applied to these tests. Even if all negative voltage sample measurements are discounted by these values results still indicate a coefficient in excess of 16 over the energy delivered.

### **Calibration Certificates**

10 ohm resistor      1563/JN21 November 2001

025 ohm resistor    1562/JN20 November 2001

Fluke oscilloscope  19.12.2001

### **DISCUSSION**

Conventional engineering largely discounts the benefit of transient voltage as this is assumed to be out of phase with current flow. This, in turn, compromises the efficient transfer of its energy. However, for purposes of dissipating radiant energy, as detailed in this and many other tests, this

assumption may need to be revisited.

Many circuits have been evaluated with varying levels of benefit but all circuits have measured gains that exceed unity. These circuits include, for example, the use of single and double wound inductors to induce counter electromotive force. N FETS or P FETS can be applied. The flyback diode has also been variously applied to the same battery or to alternate batteries connected to the supply by a common negative rail. This, in turn results in a recharge of that battery without compromising the energy delivered to the resistor in series with the supply. Tests have also been conducted from alternating current supply sources using step down transformers. Frequencies can be varied but it is evident that the faster the frequency the better the return.

The only limitation to wider applications of this technology, appear to be the restrictions of the MOSFET itself. This solid state switching device is a critical component because, as mentioned, its intrinsic diode retains the circuit integrity during the off period of the duty cycle. Its voltage tolerance also restricts the range of applications that could otherwise be immediately applied. It is hoped that shunt circuit applications will encourage an advance in this technology. If so, it may then be possible to apply this directly to higher voltage supply sources to generate a higher wattage output.

## **CONCLUSION**

There is very evidently a breach of unity resulting in all these applications. But nowhere is there a claim to have a closed system. The experiments presented herein, rely on input of energy from a supply source. Thus far, this has always resulted in a loss to the supply albeit that it is disproportionately less than the energy dissipated at the load. However these results point to the fact that it may be possible to develop a nearly closed system where losses are only evident in the load resistive material itself. That system is yet to be developed.

Albeit that tests have only been conducted at relatively low wattages, the principle has been proven that unity as applied to electric energy transfer, can and indeed has been breached. It now remains to be disproved.

## **ACKNOWLEDGEMENTS**

[1] The Cape Metrology Laboratory.

[2] Spescom.

[3] ABB Electric Systems Technology Institute .

[4] Johnathan Green of BP (SOUTH AFRICA)

[5] J DE Bruto of Power Engineers

## **APPENDIX**

### **A BRIEF OVERVIEW OF ELECTRIC CURRENT FLOW IN TERMS OF THE MAGNETIC FIELD MODEL**

The magnetic field model, referenced in the abstract, represents an axiomatic departure from classical models of energy and energy transfer. It is stressed that no part of that model has been developed mathematically. However, it was through the direct application of its principles to conventional electrical circuitry that over unity was both required and achieved. While this does not conclusively prove that model it may suggest that its fundamental concepts are consistent with the fact.

A full description of the model is not appropriate to this exercise except in as far as it relates to properties of an electric current. As mentioned this has not been sanctioned by mathematical proof and is described hereunder in the modest hope that it may explain the concepts of current flow both in line with the field model and as evident from the results on the experimental apparatus.

The fundamental departure of the field model from classical physics is the proposal that a magnetic force may be a primary force. It proposes that electromagnetic interactions are secondary phenomena. A deduction of the properties of a magnetic field led to the conclusion that all such fields obey an immutable imperative to move towards a state of zero net charge. And they can only interact with other magnetic fields.

From this standpoint, deductions were made that led to the proposal that all amalgams of gross solid and liquid matter, may be shaped by magnetic fields. These fields are extraneous to the atoms within their amalgams. They form the atomic abodes that bind gross amalgams into crystalline alignments. As the model also proposes that energy levels comprise magnetic fields, it may be that these fields are somehow extended beyond the immediate range of the atom's nuclear influence. However, it may also be that they originate from the earth's magnetic fields and that they are transferred to the amalgam during the process of manufacture.

The alignment of these atoms within their abodes establishes a relative state of balance within that amalgam. This balance is reflected in the spin or justification of those extraneous fields. In effect, the fields orbit from right to left, so to speak, or from left to right, or indeed in both directions, depending on the ionised state of the atoms.

So it is that the justification of these extraneous fields reflects the valence condition of the atoms. If the atoms in any amalgam are balanced then their extraneous fields have equal numbers of left and right justified fields that bind and separate atomic abodes. And correspondingly, if the atoms are imbalanced, such as in ionised atoms, then the binding magnetic fields only have one justification.

So, if any liquid amalgam comprises predominantly ionised atoms, the

extraneous magnetic fields have a like spin that induces an agitated state within the amalgam. By this is meant that the fields are continually moving away from each other. An example of this amalgam is battery acid and the sum of that imbalance in battery cells is measured as potential difference.

Correspondingly if a solid amalgam also comprises predominantly ionised atoms, such as in resistive wire, those extraneous magnetic fields are fixed within the structure of the amalgam. But their atomic abodes are arranged in an apparently random crystalline pattern to minimize the exposure of like charge, or spin, or justification.

Therefore it is proposed that current flow in fact comprises these magnetic fields. They induce a path through circuit components in order to change their justification at the terminals. This diminishes potential difference, thereby neutralising the imbalance at the source.

Circuit components also have these extraneous magnetic fields located within their atomic abodes. And interaction of these fields with current flow enables the transfer of the primary magnetic fields through the circuit.

As mentioned the material of a resistive load is essentially imbalanced. Having a predominance of ionised atoms indicates that it also has a predominance of imbalanced magnetic fields. In transition through resistive material, therefore, these primary fields interact with the resistor's binding magnetic fields to induce a secondary imbalance within the resistor's amalgam. This too, is measured as potential difference. The resistor's magnetic fields are then induced to alter their justification. These compromises the proximity of ionised atoms previously arranged and separated by these fields. And this, in turn, agitates the resistor's amalgam, which, depending on the intention of the circuit, may be evident in the temperature rise. Under extreme conditions of imbalance, the resistor's binding fields peel off as photons, thereby degrading the

bound condition of its material and resulting in fatigue.

So it is that this model proposes that current flow is simply imbalanced magnetic fields that can be induced to move away from or back to the terminals of a supply source. Always conserved is the quantum of those fields albeit that potential difference at the source is varied through these transitions.

This limits the amount of dissipated energy, not to the amount of fields transferred from the primary source, but to the number of transitions through that resistive amalgam. So it is proposed that the greater the number of transitions, or the greater their frequency, then, correspondingly, the greater is the amount of energy dissipated. The object of the circuit configuration is to increase the number of transitions of current flow through the resistive material.

To this end a switch is applied to inductive components to enable counter electromotive force to induce an opposing or reverse current flow of the primary source. Depending on the number of transitions and as evident in this test, the energy that is then dissipated at the resistor can, in fact, be greater than the loss of energy or potential difference at the supply source. In short, the energy delivered by the battery goes back to the battery. And the energy dissipated at the load comes from the load.