Tim Harwood's Excess Energy CD Motor

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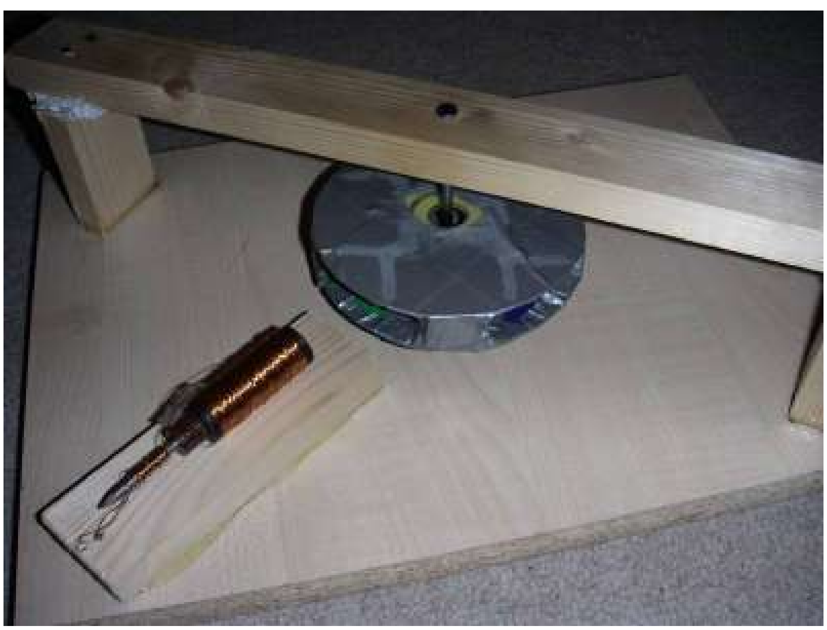
The world's first excess energy experiment using household items & Radio Shack parts

This experiment dates from the fall of 2001 when the Twin Towers were crumbling in New York. It concerns an attempt to replicate a rather obscure device invented in the 1960s, commonly referred to as the 'Adams motor.' The vision I had held was to produce a cheap and simple excess energy experiment, that could be replicated at home for minimal cost. Somewhat to my own surprise, but not due to lack of application or due to accident, I succeeded admirably in this goal, despite the near universal opinion such a thing was both 'impossible' and 'against all the laws of physics.'

No-one can deny that despite the generosity of Nexus magazine and the articles they published on behalf of Mr Adams in the 1990s, the motor had become widely perceived as a fraud by the late 1990s. Indeed, a couple of the major 'free energy' websites actually listed the device as a known fraud, and when I began my researches, several people were kind enough to email me about these 'proved facts.' It is therefore due in very large part to my personal efforts and the 'CD motor' project, that the Adams motor has been successfully retrieved from historical obscurity.

This file is presented as a practical guide to construction and replication, and will not address advanced optimization strategies or detailed theories of operation. Suffice to say significant performance gains above what can be obtained by following these instructions are possible. Besides saving a considerable amount of space, the physics involved is simply far too complex to explain without a common 'hands on' based grasp of the technology. There is no substitute for lab bench time and expertise.



The original 1.0 CD motor motor depicted without modification.

It really did 'run cold' first time.

Construction Guidelines for the Historic CD Motor Device

2 CDs - Can be taken from old computer magazine covers, for example

3/4" Magnets - Glue 2 grade 8 ceramic disc magnets together to make one magnet

Circuitry - Hall ic, MOSFET, general purpose wire, etc

12v 7Ah lead acid battery - A good Ah rating is required for best results

24 – 26 awg stator wire - Enameled copper required to wind stator

Mild steel nails, washers, nail head covers, misc

Wood / plastic - Magnetically non conductive material to fix parts

2,500 psi epoxy glue - This is about the strongest glue you can easily buy

TOTAL COST ABOUT $50

The first step is filling in the center of the CD. This can be achieved via a variety of methods, and while not the one I originally employed, mounting on an old hard drive platter has emerged as the most popular choice. Other people have used parts from old video recorders, record players, and 1/4" bike bearings. Use parts to hand and common sense.

As a general note, plastic parts are to be preferred on the rotor section because they are non conductive and offer only frictional losses. Also, the CDs MUST be used in 'magnet sandwich' pairs for structural stability. Hard pressed CDs such as those found on magazine covers or free Internet trial disks should be used, because CD-RW disks are too flimsy.

The images should really be self explanatory here, and anyone of basic intelligence should be able to combine wood, nails, and glue, to provide a some form of basic low friction basic mounting.

Stator construction is eccentric, but not difficult. Again, it is simpler to copy the images.

Note the approximate 4:1 dimensions on the rotor / stator interaction. The final stator is illustrated with enameled copper wire bare for clarity of illustration, but should be insulated with tape during normal operation. As much as anything, this eccentric geometry and scale is the secret of the motor.

Adams Type Brushless Pulse Motor Tip Sheet

Disclaimer: No attempt is made to speak for Mr Adams in this file. What is presented is a collection of personal opinions / observations, on how to extract optimal performance from Adams type brushless pulse motors. While I have done my best to be as accurate as possible, opinions in these matters inevitably vary, especially as regards optimal switching solutions.

Stator Guidelines

Many people (used to) ignore Mr Adam's original 4:1 instruction, and do not build stators with the geometry suggested (stator head HALF width / height of rotor magnet). The stator wind is the most critical part of the motor, and while I appreciate conventional theory says these stators are wrong in several respects, I can assure you this is what is required. Whether the magnets are square or round faced is not critical.

If you have any doubts, you can just copy what you see in the given illustrations. A mild steel nail about 100mm long with an 8.5mm head makes a most excellent and highly cost effective stator core, and I used a tap washer (bathroom section in your local hardware store, a non conductive part) to 'end,' my stator. Pair that with rotor magnets about 17 – 20 mm (3/4" approx) in diameter. The stators MUST be wound solid to 90-100% of the rotor magnet width.

I have found 24 awg (0.56mm) wire to be a helpful base to work from in this respect, but 25 awg and 26 awg are also commonly employed. The important point is that the total resistance of each individual stator, should not be less than 6 ohms. If using two stators connected in series for smoother rotor torque transfer, 12 ohms is therefore the correct minimum specification.

Magnet type: Ceramic / Ferrite Grade 8

Ceramic and ferrite are two words for typically the same magnet. Grade 8 is generally the strongest grade sold. Ceramic magnets are highly resistant to demagnetisation, and also have a field strength that works well when combined with a 12v control pulse. So they are both reliable and easy to work with. There is no reason to use anything else when you first start your experiments. Stronger magnets only make manifesting the effect harder, requiring higher quality stator cores, and scale absolute output only, not efficiency.

Magnet size: 3/4 " / 17-20 mm

The effect is critically related to pulse width. **In general the longer the period of the pulse, the less exotic its properties**. For this reason, magnets larger than ¾" should not be used. They can be either square or circular faced. One inch diameter is too wide, and motors built on this scale only work with 555 or other suitable control circuitry to adjust the pulse width down. Keep in mind the faster the rotor spins, the shorter the required pulse width. A timing system that works directly off the pole faces of the rotor magnets, automatically reduces the pulse width as rotor speed inreases.

Magnet duty: 20%

I prefer just under 20% duty (this means the physical space between the rotor magnets, should be roughly five times the width of the pole face of the magnets). Size and scale is one of the reasons the CD motor concept works so well, because it forces correct duty. Try NOT use 'generator' windings or any other complications around the rotor. The stator pulse should be a clean relatively low duty input onto the face of a permanent magnet. Any additional loads placed on the rotor, tend to compromise the magnitude of the switch closure event, and are relatively ineffective at tapping current besides.

Voltage Input

Expect performance to vary with input voltage. Some prefer to run run the motor at multiples of the 9v negative energy harmonic for optimal current draw results e.g. 12v is typically the minimum required to fully close the air gap down, but after that 18v, 27v, 36v, 45v, etc should be used. For best 'back emf' output, 120v and most especially 240v are suggested for investigation. **Keep in mind the higher the voltage rating of a part, the worse it tends to become at handling current**. So while theory may suggest higher input voltages, practical MOSFET based engineering may prefer a 240v maximum.

Windings Resistance: 6 - 9 Ohms

24 awg wire is really a minimum for these motors. Lutec are said to use 6.8 ohm stators, whereas Mr Adams originally recommended 10 ohms. So 6 - 10 ohms is a sensible range to aim for. It is unlikely your first stator will be fully optimal, so expect to experiment. More turns on the stator do deliver a greater back emf recharge effect, but diminishing returns are manifested beyond the 4:1 ratio. Best torque is generally seen at 9 ohms. Best system throughput at 6 ohms, which is also less demanding to switch. Higher ohm sets produce very low current draw, but at the expense of rotor torque i.e. you are not gaining efficiency. Coldest operation is typically seen around 4 - 5 ohms.

Alternative Winding Methods: Bifilar and Unidirectional

Winding the coils unidirectionally helps increase flux density. Since a magnetic field is produced around the wire as the current flows through the wire, by winding the drive coils directionally, the field that surrounds nearly every turn of wire has the same polarity. Under loaded conditions, it is also reported by some that bifilar winds improve performance.

General Construction

Apart from the stator cores, keep as much metal out of the design as possible. It acts as an electromagnetic drag upon the rotor, lowering efficiency. The magnets are fixed with 2,500 psi epoxy glue (comes in 2 syringes, resin and hardener). Be sure to mix thoroughly for best results, and try and get an exothermic brand for faster setting. Attend to the basics such as oiling the motor shaft etc.

Air Gap: 1 - 1.2 mm

There is a common but false opinion, that the shorter the air gap between the stator head and the face of the rotor magnets, the higher the efficiency. This is simply not true. A distance of about 1.1 -1.2 mm generally delivers optimal results. Air gaps below 1 mm result in a substantial drop in performance.

Rotor Speed: 1,500 – 3,600 rpm

No less than 1,500 - 2,000 rpm. With a fairly light well balanced rotor, 2,500 rpm is possible off a 12v input. If you wish to make a heavier rotor, a higher input voltage will be required to compensate. 120v and 240v are interesting values to investigate as regards current draw required, with reductions of over 70% reported.

Battery Type: 7 Ah Lead Acid

Some batteries recharge much more efficiency than others. The Adams motor works on the basis of drawing energy from a supply battery for a pulse, and then releasing an impulse of energy back to the source which is recharged. Lead acid batteries while heavy, offer the greatest efficiency in this process. The second main parameter for battery efficiency is the Ah (amp hour) rating. Up to about 4-5 Ah significant increases in recharge efficiency are gained.

Circuitry: Ground the Stator to the Supply Terminal

The only important point about circuitry for Adams motor, is that the **stator coils should be grounded to the supply terminal of the battery when the main pulse input circuit is open**. This can be implemented by various methods, but a high quality 400v rated discrete diode placed in parallel round the main control transistor is probably the easiest method. As a by product of the manufacturing process, MOSFETS contain an integrated body diode, providing a path to ground for the back emf surge. In this sense, all MOSFETS are a form of bidirectional switch. Capacitors rated to 400 – 500v can be used for back-emf capture. This will eliminate sparking on reed switches, sharply reducing burn out. It may also enable you to manifest the significant battery recharge effect.

Trigger Point: Just before the Center Point

Generally optimal rotor speed and efficiency is reached if the stator coils are pulsed just before the center point is reached. The reason for this is simple enough. There is a small delay between the application of the magnetic field H, and the resultant flux B manifested in the core. Triggering the demagnetization pulse just before the center point, allows for this delay. Higher quality core materials / and or a smaller scale of construction, will reduce the length of this delay.

Timing: Different options, different advantages

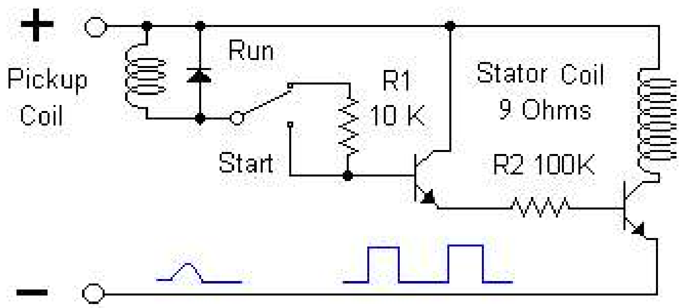
Hall ics are fragile. While a little more complicated to implement, optical systems are the most robust brushless solutions. The other option is a tiny generator coil, with diode circuitry as a trigger, but the output from such coils is very rough, and would only be suitable to trigger transistors, which is turn power the main circuit switch, which may be a higher performing MOSEFT type. For over-unity back emf output, quality MOSFET based switching solutions are absolutely required.

Note: GENERATOR COILS DIRECTLY POWERING THE MAIN CIRCUIT SWITCH CAUSE A SIGNIFICANT PERFORMANCE LOSS. THIS IDEA IS JUST PLAIN IDIOTIC.

Example Very Simple Induction Coil Based PNP Transistor Circuit Type

Dedicated Low Draw Pickup Coil Circuit

(Basic Transistor Based Commutation)

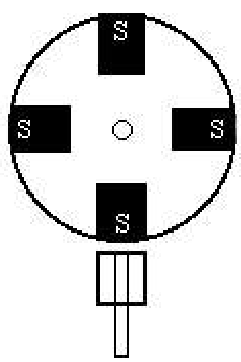


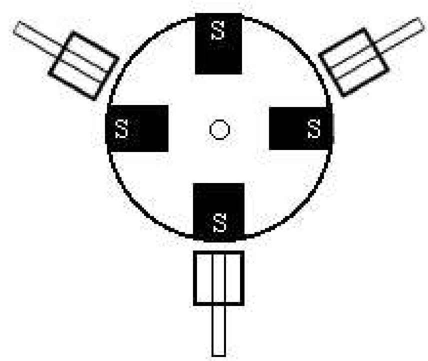
'Start' setting bypasses resistor, giving a longer pulse width

'Run' setting optimises the pulse width for normal operation

Resistor values may need adjustment for motor variations

Design Templates For Simple Adams Motors

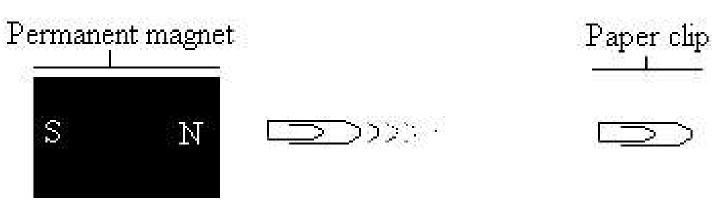




Initial testing layout
Hopeless with a mechanical load
S poles perform slightly better
Place Hall ic opposite stator

Suggested optimal rotor drive layout
0, 120, 240 degree stator spacing
Delivers near constant rotor torque
Stators pulsed and timed separately

Setting Stator Wind Depth - The Paper Clip Test



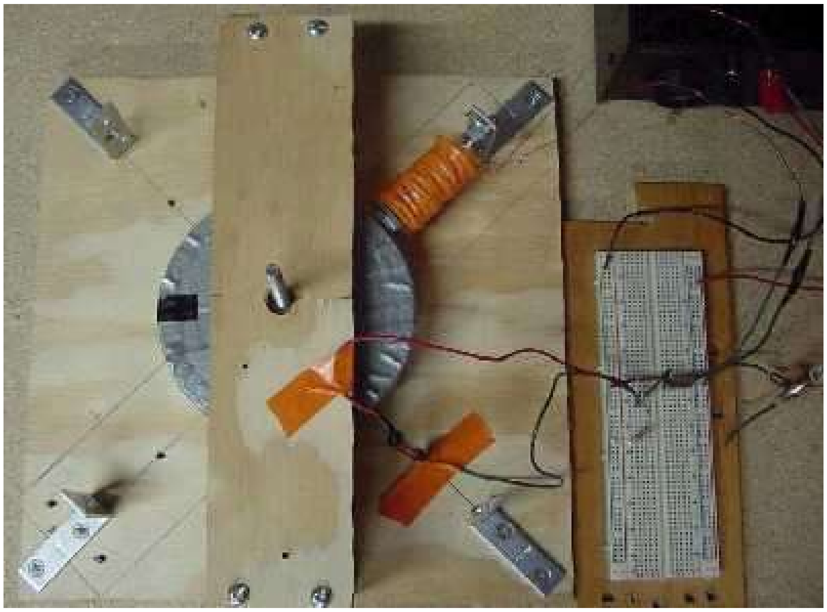
Take one permanent magnet, and one paperclip

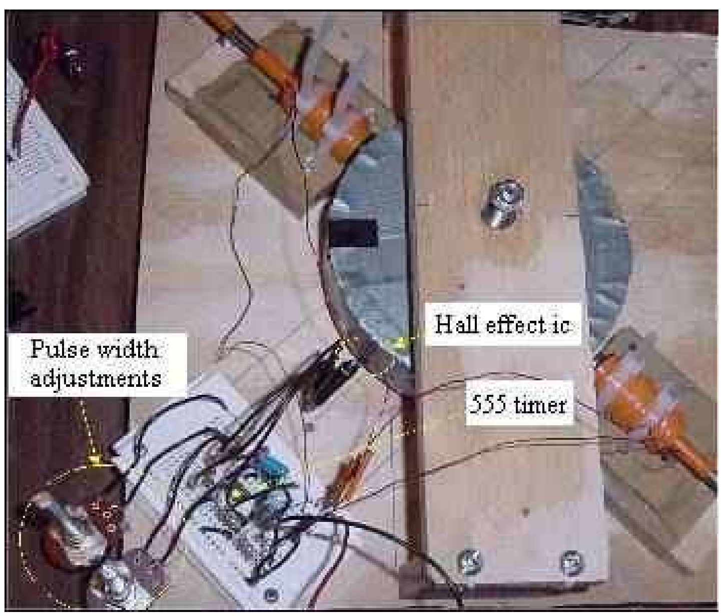
Place on smooth surface, and push paper clip towards pm

Note distance at which paper clip flies into face of magnet

Replications

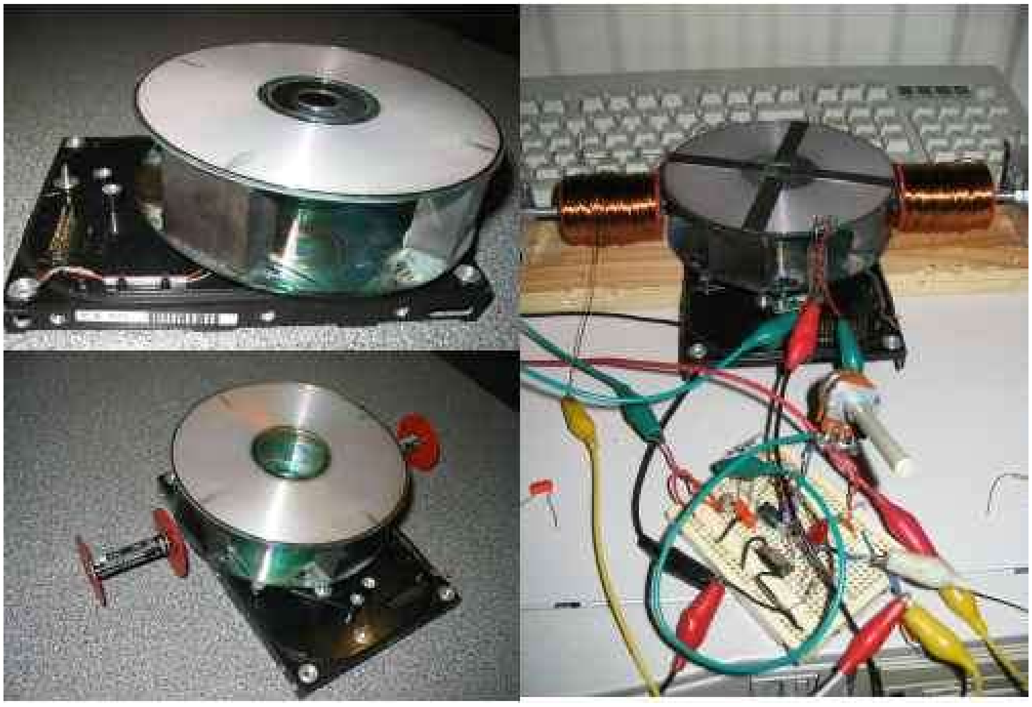
Brian's CD Motor





The only deviation from my design Brain made was his use of slightly larger 1” magnets. Sadly, this was enough to result in a motor that ran 'hot' rather than 'cold.' However, this identified pulse width as a critical variable, and with the addition of 555 circuitry, cool ambient operation was easily obtained.

Matts CD Motor / Hard Drive Motor Combo Experiment



Matt's Comments

I've built an Adams motor based on the ideas from your CD Adams motor. I had to change a few items because of what I had available.

It uses hard disk base for the bearings, 4 30mm square magnets. I tried to follow your rules as accurately as possible based on the larger magnets. I used .56mm winding wire as you suggested for the stators but based on the larger magnets each winding came to around 10 ohms. The magnets were sandwiched in between 2 CD's and the whole thing mounted on the hard disk motor. I used an infa red receiver and emitter taken from the inside of a mouse for the optical eye. The signal fed into a simple transistor and then into 555 timer for creating pulses.

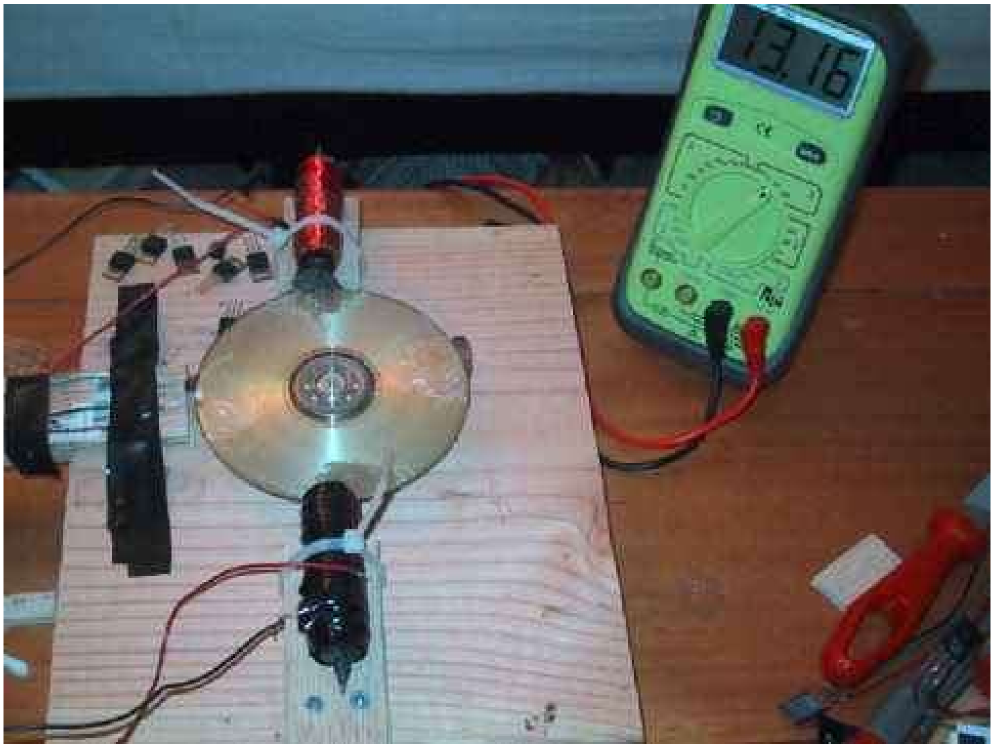
I got the thing running from the start, but the power transistor driving the stators ran hot, and the rotor ran pretty slow. After another night of tweaking, moving the eye and altering the pulse width, I've now managed to get the motor running with a stone cold power transistor. I've put a multimeter on the input and it draws around 170mA I don’t know what rpm its going at but it seems to be doing a fair few rpm.

I've included some pictures of the thing when it's running but because of the flash I don’t think you get much sense of speed. I tried adjusting the shutter speed so I could measure the blur on the rotor to find out how fast the thins spinning at.

Feel free to use the pics as you wish.

Regards.
Matt

Exact CD Motor Replication

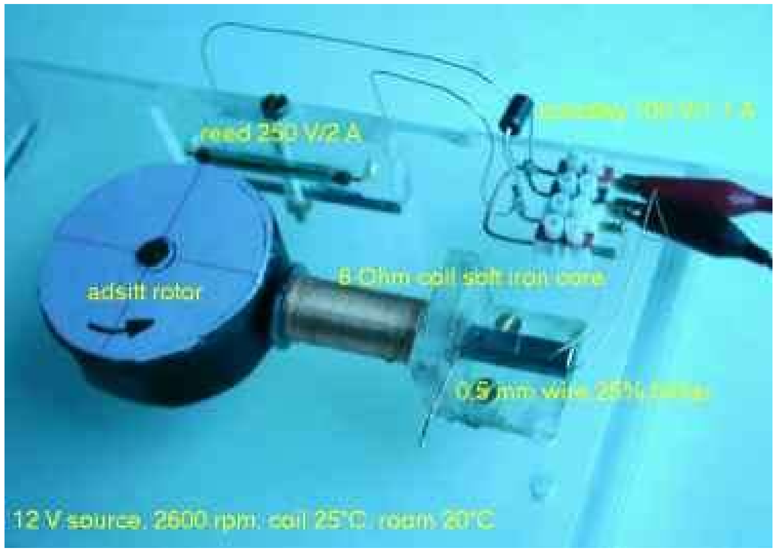


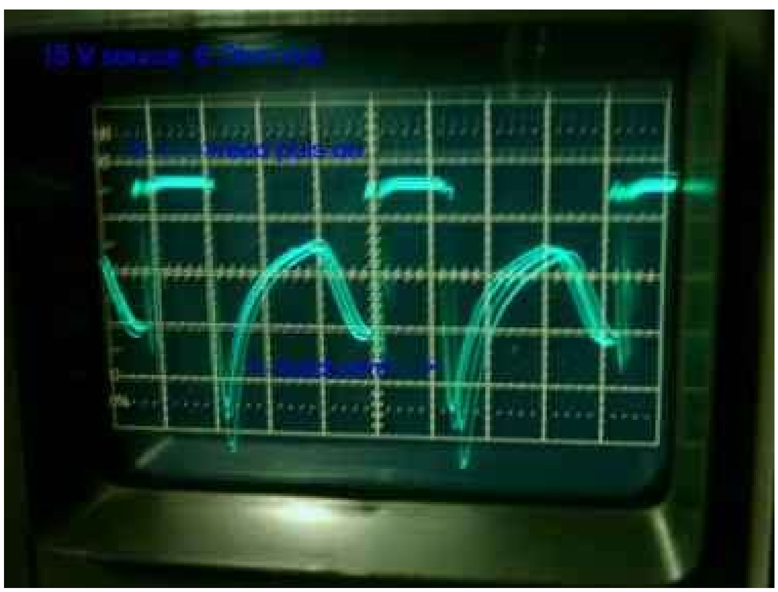
Bill's Modified Kit Motor

'I couldn't believe how easy it was for a novice to construct a machine from Tim's website and get cold running first time. My simple Hall effect driven motor is smooth and really does defy belief in how efficient it is. My machine uses a mere 70 miliamps per hour, and I do indeed get the chill effect Tim describes.'

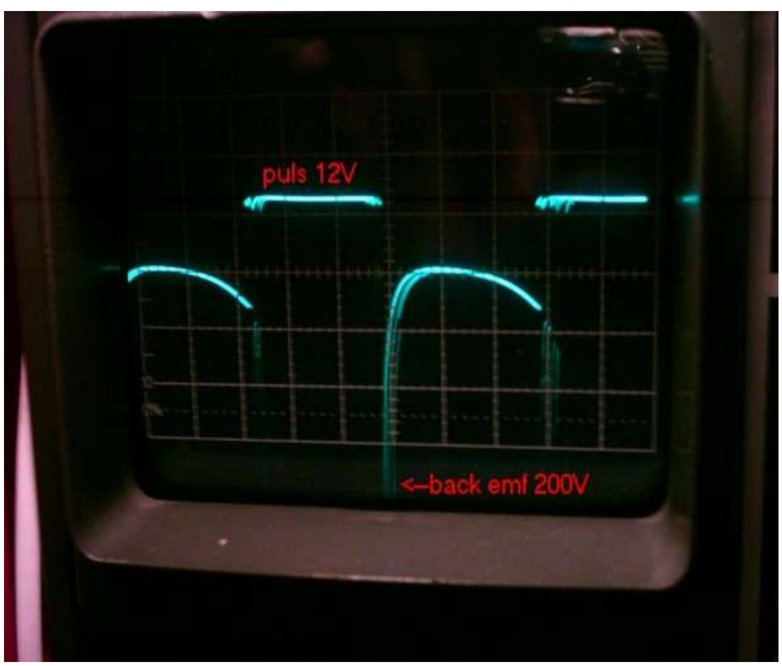
Bill, England, January 2003.'

Roland's Modified Kit Motor Experiments





The accusation the Adams motor back emf effect is 'voltage only,' is shown to be untrue by this extremely clear oscilloscope trace. The substantial current component is simply unarguable. These are independently repeatable scientific results.



Comments

The Schottky diode in parallel with the reed switch successfully eliminated the sparking effects that were damaging the reed contact. I could not fix the reed on a point however, because when I start the motor, it runs to 2000 rpm. Then I have to change the position to shorten the stator coil input pulse, which boosts rotor speed up to about 2575 rpm.

Setup is now thus:

12 V acid battery 44 Ah
Reed 250 V/2 A
Schottky 100 V/1,1 A
4 rotor magnet: diameter 18 mm, length 10 mm
stator coil: soft iron core diameter 9 mm, wounded diameter 18 mm, inner 25% bifilar, 0,5 mm wire, 6 Ohm, length 38 mm
2603 rpm +/- 0,1 rpm
room: 20°C coil: 25°C

Testing

Start with: 12,53 V
After 1 min: Voltage jumps between 12,45 and 12,52
After 1 h: Voltage jumps between 12,42 and 12,47
After 3 h: Voltage jumps between 12,41 and 12,44
Disconnected battery shows 12,43 V

So I say thank you for your very important suggestions. The reed and the Schottky - it's so simple and cheap. The strong back-emf effect certainly did manifest, so I must conclude this was definitely a good first unit to learn about the Adams motor effect.

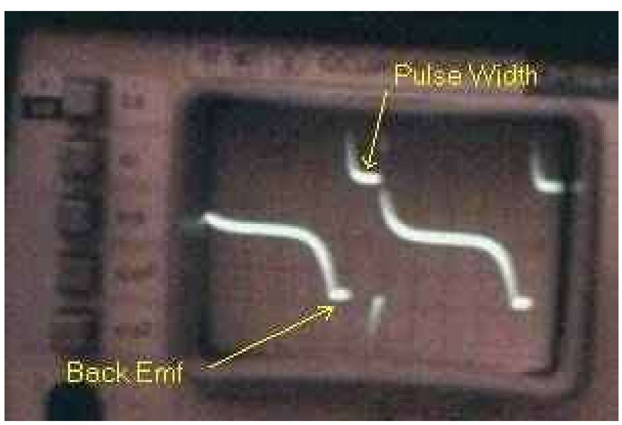
Greetings from Germany

Roland

The Original Hard Drive Motor

This fascinating motor was based upon a rotor scavenged from an old computer hard drive. Hence as one would expect, it is almost entirely frictionless, and also very well calibrated. Between the dual hard drive platters reside 4 1/2 " (12.7mm) square faced NIB magnets, fixed in place with high strength epoxy glue, at 90 degrees apart. The diameter of the hard drive platters (disks) is 130mm. The stator cores are made from permalloy (these were found to produce better results than relay cores). The dimensions of stator cores are as follows = 6x6x45mm. Each stator has 450 turns of enameled copper wire of 0.54mm diameter / 24awg.

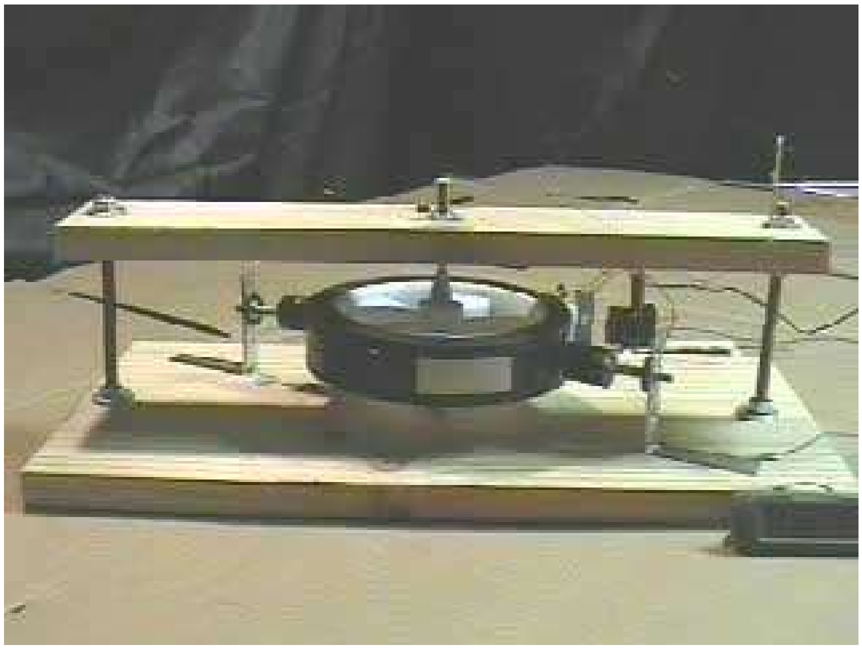
In the above picture you can see the oscilloscope reading. The back EMF (cemf) was connected to the power supply (car / automobile battery 12V). The duration of the pulse command and back EMF spike was measured on an oscilloscope, and as can be seen, the measured back EMF is a full 80% of the delivered pulse width, even using basic transistor grade switching parts! The motor runs at about 2800 RPM, and does so ABSOLUTELY COLD, as does the circuitry.

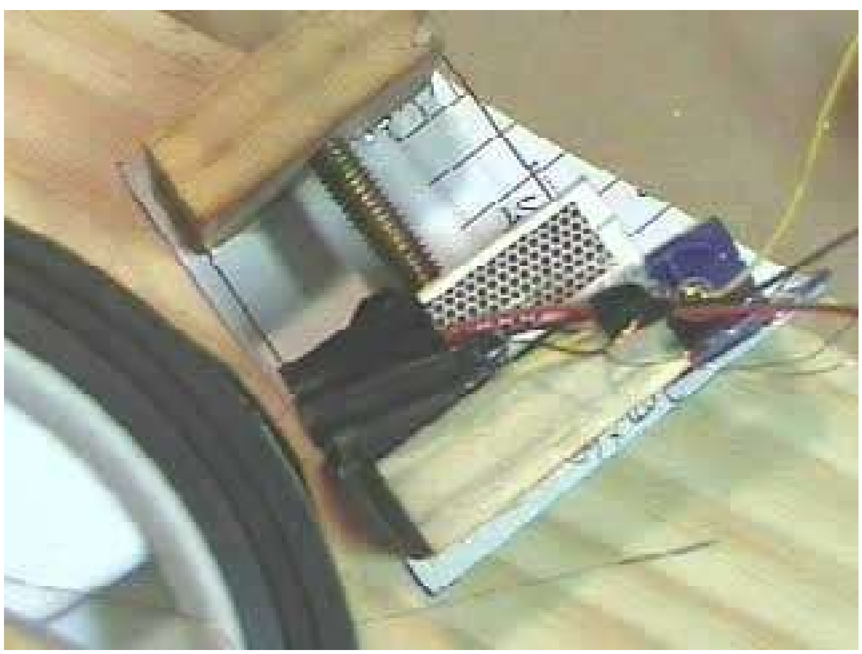


The battery started with a rating of 12.38V
Then a load (the motor) was placed on it, and the battery voltage fell to 12.32V
After 2 hours the battery voltage rose to 12.35V
After 20 hours battery voltage was recorded slightly lower at 12.32V
Then the battery was then disconnected

Adeonekonade's Replication

These pictures were posted independently on the Internet, but the site has not been accessible recently, so I decided to include them in the standard pdf download. Adeonekonade used a temperature probe, and recorded a genuine, and persistent drop in temperature, while the motor was running. He also tried other arrangements that departed from my suggested rotor / stator geometry, and discovered the motor began to heat up. While I had been accused of lying about the temperature drop, because such a thing was 'impossible and against all the laws of physics,' this wholly independent replication, with measured probe readings, rather settled the argument. Adeon kindly validated voltage input harmonics.





Please note that while best overall motor performance may be found with 9 ohm coils, the greatest temperature drop may be found with 24 awg wire and 4 - 5 ohm sets. Personally, I felt when optimized for temperature, the motor was always at its most impressive, as output numbers can always be explained away in some fashion by an academic. Measured temperature drops can not be dismissed quite so easily. Despite several challenges on my part, no skeptic has yet been able to cite a reference from the mainstream literature, to an electromagnetic system that drops in temperature under load.

The CD motor is a simple and robust experiment that can easily be replicated using the instructions contained within this file. Built as stated, it performs as stated.