# Cool CAT Fission

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**Cultivating the oddity that an object has near infinite mass until its inertia is overcome, *critical action time* (CAT) fission may provide safe, portable, and self-sustaining energy from crystalline structures using inertial compression. Here, *fission* does not imply the splitting of atoms, but rather the splitting of molecular crystalline lattices. Presented here is a compelling connection between mechanical surge and the generation of power directly from mass. Rapidly impacting crystalline structures will cause energy to accumulate within the crystal. This avalanche of force in effect becomes a reverberation beyond the parity of applied energy. This is not an amplification of energy: That would imply using a small input to control a larger output. This process reaps the inherent potential of crystals themselves. Empirical evidence provides proof and reveals the frequency by which this occurs.**

## I. Nomenclature

| | | |
|---|---|---|
| $A$ | = | intractance or augmentation of mass by its delayed reactance |
| $\dot{a}_c$ | = | centrifugal surge acceleration |
| $\dot{a}_L$ | = | linear surge acceleration |
| $D$ | = | Inertial delay or "critical action time" (CAT) |
| $F$ | = | force (N) |
| $f$ | = | frequency in cps or Hz |
| $f_Q$ | = | tank frequency of inertia |
| $g$ | = | an acceleration equal to Earth's gravity |
| $\lambda$ | = | lambda or wavelength |
| $m$ | = | eccentric mass x2 (kg) |
| $M$ | = | vehicle's mass (kg) |
| $P$ | = | power in Watts expressed as $I \times E$ |
| $r$ | = | radius |
| $t$ | = | time (s) |
| $v$ | = | velocity |
| $W$ | = | watts or units of electrical work done |
| $X$ | = | moving body |
| $Z$ | = | multi-faceted impedance |

## II. Introduction

Acute observations on how mass responds to motion [1] suggest the generation of energy from machines that repeatedly impact mass faster than it can react, creating *cool fission*. Mass subjected to sudden acceleration has increased mechanical reactance that when diverted perpendicular to the applied force, becomes surge. In most cases, surge is so intractable that it is seldom engineered into mechanical systems as a source of propulsion or energy. The author has routinely used surge in his *inertial engines* that guide this force in a predictable way by configuring the mechanics into rotary propulsion systems.[2] However, his later engines employed a direct linear approach to surge.[3] It was through the linear applications of these derivative forces that the following findings were realized.

This paper is arranged into four sections: First, the concept of *Inertial Compression* is discussed followed by a brief discourse on the *Principle of Application*, then *Empirical Evidence* is explored. Finally, an *Infinite Mass Generator* is proposed with control circuitry.

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## III. Inertial Compression

### A. Simultaneity

The research the author has done on inertia and surge reflects the notion of *inertial lag,* or delay "*D",* already investigated by researchers in the early 1960s. [4] Inertial delay is an observable phenomenon and among electrical engineers is known as *starting transient*. It is seldom considered, except for the design of dynamic rotary systems such as some electric motors and early computer tape drives [5] of the 1970s.

Inertial lag can be best observed in the elliptical rotor pattern of Dean drives called *phasing* [6] by which rotational cyclic surge and may be expressed differentially in Eq. (1) as:

$$F_{0cos}\, 2\pi ft = Ma + DM\frac{da}{dt} = M\frac{d^2x}{dt^2} + DM\frac{d^3x}{dt^3} \tag{1}$$

"… where *D* is the delay time, or 'critical action time' of the body and $\frac{da}{dt}$ is the surge. *D* is assumed to be constant.

"The equation has the solution:

$$X = X_{0cos}(2\pi ft - \emptyset)$$

"… where $\emptyset = 2fD$ and

$$X_0 = \frac{-F_0}{4\pi^2 f^2 MZ}$$

"… where *Z* is a sort of complex impedance and

$$Z = \sqrt{1 + 4\pi^2 f^2 D^2}$$

"The important feature to note in this solution is that the amplitude of the oscillation is less than predicted by the Newtonian equation and even more important, *there is a phase angle between the driving force and the displacement*, even in the absence of viscous dampening. This solution demonstrates the most significant characteristic of real bodies, to wit: not only is displacement somewhat less than Newton would predict for a given force, leading to an *increased apparent mass*, but *reaction is no longer opposite to the applied force*: there is a phase angle which will be larger the longer the critical action time of the system! *Action and reaction are not simultaneous!*" [7]

There is a temporal gap between *action* and *reaction*. Since there is no corporal simultaneity, it is serendipitous to consider the result if inertial lag were preempted and forced mass to compress. Since CAT is a constant and surge is confined by repeated applications, then energy would have to accumulate somewhere. Mass could be bombarded with more impulses than it could react to by a process that requires less energy: The Law of Conservation of Energy is upheld because the primary energy demands are pulsed even though the effect is cumulative.

### B. Examples of Delay and Detection

Since the reaction to an applied force implies a delinquent component in the equation that defines motion, it becomes increasingly clear that this characteristic has not been fully exploited. For example, lag time can be observed in magnetics[2] and piezo electrics where new applications could flourish. Time delay between action and reaction may also be dramatized by the device depicted below in Fig. 1. Acoustic delay lines are special transmission lines which initiate a useful time delay between input and output signals.

In Fig. 1 shown below, a quartz crystal block, bar, or rod has an input transducer at one end and an output transducer at the other. An electrical input signal in the first transducer sets up sound waves which travel through the interior of the crystal rod; the piezoelectric reaction of the crystal to sound vibrations generates an output voltage in the second transducer.

Similar to inertial compression, the delay is due to the time required for the acoustic energy to travel the length of the rod like that used in early echo sound-effect devices. The device in Fig. 1 above also displays the principle of application used in the experiment later reviewed in this paper where quartz crystal is the means through which the results were detected.

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[2] Inertial delay demonstration with repelling magnets / https://www.youtube.com/watch?v=yWQcSEQalZc

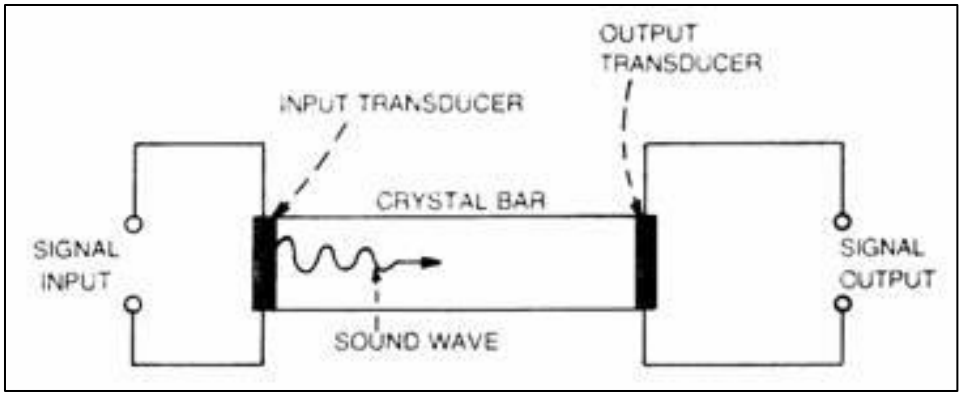



**Figure 1 Early time delay device used to create reverberations in audio recordings.**

## I. Principle of Application

### A. The Frequency of Inertia

Inertial delay has a response time that can be equated to a frequency. Taking the example of a meter-long steel rod, by applying a force to one end, the instant the force is applied at zero time, an elastic compression wave would traverse the length of the rod and return to the point of contact. This compressive wave travels at approximately 5,000 meters per second or 11,185 mph "…to the far end of the rod where it is reflected as a rarefaction and returns to the point of application of force at the same speed." [8] The rod, as an object subjected to an unbalanced force, cannot move until this compressive wave has traversed its entire length and returned 4/10,000 of a second later. The force applied can be infinitely large, but until this force has completed its "first round trip," the rod cannot obey F = ma. The impacted rod appears to exhibit near infinite mass until its inertial has timed out. However, it has been pointed out:

> "It would be oversimplifying to say the rod acts as if it had infinite mass during this time, since the center of gravity will be moved somewhat by the compression, but for all practical purposes, the rod acts as if it had a much larger mass than it actually has." [9]

In the above analysis, where the wavelength $\lambda$ is at 2.0 m, and the formula shown in Eq. (2) is

$$f = \frac{v}{\lambda} \tag{2}$$

with the velocity of 5,000 m/s then Eq. (3) would resolve the *tank frequency of inertia* with a new term $f_Q$ at:

$$f_Q = \frac{5000}{2} = 2.5\ kHz \tag{3}$$

### B. Between a Rock and a Hard Place

If two steel rods were placed together end-to-end, and a force is applied simultaneously to each outer-end of the rods, movement between the inner-ends of said rods would be restricted. The applied energy between the inner rod ends would have to be converted, in most cases into heat or into deforming the rod ends.

The same principle applies to hammer and anvil. The fact that one agent, in this case the anvil, is stationary is notwithstanding. Hot metal can be worked between the action of the blacksmith's hammer and the anvil: The impact of the hammer hitting the hot metal and the energy travelling through the work, then through the anvil, reverberates back up into the metal from the bottom of the anvil. The hot metal cannot continue the energy back up into the hammer because its contact is intermittent, so the energy is dispersed as heat, keeping the metal soft and hot. Thus, the worked metal has to flatten perpendicular to the impact.

Referring to Fig. 2 below, if the applied forces on the outer ends of a mass were at such a frequency whereas the mass could not dissipate the energy quickly enough, then the energy would tank at their convergence. The frequency of accomplishing this is determined by the speed limit of inertial reaction itself.

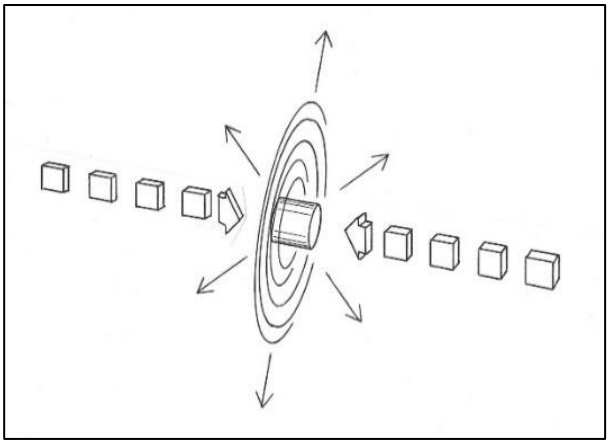


**Figure 2 Force applied equally at the proper frequency to both ends of a mass will avalanche.**

## II. Empirical Evidence

### A. The Experiment

In order to determine the exact frequency of the response speed of inertial effect, an experiment had to be designed that could quantify the frequency at which said effect occurs. In Fig. 3 below, to the left is multivibrator that supplies a pulsed DC voltage to the impact drivers on both sides of the crystal target. A crystal, in the center of the diagram, is used because of its piezoelectric properties that allows a change in energy states to be easily detected. At far right is a simple voltmeter that will register a change in AC voltage across the crystal.

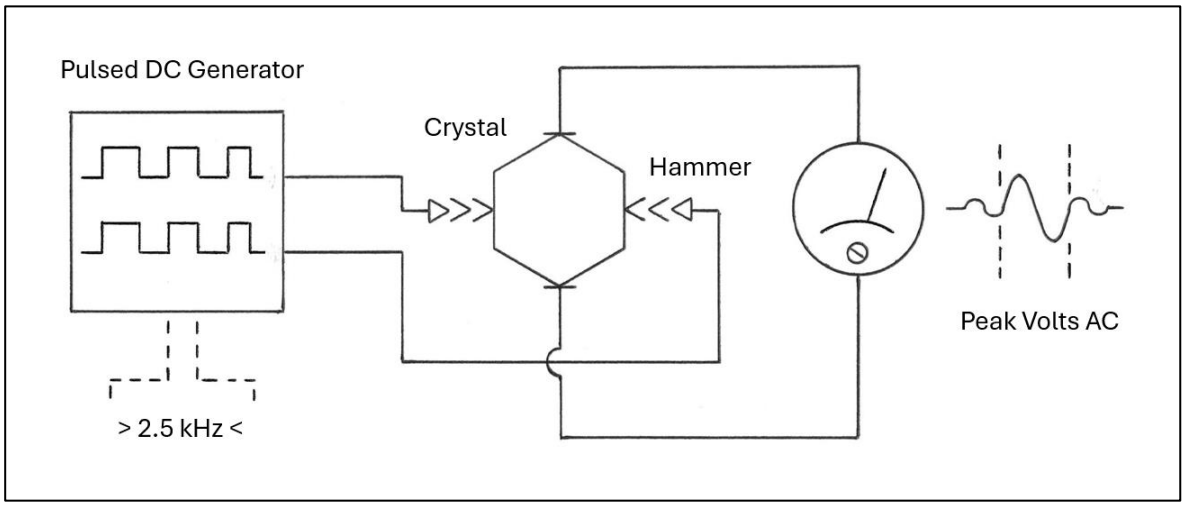
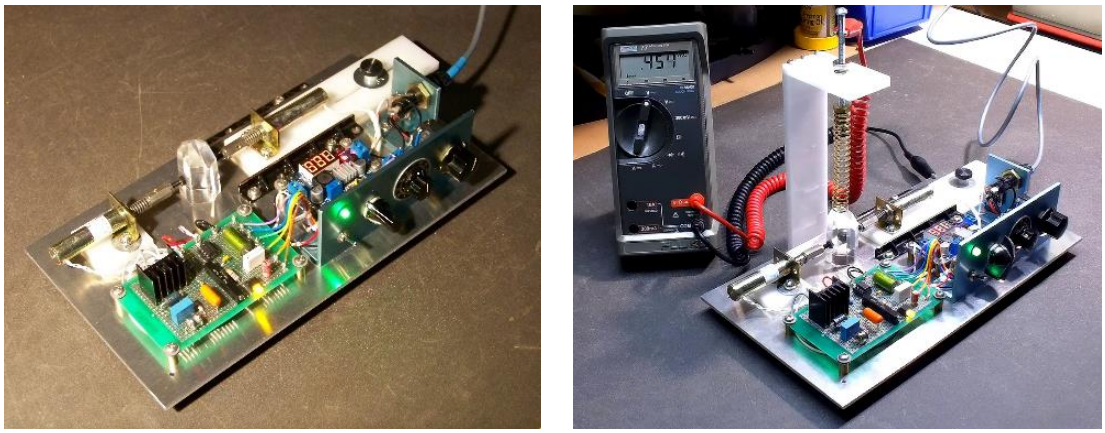



**Figure 3 Diagram of the experiment used to determine the frequency of inertial compression.**

The rate at which inertial responses travel has to now be verified to employ the principle of inertial compression. The generator, the ICG-1, shown below in Figs. 4a and 4b, was built by the author to demonstrate the augmenting of energy from inertial compression and to measure the response or speed of inertia itself.

In the following experiment note that the natural crystal was not cut for optimal operation, but to display only a potential difference so as to detect and determine the frequency of inertial compression. The quartz crystal generates only 0.457 VAC of peak energy using 13.5 watts of DC electrical power. However, said peak voltage measured *perpendicularly to its piezoelectric lattice* of the quartz crystal can only be achieved at the rate of 2,500 cps, establishing the frequency of inertia. Once this frequency has been reached, the forces from both ends of the hammers pile up within the quartz crystal to full resonance and the crystal displays a non-piezoelectric increase of *AC voltage* – not DC. Beyond that frequency the energy level drops. This narrows the tank frequency of inertia $f_Q$ to 2.5 kHz as predicted. This experiment was verified using another crystal. See Fig. 4 below. Ongoing research continues.



a) b)

**Figure 4 The ICG-1 generator was used to confirm the theory of inertial compression.**

**B. Verification**

Note the hammer impact forces come from the solenoid plungers' *springs* when the plungers are released, not directly from the action of the solenoids as they are being engaged: The 13.5 watts of electrical power is used to activate the solenoids only, not impact the crystals. This is because pull-type solenoids were used instead of push-type solenoids so that a higher frequency response could be achieved.

This experiment was first set up with a comparative test tone of 2,500 Hz while the author fine-tuned the generator to said frequency then marked it on the control panel. On the blue control panel with the green LED, from left to right, is the first pointer knob which sets the range of the oscillator frequency. The middle knob adjusts the coarse frequency within each range, and the last knob is an 8-turn control that fine-tunes that frequency. This experiment may be viewed on the YouTube link below.[3] The results were plotted in the graph Fig. 5 below using the ICG-1 generator.

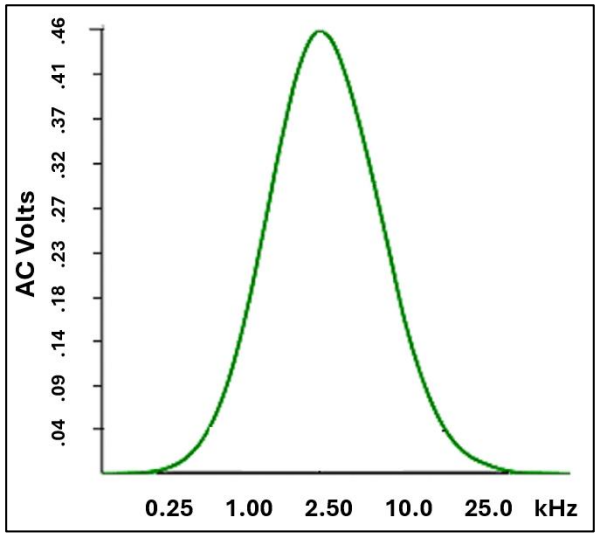



**Figure 5 Establishing the frequency of inertia.**

To allow the experiment to be readily duplicated, Fig. 6 below is the schematic of the ICG-1 generator. This particular circuit will accommodate a higher output voltage from 12VDC to 24VDC provided the solenoids are upgraded to that voltage and are rated *intermittent duty*.

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[3] *Crystal Power from Inertial Compression* - https://www.youtube.com/watch?v=APsYRkKOij4

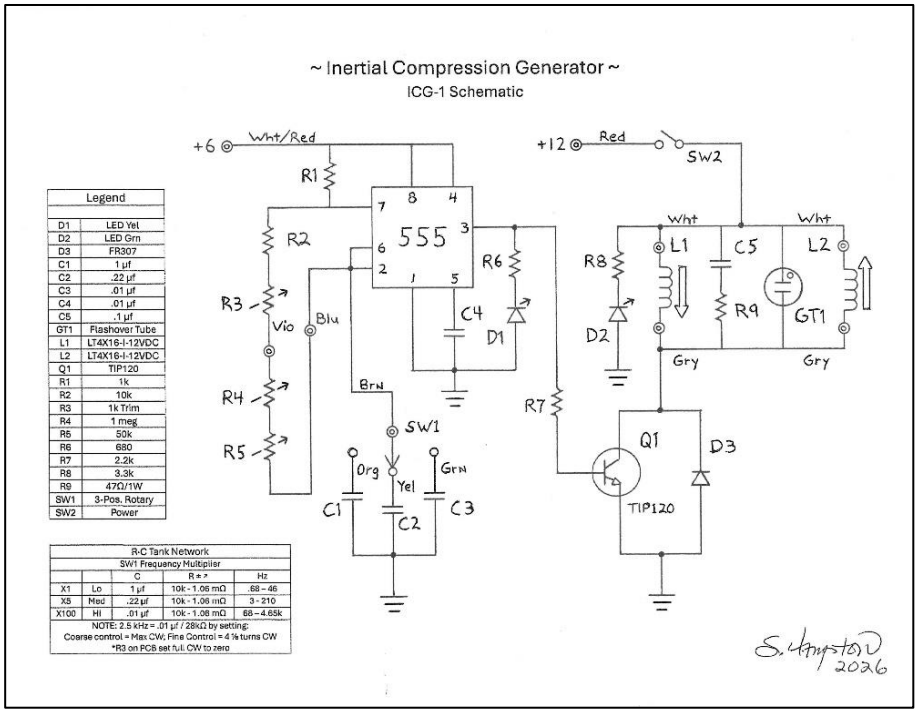



**Figure 6 ICG-1 schematic.**

## III. Infinite Mass Generator

### A. Energy Through Vanity

To convert energy directly from matter using inertial compression, a hard substance must be the focal point of the hammers. Diamonds are a possible fuel source, but they are not piezoelectric because the carbon atoms are electrically neutral. Thus, instead of generating direct electrical power from being squeezed, diamonds under inertial compression would have no other option than to heat-up and fissile.

Figure 7 below is a 1994 schematic of the author's theoretical model of a safe, cool fission generator.[10] This *infinite mass generator* would establish a traveling compression wave from the transducers between the two rod hammers driving the anvils to super-compress faceted crystals into a controllable fission. Thus, in this case, breaking the crystalline carbon structure down into its basic form of carbon and releasing large quantities of heat in the process.

Referring back to Fig. 7 below, as the frequency of the pulsed DC to the quartz crystal transducers *7* and *8* is increased simultaneously to threshold, they will squelch just before the diamond tips *1* and *2* on the anvil rods *3* and *4* go into fission driving the dancing carbon atoms on their faces into radiating intense heat in minute quantities. Though diamonds will not directly fissile, the hard diamond fuel inserts would not have enough time to cool from the traveling inertial compression waves of the oscillating transducers and their respective driving hammers.

### B. Bang the Drum Quickly

Such a device shown in Fig. 7 below could produce forces that would accumulate like a bull-whip lash on each of the diamond faces because the hammer and anvil rods are of two different, but very dense materials. In Fig. 7 below is shown cobalt for the first two thirds of the rod as the hammer, and iridium for the last third as the anvil rod. Cobalt is three times as dense as diamond; and iridium, or the slightly lighter and cheaper tungsten, is three times denser than cobalt. Molybdenum also has a density close to that of cobalt and less expensive. The rods can be advanced by an automatic feed system. Said rods need to be long enough to generate significant inertial compression.

The quartz crystal drivers must be carefully constrained from expanding perpendicular to the applied forces and care taken from fracturing. They must also be cooled and first in line for the heat exchanger. This would also pre-heat the water before it reaches the fuel inserts. The drivers should also be electrically phased 180 degrees or connected in parallel – positive to positive – so that the crystal drivers impact the rods together simultaneously.

Once started, the system would be self-sustaining and produce more energy than it consumes. In Fig 7 below, rectification *16* is depicted *after* amplification *15*. If the start-up power requirements and end-frequency turn out to be

low enough, which is the case as was seen from the experiment depicted in the previous Fig. 4, rectification may occur *before* amplification using conventional diodes: Using pulsed DC would also simplify the circuit.

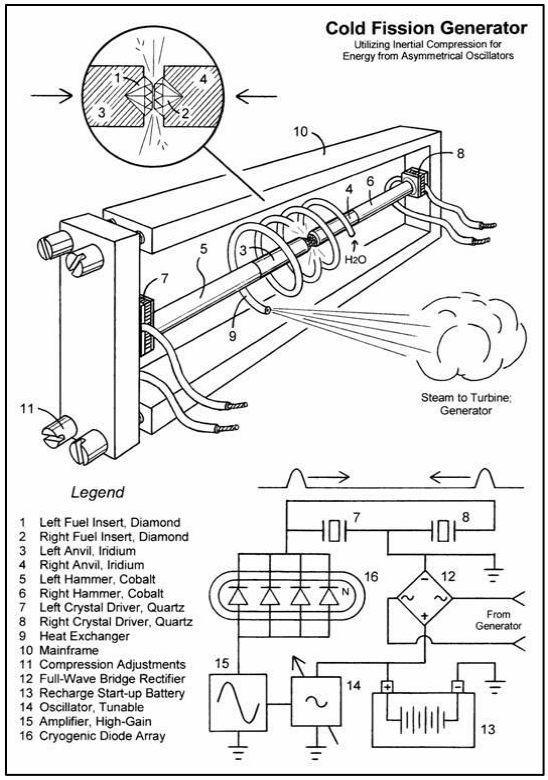



**Figure 7 Author's 1994 theoretical model of a cool fission generator.**

At the determinate inertial tank frequency of 2.5kHz, the rods would vibrate at an audible frequency that corresponds to a musical pitch in the high treble range, near the note D-sharp in the eighth octave similar to tinnitus in some people and may cause hearing fatigue from such a shrill and harsh sound. The heat shielding would have to incorporate a sound dampening matrix.

The next phase involves development of a dependable, compact generator. Then the best crystalline material will have to be found.

### C. Alternate Drivers

Because of the amplitude at which the anvil rods *3* and *4* must be driven, the quartz crystal transducers *7* and *8* may have to be substituted with *magnetostrictive* drivers. A magnetostriction oscillator is also another example of existing devices that utilize delay times. See Fig. 8 below.

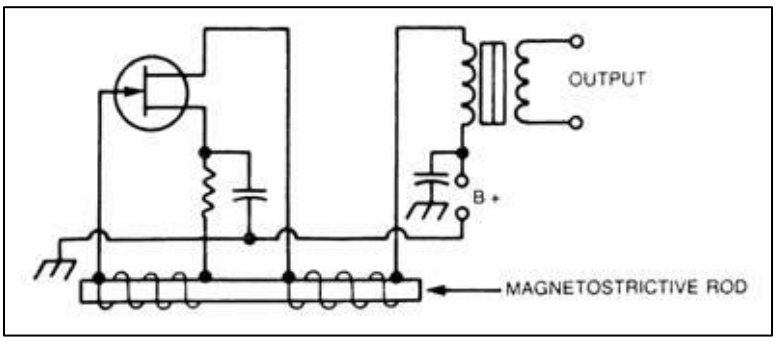



**Figure 8 A magnetostriction oscillator may work as both driver and hammer.**

Magnetostrictive effect is the expansion or contraction of a bar or rod of magnetic material (such as Invar, Monel metal, Nichrome, nickel or Stoic metal) in proportion to the strength of the applied magnetic field. Magnetostrictive vibration in such a rod is comparable to piezoelectric vibration in quartz crystal. In the above FET circuit shown in Fig. 8, the oscillator's frequency is controlled by the magnetostrictive rod. The dimensions of the rod and type of metal it contains determines its tank frequency and thus the frequency of the oscillator. The Cold Fission Generator depicted in Fig. 7 may be simplified with such a driving mechanism and may have better performance.

**D. Summation**

It has been observed that the front end of armor-piercing artillery shells hammers away at its target while the rear of the shell perseveres at a constant velocity. [11] Likewise, in the proposed generator, at the end of the rods where the hard diamond faces meet, the apparent mass would be *increased* by the accumulation of compression waves. This will escalate the confined energy $F_h$ at inertial tank frequency $f_Q$ along a horizontal line represented in Eq. (4):

$$\sum F_h = Ma + A\dot{a}_L^2 \tag{4}$$

where the sum of the cumulative forces is simply additive. The term $A$ is *intractance* as a product of the CAT and hammer mass where $A=DM$ and has units of mass-seconds. [12] The term $\dot{a}$ is an abbreviation for $\frac{da}{dt}$ and the final notation $A\dot{a}_L^2$ represents repetitive linear surge as was demonstrated in the author's earlier experiments. [13]

The proposed generator would reverse the process by which crystals were frozen billions of years ago – thawing Earth's tears and returning them to instant energy.

## Conclusion

Colliding masses with repetitive surge at $f_Q$ will accrue energy at their convergence.

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## In Memory:

Of fellow researcher the late Craig A. "T" Herrington.

## Dedication:

To Evie

## References


[1] William O. Davis, *The Fourth Law of Motion*, Analog, May 1962.

[2] S.M. Hampton, *Asymmetric Impulse Drive*, AIAA 2022-4391 Frontiers in Deep Space Propulsion, Conference & Exhibit Volume: AIAA-2022-4391, Centrifugal Dynamics Co./TM-2022-EXPL4391, DOI: 10.2514/6.2022-4391, Oct 2022

[3] S.M. Hampton, *Mechanical Impulse Drive*, Oct. 2025, pp 6.

[4] G. Harry Stine, *Detesters, Phasers and Dean Drives*, Analog, vol 96 (6), June 1976

[5] S.M. Hampton, Indiana General Magnetics, Olgesbee, IL, 1973; as a young lab technician the author's job was to measure the moment of inertia of electric motor armatures for start-up power demands. A *rotary* pendulum test was used to time armature oscillations. (Coincidently, the author now employs *ballistic* pendulums to detect unidirectional force from inertial drives.) The armature was hooked up to a long cord from the ceiling then rotated 360 degrees, released, and timed for ten revolutions. He would then go online and plug that time into a formula where it was worked out in a U.S government supercomputer somewhere in cyberspace. (In the 1970s, the internet was accessible only to the U.S. military, government agencies, or to large corporations such as Indiana General who had a contract with the government.) These tests determined the peak magnitude starting-transient curves for current drain on each armature design required to get that armature spinning to overcome its moment of inertia and achieve peak angular torque. This was important because the motors used to run early computer tape drives where speed and smooth, near instant start-stop response was crucial.

[6] S.M. Hampton, *Asymmetric Impulse Drive*, AIAA 2022-4391 Frontiers in Deep Space Propulsion, Conference & Exhibit Volume: AIAA-2022-4391, Centrifugal Dynamics Co./TM-2022-EXPL4391, DOI: 10.2514/6.2022-4391, Oct 2022, pp 6.
[7] William O. Davis, *The Fourth Law of Motion*, Analog, May 1962. pp. 98.
[8] William O. Davis, *The Fourth Law of Motion*, Analog, May 1962. Pp. 91.
[9] G.H. Stine, *Detesters, Phasers and Dean Drives*, Analog, vol 96 (6), June 1976, pp. 77
[10] S.M. Hampton, *Dean Drives and Davis Mechanics*, Oct. 1992. pp. 60 – 63 out-of-print
[11] G.H. Stine, *Detesters, Phasers and Dean Drives*, Analog, vol 96 (6), June 1976, pp. 78
[12] William O. Davis, *The Fourth Law of Motion*, Analog, May 1962. pp. 97.
[13] S.M. Hampton, *Mechanical Impulse Drive*, Oct. 2025, pp. 7 - 12. For more on linear impulse space drives.